

# **TECHNICAL REPORT**



**for the  
2010 Pennsylvania  
System of School Assessment**

**Provided by  
Data Recognition Corporation**



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## ***Glossary of Common Terms***

The following table contains some terms used in this technical report and their meanings. Some of these terms are used universally in the assessment community, and some of these terms are used commonly by psychometric professionals. A glossary of accommodation terms as applied to the PSSA is provided in Chapter Ten.

**Table G–1. Glossary of Terms**

<b>Term</b>	<b>Common Definition</b>
Ability	In Rasch scaling, ability is a generic term indicating the level of an individual on the construct measured by an exam. As an example for the PSSA, a student’s reading ability is measured by how the student performed on the PSSA Reading test. A student who answered more items correctly has a higher ability than a student who answered fewer items correctly.
Adjacent Agreement	A score/rating difference of one (1) point in value usually assigned by two different raters under the same conditions (e.g., two independent raters give the same paper scores that differ by one point).
Alternate Forms	Two or more versions of a test that are considered exchangeable, i.e., they measure the same constructs in the same ways, are intended for the same purposes, and are administered using the same directions. More specific terminology applies depending on the degree of statistical similarity between the test forms (e.g., parallel forms, equivalent forms, and comparable forms) where parallel forms refers to the situation in which the test forms have the highest degree of similarity to each other.
Average	A measure of central tendency in a score distribution that usually refers to the arithmetic mean of a set of scores. In this case, it is determined by adding all the scores in a distribution and then dividing the obtained value by the total number of scores. Sometimes people use the word average to refer to other measures of central tendency such as the median (the score in the middle of a distribution) or mode (the score value with the greatest frequency).
Bias	In a statistical context, bias refers to any source of systematic error in the measurement of a test score. In discussing test fairness, bias may refer to construct-irrelevant components of test scores that differentially affect the performance of different groups of test takers (e.g., gender, ethnicity, etc.). Attempts are made to reduce bias by conducting item fairness reviews and various differential item functioning (DIF) analyses, detecting potential areas of concern, and either removing or revising the flagged test items prior to the development of the final operational form of the test (see also Differential Item Functioning).
Constructed-Response Item	See Open-Ended Item.
Content Validity Evidence	Evidence regarding the extent to which a test provides an appropriate sampling of a content domain of interest (e.g., assessable portions of a state’s Grade 6 mathematics curriculum in terms of the knowledge, skills, objectives, and processes sampled.)

*Glossary of Common Terms*

<b>Term</b>	<b>Common Definition</b>
Core-Linking Item	Items that are utilized during the linking process (see also Linking). They are a subset of the PSSA operational items and so they 1) are the same on all test forms for any grade/subject area test and 2) contribute to student total raw scores and scaled scores.
Criterion-Referenced Interpretation	When a score is interpreted as a measure of a student’s performance with respect to an expected level of mastery, educational objective, or standard. The types of resulting score interpretations provide information about what a student knows or can do with respect to a given content area.
Cut Score	A specified point on a score scale such that scores at or above that point are interpreted or acted upon differently from scores below that point (e.g., a score designated as the minimum level of performance needed to pass a competency test). One or more cut scores can be set for a test that results in dividing the score range into various proficiency level ranges. Methods for establishing cut scores vary. For the PSSA, three cut scores are used to place students into one of four performance levels (see also Performance Level Setting).
Decision Consistency	The extent to which classifications based on test scores would match the decisions based on scores from a second, parallel form of the same test. It is often expressed as the proportion of examinees who are classified the same way from the two test administrations.
Differential Item Functioning (DIF)	A statistical property of a test item in which different groups of test takers (who have the same total test score) have different average item scores. In other words, students with the same ability level but different group memberships do not have the same probability of answering the item correctly (see also Bias).
Distractor	An incorrect option in a multiple-choice item (also called a foil).
Equating	The strongest of several linking methods used to establish comparability between scores from multiple tests. Equated test scores should be considered exchangeable. Consequently, the criteria needed to refer to a linkage as equating are strong and somewhat complex (equal construct and precision, equity, and invariance). In practical terms, it is often stated that it should be a matter of indifference to a student if he/she takes any of the equated tests (see also Linking).
Equating Block (EB) Items	The PSSA uses multiple test forms for each grade/subject area test. Each form is composed of operational (OP) items, equating block (EB) items, and field test (FT) items. EB items are utilized during the linking process (see also Linking). Each test form includes a set of EB items. EB items are not part of any student scores.
Error of Measurement	The amount by which the score actually received (an observed score) differs from a hypothetical true score (see also Standard Error of Measurement).
Exact Agreement	When identical scores/ratings are assigned by two different raters under the same conditions (e.g., two independent raters give a paper the same score).

*Glossary of Common Terms*

<b>Term</b>	<b>Common Definition</b>
Field Test (FT) Items	The PSSA uses multiple test forms for each grade/subject area test. Each form is composed of operational (OP) items, equating block (EB) items, and field test (FT) items. An FT item is a newly-developed item that is ready to be tried out to determine its statistical properties (see also <i>P</i> -value and Point-Biserial Correlation). Each test form includes a set of FT items. FT items are not part of any student scores.
Frequency	The number of times that a certain value or range of values (score interval) occurs in a distribution of scores.
Frequency Distribution	A tabulation of scores from low to high or high to low showing the number and/or percent of individuals who obtain each score or who fall within each score interval or category.
Infit/Outfit	Statistical indicators of the agreement of the data and the measurement model (see also Outfit/Infit).
Item Difficulty	For the Rasch model, the dichotomous item difficulty represents the point along the latent trait continuum where an examinee has a 0.50 probability of making a correct response. For a polytomous item, the difficulty is the average of the item's step difficulties (see also Step Difficulty).
Key	The correct response option or answer to a test item.
Linking	A generic term referring to one of a number of processes by which scores from one or more tests are made comparable to some degree. Linking includes several classes of transformations (equating, scale alignment, prediction, etc.). Equating is associated with the strongest degree of comparability (exchangeable scores). Other linkages may be very strong but fail to meet one or more of the strict criteria required of equating (see also Equating).
Logit	In Rasch scaling, logits are units used to express both examinee ability and item difficulty. When expressing examinee ability, a student who answers more items correctly has a higher logit than a student who answers fewer items correctly. Logits are transformed into Scaled Scores through a linear transformation. When expressing item difficulty, logits are transformed <i>p</i> -value (see also <i>P</i> -value). The logit difficulty scale is inversely related to <i>p</i> -values. A higher logit value would represent a relatively harder item, while a lower logit value would represent a relatively easier item.
Mean	Also referred to as the arithmetic mean of a set of scores, is found by adding all the score values in a distribution and dividing by the total number of scores. For example, the mean of the set {66, 76, 85, 97} is 81. The value of a mean can be influenced by extreme values in a score distribution.
Measure	In Rasch scaling, measure generally refers to a specific estimate of an examinee's ability (often expressed as logits) or an item's difficulty (again, often expressed as logits). As an example for the PSSA, a student's reading measure might be equal to 0.525 logits. Or, a PSSA Reading test item might have logit equal to -0.905.

<b>Term</b>	<b>Common Definition</b>
Median	The middle point or score in a set of rank-ordered observations that divides the distribution into two equal parts such that each part contains 50 percent of the total data set. More simply put, half of the scores are below the median value and half of the scores are above the median value. As an example, the median for the following ranked set of scores {2, 3, 6, 8, 9} is 6.
Multiple-Choice Item	A type of item format that requires the test taker to select a response from a group of possible choices, one of which is the correct answer (or key) to the question posed (see also Open-Ended Item).
<i>N</i> -count	Sometimes designated as <i>N</i> or <i>n</i> , it is the number of observations (usually individuals or students) in a particular group. Some examples include the number of students tested, the number of students tested from a specific subpopulation (e.g., females), the number of students who attained a specific score, etc. In the follow set {23, 32, 56, 65, 78, 87}, <i>n</i> = 6.
Open-ended item	An open-ended (OE) item—referred to by some as a constructed-response (CR) item—is an item format that requires examinees to create their own responses, which can be expressed in various forms (e.g., written paragraph, created table/graph, formulated calculation, etc.). Such items are frequently scored using more than two score categories, that is, polytomously (e.g., 0, 1, 2, and 3). This format is in contrast to when students make a choice from a supplied set of answers options (e.g., multiple-choice (MC) items which are typically dichotomously scored as right = 1 or wrong = 0.) When interpreting item difficulty and discrimination indices it is important to consider whether an item is polytomously or dichotomously scored.
Operational Item	The PSSA uses multiple test forms for each grade/subject area test. Each form is composed of operational (OP) items, equating block (EB) items, and field test (FT) items. OP items are the same on all forms for any grade/subject area test. Student total raw scores and scaled scores are based exclusively on the OP items.
Outfit/Infit	Statistical indicators of the agreement of the data and the measurement model. Infit and Outfit are highly correlated, and both are highly correlated with the point-biserial correlation. Underfit can be caused when low-ability students correctly answer difficult items (perhaps by guessing or atypical experience) or high-ability students incorrectly answer easy items (perhaps because of carelessness or gaps in instruction). Any model expects some level of variability, so overfit can occur when nearly all low-ability students miss an item while nearly all high-ability students get the item correct.
Percent Correct	When referring to an individual item, the percent correct is the item's <i>p</i> -value expressed as a percent (instead of a proportion). When referring to a total test score, it is the percentage of the total number of points that a student received. The percent correct score is obtained by dividing the student's raw score by the total number of possible points and multiplying the result by 100. Percent Correct scores are often used in criterion-referenced interpretations and are generally more helpful if the overall difficulty of a test is known. Sometimes Percent Correct scores are incorrectly interpreted as Percentile Ranks.

<b>Term</b>	<b>Common Definition</b>
Percentile	The score or point in a score distribution at or below which a given percentage of scores fall. It should be emphasized that it is a value on the score scale, not the associated percentage (although sometimes in casual usage this misinterpretation is made). For example, if 72 percent of the students score at or below a Scaled Score of 1500 on a given test, then the Scaled Score of 1500 would be considered the 72nd percentile. As another example, the median is the 50th percentile.
Percentile Rank	The percentage of scores in a specified distribution falling at/below a certain point on a score distribution. Percentile Ranks range in value from 1 to 99, and indicate the status or relative standing of an individual within a specified group, by indicating the percent of individuals in that group who obtained equal or lower scores. An individual's percentile rank can vary depending on which group is used to determine the ranking. As suggested above, Percentiles and Percentile Rank are sometimes used interchangeably; however strictly speaking, a percentile is a value on the score scale.
Performance Level Descriptors	Descriptions of an individual's competency in a particular content area, usually defined as ordered categories on a continuum, often labeled from Below Basic to Advanced, that constitute broad ranges for classifying performance. The exact labeling of these categories, and narrative descriptions, may vary from one assessment or testing program to another.
Performance Level Setting	Also referred to as standard setting, a procedure used in the determination of the cut scores for a given assessment that is used to measure students' progress towards certain performance standards. Standard setting methods vary (e.g., modified Angoff, Bookmark Method, etc.), but most use a panel of educators and expert judgments to operationalize the level of achievement students must demonstrate in order to be categorized within each performance level.
Point-Biserial Correlation	In classical test theory this is an item discrimination index. It is the correlation between a dichotomously scored item and a continuous criterion, usually represented by the total test score (or the corrected total test score with the reference item removed). It reflects the extent to which an item differentiates between high-scoring and low-scoring examinees. This discrimination index ranges from $-1.00$ to $+1.00$ . The higher the discrimination index (the closer to $+1.00$ ), the better the item is considered to be performing. For multiple-choice items scored as 0 or 1, it is rare for the value of this index to exceed 0.5.
<i>P</i> -value	An index indicating an item's difficulty for some specified group (perhaps grade). It is calculated as the proportion (sometimes percent) of students in the group who answer an item correctly. <i>P</i> -values range from 0.0 to 1.0 on the proportion scale. Lower values correspond to more difficult items and higher values correspond to easier items. <i>P</i> -values are usually provided for multiple-choice items or other items worth one point. For open-ended items or items worth more than one point, difficulty on a <i>p</i> -value-like scale can be estimated by dividing the item mean score by the maximum number of points possible for the item (see also Logit).

<b>Term</b>	<b>Common Definition</b>
Raw Score	Sometimes abbreviated by RS—it is an unadjusted score usually determined by tallying the number of questions answered correctly, or by the sum of item scores (i.e., points). (Some rarer situations might include formula-scoring, the amount of time required to perform a task, the number of errors, application of basal/ceiling rules, etc.). Raw scores typically have little or no meaning by themselves and require additional information—like the number of items on the test, the difficulty of the test items, norm-referenced information, or criterion-referenced information.
Reliability	The expected degree to which test scores for a group of examinees are consistent over exchangeable replications of an assessment procedure, and therefore, are considered dependable and repeatable for an individual examinee. A test that produces highly consistent, stable results (i.e., relatively free from random error) is said to be highly reliable. The reliability of a test is typically expressed as a reliability coefficient or by the standard error of measurement derived by that coefficient.
Reliability Coefficient	A statistical index that reflects the degree to which scores are free from random measurement error. Theoretically, it expresses the consistency of test scores as the ratio of true score variance to total score variance (true score variance plus error variance). This statistic is often expressed as correlation coefficient (e.g., correlation between two forms of a test) or with an index that resembles a correlation coefficient (e.g., calculation of a test’s internal consistency using Coefficient Alpha). Expressed this way, the reliability coefficient is a unitless index. The higher the value of the index (closer to 1.0), the greater the reliability of the test (see also Standard Error of Measurement).
Scaled Score	A mathematical transformation of a raw score developed through a process called scaling. Scaled scores are most useful when comparing test results over time. Several different methods of scaling exist, but each is intended to provide a continuous and meaningful score scale across different forms of a test.
Selected-Response Item	See Multiple-Choice Item.
Spiraling	A packaging process used when multiple forms of a test exist and it is desired that each form be tested in all classrooms (or other grouping unit (e.g., schools)) participating in the testing process. This process allows for the random distribution of test booklets to students. For example, if a package has four test forms labeled A, B, C, and D, the order of the test booklets in the package would be A, B, C, D, A, B, C, D, A, B, C, D, etc.

<b>Term</b>	<b>Common Definition</b>
Standard Deviation (SD)	A statistic that measures the degree of spread or dispersion of a set of scores. The value of this statistic is always greater than or equal to zero. If all of the scores in a distribution are identical, the standard deviation is equal to zero. The further the scores are away from each other in value, the greater the standard deviation. This statistic is calculated using the information about the deviations (distances) between each score and the distribution's mean. It is equivalent to the square root of the variance statistic. The standard deviation is a commonly used method of examining a distribution's variability since the standard deviation is expressed in the same units as the data.
Standard Error of Measurement (SEM)	It is the amount an observed score is expected to fluctuate around the true score. As an example, across replications of a measurement procedure, the true score will not differ by more than plus or minus one standard error from the observed score about 68 percent of the time (assuming normally distributed errors). The SEM is frequently used to obtain an idea of the consistency of a person's score in actual score units, or to set a confidence band around a score in terms of the error of measurement. Often a single SEM value is calculated for all test scores. On other occasions, however, the value of the SEM can vary along a score scale. Conditional standard errors of measurement (CSEMs) provide an SEM for each possible scaled score.
Step Difficulty	Step difficulty is a parameter estimate in Master's partial credit model (PCM) that represents the relative difficulty of each score step (e.g., going from a score of 1 to a score of 2). The higher the value of a particular step difficulty, the more difficult a particular step is relative to other score steps (e.g., is it harder to go from a 1 to a 2, or to go from a 2 to a 3).
Strand	On score reports, a strand often refers to a set of items on a test measuring the same contextual area (e.g., Number Sense in Mathematics). Items developed to measure the same reporting category would be used to determine the strand score (sometimes called "subscale" score).
Technical Advisory Committee (TAC)	A group of individuals, most often professionals in the field of testing, who are either appointed or selected to make recommendations for and to guide the technical development of a given testing program.
Validity	The degree to which accumulated evidence and theory support specific interpretations of test scores entailed by the purposed uses of a test. There are various ways of gathering validity evidence.



## ***Preface: An Overview of Assessments from 2003 to the Present***

The period from 2003 through 2006 brought significant structural changes to the test blueprint for the Pennsylvania System of School Assessment (PSSA). These changes necessitated extensive test development and field testing activity along with phased-in implementation of the operational assessment. Included in this process was the development and implementation of assessments at additional grade levels.

For mathematics and reading, content changes for Grades 5, 8, and 11 were developed in 2003, field tested in spring 2004, and implemented in spring 2005. The *2005 PSSA Technical Report for Reading and Mathematics* provides a description of test development activities, including a review of open-ended tasks and multiple-choice items, field testing, selection of items, statistical analysis of assessment data, reliability, validity, standard setting, and other technical characteristics of the operational 2005 PSSA. Test development for the new grade levels of 4, 6, and 7 began in 2004, with field testing in 2005, and full implementation in 2006. Similarly, the *2006 PSSA Technical Report for Reading and Mathematics: Grades 4, 6, and 7* provides a complete description of test development activities, item review, field testing, statistical analysis, item selection, and technical characteristics of the operational 2006 PSSA for these grade levels. In 2007, the Grade 3 reading and mathematics assessment became DRC's responsibility and is covered in the *2007 PSSA Technical Report for Reading and Mathematics*, along with the remaining grades.

Changes implemented in the writing assessment of spring 2006 were designed to sharpen the focus on what is assessed with respect to Academic Standards 1.4 and 1.5. To support this effort, a shift in grade levels assessed was made, moving from Grades 6 and 9 to Grades 5 and 8, thereby aligning assessment to the end of elementary and middle school years. The writing testing window was changed from fall to February 2006 for Grades 5 and 8, making it consistent with Grade 11. Mode-specific scoring guidelines replaced domain scoring, and the introduction of stimulus-based passages and associated multiple-choice items measuring revising and editing expanded the basis of the conventions score. An account of the development of writing prompts and stimulus-based, multiple-choice items, review processes, field testing and item analysis, standard setting, and other technical characteristics of the operational 2006 PSSA may be found in the *2006 PSSA Technical Report for Writing*.

The introduction of an operational science assessment in 2008 moved closer to reality with a major standalone field test at Grades 4, 8, and 11 in April–May of 2007. A description of the development of science scenarios and related multiple-choice, short answer open-ended, and extended open-ended questions, item review processes, statistical analysis of field test data, and selection of items for the 2008 operational science test may be found in the *2008 PSSA Preliminary Technical Report for Science*. Subsequently, the first operational science assessment took place in the spring of 2008, along with standard setting and reporting of results.

With the exception of some shifting of test windows, the spring assessments of 2009 and 2010 were conducted without change in content structure of the PSSA test instruments.

The following pages provide an overview of the year-to-year changes to the PSSA. Tables and descriptions show the subject areas assessed, time of year the testing activity took place, and the type of testing that occurred (e.g., operational, field testing, Grade 12 retest) for each year.

To access any of the PSSA technical reports referenced in the Preface, please go to the Pennsylvania Department of Education website, [www.education.state.pa.us](http://www.education.state.pa.us). On the upper left part of the screen, in the box under “PDE Search,” type in the title of the desired PSSA technical report, then press “Go.”

**ASSESSMENT ACTIVITIES OCCURRING IN THE 2003–04 SCHOOL YEAR**

Table P–1 outlines the operational assessments and field tests administered during the 2003–04 school year. (A spring operational assessment in mathematics and reading took place at Grades 3, 5, 8, and 11.)

As a result of new Assessment Anchor Content Standards (Assessment Anchors) developed by the Pennsylvania Department of Education (PDE) during 2003, new test items were developed (see Chapter Two of the *2005 PSSA Technical Report for Reading and Mathematics*). Following the spring operational assessment, a separate, standalone field test of new items for Grades 5, 8, and 11 was conducted. Note that Grade 11 students also took an operational writing assessment in February, and Grades 6 and 9 students participated in a fall writing assessment. Lastly, Grade 12 students who as 11th graders in the preceding spring failed to attain at least the Proficient level in any subject area were offered an opportunity to retest.

**Table P–1. Operational Assessment and Field Testing  
During the 2003–04 School Year**

<b>Grade</b>	<b>Assessment Activity</b>	<b>Date</b>
3	Operational mathematics and reading with embedded field test (conducted by CTB/McGraw-Hill)	April 2004
5	Operational mathematics and reading	April 2004
	Standalone field test in mathematics and reading	April/May 2004
6	Operational writing	October 2004
8	Operational mathematics and reading	April 2004
	Standalone field test in mathematics and reading	April/May 2004
9	Operational writing	October 2004
11	Operational mathematics and reading	April 2004
	Standalone field test in mathematics and reading	April/May 2004
	Operational writing	February 2004
12	Retest opportunity for students who as Grade 11 students in the spring of 2003 failed to reach at least the Proficient level in mathematics, reading, or writing	October/ November 2004

**ASSESSMENT ACTIVITIES OCCURRING IN THE 2004–05 SCHOOL YEAR**

Table P–2 displays the operational assessments and field tests that took place during the 2004–05 school year. The operational assessment at Grades 5, 8, and 11 used items chosen from the spring 2004 field test. This was the first operational assessment that reflected the Pennsylvania Assessment Anchors and Eligible Content. Fulfilling the No Child Left Behind Act of 2001 (NCLB) requirement that states must implement a test at Grades 3 through 8, a major field test in mathematics and reading was administered at Grades 4, 6, and 7. Item development for these new grade levels took place during 2004.

The Grades 6 and 9 writing assessment was reevaluated in favor of moving the writing assessment to Grades 5 and 8. This accounts for the separate (standalone) field test at these grade levels. There was also a test administration change from October to February. In addition, the writing assessment underwent changes to align the test to the Academic Standards for writing. New writing prompts and stimulus-based multiple-choice items were also field tested at Grade 11 as part of the operational assessment, hence the reference to an embedded field test. No assessment activity of any kind occurred at Grade 9. As in fall 2003, the retest opportunity at Grade 12 continued.

**Table P–2. Operational Assessment and Field Testing  
During the 2004–05 School Year**

<b>Grade</b>	<b>Assessment Activity</b>	<b>Date</b>
3	Operational mathematics and reading with embedded field test (conducted by CTB/McGraw-Hill)	April 2005
4	Standalone field test for mathematics and reading	April 2005
5	Operational mathematics and reading with embedded field test	April 2005
	Standalone field test in writing	February 2005
6	Standalone field test for mathematics and reading	April 2005
7	Standalone field test for mathematics and reading	April 2005
8	Operational mathematics and reading with embedded field test	April 2005
	Standalone field test in writing	February 2005
11	Operational mathematics and reading with embedded field test	April 2005
	Operational writing with embedded field test	February 2005
12	Retest opportunity for students who as Grade 11 students in the spring of 2004 failed to reach at least the Proficient level in mathematics, reading, or writing	October/ November 2004

**ASSESSMENT ACTIVITIES OCCURRING IN THE 2005–06 SCHOOL YEAR**

Table P–3 shows the assessment activities that occurred during the 2005–06 school year. Note that the reading and mathematics operational assessments ran consecutively in Grades 3–8 and Grade 11. For Grades 4, 6, and 7, it was the first year for operational assessments. Field testing for mathematics and reading was embedded as part of the operational assessment at each grade level. At Grade 3, the reference to field testing with items developed by DRC reflects the transition of shifting the assessment from CTB/McGraw-Hill to DRC in 2007. As in previous years, the retest opportunity at Grade 12 continued.

The first operational assessments for writing at Grades 5 and 8 took place in the 2005–2006 school year, while the Grade 11 writing assessment continued in the same February test window. For all three grade levels, the operational writing assessments featured mode-specific scoring guidelines, stimulus-based multiple-choice items, and a grade-specific emphasis shift in writing modes assessed. See the *2006 PSSA Technical Report for Writing: Grades 5, 8, and 11* for further information about the new writing assessments. Since extensive field testing in February 2005 produced a pool of prompts for use over several years, no additional writing prompts were field tested in 2006. However, new multiple-choice items were field tested in the 2006 writing assessment.

**Table P–3. Operational Assessment and Field Testing During the 2005–06 School Year**

<b>Grade</b>	<b>Assessment Activity</b>	<b>Date</b>
3	Operational mathematics and reading with embedded field test of DRC-written items (conducted by CTB/McGraw-Hill)	April 2006
4	Operational mathematics and reading with embedded field test	March 2006
5	Operational mathematics and reading with embedded field test	March 2006
	Operational writing with embedded field test	February 2006
6	Operational mathematics and reading with embedded field test	March 2006
7	Operational mathematics and reading with embedded field test	March 2006
8	Operational mathematics and reading with embedded field test	March 2006
	Operational writing with embedded field test	February 2006
11	Operational mathematics and reading with embedded field test	March 2006
	Operational writing with embedded field test	February 2006
12	Retest opportunity for students who as Grade 11 students in the spring of 2005 failed to reach at least the Proficient level in mathematics, reading, or writing	October/ November 2005

**ASSESSMENT ACTIVITIES OCCURRING IN THE 2006–07 SCHOOL YEAR**

Table P–4 shows the assessment plan for the 2006–07 school year. Note that the mathematics and reading assessments ran consecutively in Grades 3–8 and Grade 11. For Grades 4, 6, and 7, it was the second year for operational assessments and the first year in which these grade levels were included in the adequate yearly progress (AYP) calculations. Field testing for mathematics and reading continued to be embedded as part of the operational assessments at each grade level. This was the first year in which DRC was responsible for the Grade 3 assessment, as the transition from CTB/McGraw-Hill was completed. As in previous years, the retest opportunity at Grade 12 continued.

The operational assessment for writing at Grades 5, 8, and 11 continued in the same February test window featuring the mode-specific scoring guidelines, stimulus-based multiple-choice items, and a grade-specific emphasis in writing modes assessed, which were introduced in 2006. Since extensive field testing in February 2005 produced a pool of prompts for use over several years, no additional writing prompts needed to be field tested in 2007. However, new multiple-choice items were field tested in the 2007 writing assessment.

Following the spring operational assessments in writing, reading, and mathematics, a separate, standalone field test in science was administered for Grades 4, 8, and 11 with full implementation scheduled for 2008.

**Table P–4. Operational Assessment and Field Testing  
During the 2006–07 School Year**

<b>Grade</b>	<b>Assessment Activity</b>	<b>Date</b>
3	Operational mathematics and reading with embedded field test	March 2007
4	Operational mathematics and reading with embedded field test	March 2007
	Standalone field test in science	April/May 2007
5	Operational mathematics and reading with embedded field test	March 2007
	Operational writing with embedded field test	February 2007
6	Operational mathematics and reading with embedded field test	March 2007
7	Operational mathematics and reading with embedded field test	March 2007
8	Operational mathematics and reading with embedded field test	March 2007
	Operational writing with embedded field test	February 2007
	Standalone field test in science	April/May 2007
11	Operational mathematics and reading with embedded field test	March 2007
	Operational writing with embedded field test	February 2007
	Standalone field test in science	April/May 2007
12	Retest opportunity for students who as Grade 11 students in the spring of 2006 failed to reach at least the Proficient level in mathematics, reading, or writing	October/ November 2006

## **ASSESSMENT ACTIVITIES OCCURRING IN THE 2007–08 SCHOOL YEAR**

Table P–5 shows the assessment plan for the 2007–08 school year. Note that the mathematics and reading assessments ran consecutively in Grades 3–8 and Grade 11. For Grades 4, 6, and 7, it was the third year for operational assessments and the second year in which these grade levels were included in the AYP calculations. Field testing for mathematics and reading continued to be embedded as part of the operational assessments at each grade level. This was the second year in which DRC was responsible for the Grade 3 assessment. As in previous years, the retest opportunity at Grade 12 continued.

The operational assessment for writing at Grades 5, 8, and 11 continued in the same February test window featuring the mode-specific scoring guidelines, stimulus-based multiple-choice items, and a grade-specific emphasis in writing modes assessed, which was introduced in 2006. Since extensive field testing in February 2005 produced a pool of prompts for use over several years, no additional writing prompts needed to be field tested in 2007. However, new multiple-choice items were field tested in the 2008 writing assessment.

Joining the spring operational assessments in writing, reading, and mathematics was science at Grades 4, 8, and 11. See the *2008 PSSA Technical Report for Science: Grades 4, 8, and 11* for further information about the new science assessments

**Table P–5. Operational Assessment and Field Testing  
During the 2007–08 School Year**

<b>Grade</b>	<b>Assessment Activity</b>	<b>Date</b>
3	Operational mathematics and reading with embedded field test	March/April 2008
4	Operational mathematics and reading with embedded field test	March/April 2008
	Operational science with embedded field test	April/May 2008
5	Operational mathematics and reading with embedded field test	March/April 2008
	Operational writing with embedded field test	February 2008
6	Operational mathematics and reading with embedded field test	March/April 2008
7	Operational mathematics and reading with embedded field test	March/April 2008
8	Operational mathematics and reading with embedded field test	March/April 2008
	Operational writing with embedded field test	February 2008
	Operational science with embedded field test	April/May 2008
11	Operational mathematics and reading with embedded field test	March/April 2008
	Operational writing with embedded field test	February 2008
	Operational science with embedded field test	April/May 2008
12	Retest opportunity for students who as Grade 11 students in the spring of 2007 failed to reach at least the Proficient level in mathematics, reading, or writing	October/ November 2007

## **ASSESSMENT ACTIVITIES OCCURRING IN THE 2008–09 SCHOOL YEAR**

Table P–6 shows the assessment plan for the 2008–09 school year. The mathematics and reading assessments continued to be operational for Grades 3–8 and Grade 11. Field testing for mathematics and reading continued to be embedded as part of the operational assessments at each grade level. As in previous years, the fall retest opportunity at Grade 12 continued.

The operational assessment for writing at Grades 5, 8, and 11 continued with a February test window featuring mode-specific scoring guidelines; stimulus-based, multiple-choice items; and a grade-specific emphasis in writing modes assessed. An embedded field test of writing prompts was incorporated in the 2009 assessment along with a set of embedded field test multiple-choice items.

The second operational assessment in science took place in April/May. Similar to the other operational assessments, field testing for science was embedded as part of the operational assessments at each grade level.

**Table P–6. Operational Assessment and Field Testing  
During the 2008–09 School Year**

<b>Grade</b>	<b>Assessment Activity</b>	<b>Date</b>
3	Operational mathematics and reading with embedded field test	March 2009
4	Operational mathematics and reading with embedded field test	March 2009
	Operational science with embedded field test	April/May 2009
5	Operational mathematics and reading with embedded field test	March 2009
	Operational writing with embedded field test	February 2009
6	Operational mathematics and reading with embedded field test	March 2009
7	Operational mathematics and reading with embedded field test	March 2009
8	Operational mathematics and reading with embedded field test	March 2009
	Operational writing with embedded field test	February 2009
	Operational science with embedded field test	April/May 2009
11	Operational mathematics and reading with embedded field test	March 2009
	Operational writing with embedded field test	February 2009
	Operational science with embedded field test	April/May 2009
12	Retest opportunity for students who as Grade 11 students in the spring of 2008 failed to reach at least the Proficient level in mathematics, reading, or writing	October/ November 2008

## **ASSESSMENT ACTIVITIES OCCURRING IN THE 2009–10 SCHOOL YEAR**

Table P–7 shows the assessment plan for the 2009–10 school year. A notable change from previous years was that all assessments and make-ups were completed during the test window from April through the first week of May.

The mathematics and reading assessments continued to be operational for Grades 3–8 and Grade 11. Field testing for mathematics and reading continued to be embedded as part of the operational assessments at each grade level. As in previous years, the fall retest opportunity at Grade 12 continued.

The operational assessment for writing at Grades 5, 8, and 11 continued to feature mode-specific scoring guidelines, stimulus-based multiple-choice items, and a grade-specific emphasis in writing modes assessed. An embedded field test of writing prompts was included in the 2010 assessment along with a set of embedded field test multiple-choice items.

The operational assessment for science at Grades 4, 8, and 11 continued to include multiple-choice and open-ended questions that are related to a scenario. Field testing was embedded as part of the operational assessments at each grade level.

**Table P–7. Operational Assessment and Field Testing  
During the 2009–10 School Year**

<b>Grade</b>	<b>Assessment Activity</b>	<b>Date</b>
3	Operational mathematics and reading with embedded field test	April/May 2010
4	Operational mathematics and reading with embedded field test	April/May 2010
	Operational science with embedded field test	April/May 2010
5	Operational mathematics and reading with embedded field test	April/May 2010
	Operational writing with embedded field test	April/May 2010
6	Operational mathematics and reading with embedded field test	April/May 2010
7	Operational mathematics and reading with embedded field test	April/May 2010
8	Operational mathematics and reading with embedded field test	April/May 2010
	Operational writing with embedded field test	April/May 2010
	Operational science with embedded field test	April/May 2010
11	Operational mathematics and reading with embedded field test	April/May 2010
	Operational writing with embedded field test	April/May 2010
	Operational science with embedded field test	April/May 2010
12	Retest opportunity for students who as Grade 11 students in the spring of 2009 failed to reach at least the Proficient level in mathematics, reading, science, or writing	October/ November 2009

**ASSESSMENT ACTIVITIES PLANNED FOR THE 2010–11 SCHOOL YEAR**

Table P–8 shows the assessment plan for the 2010–11 school year. A change from last year is an earlier test window, beginning in mid-March for mathematics and reading, late-March to April for writing, and early April for science. A make-up period extends into mid-April for all assessments.

The mathematics and reading assessments will continue to be operational for Grades 3–8 and Grade 11. Field testing for mathematics and reading will continue to be embedded as part of the operational assessments at each grade level. As in previous years, the fall retest opportunity at Grade 12 will continue.

The operational assessment for writing at Grades 5, 8, and 11 will continue to feature mode-specific scoring guidelines, stimulus-based multiple-choice items, and a grade-specific emphasis in writing modes assessed. An embedded field test of writing prompts will be included in the 2011 assessment along with a set of embedded field test multiple-choice items.

The operational assessment for science at Grades 4, 8, and 11 will continue to include multiple-choice and open-ended questions that are related to a scenario. Field testing will be embedded as part of the operational assessments at each grade level.

**Table P–8. Operational Assessment and Field Testing  
During the 2010–11 School Year (Planned)**

<b>Grade</b>	<b>Assessment Activity</b>	<b>Date</b>
3	Operational mathematics and reading with embedded field test	March/April 2011
4	Operational mathematics and reading with embedded field test	March/April 2011
	Operational science with embedded field test	March/April 2011
5	Operational mathematics and reading with embedded field test	March/April 2011
	Operational writing with embedded field test	March/April 2011
6	Operational mathematics and reading with embedded field test	March/April 2011
7	Operational mathematics and reading with embedded field test	March/April 2011
8	Operational mathematics and reading with embedded field test	March/April 2011
	Operational writing with embedded field test	March/April 2011
	Operational science with embedded field test	March/April 2011
11	Operational mathematics and reading with embedded field test	March/April 2011
	Operational writing with embedded field test	March/April 2011
	Operational science with embedded field test	March/April 2011
12	Retest opportunity for students who as Grade 11 students in the spring of 2010 failed to reach at least the Proficient level in mathematics, reading, science, or writing	October/ November 2010



## **Chapter One: Background of the Pennsylvania System of School Assessment (PSSA)**

This brief overview of the Pennsylvania System of School Assessment (PSSA) summarizes the history of the current program's development process, the program's intent and purpose, recent changes to the program, and the student population that participates in the assessments. Pennsylvania's involvement in state-wide assessment actually began in the 1969–70 school year with a purely school-based assessment known as *Educational Quality Assessment* (EQA), which continued through the 1987–1988 school year. A state mandated student competency testing program called *Testing for Essential Learning and Literacy Skills* (TELLS) also operated from the school years of 1984–85 through 1990–91.

### **THE PENNSYLVANIA SYSTEM OF SCHOOL ASSESSMENT**

The Pennsylvania System of School Assessment program was instituted in 1992 as a school evaluation model with reporting at the school level only. Test administration took place in February/March, and school district participation was every third year based on the strategic planning cycle. Mathematics and reading were assessed at Grades 5, 8, and 11; districts could choose to participate in the writing assessment at Grades 6 and 9. The State Board of Education's revisions to Chapter 5 in November 1994 brought major changes to the PSSA, beginning with the spring 1995 assessment. These changes included the following:

- All districts were required to participate in the mathematics and reading assessment each year.
- Student-level reports were generated in addition to school reports.
- The Grades 6 and 9 writing assessments became mandatory on a three-year cycle corresponding with the district's strategic planning cycle.

Yearly administration of the PSSA in 1996, 1997, and 1998 continued at the assessed grades for mathematics and reading, utilizing essentially the same test structure, reporting practices, and test window. Writing assessment continued on the established mandatory cycle; however, an increasing number of districts chose to participate every year on a voluntary basis.

### ***Pennsylvania Academic Standards and the PSSA***

A major structural change took place in test content with the State Board of Education's adoption of the Pennsylvania Academic Standards for Reading, Writing, Speaking and Listening, and Mathematics in January 1999 (Pennsylvania State Board of Education, 1999). The Academic Standards, which are part of *Chapter 4 Regulations on Academic Standards and Assessment*, detailed what students should know (knowledge) and be able to do (skills) at various grade levels. Subsequently, the State Board approved a set of criteria defining Advanced, Proficient, Basic, and Below Basic levels of performance. Mathematics and reading performance level results were reported at both the student and school levels for the 2000 PSSA. At that point, the PSSA became a standards-based, criterion-referenced assessment measuring student attainment of the Academic Standards while simultaneously determining the extent to which school programs enabled students to achieve proficiency of the Academic Standards. The regulations also stipulated that appropriate results be broadly disseminated to an array of audiences including students, parents, educators, citizens, and state policymakers, including the State Senate, the General Assembly, and the State Board. School reporting was to include the aggregate

performance of all students and for relevant subgroups, such as those students with an Individualized Educational Plan (IEP). Finally, the data was intended to inform educators regarding school program strengths and weaknesses in order to guide the improvement of curricula and instructional strategies. The data was also intended to be used in the development of strategic plans.

The mathematics and reading assessments from 2001 through 2004 underwent various content enhancements to improve alignment to the Academic Standards. For example, the reading assessment transitioned to utilizing more passages of shorter length and fewer items to improve the range of topics to which students responded. Various reporting modifications were introduced to more effectively communicate results.

### **ASSESSMENT ANCHOR CONTENT STANDARDS, CONTENT STRUCTURE, AND NEW GRADE LEVELS FOR MATHEMATICS AND READING**

Assessment in 2005 was marked by major structural changes to the PSSA. Assessment Anchor Content Standards (Assessment Anchors) developed during the previous school year to clarify content structure and improve articulation between assessment and instruction were implemented in terms of test design and reporting. At the same time field testing of mathematics and reading occurred at Grades 4, 6, and 7. As specified by PL 107–110, the 2001 No Child Left Behind Act (NCLB), states, school districts, and schools must achieve a minimum level of improvement each year, known as adequate yearly progress, or AYP. Accordingly, the third year of calculations for AYP were conducted and reported for Grades 5, 8, and 11.

The 2006 operational mathematics and reading assessment incorporated Grades 4, 6, and 7 for the first time. The assessed grade levels for 2006 included Grades 3–8 and 11. The fourth year of calculations for AYP were conducted and reported for Grades 5, 8, and 11 and, for the first time, Grade 3.

In 2007 the operational mathematics and reading assessment continued in Grades 3–8 and 11. AYP calculations for Grades 4, 6, and 7 took place in 2007 when they were assessed for the second time.

The operational mathematics and reading assessments of 2008, 2009, and 2010 continued in Grades 3–8 and 11, utilizing the same content structure. AYP calculations continued for all grades.

The validation of performance levels for mathematics and reading, utilizing the Bookmark method, took place during the summer of the following years: 2005 (Grades 5, 8, and 11), 2006 (Grades 4, 6, and 7), and 2007 (Grade 3). See Chapter Thirteen for a brief summary.

More information regarding the 2010 mathematics and reading tests may be found in Chapter Two and in the following Pennsylvania Department of Education publications available on the PDE website: *2009–2010 PSSA Assessment Handbook*, *2009–2010 PSSA Reading Item and Scoring Sampler Supplement* (one per assessed grade level), and *2009–2010 PSSA Mathematics Item and Scoring Sampler Supplement* (one per assessed grade level). These handbooks can be accessed by going to [www.education.state.pa.us](http://www.education.state.pa.us). On the left, click on “Programs”, then “Programs O–R”, then “Pennsylvania System of School Assessment (PSSA)” and then “Resource Materials”.

## THE PENNSYLVANIA SCIENCE ASSESSMENT

In accordance with the NCLB requirement to implement an operational science assessment in 2008, a major test development effort in science took place during 2006, followed by a large-scale, standalone field test in April/May of 2007. A full implementation of an operational science assessment at Grades 4, 8, and 11 first occurred in April–May 2008. The 2009 PSSA operational science assessment continued with the same content structure and test window as in 2008.

Several historical milestones were significant to the development of a science test in Pennsylvania. These include the following:

- The adoption of Act 16 or Pennsylvania Senate Bill 652 in 2000, which redefined the PSSA “as a test developed and implemented by the Department of Education to determine only academic achievement relating directly to objective Academic Standards in the areas of reading, mathematics, and science.” (See the *Science Assessment Handbook*, PDE, November 2006).
- Pennsylvania State Board of Education adoption of the *Science and Technology Standards* on July 12, 2001, and the *Environment and Ecology Standards* on January 5, 2002.

Aligned to the *Pennsylvania Science Assessment Anchor Content Standards* and Eligible Content, the science test is designed to measure and report results in four major categories:

- The Nature of Science
- Biological Sciences
- Physical Sciences
- Earth and Space Sciences

Students use their content knowledge and science process skills to answer a set of multiple-choice items and open-ended questions that are standalone or related to a scenario. A science scenario consists of a description of a class project, an experiment, or other research and typically contains text, graphs, charts, and/or tables. Science test questions at Grade 4 consist of standalone multiple-choice and 0–2-point short answer open-ended items. At Grades 8 and 11, multiple-choice questions consist of both stand-alone and scenario-based items. All open-ended items at Grade 8 are standalone 0–2-point questions. Grade 11 is more complex, as it has stand-alone 0–2-point questions and scenario-based 0–4-point questions formed by combining two 0–2-point questions. More information may be found in Chapter Two and in the following Pennsylvania Department of Education publications available on the PDE website: *2009–2010 PSSA Assessment Handbook* and *2009–2010 PSSA Science Item and Scoring Sampler Supplement* (one per assessed grade level). These handbooks can be accessed by going to [www.education.state.pa.us](http://www.education.state.pa.us). On the left, click on “Programs”, then “Programs O–R”, then “Pennsylvania System of School Assessment (PSSA)” and then “Resource Materials”.

The establishment of performance levels for science, utilizing the Bookmark method, took place during the summer of 2008. See Chapter Thirteen of this technical report for a brief summary.

## **THE PENNSYLVANIA WRITING ASSESSMENT**

In 1990, the state initiated an on-demand writing assessment in which students wrote an essay in response to a particular topic or prompt. With the advent of the Pennsylvania Academic Standards in 1999, major changes took place in the writing assessment, including alignment to the Academic Standards, as well as changes in scoring method, prompts, testing date, and reporting. These changes, which are summarized below, were implemented in the 2000–01 school year and were followed by performance level reporting in the 2001–02 school year.

- The writing assessment became mandatory for all districts every year.
- Administration of the Grades 6 and 9 writing assessment was changed from February to October.
- Scoring changed to a four-point scale for each of five domains (focus, content, organization, style, and conventions).
- Prompts were different for Grade 6 and Grade 9 rather than being identical at the two grade levels.
- Within a grade level all students responded to two common prompts.
- The reporting model was greatly revised, and individual student reports were issued for the first time.
- A writing assessment for Grade 11 was administered for the first time in February 2001.
- In 2002, performance levels were adopted for writing and implemented in the reporting of total writing results for the February Grade 11 and fall 2002 Grades 6 and 9 writing assessment.

In 2003 and 2004 writing continued to be assessed with a February window for Grade 11 and a fall window for Grades 6 and 9.

In 2005 Grade 11 continued to be assessed in February; however, major field testing took place at Grades 5 and 8 in anticipation of implementation of an operational writing assessment in 2006. Consequently, a fall 2005 operational writing assessment did not take place.

The 2006 PSSA operational writing assessment featured additional revisions that included the following enhancements:

- Testing previously done in Grades 6 and 9 shifted to Grades 5 and 8 to provide better alignment to the end of elementary school and middle school.
- Grades 5 and 8 joined Grade 11 in a February test window rather than the October window used previously for Grades 6 and 9.
- Students responded to two writing prompts, which were evaluated in terms of (1) a mode-specific scoring guideline and (2) a conventions scoring guideline, instead of the former domain scoring.
- Stimulus-based revising/editing multiple-choice items were incorporated to provide a more reliable and valid measure of the Conventions Academic Standard.

The 2007 and 2008 PSSA operational writing assessments continued with the same structure and February test window as in 2006.

Although the 2009 and 2010 PSSA operational writing assessments continued with the same structure as in previous years, students also responded to an embedded field test prompt. In addition, adjustments were made to the test window in 2010 as it was shifted from February to April/May.

The validation of performance levels for writing, utilizing the Body of Work method, took place during the summer of 2006. See Chapter Thirteen for a brief summary.

More information may be found in Chapter Two and in the following two Pennsylvania Department of Education publications available on the PDE website: *2009–2010 PSSA Assessment Handbook* and *2009–2010 PSSA Writing Item and Scoring Sampler Supplement* (one per assessed grade level). These handbooks can be accessed by going to [www.education.state.pa.us](http://www.education.state.pa.us). On the left, click on “Programs”, then “Programs O–R”, then “Pennsylvania System of School Assessment (PSSA)” and then “Resource Materials”.



## ***Chapter Two: Overview of the PSSA Framework***

### **ACADEMIC STANDARDS, ASSESSMENT ANCHOR CONTENT STANDARDS, AND ELIGIBLE CONTENT**

#### ***PSSA Mathematics, Reading, and Science***

The PSSA Assessment Anchor Content Standards and Eligible Content are based on the Pennsylvania Academic Standards. Although the Academic Standards indicate what students should know and be able to do, educator concerns regarding the number and breadth of Academic Standards led to an initiative by the Pennsylvania Department of Education (PDE) to develop Assessment Anchor Content Standards (Assessment Anchors) to indicate which parts of the Academic Standards (Instructional Standards) would be assessed on the PSSA. Based on recommendations from Pennsylvania educators, the Assessment Anchors were designed as a tool to improve the articulation of curricular, instructional, and assessment practices. The Assessment Anchors clarify what is expected across each grade span and focus the content of the standards into what is assessable on a large-scale test. The Assessment Anchor documents also serve to communicate eligible content, also called assessment limits, or the range of knowledge and skills from which the PSSA would be designed.

The Assessment Anchor's coding is read like an outline. The coding includes the content, grade level, Reporting Category, Assessment Anchor, descriptor (Sub-Assessment Anchor), and Eligible Content. Thus, S.4.A.1.3.1 would be Science, Grade 4, Reporting Category A, Assessment Anchor 1, descriptor (Sub-Assessment Anchor) 3, and Eligible Content 1.

Each of the Assessment Anchors has one or more descriptors (Sub-Assessment Anchors) and Eligible Content varying to reflect grade-level appropriateness. The Assessment Anchors form the basis of the test design for the grades undergoing new test development. In turn, this hierarchy is the basis for organizing the total content scores (based on the core [common] sections).

A draft version of the Assessment Anchors and Eligible Content for mathematics and reading was submitted to Achieve, Inc., Washington, D.C., for a special analysis to evaluate the degree of alignment with the Academic Standards. Preliminary feedback enabled PDE to make adjustments to improve the alignment as the Assessment Anchors took final form. These adjustments were reflected operationally starting with the 2007 PSSA. Achieve, Inc. also conducted a preliminary review of the science anchors in 2003 and produced a follow-up report on the anchors in 2005.

The complete set of Assessment Anchors and Eligible Content can be referenced at PDE's website: [www.education.state.pa.us](http://www.education.state.pa.us). Click on "Programs" from the menu in the left-hand column, then select "Programs O–R," "Pennsylvania System of School Assessment (PSSA)," and then "Assessment Anchors." In addition, see Appendix A for more information about how the Academic Standards are linked to the Reporting Categories, Assessment Anchors, and Eligible Content.

## ***PSSA Writing***

Assessment Anchors and Eligible Content have not been developed for the writing content area. Instead, the PSSA writing program is aligned directly to the Academic Standards at 1.4 (Types of Writing [Mode]) and at 1.5 (Quality of Writing). In 1999, Pennsylvania adopted academic standards for writing (*Academic Standards for Reading, Writing, Speaking and Listening*) that describe what students should know and be able to do with the English language at a grade level. Within the framework of the assessment, the writing prompts are measured under Academic Standards 1.4.A Narrative, 1.4.B Informational, and 1.4.C Persuasive, thus providing the responses to the eligible modes the prompts are designed to elicit. The writing prompts are also measured under Academic Standards 1.5.A–F Quality of Writing. The stimulus-based multiple-choice items are measured under the Academic Standards 1.5.E Revising and 1.5.F Editing.

## **OVERVIEW OF THE 2010 PSSA**

### ***Mathematics Assessment Measures***

The PSSA mathematics assessment has five major reporting categories: Numbers and Operations, Algebraic Concepts, Geometry, Measurement, and Data Analysis and Probability. By organizing the Assessment Anchors into a five-category reporting structure, there is a similarity to the categories used by the National Council of Teachers of Mathematics (NCTM) and the National Assessment of Educational Progress (NAEP). See Appendix A for more information about how the Academic Standards are linked to the Reporting Categories, Assessment Anchors, and Eligible Content.

The PSSA mathematics assessment employs two types of test items: multiple-choice and open-ended. These item types assess different levels of knowledge and provide different kinds of information about mathematics achievement. Psychometrically, multiple-choice items are very useful and efficient tools for collecting information about a student's academic achievement. Open-ended performance tasks generally generate fewer scoreable points than multiple-choice items in the same amount of testing time; however, they provide tasks that are more realistic and better sample higher-level thinking skills. Furthermore, well-constructed scoring guides have made it possible to include open-ended tasks in large-scale assessments such as the PSSA. Trained scorers can apply the scoring guides to efficiently score large numbers of student papers in a highly reliable way. The design of the PSSA attempts to achieve a reasonable balance between the two item types.

### **MATHEMATICS MULTIPLE-CHOICE ITEMS**

The majority of the mathematics items included on the PSSA are multiple-choice (selected-response) items. This item type is especially efficient for measuring a broad range of content. In the PSSA mathematics assessment, each multiple-choice item has four response options, only one of which is correct. The student is awarded one point for choosing the correct response. Distractors typically represent incorrect concepts, incorrect logic, incorrect application of an algorithm, or computational errors.

Multiple-choice items are used to assess a variety of skill levels, from short-term recall of facts to problem solving. PSSA items involving application emphasize the requirement to carry out some mathematical process to find an answer, rather than simply recalling information from memory.

## **OPEN-ENDED TASKS FOR MATHEMATICS**

Open-ended, or constructed-response, tasks require students to read a problem description and to develop an appropriate solution. The open-ended items are designed to take about ten minutes per item. Most of the open-ended items have several components to the overall task that may enable students to enter or begin the problem at different places. In some items, each successive component is designed to assess progressively more difficult skills or higher knowledge levels. Certain components ask students to explain their reasoning for engaging in particular mathematical operations or for arriving at certain conclusions. The types of tasks utilized do not necessarily require computations. Students may also be asked to perform such tasks as constructing a graph, shading some portion of a figure, or listing object combinations that meet specified criteria.

Open-ended tasks are especially useful for measuring students' problem-solving skills in mathematics. They offer the opportunity to present real-life situations that require students to solve problems using mathematics abilities learned in the classroom. Students must read the task carefully, identify the necessary information, devise a method of solution, perform the calculations, enter the solution directly in the answer document, and when required, offer an explanation. This provides insight into the students' mathematical knowledge, abilities, and reasoning processes.

The open-ended mathematics items are scored on a 0–4 point scale using an item-specific scoring guideline. The item-specific scoring guideline outlines the requirements for each score point. Item-specific scoring guidelines are based on the General Description of Mathematics Scoring Guidelines for Open-ended Items. The general guidelines describe a hierarchy of responses, which represent the five score levels. See Appendix B or the *Mathematics Item and Scoring Samplers* available on the PDE website.

### ***Reading Assessment Measures***

The PSSA reading assessment has two major reporting categories: Comprehension and Reading Skills, and Interpretation and Analysis of Fictional and Nonfictional Text. These two reporting categories are derived from the Reading Academic Standards 1.1, 1.2, and 1.3. Standards 1.6, 1.7, and 1.8 are not addressed on the PSSA because they are not specific to reading comprehension and can be more accurately evaluated at the school level. Standards 1.4 and 1.5 are addressed on the PSSA writing assessment. See Appendix A for more information about how the Academic Standards are linked to the Reporting Categories, Assessment Anchors, and Eligible Content.

The reading assessment employs two types of test items: multiple-choice and open-ended. The items are designed to measure students' comprehension of the content contained in the reading passages.

### **READING MULTIPLE-CHOICE ITEMS**

Multiple-choice (selected-response) items measure how well students comprehend the overall meaning of a passage or make basic inferences about it. At times, asking students to choose a preferred answer is the best way to determine whether they have gleaned certain information from a story. Such information may include setting, central idea, or main events and their sequence.

Each reading multiple-choice item has four response options, only one of which is correct. The student is awarded one point for choosing the correct response. Incorrect response choices, or distractors, typically represent some kind of misinterpretation, predisposition, unsound reasoning, or casual reading.

### **OPEN-ENDED TASKS FOR READING**

Open-ended, or constructed-response, tasks are designed to address comprehension of text in ways that multiple-choice items cannot. A short written response, requiring about ten minutes per item, allows students to prepare an answer and summarize using supporting details or examples derived from the text.

The reading open-ended items are scored on a 0–3 point scale using an item-specific scoring guideline. This scale is consistent with the scale used on the National Assessment of Educational Progress (NAEP). The change from the former 0–4 point scale improves the alignment with the types of tasks required. Each task is text-dependent and is carefully constructed with the scoring guideline reflecting the task requirements. All item-specific scoring guidelines are based on the General Scoring Guidelines for Open-ended Reading Items. The general guidelines describe a hierarchy of responses, which represent the four score levels. See Appendix B or the *Reading Item and Scoring Samplers* available on the PDE website.

### ***Science Assessment Measures***

The PSSA science assessment has four major reporting categories: The Nature of Science, Biological Science, Physical Science, and Earth and Space Sciences. These categories are similar to those used by the National Assessment of Educational Progress (NAEP) and The Third International Mathematics and Science Study (TIMSS). However, the PSSA organizes the categories differently. The science assessment anchors cover seventeen major categories from two sets of standards: Science and Technology Standards (3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, and 3.8) and Environment and Ecology Standards (4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, and 4.9). See Appendix A for more information about how the Academic Standards are linked to the Reporting Categories, Assessment Anchors, and Eligible Content.

The science assessment employs two types of test items: multiple-choice and open-ended. These item types assess different levels of knowledge and provide different kinds of information about science achievement. The design of the operational 2010 PSSA for science achieves a reasonable balance between the two item types.

### **SCIENCE MULTIPLE-CHOICE ITEMS**

The majority of the science items included on the PSSA are multiple-choice (selected-response) items, either as standalone multiple-choice items or as scenario-based multiple-choice items. Multiple-choice items are especially efficient for measuring a broad range of content. In the PSSA science assessment, each multiple-choice item has four response options, only one of which is correct. The student is awarded one point for choosing the correct response. Distractors typically represent incorrect concepts, incorrect logic, or incorrect application of a scientific principle.

Multiple-choice items are used to assess a variety of skill levels, from short-term recall of facts to the application of science content. PSSA items involving application emphasize the requirement to utilize science content to find an answer rather than simply recalling information from memory.

## **OPEN-ENDED ITEMS FOR SCIENCE**

At all grades, stand alone open-ended science items require students to read a description of a scientific problem and to develop an appropriate solution. Scenario-based open-ended items for science (exclusive to Grade 11) are similar; however, with scenario-based open-ended items, students also have to consider the stimulus material presented in the associated scenario. Stand alone open-ended items require about five minutes per task, while the 2- or 3-part scenario-based open-ended items at Grade 11 require a total of about 10 minutes. At Grade 11 in scenario-based open-ended items, successive components of the open-ended item are designed to measure The Nature of Science and then either Biological Science, Physical Science, or Earth and Space Science.

Open-ended tasks are especially useful for measuring students' skills in science. These tasks may present real-life situations that require students to solve problems using science abilities learned in the classroom. Students must read a task carefully, identify the necessary information, devise a method of solution, enter the solution directly into the answer document, and when required, offer an explanation. This provides insight into students' science knowledge, abilities, and reasoning processes.

The open-ended science items are scored on a 0–2-point scale with an item-specific scoring guideline, and each task is carefully constructed with a scoring guideline reflecting the task requirements. At Grade 11, scenario-based open-ended items combine two 0–2-point scale items into one compound 0–4-point scale item with two of the points associated with The Nature of Science and two of the points associated with Biological Science, Physical Science, or Earth and Space Science. The general guidelines describe a hierarchy of responses, which represent the three score levels. Each item-specific scoring guideline outlines the requirements at each score point, and each item-specific scoring guideline is based on the Science Scoring Guidelines for Open-ended Items. See Appendix B or the *Science Item and Scoring Samplers* available on the PDE website.

## **SCIENCE SCENARIOS FOR GRADES 8 AND 11**

In addition to standalone multiple-choice and open-ended items, the science assessment includes scenarios at Grades 8 and 11. In consideration of the multidisciplinary and interdisciplinary nature of science content, science scenarios create stronger connections between The Nature of Science/Science Content and the multiple-choice and open-ended items associated with a scenario. As a result, science scenarios allow the assessment to efficiently address and utilize the connections among the science content domains. A science scenario contains text, graphics, charts, and/or tables, and uses these elements to describe the results of a class project, an experiment, or other similar research. Students use the information found in a science scenario as a platform from which to answer both multiple-choice and open-ended questions (Grade 11 only). Scenarios and questions reach beyond simple fact recollection; they are designed to challenge students to think and to apply the knowledge and skills learned in their classrooms. Scenarios are designed to reflect multi-dimensional classroom activities that incorporate higher cognitive levels of understanding. Science scenarios challenge students to interpret stimulus content and to apply existing knowledge to new data while using science knowledge and process skills to arrive at their answers.

**Writing Assessment Measures**

**WRITING MULTIPLE-CHOICE ITEMS**

Each multiple-choice item on the writing test is associated with a passage containing embedded errors. Starting with the 2006 operational assessment and continuing through the 2010 assessment, four multiple-choice items are associated with each passage. Multiple revising and editing instances are incorporated within each passage and require that a student demonstrate both passive (recognizing and identifying grammatical and mechanical errors in text, such as misspellings, errors in word choice, errors in verb tense, or pronoun usage) and active (choosing the appropriate correction of an embedded error, such as deleting an irrelevant detail, changing the sequence of details, or placing correct marks of punctuation) revising and editing skills.

All multiple-choice items have four response options that include one single correct answer. The student is awarded one raw score point for choosing the correct response. Incorrect response choices, or distractors, typically represent some kind of misinterpretation or predisposition, unsound reasoning, or casual reading of the item and/or stimuli.

**WRITING PROMPTS**

At each assessed grade level, students respond to writing prompts developed to measure composition of writing as specified in the Academic Standards 1.4.A–C and further clarified in Academic Standards 1.5 A–F. A student response to a prompt requires approximately 60 minutes per prompt, though students are allowed more time to finish their responses if necessary. The writing prompts were field tested in a stand alone field test in 2005 and in embedded field test positions in 2009 and 2010, with only one field test prompt being administered per student in the embedded field test. Prompt modes and prompts were spiraled across the total number of available forms. Spiraling is accomplished by administering each student one of many available field test prompts in a sequential manner. For example, the first student received Prompt 1, the second student Prompt 2, and so on until every prompt was administered. If there were more students than prompts, the sequence was repeated starting with the first prompt until every student was assigned a prompt. This process ensured that each prompt was administered to approximately equal and representative student populations in regard to demographics like gender, ethnicity, school size, and location in the state.

**Table 2–1. Writing Prompt Field Test Implementation**

Administration	Activity		
	Grade 5	Grade 8	Grade 11
2005	Stand alone FT	Stand alone FT	Embedded FT
2006	None	None	None
2007	None	None	None
2008	None	None	None
2009	Embedded FT	Embedded FT	Embedded FT
2010	Embedded FT	Embedded FT	Embedded FT

See Chapter Five for more information about the writing prompt field tests.

Beginning with the operational assessment in 2006 and continuing through 2010, students in Grade 5 responded to two pre-selected operational prompts chosen from across the three modes: narrative, informational, and persuasive. (See Table 2–2 for more information about the modes selected for operational use during a given administration.) The narrative prompt can be story/fiction or personal narrative/recount, which aligns with Academic Standard 1.4.A. The informational prompt can be sequence (process analysis) or simple definition, which aligns with Academic Standard 1.4.B. The persuasive prompt can be problem/solution or evaluation, which aligns with Academic Standard 1.4.C. The 2005 field test yielded enough Grade 5 prompts that no additional writing prompts were field tested in 2006, 2007, or 2008.

Beginning with the operational assessment in 2006 and continuing through 2010, students in Grade 8 responded to two operational prompts: informational and persuasive. The informational prompt can be sequence (process analysis), illustration, conceptual definition, cause/effect, classification, or compare/contrast, which aligns with Academic Standard 1.4.B. The persuasive prompt can be problem/solution or evaluation, which aligns with Academic Standard 1.4.C. The 2005 field test yielded enough Grade 8 prompts that no additional writing prompts were field tested in 2006, 2007, or 2008.

Academic writing is the focus for the Grade 11 PSSA writing assessment, including writing required for students who wish to pursue post-secondary educational and/or career opportunities. Beginning with the operational assessment in 2006 and continuing through 2010, students in Grade 11 responded to two operational prompts: informational and persuasive. The informational prompt can be advanced sequence (process analysis), illustration, definition, cause/effect, classification, or compare/contrast, which aligns with Academic Standard 1.4.B. The persuasive prompt can be problem/solution or evaluation, which aligns with Academic Standard 1.4.C. The 2005 field test yielded enough Grade 11 prompts that no additional writing prompts were field tested in 2006, 2007, or 2008.

Beginning with the field test in 2005 and continuing through 2010, the responses to writing prompts were scored twice using two different scoring guidelines developed especially for the PSSA. The first score is based on the application of a mode-specific scoring guideline, and the second score is based on the application of a conventions scoring guideline. The mode-specific scoring guideline is designed to evaluate first-draft, on-demand responses. It identifies the essential criteria for successfully responding to a particular mode of writing relating to the core areas of writing: focus, development of content, organization, and style. In contrast, the conventions scoring guideline measures the demonstrated level of control of sentence formation, grammar, usage, spelling, and punctuation. For more information on the application of the new scoring guidelines, see Appendix B or the current *Writing Item and Scoring Sampler*, available on the PDE website.

**Table 2–2. Writing Prompt Operational Mode Summary**

<b>Administration</b>	<b>Operational Modes</b>		
	<b>Grade 5</b>	<b>Grade 8</b>	<b>Grade 11</b>
<b>2006</b>	Narrative, Informational	Informational, Persuasive	Informational, Persuasive
<b>2007</b>	Informational, Persuasive	Informational, Persuasive	Informational, Persuasive
<b>2008</b>	Narrative, Persuasive	Informational, Persuasive	Informational, Persuasive
<b>2009</b>	Informational, Persuasive	Informational, Persuasive	Informational, Persuasive
<b>2010</b>	Narrative, Informational	Informational, Persuasive	Informational, Persuasive

### Chapter Three: Item Development Process

The core portion of the 2010 PSSA operational administration is made up of items that were field tested primarily in the 2009 PSSA administration. Therefore the activities that led to the 2010 PSSA operational administration began with the development of the test items that appeared in the field test portion of the 2009 operational administration. In turn, items that appeared on the field test portion of the 2009 operational administration were developed during 2008 and prior. See Table 3–1 for a graphic representation of the basic process flow and overlap of the development cycles.

**Table 3–1. General Development Timeline Pattern of the PSSA**

Operational Administration Year	Events Occurring in Calendar Year					
	2006	2007	2008	2009	2010	2011
2008	Initial Item Development →	Field Test→	Operational Core Admin with embedded <u>matrix</u> items→	Core-to-Core Link		
2009		Initial Item Development →	Field Test→	Operational Core Admin with embedded <u>equating block</u> items→	Core-to-Core Link	
2010			Initial Item Development*→	Field Test→	Operational Core Admin with embedded <u>equating block</u> items→	Core-to-Core Link

\*The initial item development for 2009 field test forms that occurred in 2008 was only for writing prompts, science scenarios, and science multiple-choice and open-ended items. All 2009 mathematics and reading field test items were selected from an existing item bank of previously developed passages and items. All 2009 writing passages and multiple-choice items were also selected from the existing item bank. In addition, some 2009 science scenarios and science multiple-choice and open-ended field test items were selected from the existing item bank as needed for the field test. All passages and items selected from the item bank had been previously reviewed and approved by past bias and content review committees according to the processes described later in this chapter.

**Table 3–2. General Timeline Associated with 2009 Field Test and 2010 Operational Assessment of Mathematics and Reading at Grades 3, 4, 5, 6, 7, 8, and 11**

Time Frame	Assessment	Activity
Prior to 2008	'09 FT for '10 OP	Item development for 2009 embedded field test
September 2008	'09 FT for '10 OP	Selection of items for 2009 embedded field test from existing item bank
September 2008–January 2009	'09 OP & '09 FT for '10 OP	Forms construction for 2009 embedded field test
January–July 2009	'10 FT for '11 OP	Item development for items to embed on 2009 operational assessment
February–May 2009	'09 FT for '10 OP	2009 embedded field test in 2009 operational test
July 2009	'10 FT for '11 OP	Item review for the embedded field test in 2010 operational assessment
August 2009	'09 FT for '10 OP	Statistical review of 2009 field tested items
September 2009–February 2010	'10 OP & '10 FT for '11 OP	Forms construction for 2010 operational assessment
February–May 2010	'10 OP & '10 FT for '11 OP	2010 operational assessment

## MATHEMATICS AND READING

A series of major activities took place in 2003 and 2004, which culminated in the implementation of changes to the structure of the operational PSSA in the 2005 assessment that continued through the 2010 administration. These key activities included the development of the Pennsylvania Assessment Anchor Content Standards (Assessment Anchors); test item development; content review; bias, fairness, and sensitivity review; field testing of items in spring 2009; item review with data; and final selection of items to compose the 2010 PSSA. These activities are described in some detail in this chapter as well as in Chapters Four and Five. It should also be noted that test items for the 2009 field test were developed by Data Recognition Corporation (DRC) and WestEd.

### *Test Content Blueprint for 2010 Mathematics and Reading Assessment*

The 2010 PSSA is based on the Pennsylvania Academic Standards. The 2010 PSSA reflects the new Assessment Anchors (PDE 2004), which were designed as a means of improving the articulation of curricular, instructional, and assessment practices. The Assessment Anchors serve to clarify the Academic Standards assessed on the PSSA and to communicate assessment limits, or the range of knowledge and skills from which the PSSA was designed. Relevant to item development are the refinement and clarification embodied in the Assessment Anchors. Since the Assessment Anchors encompass Grades 3 through 8 and Grade 11, the document informs test design for the grades undergoing new test development as well as the grades currently assessed.

The PSSA for Grades 3, 5, 8, and 11 in 2005 through 2010 followed a revised blueprint and testing plan to reflect the new Assessment Anchors and item distribution. The first operational administration of the PSSA for Grades 4, 6, and 7 took place in 2006. It followed the revised blueprint and testing plan, and it reflected the new Assessment Anchors and item distribution revised plan first applied to the PSSA for Grades 3, 5, 8, and 11 in 2005 and continued through 2010.

### ***Operational Layout for 2010 Mathematics and Reading***

The mathematics and reading PSSA plan was developed through the collaborative efforts of Data Recognition Corporation (DRC) and the National Center for Improvement of Educational Assessment (NCIEA). The plan was subsequently evaluated and approved by PDE. At Grades 4 through 8 and Grade 11, the reading and mathematics assessments are combined in one test booklet and one separate answer booklet. The test booklet contains reading passages and reading and mathematics multiple-choice items. The answer booklet contains scannable pages for multiple-choice (MC) responses, open-ended (OE) items with response spaces, and demographic data collection areas. At Grade 3, the reading and mathematics assessments are combined into one integrated test/answer booklet. All MC items are worth 1 point. Reading OE items receive a maximum of 3 points (on a scale of 0–3) and mathematics OE items receive a maximum of 4 points (on a scale of 0–4). Each test form contains common items (identical on all forms) along with equating block (containing equating items) and embedded field test items. The common items consist of a set of core items taken by all students. These core items also include core-to-core linking items, which are items that also appeared on the previous year’s core form. The equating block items and the embedded field test items are unique, in most instances, to a form. That is, there can be instances in which an equating block or embedded field test item appears on more than one form.

The 2010 PSSA is comprised of nine forms per grade. All of the forms contain the common items identical for all students and sets of generally unique items that fulfill two purposes:

1. Field testing new items (FT items).
2. Using items from the previous years’ assessments for the purpose of linking equating block (EB) items.

The following two tables display the design for reading and mathematics for forms 1 through 9. The column entries for these tables denote the following:

- Grade level
- Number of unique common, or core, MC items (Core MC)
- Number of core-to-core linking MC items (Core-to-Core Linking MC)
- Number of equating block MC items (EB MC)
- Number of embedded MC field test items (Embedded FT MC)
- Number of unique common, or core, OE items (Core 3-pt. reading or Core 4-pt. mathematics OE)
- Number of core-to-core linking OE items (Core-to-Core Linking OE)
- Number of equating block OE items (EB OE)
- Number of embedded OE field test items (Embedded FT OE)

- Total number of MC and OE items in the form (Total Items MC/OE)
- Total number of operational points (derived from Core MC, Core-to-Core MC, Core OE, and Core-to-Core OE only) for producing a student score (Total Operational Points)

**Table 3–3. Mathematics Test Plan 2010 per Operational Form**

Grade	No. of Unique Core MC per Op. Form	No. of Core-to-Core MC per Op. Form	No. of Equating Block MC per Op. Form	No. of Embedded FT MC per Op. Form	No. of Unique Core 4-pt. OE per Op. Form	No. of Core-to-Core 4-pt. OE per Op. Form	No. of Equating Block OE per Op. Form	No. of Embedded FT OE per Op. Form	Total No. of Items per Op. Form MC/OE	Total No. of Core Points per Op. Test
3, 4, 5, 6, 7, 8, and 11	44	16	2	10	1	2	0	1	72/4	72

**Table 3–4. Reading Test Plan 2010 per Operational Form**

Grade	No. of Unique Core MC per Op. Form	No. of Core-to-Core MC per Op. Form	No. of Equating Block MC per Op. Form	No. of Embedded FT MC per Op. Form	No. of Unique Core 3-pt. OE per Op. Form	No. of Core-to-Core 3-pt. OE per Op. Form	No. of Equating Block OE per Op. Form	No. of Embedded FT OE per Op. Form	Total No. of Items per Op. Form MC/OE	Estimated No. of Passages per Op. Form	Total No. of Core Points per Op. Test
3	22–27 (3 passages)	13–18 (2 passages)	8* (1 passage)	10* (1 passage)	1	1	0	1	58/3	7	46
4, 5, and 11	22–27 (3 passages)	13–18 (2 passages)	8* (1 passage)	10* (1 passage)	2	2	0	1	58/5	7	52
6, 7, and 8	22–27 (4 passages)	13–18 (2 passages)	8* (1 passage)	10* (1 passage)	2	2	0	1	58/5	8	52

\* Average

Since an individual student’s score is based solely on the common (or core) items, the total number of operational points is 72 for mathematics and 52 for reading (or 46 points for Grade 3). The total score is obtained by combining the points from the core MC and OE portions of the test as follows:

**Table 3–5. 2010 Mathematics and Reading Core Points**

Student’s Score	MC Items	Grade	OE Items	Total Score
Mathematics	60	3, 4, 5, 6, 7, 8, and 11	3 items × 4-points=12 points	72
Reading	40	3	2 items × 3-points=6 points	46
		4, 5, 6, 7, 8, and 11	4 items × 3-points=12 points	52

For more information concerning the process used to convert the operational layout into forms (i.e., form construction), see Chapter Six. For more information about operational layout across forms and across years (i.e., form equivalency) see Chapter Ten.

**Linking for 2010 Mathematics and Reading Assessment**

Linking provides a statistical bridge between assessment administrations. The 2010 administration is linked back to the 2009 administration through the use of linking items in the core (core-to-core linking items) and the equating block (equating items).

**MULTIPLE-CHOICE**

For Grades 3–8 and 11, mathematics used 16 core-to-core linking MC items and 18 equating block MC items per grade, and reading used 13 to 18 core-to-core linking MC items and 16 equating block MC items per grade.

**OPEN-ENDED**

For Grades 3–8 and 11, mathematics used two 4-point core-to-core linking OE items and no [zero] equating block OE items per grade. For Grade 3, reading used one 3-point core-to-core linking OE item and no [zero] equating block OE items. For Grades 4–8 and 11, reading used two 3-point core-to-core linking OE item and no [zero] equating block OE items.

**Table 3–6. 2010 Mathematics and Reading Linking Points Plan**

Content	Grade	No. of Core-to-Core MC	No. of Equating Block MC	No. of Core-to-Core OE	No. of Equating Block OE	Max. No. of Linking Points per Op. Test*
Mathematics	3, 4, 5, 6, 7, 8, and 11	16	18*	2 (4 pt)	0	42*
Reading	3	13–18	16*	1 (3 pt)	0	37*
	4, 5, 6, 7, 8, and 11	13–18	16*	2 (3 pt)	0	40*

\*Not all equating block items will be unique to each form as some may appear on more than one form.

The matter of linking will be treated more fully in Chapter Fifteen.

**Test Sessions and Timing for 2010 Mathematics and Reading Assessment**

The test window for the 2010 operational assessment, including make-ups, extended from April 7 through May 7, 2010. The reading and mathematics assessments consisted of six sections. Test administration recommendations called for each section to be scheduled as one assessment session, although schools were permitted to combine multiple sections in a single session. Administration guidelines stipulated that the sections be administered in the sequence in which they were printed in the test booklets. The following tables outline the assessment schedule and estimated times for each section, as well as the number and types of items tested for each grade. The estimated Student Testing times shown on the next page do not include time for administrative tasks that occur during the pre- and post-administration activities. These times are estimated separately. Times are approximate and are supplied to test administrators for scheduling purposes only.

**Table 3–7. Reading and Mathematics—2010 Administration and Testing Times**

Test Section & Content	Suggested Times (In Minutes)			Grade Level						
	Administration (Total)	Administrative (Pre & Post)	Student Testing	Number of Items and Item Type						
				3	4	5	6	7	8	11
<b>1 Mathematics</b>	70 to 85	15 to 20	55 to 65	24 MC 2 OE	24 MC 2 OE	24 MC 2 OE	24 MC 2 OE	24 MC 2 OE	24 MC 2 OE	24 MC 2 OE
<b>2 Reading</b>	80 to 105	15 to 20	65 to 85	24 MC 1 OE	22 MC 2 OE	24 MC 2 OE	22 MC 2 OE	19 MC 2 OE	21 MC 2 OE	24 MC 2 OE
<b>3 Mathematics</b>	65 to 80	15 to 20	50 to 60	24 MC 1 OE	24 MC 1 OE	24 MC 1 OE	24 MC 1 OE	24 MC 1 OE	24 MC 1 OE	24 MC 1 OE
<b>4 Reading</b>	65 to 80	15 to 20	50 to 60	18 MC 1 OE	18 MC 1 OE	18 MC 1 OE	18 MC 1 OE	18 MC 1 OE	18 MC 1 OE	18 MC 1 OE
<b>5 Mathematics</b>	65 to 80	15 to 20	50 to 60	24 MC 1 OE	24 MC 1 OE	24 MC 1 OE	24 MC 1 OE	24 MC 1 OE	24 MC 1 OE	24 MC 1 OE
<b>6 Reading</b>	60 to 100	15 to 20	45 to 80	16 MC 1 OE	18 MC 2 OE	16 MC 2 OE	18 MC 2 OE	21 MC 2 OE	19 MC 2 OE	16 MC 2 OE

During the assessment, students may request an extended assessment period if they indicate that they have not completed the task. Such requests are granted if the assessment administrator finds the request to be educationally valid. See Chapter Seven for more information about testing sessions.

### ***Reporting Categories and Points Distributions for 2010 Mathematics and Reading Assessments***

The mathematics assessment results will be reported in five categories that approximately correspond to those advocated by the National Council of Teachers of Mathematics (NCTM). The code letters for these Assessment Anchor categories are A–E and correspond to the following:

- A.** Numbers and Operations
- B.** Measurement
- C.** Geometry
- D.** Algebraic Concepts
- E.** Data Analysis and Probability

The distribution of mathematics items into these five categories is shown in the following table.

**Table 3–8. Mathematics Reporting Categories**

Grade	Reporting Categories				
	A: Numbers and Operations	B: Measurement	C: Geometry	D: Algebraic Concepts	E: Data Analysis & Probability
3	40%–50%	12%–15%	12%–15%	12%–15%	12%–15%
4	43%–47%	12%–15%	12%–15%	12%–15%	12%–15%
5	41%–45%	12%–15%	12%–15%	13%–17%	12%–15%
6	28%–32%	12%–15%	15%–20%	15%–20%	15%–20%
7	20%–24%	12%–15%	15%–20%	20%–27%	15%–20%
8	18%–22%	12%–15%	15%–20%	25%–30%	15%–20%
11	12%–15%	12%–15%	12%–18%	38%–42%	12%–18%

The reading assessment results will be reported in two broad categories:

- A. Comprehension and Reading Skills
- B. Interpretation and Analysis of Fictional and Nonfictional Text

Assessment Anchors associated with Comprehension and Reading Skills are coded with an initial letter A, and those related to Interpretation and Analysis of Fictional and Nonfictional Text are coded with an initial letter B. The distribution of items into these two categories across genres is shown in the following table.

**Table 3–9. Reading Reporting Categories and Genre**

Grade	Reporting Categories			
	A: Comprehension and Reading Skills % Range	B: Interpretation and Analysis of Fictional and Nonfictional Text % Range	% of Passages (Genre) Fiction	% Passages (Genre) Nonfiction
3	60%–80%	20%–40%	50%–70%	30%–50%
4	60%–80%	20%–40%	50%–70%	30%–50%
5	60%–80%	20%–40%	50%–70%	30%–50%
6	50%–70%	30%–50%	40%–60%	40%–60%
7	50%–70%	30%–50%	40%–60%	40%–60%
8	40%–60%	40%–60%	40%–60%	40%–60%
11	40%–60%	40%–60%	30%–50%	50%–70%

Both the mathematics and reading content area reporting categories are further subdivided for specificity and Eligible Content or limits. Each subdivision is coded by adding an additional numeral, such as A.1. These subdivisions are called Assessment Anchors and Eligible Content.

### ***Assessment Anchor Content Standards Subsumed within Reporting Categories for 2010 Mathematics and Reading Assessment***

For mathematics, there are 16 Assessment Anchor Content Standards (Assessment Anchors) that occur at all grade levels (Grades 3 through 8 and 11), although they are not all assessed at each grade level. More specifically, the number targeted for assessment by grade level are 10 at Grade 3; 12 at Grade 4; 13 at Grade 5; 12 at Grade 6; 14 at Grade 7; 13 at Grade 8; and 13 at Grade 11.

For reading, there are five Assessment Anchors that vary to reflect grade-level appropriateness. Within the Comprehension and Reading Skills Reporting Category, two Assessment Anchors pertain to understanding fiction text and understanding nonfiction text. Within the Interpretation and Analysis of Fiction and Nonfiction Text Reporting Category, three Assessment Anchors pertain to Components of Text, Literary Devices and Concepts, and Organization of Nonfiction Text.

Mathematics and reading scores are based on the core (common) sections. Also reported are the student's mathematics and reading performance levels. See Appendix C for a summary by grade and subject.

### **SCIENCE**

In 2003, the existing Science, Technology, Environment, and Ecology (STEE) test was put on hold, and PDE began efforts to develop a new science assessment. In the winter of 2006, a series of cognitive labs or item pilots were conducted across Pennsylvania with the primary focus of ascertaining language and contextual issues within the draft open-ended test items (Grade 4), scenario-based multiple-choice items (Grades 8 and 11), and scenario-based open-ended items (Grade 11), as well as determining the relative difficulty of the test items, the time required to complete the individual tasks, and the opportunity to know factors related to the implementation of the new science Assessment Anchors and Eligible Content by the participating schools. (See the section on the science cognitive labs discussed later in this chapter.)

Following the series of successful cognitive labs or item pilots, DRC developed another set of test items for the proposed voluntary, standalone field test. During the development phase, PDE made the determination to change the designation of the field test from a voluntary assessment to a census-based assessment. Leading up to the administration of the standalone field test, both content review and bias, fairness, and sensitivity review were conducted in Pennsylvania with Pennsylvania educators. In the spring of 2007, the initial standalone field test was administered to the census populations at Grades 4, 8, and 11, followed by a rangefinding for the open-ended items. After the scoring was completed, an item review with data was conducted for the field test items administered in 2007.

**Table 3–10. Science Development Implementation Timeline**

<b>Year</b>	<b>Event</b>
<b>2003</b>	STEE test put on hold
<b>2004</b>	New assessment plan developed by PDE
<b>2005</b>	
<b>2006</b>	Item Pilot (Cognitive Labs) to try out scenario-based science items
<b>2007</b>	Initial Stand Alone Field Test for Grades 4, 8, and 11
<b>2008</b>	Initial Operational Administration with core, matrix, and embedded field test positions
<b>2009</b>	Second Operational Administration with core, equating block, and embedded field test positions
<b>2010</b>	Continuation of Operational Administration with core, equating block, and embedded field test positions

***Test Content Blueprint for the 2010 Operational Science Test***

The PSSA is based on the Pennsylvania Academic Standards as defined by the Eligible Content. The PSSA science assessment for 2010 reflects the Assessment Anchor Content Standards, which were designed as a means of improving the articulation of curricular, instructional, and assessment practices. The Assessment Anchors serve to clarify the Academic Standards assessed on the PSSA and to communicate assessment limits, or the range of knowledge and skills from which the PSSA would be designed. Relevant to item development are the refinement and clarification embodied in the Assessment Anchors (PDE, 2004).

The Assessment Anchors are rooted in the Academic Standards adopted by the State Board of Education in January of 2002, and the standards—under two documents: Science and Technology Standards and the Environment and Ecology Standards—cover seventeen major categories describing what students need to know. Rather than attempting to report results for all seventeen standards, the categories are organized into only four. These categories are similar to those used by the National Assessment of Educational Progress (NEAP) and The Third International Mathematics and Science Study (TIMSS). However, the PSSA organizes the categories differently.

Achieve, Inc. conducted a preliminary review of the anchors in 2003 and produced a follow-up report on the anchors in 2005. More information about the Assessment Anchors and the Eligible Content can be found by referencing the Pennsylvania Science Assessment Anchors located on PDE’s website at [www.education.state.pa.us](http://www.education.state.pa.us).

More information on the Assessment Anchors can be found in Chapter Two.

### Operational Layout for 2010 Science

The third operational administration of the PSSA science test took place in 2010. Critical to the preparation for this operational assessment, the design of the operational assessment had to be configured to meet NCLB requirements as well as other test development and psychometric requirements. The preliminary science PSSA plan was developed in 2004 through the collaborative efforts of DRC and PDE based on the recommendations of the Pennsylvania Technical Advisory Committee (TAC). At Grades 4 and 8, the science assessment consists of one test booklet and one separate answer booklet. The test booklet contains multiple-choice items and at Grade 8 contains stimulus scenario text. The answer booklet contains scannable pages for multiple-choice (MC) responses (answer grids), open-ended (OE) items with response spaces, and demographic data collection areas. At Grade 11, the science assessment is in one integrated test/answer booklet with items and scenario text appearing with scannable multiple-choice answer grids, OE response space, and demographic data collection areas.

All MC items are worth 1 point. Standalone OE items receive a maximum of 2 points (on a scale of 0–2), and scenario-based OE items (at Grade 11 only) receive a maximum of 4 points (on a scale of 0–4). Each test form contains common items (that are identical on all forms) along with equating block (equating items) and embedded field test items. The common items consist of a set of core items taken by all students. The equating block items and the embedded field test items are unique, in most instances, to a form. That is, there can be instances in which an equating block or embedded field test item appears on more than one form.

At Grades 4 and 8, the 2010 PSSA science assessment is composed of 12 forms per grade. At Grade 11, the 2010 PSSA science assessment is composed of 8 forms. All of the forms contain common items identical for all students and sets of generally unique items that fulfill two purposes:

1. Field testing new items.
2. Using items from the previous years' assessments for the purpose of linking.

The following three tables display the 2010 operational test design for science.

**Table 3–11. 2010 Science Test Plan per Operational Form**

Grade	No. of Unique Core MC per Op. Form	No. of Core-to-Core MC per Op. Form	No. of Equating Block MC per Op. Form	No. of Embedded FT MC per Op. Form	No. of Unique Core OE per Op. Form	No. of Core-to-Core OE per Op. Form	No. of Equating Block OE per Op. Form	No. of Embedded FT OE per Op. Form	Total No. of Items per Op. Form MC/OE	Total No. of Core Points per Op Test*
4	42	16	2	8	3 (2 pt)	2 (2 pt)	0	1 (2 pt)	68 MC 6 OE	68
8	38 + 4 scenario-based	16	2	6 + 4 scenario-based	3 (2 pt)	2 (2 pt)	0	1 (2 pt)	70 MC 6 OE	68
11	22 + 12 scenario-based	16	2	6 + 4 scenario-based	4 (2 pt) 3 (4 pt scenario-based)	2 (2 pt)	0	1 (2 pt) 1 (4 pt scenario-based)	62 MC 11 OE	74

\*Some equating block items may not be unique to each form.

Since an individual student’s score is based solely on the common (or core) items, the total number of operational points is 68 for Grades 4 and 8 and 74 for Grade 11. The total score is obtained by combining the points from the core MC and OE portions of the test as follows:

**Table 3–12. 2010 Science Core Plan per Grade**

Grade	Standalone MC Items	Scenario-based MC Items	Standalone OE Items	Scenario-based OE Items	Total Points
4	58	0	5 (2 pt)	0 (4 pt)	68
8	54	4	5 (2 pt)	0 (4 pt)	68
11	38	12	6 (2 pt)	3 (4 pt)	74

For more information concerning the process used to convert the operational layout into forms (i.e., form construction), see Chapter Six. For more information about operational layout across forms and across years (i.e., form equivalency), see Chapter Ten.

***Linking for 2010 Science Assessment***

Linking provides a statistical bridge between assessment administrations. The 2010 administration is linked back to the 2009 administration through the use of linking items in the core (core-to-core linking items) and the equating block (equating items).

**MULTIPLE-CHOICE**

For Grades 4 and 8, science used 16 core-to-core linking MC items and 24 equating block MC items per grade. For Grade 11, science used 16 core-to-core linking MC items and 16 equating block MC items.

**OPEN-ENDED**

For all three grades, science used two 2-point core-to-core linking OE items and no [zero] equating block OE items per grade.

**Table 3–13. 2010 Science Linking Points Plan**

Grade	No. of Core-to-Core MC	No. of Equating Block MC	No. of Core-to-Core OE	No. of Equating Block OE	Max. No. of Linking Points per Op. Test*
4 and 8	16	24*	2 (2 pt)	0	44*
11	16	16*	2 (2 pt)	0	36*

\*Not all equating block items will be unique; some may appear on more than one form.

The matter of linking is discussed more fully in Chapter Fifteen.

**Test Sessions and Timing for 2010 Science Assessment**

The test window for the 2010 operational assessment extended from April 26 through May 7, 2010, including make-ups. The science assessments consisted of two sections at Grades 4 and 8 and three sections at Grade 11. Test administration recommendations call for each section to be scheduled as one assessment session, although schools are permitted to combine multiple sections in a single session. Administration guidelines stipulate that the sections be administered in the sequence in which they are printed in the booklets. The following tables outline the assessment schedule and estimated times for each section and the number and types of items tested for each grade. The estimated student testing times did not include time for administrative tasks that occur during the pre- and post-administration activities.

**Table 3–14. Science – 2010 Administration and Testing Times**

Test Section	Suggested Times (In Minutes)			Grade Level Number of Items and Item Type		
	Administration (Total)	Administrative (Pre & Post)	Student Testing	4	8	11
1	60 to 85	15 to 20	45 to 65	34 MC 3 OE	35 MC 3 OE	22 MC 3 OE
2	60 to 80	15 to 20	45 to 60	34 MC 3 OE	35 MC 3 OE	20 MC 4 OE
3	60 to 75	15 to 20	45 to 55			20 MC 4 OE

During the assessment, students were allowed to request an extended assessment period if they indicated that they had not completed the task. Such requests were granted if the assessment administrator found them to be educationally valid. See Chapter Seven for more information about testing sessions.

**Reporting Categories and Points Distributions**

The science assessment results will be reported in four categories, coded as A through D:

- A. The Nature of Science
- B. Biological Science
- C. Physical Science
- D. Earth and Space Science

The distribution of science items into these four categories is shown in the following table.

**Table 3–15. Science Reporting Categories**

Grade	Reporting Categories			
	A: Nature of Science	B: Biological Science	C: Physical Science	D: Earth & Space Science
4	~50%	~17%	~17%	~17%
8	~50%	~17%	~17%	~17%
11	~50%	~17%	~17%	~17%

The Reporting Categories are further subdivided for specificity and Eligible Content limits. Each subdivision is coded by adding an additional numeral, such as A.1. These subdivisions are called Assessment Anchors, Descriptors (Sub-Assessment Anchors), and Eligible Content.

***Assessment Anchor Content Standards Subsumed within Reporting Categories for 2010 Science Assessment***

Distributed across the four Reporting Categories are a dozen Sub-Reporting Categories. Each of the 12 Assessment Anchors exists at each grade, with the Assessment Anchors and Eligible Content varying to reflect grade-level appropriateness. The numbers of Assessment Anchors targeted by grade level are 21 at Grade 4; 23 at Grade 8; and 23 at Grade 11.

Total science scores reported at the student level are based on the core (common) sections. School and district-level scores are reported at the Eligible Content level under the Assessment Anchors and are based on the core (common) positions. See Appendix C for a summary by grade and subject.

***2006 Science Item Pilot***

Prior to the initial field test in 2007, DRC, in collaboration with PDE, conducted a science cognitive lab/item pilot in selected schools throughout the Commonwealth from February 27 through March 17, 2006. A sample of 507 students from urban, suburban, and rural school districts from across the Commonwealth participated in the PSSA Science Item Tryout Project. The impetus for this study was Pennsylvania’s response to the mandatory science assessment component of the No Child Left Behind legislation to create a rigorous science test for Grades 4, 8, and 11 by 2008. The primary purpose of the cognitive lab or item tryout was to pilot the use of the new science scenarios at Grade 8 and Grade 11, and to pilot the multiple-choice items at Grade 4.

The project involved development of science scenarios, refinement of science test items, creation of survey questions, and design of interview protocols to be administered using a cognitive laboratory technique. The cognitive laboratory technique was developed in the early 1980s through an interdisciplinary effort by survey methodologists and psychologists (Willis, 1999; Erickson and Simon, 1993). Different models of the cognitive process to solve a test item have evolved over the years, but all have four major processes in common: 1) comprehension of the question, 2) retrieval of relevant information, 3) decision process, and 4) response process (Tourangeau, 1984).

In the development and execution of the cognitive laboratory project, DRC customized the techniques employed specifically to meet PDE’s goal and expectations. The goal of the project was to gather relevant information about the thinking processes of students enrolled in science in Grades 4, 8, and 11 in order to create a better science assessment for Pennsylvania students.

***Logistics and Demographics***

PDE provided DRC with a list of the Science, Technology, Environment, and Ecology Assessment Advisory Committee (STEEAAC) members who agreed to participate and to facilitate the PSSA Science Item Tryout Project in their respective districts. Disbursed throughout Pennsylvania, participating districts provided a representative sample of students enrolled in science in Grades 4, 8, and 11 in urban, suburban, and rural schools. Participating districts are listed in Table 3–16.

**Table 3–16. Participating Districts by Region**

<b>Region of Commonwealth</b>	<b>School District</b>
<b>Western</b>	Athens Area Grove City Area Penn Hills Pittsburgh Public Schools
<b>Central</b>	Manheim Township Newport State College Area West Shore Wilkes Barre Area
<b>Eastern</b>	Haverford Township Lower Merion Mid-Valley Philadelphia City SD Upper Merion

### ***Process and Procedures for the 2006 Item Pilot***

Two parallel forms of the science assessment were designed for each grade level, with a designated administration time of thirty minutes. No attempt was made to replicate the design of a PSSA science operational test for the cognitive lab or pilot test because of testing-time limitations and the objectives of this study. The items were representative of items from each of the proposed PSSA's four reporting strands (i.e., The Nature of Science, Biological Science, Physical Science, and Earth and Space Science). All test items were approved by PDE before inclusion in the PSSA Science Item Tryout Project.

In Grade 4, each form of the test consisted of ten multiple-choice items, 70 percent of which included graphs, graphics, charts, or tables with relevant information associated with the item. All four reporting strands were assessed in each Grade 4 test form. In Grades 8 and 11, age/grade-appropriate science scenarios were developed. The scenarios included graphics, charts, tables, graphs, and diagrams to support the scenario text. A set of test items associated with each science scenario was developed. In Grade 8, each test form included items from all four reporting strands. In Grade 11, scenarios in test Form A assessed the biological, earth and space, and nature of science reporting strands, while test Form B assessed the physical, earth and space, and nature of science reporting strands.

Scenarios and questions reached beyond simple fact recollection; they were designed to challenge students to think and to apply knowledge and skills learned in their classrooms. The science scenarios were based on Pennsylvania Assessment Anchors and Eligible Content. Scenarios were designed to reflect multi-dimensional classroom activities that incorporate higher cognitive levels of understanding. Each scenario was stimulus-based and included passages with graphics, charts, graphs, or a combination of all three media. Science scenarios challenged students to interpret passage content while using science knowledge and process skills to arrive at their answers.

### ***Implementation and Test Administration for 2006 Item Pilot***

Two classrooms within one geographic region participated in the project each day. At least two test development specialists were present at all but one school district during the pilot study project sessions; in addition, representatives from PDE attended most sessions. The PSSA Science Item Tryout Project field work occurred during a three-week window, beginning on February 27 and concluding on March 16.

## **WRITING**

### ***Test Content Blueprint for 2010 Writing Assessment***

As indicated in Chapter One and Chapter Two, the PSSA is based on the Pennsylvania Academic Standards for Reading, Writing, Speaking, and Listening. The writing test specifically measures Academic Standards 1.4 (Types of Writing) and 1.5 (Quality of Writing). The Reading, Writing, Speaking and Listening Standards were designed to show what students should know and be able to do with the English language at each grade level. The Standards establish an outline for what can be assessed on the PSSA writing test and help to communicate the range of knowledge and skills from which the PSSA items would be designed.

The PSSA writing test for Grades 5, 8, and 11 in 2006 through 2010 followed this content blueprint and testing plan in order to reflect the Academic Standards.

### ***Operational Layout for 2010 Writing***

The PSSA operational layout was developed through the collaborative efforts of Data Recognition Corporation (DRC), the National Center for Improvement of Educational Assessment (NCIEA), and the Pennsylvania Department of Education. The layout was subsequently evaluated and approved by PDE. The writing test book is scannable and includes fields for student demographic data, stimuli (i.e., embedded error passages) linked to multiple-choice (MC) items, and writing prompts (WP). All MC items are worth 1 point. Responses to WP items receive a maximum of 4 points (on a scale of 1–4) for demonstrating control in a given mode and also receive a maximum of 4 points (on a scale of 1–4) for demonstrating control of conventions. The writing scoring guidelines have a 1, 2, 3, and 4 score point, but there is no zero score point. Blanks and other non-scoreable responses are the only situations in which a student’s raw score is zero.

#### **MULTIPLE-CHOICE ITEMS**

Each test form contains a common set of operational items (i.e., each student is tested on an identical set of core items) along with embedded field test items. The embedded field test items are unique across each form.

#### **WRITING PROMPTS**

Each test form contains two common operational writing prompts along with one embedded field test item. The core prompts are taken by all students at a grade level, and the embedded field test items are unique across each form. The 2006 through 2008 operational forms did not contain matrix or embedded field test writing prompts; however, in order to begin building a bank of usable prompts for use in future operational administrations, writing prompts began to appear in field test positions starting again in 2009. For more information on the field test process that occurred for the development of the writing prompts used operationally in 2010, see Chapter Five.

#### ***Forms***

The 2010 writing PSSA is comprised of six forms at each grade. All of the forms contain common items identical for all students and sets of unique embedded field test items that expand the total pool of available items.

The following two tables display the design for the writing test forms. The column entries for these tables denote the following:

- Number of core Revising and Editing (R&E) stimulus-based MC items
- Number of embedded field test R&E stimulus-based MC items
- Total number of R&E stimulus-based MC items
- Number of pre-equated core 4-point writing prompts (WP)
- Number of field test WP
- Total number of MC and OE items in the form (Total Items MC/WP)

**Table 3–17. 2010 Writing Test Plan per Operational Form per Grade**

No. of Core R&E Stimulus-based MC Items per Form	No. of FT R&E Stimulus-based MC Items per Form	Total No. of R&E MC Items per Form	No. of Pre-equated Core 4-point WP per Form	No. of FT WP per Form	Total No. of Items per Op. Form
12	8	20	2	1	20/3

Since an individual student’s score is based solely on the common, or core items, the total number of operational points is 100. The total score is obtained by combining the points from the core MC and WP portions of the test as displayed in Table 3–18.

**Table 3–18. Maximum Eligible Core Points for Writing Prompts**

Multiple-choice	Writing Prompts		Totals
	Conventions	Mode	
12	8	80	100
12 items × 1 point each (12×1)	2 items each worth a maximum of 4 points each (2×4)	2 items each worth a maximum of 4 points each. The raw score is then multiplied by 10. (2×4)×10	(12 + 8 + 80)

***Linking for 2010 Writing Assessment***

The matter of linking for the PSSA writing assessment is covered in Chapter Fifteen.

***Test Sessions and Timing***

The test window for the 2010 operational assessment was from April 19 through May 7, 2010, including make-ups. The writing assessment consisted of four sections. Test administration required each complete section to be scheduled as one assessment session, although schools were permitted to combine multiple sections as a single session. Administration guidelines stipulated that the sections be administered in the sequence in which they were printed in the test book. Table 3–19 outlines the assessment schedule and estimated times for each section.

**Table 3–19. Writing—All Grades**

Section	Contents	Administration (Total in minutes)	Administrative (Pre & Post in minutes)	Student Testing in minutes
1	20 Multiple-choice	60 to 75	15 to 20	45 to 55
2	1 Writing Prompt	70 to 85	15 to 20	55 to 65
3	1 Writing Prompt	70 to 85	15 to 20	55 to 65
4	1 Writing Prompt	70 to 85	15 to 20	55 to 65

During the assessment, students may request an extended assessment period if they indicate that they have not completed the task. Such requests are granted if the assessment administrator finds them to be educationally valid. See Chapter Seven for more information about testing sessions.

### ***Reporting Categories and Point Distribution for 2010 Writing Assessment***

The writing assessment results will be reported in two categories:

1. Composition – Academic Standard 1.4, Types of Writing
2. Revising and Editing – Academic Standard 1.5, Quality of Writing

Academic Standards A, B, and C are associated with Composition. Academic Standards E and F are associated with Revising and Editing. The distribution of core items into these two categories is shown in Table 3–20. See also Appendix C for a summary by grade and subject.

**Table 3–20. Core Points Distribution**

<b>Reporting Category</b>	<b>Composition</b>	<b>Revising and Editing</b>	<b>Total</b>
Academic Standards	1.4.A, 1.4.B, 1.4.C	1.5.E and 1.5.F	
Multiple-choice Items	N/A	12	12
Writing Prompt 1	4 (Mode)	4 (Conventions)	8
Writing Prompt 2	4 (Mode)	4 (Conventions)	8
Raw Sub-total	8	20	28
Weighting Factor applied to Raw Score	x10	x1	
Total Possible Points	80	20	100

For more information concerning the process used to convert the operational layout into forms (i.e., form construction), see Chapter Six. For more information about operational layout across forms and across years (i.e., form equivalency), see Chapter Ten.

### **TEST DEVELOPMENT CONSIDERATIONS: ALL ASSESSMENTS**

Alignment to the PSSA Assessment Anchors and Eligible Content (or, in the case of writing, strong alignment with the PSSA Academic Standards), grade-level appropriateness (reading/interest level, etc.), depth of knowledge, cognitive level, item/task level of complexity, estimated difficulty level, relevancy of context, rationale for distractors, style, accuracy, and correct terminology were major considerations in the item development process. The *Standards for Educational and Psychological Testing* (AERA, APA, NCME, 1999) and the *Principles of Universal Design* (Thompson, Johnstone, & Thurlow, 2002) guided the development process. In addition, DRC's *Bias, Fairness, and Sensitivity Guidelines* were used for developing items. All items were reviewed for fairness by bias and sensitivity committees and for content by Pennsylvania educators and field-specialists. Items were also reviewed for adherence to the Principles of Universal Design by representatives from the National Center for Educational Outcomes (NCEO). In addition, the items were reviewed for adherence to the guidelines outlined in the Pennsylvania publication *Principles, Guidelines and Procedures for Developing Fair Assessment Systems: Pennsylvania Assessment Through Themes* (PATT).

### ***Bias, Fairness, and Sensitivity: All Assessments***

At every stage of the item and test development process, DRC employs procedures that are designed to ensure that items and tests meet Standard 7.4 of the Standards for Educational and Psychological Testing (AERA, APA, NCME, 1999).

*Standard 7.4: Test developers should strive to identify and eliminate language, symbols, words, phrases, and content that are generally regarded as offensive by members of racial, ethnic, gender, or other groups, except when judged to be necessary for adequate representation of the domain.*

To meet Standard 7.4, DRC employs a series of internal quality steps. DRC provides specific training for test developers, item writers, and reviewers on how to write, review, revise, and edit items for issues of bias, fairness, and sensitivity (as well as for technical quality). Training also includes an awareness of and sensitivity to issues of cultural diversity. In addition to providing *internal* training in reviewing items in order to eliminate potential bias, DRC also provides *external* training to the review panels of minority experts, teachers, and other stakeholders.

DRC's guidelines for bias, fairness, and sensitivity includes instruction concerning how to eliminate language, symbols, words, phrases, and content that might be considered offensive by members of racial, ethnic, gender, or other groups. Areas of bias that are specifically targeted include, but are not limited to stereotyping, gender, regional/geographic, ethnic/cultural, socioeconomic/class, religious, experiential, and biases against a particular age group (ageism) or persons with disabilities. DRC catalogues topics that should be avoided and maintains balance in gender and ethnic emphasis within the pool of available items and passages.

### ***Universal Design: All Assessments***

As stated above, the Principles of Universal Design were incorporated throughout the item development process to allow participation of the widest possible range of students in the PSSA. The following checklist was used as a guideline:

- Items measure what they are intended to measure.
- Items respect the diversity of the assessment population.
- Items have a clear format for text.
- Stimuli and items have clear pictures and graphics.
- Items have concise and readable text.
- Items allow changes to other formats, such as Braille, without changing meaning or difficulty.
- The arrangement of the items on the test has an overall appearance that is clean and well organized.

A more extensive description of the application of the Principles of Universal Design is described in Chapter Four.

### ***Depth of Knowledge: All Assessments***

An important element in statewide assessment is the alignment between the overall assessment system and the state's standards. A methodology developed by Norman Webb (1999) offers a comprehensive model that can be applied to a wide variety of contexts. With regard to the alignment between standards statements and the assessment instruments, Webb's criteria include five categories, one of which deals with content. Within the content category is a useful set of levels for evaluating depth of knowledge (DOK). According to Webb (1999), "depth-of-knowledge consistency between standards and assessments indicates alignment if what is elicited from students on the assessment is as demanding cognitively as what students are expected to know and do as stated in the standards" (p. 7–8). The four levels of cognitive complexity (i.e., depths of knowledge) are as follows:

- Level 1: Recall
- Level 2: Application of Skill/Concept
- Level 3: Strategic Thinking
- Level 4: Extended Thinking

Depth-of-knowledge levels were incorporated in the item writing and review process, and items were coded with respect to the level they represented. Generally, multiple-choice items are written to DOK levels 1 and 2, and open-ended items are written to DOK level 3.

### ***Passage Readability***

Evaluating the readability of a passage is essentially a judgmental process by individuals familiar with the classroom context and what is linguistically appropriate at a given grade level as described in the section on reading passage selection on page 38. Although various readability indices were computed and reviewed, it is recognized that such methods measure different aspects of readability and are often fraught with particular interpretive liabilities. Thus, the commonly available readability formulas were not used in a rigid way, but more informally to provide for several snapshots of a passage that senior test development staff considered along with experience-based judgments in guiding the passage selection process. In addition, passages were reviewed by committees of Pennsylvania educators who evaluated each passage for readability and grade-level appropriateness.

### ***Test Item Readability: All Assessments***

Careful attention was given to the readability of the items to make certain that the assessment focus of the item did not shift based on the difficulty of reading the item. Subject areas such as mathematics or science contain many content-specific vocabulary terms. As a result, readability formulas were not used. However, wherever it was practicable and reasonable, every effort was made to keep the vocabulary one grade level below the tested grade level for non-reading tests. There was a conscious consideration made to ensure that each test question was evaluating a student's ability to build toward mastery of the mathematics standards or the science standards versus the student's reading ability. Resources used to verify the vocabulary level were the *EDL Core Vocabularies* and the *Children's Writer's Word Book*.

The issue of readability was addressed for all items during the final editing of items and at the Item Content Review. In addition, every test question is brought before several different committees comprised of grade-level experts in the field of mathematics education and science

education. They review each question from the perspective of the students they teach, and they determine the validity of the vocabulary used and work to minimize the level of reading required.

Vocabulary was also addressed at the Bias, Fairness, and Sensitivity Review, although the focus was on how certain words or phrases may represent a possible source of bias or issues of fairness or sensitivity.

### TEST DEVELOPMENT PROCESS: ALL ASSESSMENTS

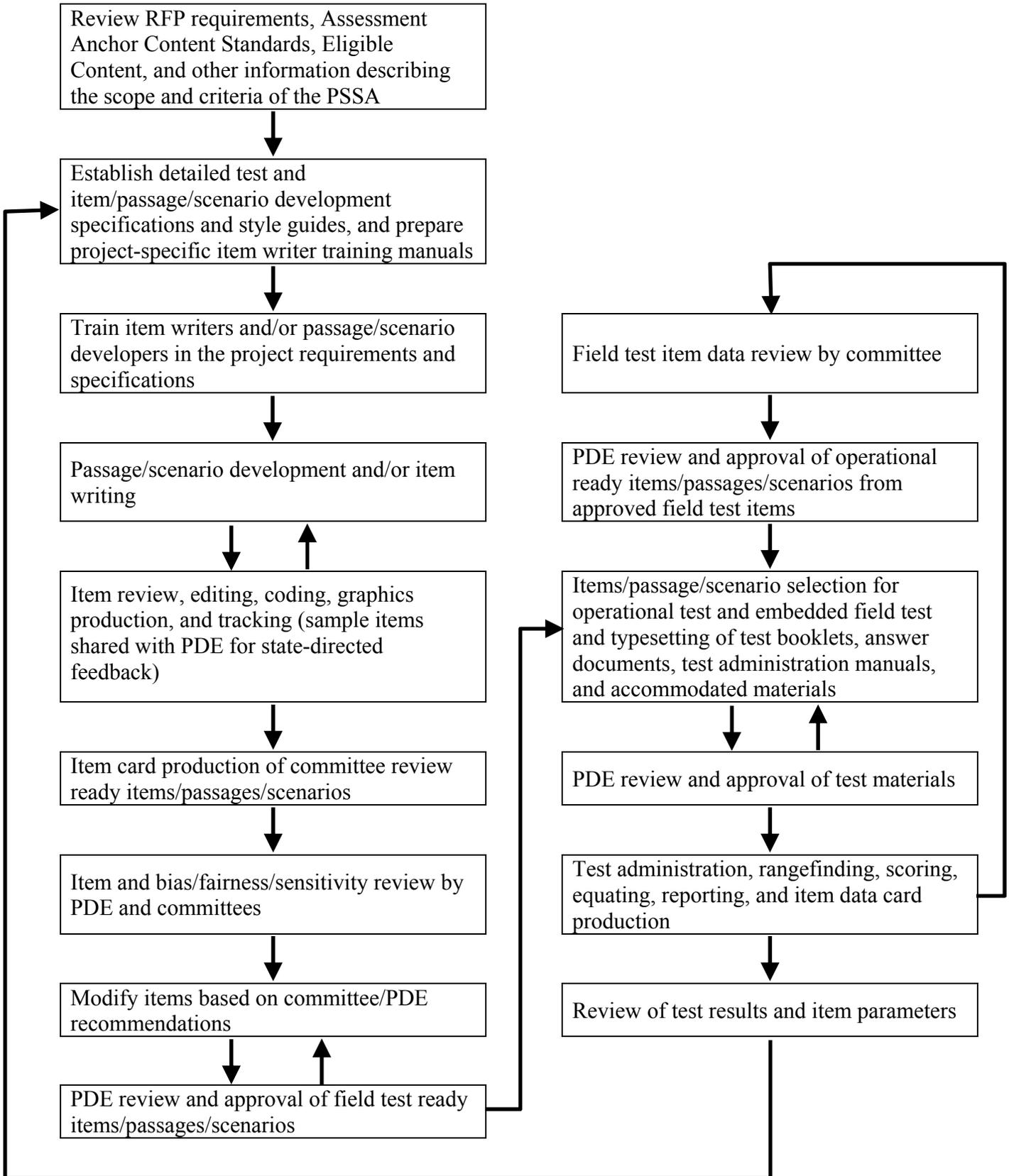
Due to the timing associated with the awarding of the current contract, most of the 2009 field test items were selected from an existing item bank with items developed prior to 2008. Only the writing prompts and science multiple-choice and open-ended items were newly developed in 2008. The item development process for these items followed a logical timeline, which is outlined below in Figure 3–1. On the front end of the schedule, tasks were generally completed with the goal of presenting field test candidate items to committees of Pennsylvania educators. On the back-end of the schedule, all tasks lead to the field test data review. The items selected from the item bank for the 2009 field test also followed a similar process in previous years for the initial steps.

**Figure 3–1. Item and Test Development Cycle and Timeline**

Steps in Development Cycle	Timeline Before/After New Item Review		
Development planning	Fall	↓	-12 to -9 months
Reading passage selection	Fall	↓	-12 to -9 months
Item writer training	Fall/Winter	↓	-9 months
Initial item authoring	Winter/Spring	↓	-9 to -4 months
Internal reviews and PDE reviews	Spring/Summer	↕	-8 to -1 month
Bias, Fairness, and Sensitivity Review	Summer/Fall	↓	+/- 0 months
<b>New Item Content Review</b>	<b>Summer/Fall</b>	⇒	<b>+/- 0 months</b>
Post-review resolution and clean-up	Summer/Fall	↓	+1 to +2 months
Build test forms	Fall	↓	+2 to +4 months
Internal form reviews and PDE reviews	Fall/Winter	↕	+3 to +4 months
Form printing, packaging, and shipping	Winter/Spring	↓	+4 to +8 months
Test administration	Spring	↓	+9 months
Material/data processing, rangefinding, and scoring	Spring/Summer	↓	+10 to +12 months
<b>Field Test Item Data Review</b>	<b>Summer</b>	⇒	<b>+12 months</b>
Select operational items	Summer/Fall	↓	+13 to +15 months

The process flowchart in Figure 3–2 illustrates the interrelationship among the steps in the process that occur in a normal year of development (i.e. when the items for field testing are primarily from new development, as opposed to being selected from an existing item bank). In addition, a detailed process table describing the item and test development processes also appears in Appendix D.

Figure 3–2. DRC Item and Test Development Process



The following paragraphs describe the processes which lead up to the operational test in a normal round of development. These processes were used to develop all of the 2009 field test items used as operational items in the 2010 administration, whether the items were newly developed in 2008 or selected from the existing item bank.

***Item Development Planning Meeting: All Assessments***

Prior to the start of any item development work, DRC's test development staff meets with PDE's assessment office to discuss the test development plans for the next PSSA administration, including the test blueprint, the field test plan (including development counts), procedures, timelines, etc. With a complete development cycle lasting several years (from item authoring through field test, data review, and operational usage), the initial planning begins well in advance of the anticipated administration. For the 2010 operational administration, the initial planning meeting for the item authoring process for the 2009 field test occurred in fall 2007. Item authoring began in summer 2008, with the item review meetings occurring in September 2008. See Table 3-2.

***Item Writer Training: All Assessments***

Item writers were selected and trained for the content areas of mathematics, reading, science, and writing. Qualified writers were college graduates with teaching experience and a demonstrated base of knowledge in the content area. Many of these writers were content assessment specialists and curriculum specialists. The writers were trained individually and had previous experience in writing multiple-choice and open-ended items. Prior to developing items for the PSSA, the cadre of item writers was trained with regard to the following:

- Pennsylvania Academic Standards, Assessment Anchors, and Eligible Content
- Webb's Four Levels of Cognitive Complexity: Recall, Basic Application of Skill/Concept, Strategic Thinking, and Extended Thinking
- General Scoring Guidelines for Each Content Area
- Specific and General Guidelines for Item Writing
- Bias, Fairness, and Sensitivity Guidelines
- Principles of Universal Design
- Item Quality Technical Style Guidelines
- Reference Information
- Sample Items

### ***Reading Passage Selection***

The task of searching for passages was conducted by DRC professionals with classroom experience in reading/language arts. These professionals also underwent specialized training (provided by DRC) in the characteristics of acceptable passages. Guidelines for passage selection included appropriate length, text structure, density, and vocabulary for the grade level. A judgment was also made about whether the reading level required by a particular passage was at the independent level, that is, where the average student should be able to read 90 percent of words in the text independently. Passage finders were given the charge to search for a specified number of passages for each genre. Generally, at least twice as many passages as needed were sought. Most passages acquired for the 2009 field test were authentic in that they were culled from published materials. Approval to reprint was secured from the publishers. Passages underwent an internal review by several test development content editors to judge their merit with regard to the following criteria:

- Passages have interest value for students.
- Passages are grade-appropriate in terms of vocabulary and language characteristics.
- Passages are free of bias, fairness, and sensitivity issues.
- Passages represent different cultures.
- Passages are from a variety of sources.
- Passages are able to stand the test of time.
- Passages are sufficiently rich to generate a variety of MC and OE items.
- Passages are complete with all necessary permissions documentation.
- Passages avoid dated subject matter unless a relevant historical context is provided.
- Passages should not require students to have extensive background knowledge in a certain discipline or area to understand a text.

Once through the internal review process, those passages deemed potentially acceptable were reviewed by the Reading Content Committee and Bias, Fairness, and Sensitivity Committee for final approval.

### ***Item Authoring and Tracking: All Assessments***

Initially, items are generated with software-prepared PSSA Item Cards, which allows for preliminary sorting and reviewing. Although very similar, the PSSA Item Card for Multiple-Choice Items differs from the PSSA Item Card for Open-Ended Items in that the former has a location at the bottom of the card for comments regarding the distractors. Blank examples of these two cards are shown in Appendix E. In both instances a column against the right margin includes codes to identify the subject area, grade, content categories, passage information (in the case of reading), item type, depth of knowledge (cognitive complexity), estimated difficulty, answer key (for MC items), and calculator use (for mathematics items).

All items undergoing field testing in 2009 were entered into the DRC Item Development and Educational Assessment System (IDEAS), which is a comprehensive, secure, online item banking system. It accommodates item writing, item viewing and reviewing, and item tracking and versioning. IDEAS manages the transition of an item from its developmental stage to its approval for use within a test form. The system supports an extensive item history that includes item usage within a form, item-level notes, content categories and subcategories, item statistics from both classical and Rasch item analyses, and classifications derived from analyses of differential item functioning (DIF). A sample IDEAS Item Card is presented in Appendix E.

### ***Internal Reviews and PDE Reviews: All Assessments***

To ensure that the items produced were sufficient in number and adequately distributed across subcategories and levels of difficulty, item writers were informed of the required quantities of items. As items were written, an item authoring card was completed. It contained information about the item, such as grade level, content category, and subcategories. Based on the item writer's classroom teaching experience, knowledge of the content area curriculum, and cognitive demands required by the item, estimates were recorded for level of cognitive complexity and difficulty level. Items were written to provide for a range of difficulty.

As part of the item construction process, each item was reviewed by content specialists and editors at DRC, at WestEd, or at both companies (depending on the grade and content). Content specialists and editors evaluated each item to make sure that it measured the intended Eligible Content and/or Assessment Anchor Content Standard. They also assessed each item to make certain that it was appropriate for the intended grade and that it provided and cued only one correct answer (MC items only). In addition, the difficulty level, depth of knowledge, graphics, language demand, and distractors were also evaluated. Other elements considered in this process include, but are not limited to Universal Design, bias, source of challenge, grammar/punctuation, and PSSA style.

Following this internal process, items were reviewed by content specialists at the Pennsylvania Department of Education. PDE staff then consulted with DRC and WestEd about any general issues or concerns (e.g., style, format, interpretation of Assessment Anchors and Eligible Content) and about edits to specific items. Following PDE's review, the items were prepared for the content review meetings conducted with Pennsylvania educators.

### ***Item Content Review in Fall 2008: All Assessments***

Prior to the 2009 field testing, all newly-developed test items were submitted to content committees for review. (Note: the 2009 field test items selected from the existing item bank had already been through the same reviews at an earlier time.) The content committees consisted of Pennsylvania educators from school districts throughout the Commonwealth of Pennsylvania, some with postsecondary university affiliations. The primary responsibility of the content committee was to evaluate items with regard to quality and content classification, including grade-level appropriateness, estimated difficulty, depth of knowledge, and source of challenge. With source of challenge, items are identified where the cognitive demand is focused on an unintended content, concept, or skill (Webb, 2002). In addition, source of challenge may be attributed if the reason that an answer could be given results from a cultural bias, an inappropriate reading level, or a flawed graphic in an item, or if an item requires specialized, non-content related knowledge to answer. Source of challenge could result in a student who has mastered the intended content or skill answering the item incorrectly or a student who has not mastered the intended content or skill answering the item correctly. Committee members were

asked to note any items with a source of challenge and to suggest revisions to remove the source of challenge. They also suggested revisions and made recommendations for reclassification of items. In some cases when an item was deleted, the committee suggested a replacement item and/or reviewed a suggested replacement item provided by the facilitators. The committee also reviewed the items for adherence to the Principles of Universal Design, including language demand and issues of bias, fairness, and sensitivity.

The content review was held September 23 and 24, 2008. Committee members were approved by PDE, and PDE-approved invitations were sent to them by DRC. PDE also selected internal staff members for attendance. The meeting commenced with a welcome by PDE and DRC. This was followed by an overview of the test development process by DRC. PDE, along with DRC, also provided training on the procedures and forms to be used for item content review.

DRC content assessment specialists facilitated the reviews and were assisted by representatives of PDE and WestEd. Committee members, grouped by grade level and content area, worked through and reviewed the items for quality and content, as well as for the following categories:

- Assessment Anchor Alignment (classified as Full, Partial, or No)
- Content Limits (classified as Yes or No)
- Grade-Level Appropriateness (classified as at Grade Level, Below Grade Level, or Above Grade Level)
- Difficulty Level (classified as Easy, Medium, or Hard)
- Depth of Knowledge (classified as Recall, Application, Strategic Thinking)
- Appropriate Source of Challenge (classified as Yes or No)
- Correct Answer (classified as Yes or No)
- Quality of Distractors (classified as Yes or No)
- Graphics (classified as Yes or No) in regards to appropriateness
- Appropriate Language Demand (classified as Yes or No)
- Freedom from Bias (classified as Yes or No)

The members then came to consensus and assigned a status to each item as a group: Approved, Accepted with Revision, Move to Another Assessment Anchor or Grade, or Rejected. All comments were recorded, and a master rating sheet was completed. Committee facilitators recorded the committee consensus on the Item Review Rating Sheet. A sample form and rating criteria may be found in Appendix F.

Security was addressed by adhering to a strict set of procedures. Items in binders were distributed for committee review by number and signed for by each member on a daily basis. All attendees, with the exception of PDE staff, were required to sign a confidentiality agreement. All materials not in use at any time were stored in a locked room. Secure materials that did not need to be retained after the meetings were deposited in secure barrels and the contents of which were shredded.

***Bias, Fairness, and Sensitivity Reviews in September 2008: Science and Writing***

Prior to 2009 field testing, all newly-developed test items for science and writing were also submitted to a Bias, Fairness, and Sensitivity Committee for review. This took place on September 18, 2008. The committee’s primary responsibility was to evaluate items with regard to bias, fairness, and sensitivity issues. They also made recommendations for changes or deletion of items in order to remove the potential for issues of bias, fairness, and/or sensitivity. Included in the review were proposed reading passages. An expert, multi-ethnic committee composed of men and women was trained by a DRC test development director to review items for bias, fairness, and sensitivity issues. Training materials included a manual developed by DRC (DRC, 2003–2010). Members of the committee also had expertise with special needs students and English Language Learners. PDE staff members were also trained and participated in the review. All reading and mathematics items were read by a cross-section of committee members. Each member noted bias, fairness, and/or sensitivity comments on tracking sheets and on the item, if needed, for clarification. Committee members individually categorized any concerns as related to ageism, disability, ethnicity/culture, gender, regional, religious, socioeconomic, or stereotyping. These categories were then the framework through which recommendations for modification or rejection of items occurred during the subsequent committee consensus process. The committee then discussed each of the issues as a group and came to consensus as to which issues should represent the view of the committee. All consensus comments were then compiled, and the suggested actions on these items were recorded and submitted to PDE. This review followed the same security procedures as outlined above, except that the materials were locked up and stored at the DRC offices in Harrisburg. Table 3–21 shows the gender, race/ethnicity composition, and individual backgrounds for the members of the bias committee who reviewed the PSSA items and passages for bias, fairness, and sensitivity.

**Table 3–21. Demographic Composition of the 2008 Bias, Fairness, and Sensitivity Committee**

<b>Member #</b>	<b>Gender</b>	<b>Race/Ethnicity</b>	<b>Background</b>
<b>1.</b>	Male	Caucasian American	High School Teacher
<b>2.</b>	Female	Caucasian American	Elementary School Teacher
<b>3.</b>	Female	Hispanic American	Local Community Leader
<b>4.</b>	Male	African American	Retired School Superintendent and Teacher
<b>5.</b>	Female	African American	National Consultant for Special Education
<b>6.</b>	Male	Caucasian American	PDE Staff Member
<b>Totals</b>	3 Females 3 Males	2 African Americans 3 Caucasian Americans 1 Hispanic American	

The results from the Bias, Fairness, and Sensitivity Committee review of science are summarized in Table 3–22.

**Table 3–22. Number of Items—2008  
Bias, Fairness, and Sensitivity Committee Review for Science**

Grade	Science Items			
	Total items or scenarios reviewed per grade	Accepted As Is	Accepted With Revision	Rejected
4	25	23	2	0
8	149	127	21	1
11	30	29	0	1
<b>Total</b>	204	179	23	2

The results from the Bias, Fairness, and Sensitivity Committee review of writing are summarized in Table 3–23.

**Table 3–23. Number of Items—2008  
Bias, Fairness, and Sensitivity Committee Review for Writing**

Grade	Writing Prompts			
	Total items reviewed per grade	Accepted As Is	Accepted With Revision	Rejected
5	21	5	12	4
8	12	1	11	0
11	12	4	6	2
<b>Total</b>	45	10	29	6

## ***Chapter Four: Universal Design Procedures Applied in the PSSA Test Development Process***

Universally designed assessments allow participation of the widest possible range of students and contribute to valid inferences about participating students. Principles of Universal Design are based on the premise that each child in school is a part of the population to be tested and that testing results should not be affected by disability, gender, race, or English language ability (Thompson, Johnstone & Thurlow, 2002). At every stage of the item and test development process, including the 2009 field test, procedures were employed to ensure that items and subsequent tests were designed and developed using the elements of universally designed assessments developed by the National Center for Educational Outcomes (NCEO).

Federal legislation addresses the need for universally designed assessments. The No Child Left Behind Act (Elementary and Secondary Education Act) requires that each state must “provide for the participation in [statewide] assessments of all students” [Section 1111(b)(3)(C)(ix)(I)]. Both Title 1 and IDEA regulations call for universally designed assessments that are accessible and valid for all students, including students with disabilities and English Language Learners. The benefits of universally designed assessments not only apply to these groups of students, but to all individuals with wide-ranging characteristics.

DRC’s test development team was trained in the elements of Universal Design as it relates to developing large-scale statewide assessments. Team leaders were trained directly by NCEO, and other team members were subsequently trained by team leaders. Committees involved in content review included some members who were familiar with the unique needs of students with disabilities and English Language Learners. Likewise some members of the Bias, Fairness, and Sensitivity Committee were conversant with these issues. What follows are the Universal Design guidelines followed during all stages of the item development process for the PSSA.

### **ELEMENTS OF UNIVERSALLY DESIGNED ASSESSMENTS**

After a review of research relevant to the assessment development process and the Principles of Universal Design (Center for Universal Design, 1997), NCEO has produced seven elements of Universal Design as they apply to assessments (Thompson, Johnstone & Thurlow, 2002). These elements served to guide PSSA item development.

- **Inclusive Assessment Population**

The PSSA target population includes all students at the assessed grades attending Commonwealth schools. For state, district, and school accountability purposes, the target population includes all students except those who will participate in accountability through an alternate assessment.

- **Precisely Defined Constructs**

An important function of well-designed assessments is that they actually measure what they are intended to measure. The Pennsylvania Assessment Anchor Content Standards (Assessment Anchors) provided clear descriptions of the constructs to be measured by the PSSA at the assessed grade levels. Universally designed assessments must remove all non-construct-oriented cognitive, sensory, emotional, and physical barriers.

- **Accessible, Non-biased Items**

DRC conducted both internal and external reviews of items and test specifications to ensure that they did not create barriers because of lack of sensitivity to disability, culture, or other subgroups. Items and test specifications were developed by a team of individuals who understand the varied characteristics of items that might create difficulties for any group of students. Accessibility is incorporated as a primary dimension of test specifications, so accessibility was woven into the fabric of the test rather than being added after the fact.

- **Amenable to Accommodations**

Even though items on universally designed assessments are accessible for most students, there are some students who continue to need accommodations. This essential element of a universally designed assessment requires that the test is compatible with accommodations and a variety of widely used adaptive equipment and assistive technology. (See the section on Assessment Accommodations later in Chapter Four.)

- **Simple, Clear, and Intuitive Instructions and Procedures**

Assessment instructions should be easy to understand, regardless of a student's experience, knowledge, language skills, or current concentration level. Questions that are posed using complex language can invalidate the test if students cannot understand how they are expected to respond to a question. To meet this guideline, directions and questions were prepared in simple, clear, and understandable language that underwent multiple reviews.

- **Maximum Readability and Comprehensibility**

A variety of guidelines exist to ensure the maximum readability and comprehensibility of a test. These features go beyond what is measured by readability formulas. Readability and comprehensibility are affected by many factors, including student background, sentence difficulty, text organization, and others. All of these features were considered as item text was developed.

Plain language is a concept now being highlighted in research on assessments. Plain language has been defined as language that is straightforward and concise. The following strategies for editing text to produce plain language were used during the editing process of the new PSSA items:

- Reduction of excessive length
- Use of common words
- Avoidance of ambiguous words
- Avoidance of irregularly spelled words
- Avoidance of proper names
- Avoidance of inconsistent naming and graphic conventions
- Avoidance of unclear signals about how to direct attention

- **Maximum Legibility**

Legibility is the physical appearance of text, the way that the shapes of letters and numbers enable people to read text easily. Bias can result when tests contain physical features that interfere with a student's focus on or understanding of the constructs that test items are intended to assess. A style guide developed and updated annually (DRC, 2004–2009) was utilized, with PDE approval, which included dimensions of style consistent with universal design.

## **GUIDELINES FOR UNIVERSALLY DESIGNED ITEMS**

All test items written and reviewed adhered closely to the following guidelines for Universal Design. Item writers and reviewers used a checklist during the item development process to ensure that each aspect was attended to. For more information on the checklist, see the Universal Design section in Chapter Three of this report.

- 1. Items measure what they are intended to measure.** Item writing training included ensuring that writers and reviewers had a clear understanding of Pennsylvania's Academic Standards and the Assessment Anchors. During all phases of test development, items were presented with content-standard information to ensure that each item reflected the intended Assessment Anchor. Careful consideration of the content standards was important in determining which skills involved in responding to an item were extraneous and which were relevant to what was being tested. In certain types of items an additional skill is necessary, such as the mathematics test, which requires the student to read.
- 2. Items respect the diversity of the assessment population.** To develop items that avoid content that might unfairly advantage or disadvantage any student subgroup, item writers, test developers, and reviewers were trained to write and review items for issues of bias, fairness, and sensitivity. Training also included an awareness of, and sensitivity to, issues of cultural and regional diversity.
- 3. Items have a clear format for text.** Decisions about how items are presented to students must allow for maximum readability for all students. Appropriate fonts and point sizes were employed with minimal use of italics, which is far less legible and is read considerably more slowly than standard typeface. Captions, footnotes, keys, and legends were at least a 12-point size (11 pt. for Grade 11). Legibility was enhanced by sufficient spacing between letters, words, and lines. Blank space around paragraphs and between columns and staggered right margins were used.
- 4. Stimuli and items have clear pictures and graphics.** When pictures and graphics were used, they were designed to provide essential information in a clear and uncluttered manner. Illustrations were placed directly next to the information to which they referred, and labels were used where possible. Sufficient contrast between background and text, with minimal use of shading, increased readability for students with visual impairments. Color was not used to convey important information.

5. **Items have concise and readable text.** Linguistic demands of stimuli and items can interfere with a student’s ability to demonstrate knowledge of the construct being assessed. During item writing and review, the following guidelines were used.
  - Simple, clear, commonly-used words were used whenever possible.
  - Extraneous text was omitted.
  - Vocabulary and sentence complexity were appropriate for the grade level being assessed.
  - Technical terms and abbreviations were used only if they were related to the content being measured.
  - Definitions and examples were clear and understandable.
  - Idioms were avoided unless idiomatic speech was being assessed.
  - The questions to be answered were clearly identifiable.
6. **Items allow changes to format without changing meaning or difficulty.** A Braille version of the PSSA was available at each assessed grade. Attention was given to using items that allow for Braille. Specific accommodations were permitted, such as signing to a student, the use of oral presentation under specified conditions, and the use of various assistive technologies. A Spanish version of the PSSA mathematics and PSSA science test was available for use by English Language Learners who would benefit from this accommodation.
7. **The test has an overall appearance that is clean and organized.** Images, pictures, and text that may not be necessary (e.g., sidebars, overlays, callout boxes, visual crowding, shading) and that could be potentially distracting to students were avoided. Also avoided were purely decorative features that did not serve a purpose. Information was organized in a left-right, top-bottom format.

## ITEM DEVELOPMENT

DRC and WestEd work closely with the Pennsylvania Department of Education to help ensure that PSSA tests comply with nationally recognized Principles of Universal Design. The implementation of accommodations on large-scale statewide assessments for students with disabilities is supported in the development of the PSSA. In addition to the Principles of Universal Design as described in the Pennsylvania Technical Report, DRC and WestEd apply to each content area assessment the standards for test accessibility as described in *Tests Access: Making Tests Accessible for Students with Visual Impairments—A Guide for Test Publishers, Test Developers, and State Assessment Personnel* (Allman, 2004). To this end, DRC and WestEd embrace the following precepts:

- Test directions are carefully worded to allow for alternate responses to open-ended questions.
- During item and bias reviews, test committee members are made aware of the Principles of Universal Design and of issues that may adversely affect students with disabilities with the goal of ensuring that PSSA tests are bias free for all students.

- With the goal of ensuring that the PSSA tests are accessible to the widest range of diverse student populations, PDE instructs DRC and WestEd to limit item types that are difficult to format in Braille and that may become distorted when published in large print. DRC and WestEd are instructed to limit the following on the PSSA.
  - Mathematics: Complicated tessellations; charts or graphs that extend beyond one page.
  - Reading: Graphics and illustrations that are not germane to the content presented.
  - All content areas: Unnecessary boxes and framing of text, unless enclosing the text provides necessary context for the student; use of italics (limited to only when it is absolutely necessary, such as with variables).

### **ITEM FORMATTING**

For all content areas, DRC formats PSSA tests to maximize accessibility for all students by using text that is in a point size and font style that is easily readable. DRC limits shading, graphics, charts, and number of items per page so that there is sufficient white space on each page. Whenever possible, DRC ensures that graphics, pictures, diagrams, charts, and tables are positioned on the page with the associated test items. DRC uses high contrast for text and background where possible to convey pertinent information. Tests are published on dull-finish paper to avoid the glare encountered on glossy paper. DRC pays close attention to the binding of the PSSA test booklets to ensure that they lie flat for two-page viewing and ease of reading and handling.

DRC ensures consistency across PSSA assessments by following these Principles of Universal Design:

- High contrast and clarity is used to convey detailed information.
- Typically, shading is avoided; when necessary for content purposes, 10 percent screens are used as the standard.
- Overlaid print on diagrams, charts, and graphs is avoided.
- Charts, graphs, diagrams, and tables are clearly labeled with titles and with short descriptions where applicable.
- Only relevant information is included in diagrams, pictures, and graphics.
- Symbols used in keys and legends are meaningful and provide reasonable representations of the topics they depict.
- Pictures that require physical measurement are true to size.

## **ASSESSMENT ACCOMMODATIONS**

While universally designed assessments provide for participation of the widest range of students, many students require accommodations in order to participate in the regular assessment. Clearly, the intent of providing accommodations for students is to ensure that students are not unfairly disadvantaged during testing and that the accommodations used during instruction, if appropriate, are made available as students take the test. The literature related to assessment accommodations is still evolving and often focuses on state policies regulating accommodations rather than on providing empirical data that supports the reliability and validity of the use of accommodations. On a yearly basis, the Pennsylvania Department of Education examines accommodations policies and current research to ensure that valid, acceptable accommodations are available for students. An accommodations manual for the PSSA entitled *2010 Accommodations Guidelines for Students with IEPs and Students with 504 Plans* (PDE, January 2010) was developed for use with the 2010 PSSA.

The manual can be accessed by going to [www.education.state.pa.us](http://www.education.state.pa.us). On the left, click on “Programs,” then “Programs O–R,” then “Pennsylvania System of School Assessment (PSSA),” and then “Testing Accommodations & Security.”

In addition, Spanish-language versions, translated from the original English versions, were made available for both the mathematics and science PSSA. The Spanish translation versions are discussed in Chapter Six.

## **Chapter Five: Field Test Leading to the 2010 Core**

Generally, all non-linking core items appearing on the 2010 assessment came from the 2009 embedded field test positions. Prior to 2009, PSSA test forms contained common items that were identical on all forms along with matrix/embedded field test items. On the 2009 administration, equating block positions (equating items) replaced matrix positions. The common items consisted of a set of core items taken by all students. The matrix and field test items were embedded and were unique, in most instances, to a form; however, there were instances in which a matrix or embedded field test item appeared on more than one form. The purpose of administering field test items is to obtain statistics for them so they can be reviewed before becoming operational. Based on this statistical review, many of the field test items embedded in the 2009 PSSA were selected for use as common or equating block items (equating items) in the 2010 PSSA.

More information on the field test designs for all contents can be found in the content-specific portions of Chapter Three.

### **STATISTICAL ANALYSIS OF ITEM DATA**

All field tested items were analyzed statistically following conventional item analysis methods. For MC items, traditional or classical item statistics included the corrected point-biserial correlation (Pt. Bis.) for the correct and incorrect responses (distractors), percent correct ( $p$ -value), and the percent responding to incorrect responses. For OE items, the statistical indices included the item-test correlation, the point-biserial correlation for each score level, percent in each score category or level, and the percent of non-scoreable responses.

In general, more capable students are expected to respond correctly to easy items and less capable students are expected to respond incorrectly to difficult items. If either of these situations does not occur, the item will be reviewed by DRC test development staff and committees of Pennsylvania educators to determine the nature of the problem and the characteristics of the students affected. The primary way of detecting such conditions is through the point-biserial correlation coefficient for dichotomous (MC) items and the item-total correlation for polytomous (OE) items. In each case the statistic will be positive if the total test mean score is higher for the students who respond correctly to MC items (or attain a higher OE item score) and negative when the reverse is true.

Item statistics are used as a means of detecting items that deserve closer scrutiny, rather than being a mechanism for automatic retention or rejection. Toward this end, a set of criteria was used as a screening tool to identify items that needed a closer review by committees of Pennsylvania educators. For an MC item to be flagged, the criteria included any of the following:

- Point-biserial correlation for the correct response of less than 0.25
- Point-biserial correlation for any incorrect response greater than 0.0
- Percent correct less than 0.3 or greater than 0.9
- Percent responding to any incorrect responses greater than the percent correct
- Gender DIF code of either C- or C+
- Any ethnic DIF code of C-

For an OE item to be flagged, the criteria included any of the following:

- Score Proportion < .05
- Gender DIF code of B-, B+, C- or C+
- Any ethnic DIF code of B- or C-

Item analysis results for MC and OE field test items are presented in Appendix I.

## **REVIEW OF ITEMS WITH DATA**

In the preceding section on Statistical Analysis of Item Data, it was stated that test development content-area specialists used certain statistics from item and DIF analyses of the 2009 field test to identify items for further review. Specific flagging criteria for this purpose were specified in the previous section. Items not identified for this review were those that had good statistical characteristics and, consequently, were regarded as statistically acceptable. Likewise, items of extremely poor statistical quality were regarded as unacceptable and needed no further review. However, there were some items, relatively few in number, that DRC content-area test development specialists and DRC psychometric specialists regarded as needing further review by a committee of Pennsylvania educators. The intent was to capture all items that needed a closer look; thus, the criteria employed tended to over-identify rather than under-identify items.

The review of the items with data was conducted by over 50 Pennsylvania educators (teachers and PDE staff) broken out into subject-area content committees. The review for reading and mathematics took place on August 3–4, 2009. The review for science took place on August 4, 2009. The review for writing took place on August 11, 2009. In these sessions, committee members were first trained by a representative from DRC's psychometrics staff with regard to the statistical indices used in item evaluation. This was followed by a discussion with examples concerning reasons that an item might be retained regardless of the statistics. The committee review process involved a brief exploration of possible reasons for the statistical profile of an item (e.g., possible bias, grade appropriateness, instructional issues) and a decision regarding acceptance. DRC content-area test development specialists facilitated the review of the items. Each committee reviewed the pool of field test items and made recommendations on each item and/or scenario/passage. Further discussion on how this information was used is covered in Chapter Six.

**Table 5–1. 2009 Data Review Committee Results**

Assessment	Grade	No. of Items in 2009 Field Test	Flagged Items in 2009 Field Test Examined at 2009 Data Review Committee					Flagged Items in 2009 Field Test Rejected by 2009 Data Review Committee		Items Classified as “Rejected” from 2009 Field Test (all sources: Data Review Committee, PDE, and DRC)	
			MC	OE	Items flagged for DIF only	Total	Total (% of FT)	No. of	% of FT	No. of	% of FT
Mathematics	3	99	50	9	9	59	59.6%	3	3.0%	3	3.0%
	4	99	21	9	13	30	30.3%	2	2.0%	3	3.0%
	5	99	20	9	8	29	29.3%	1	1.0%	1	1.0%
	6	99	9	9	5	18	18.2%	2	2.0%	2	2.0%
	7	99	5	9	1	14	14.1%	2	2.0%	2	2.0%
	8	99	10	9	6	19	19.2%	3	3.0%	4	4.0%
	11	99	14	9	6	23	23.2%	2	2.0%	3	3.0%
Reading	3	99	11	9	5	20	20.2%	2	2.0%	2	2.0%
	4	99	15	9	5	24	24.2%	4	4.0%	4	4.0%
	5	99	13	10	9	23	23.2%	1	1.0%	1	1.0%
	6	99	15	9	8	24	24.2%	2	2.0%	2	2.0%
	7	99	14	9	8	23	23.2%	0	0.0%	0	0.0%
	8	99	18	9	11	27	27.3%	2	2.0%	3	3.0%
	11	99	18	9	10	27	27.3%	1	1.0%	4	4.0%
Science	4	81	27	3	4	30	37.0%	9	11.1%	12	14.8%
	8	99	42	8	8	50	52.1%	4	4.0%	4	4.0%
	11	96	46	4	5	50	50.5%	4	4.2%	12	12.5%
Writing	5	54	9	6	12	15	27.8%	0	0.0%	16	29.6%
	8	54	8	6	11	14	25.9%	0	0.0%	16	29.6%
	11	54	11	6	13	17	31.5%	0	0.0%	11	20.4%
<b>Total</b>		<b>1,824</b>	<b>376</b>	<b>160</b>	<b>157</b>	<b>536</b>	<b>29.4%</b>	<b>44</b>	<b>2.4%</b>	<b>105</b>	<b>5.8%</b>

## **DIFFERENTIAL ITEM FUNCTIONING**

Differential item functioning (DIF) occurs when examinees with the same ability level but different group memberships do not have the same probability of answering an item correctly. This pattern of results may suggest the presence of *item bias*. As a statistical concept, however, DIF can be differentiated from item bias, which is a content issue that can arise when an item presents negative group stereotypes, uses language that is more familiar to one subpopulation than to another, or is presented in a format that disadvantages certain learning styles. While the source of item bias is often plain to trained judges, DIF may have no clear cause. However, studying how DIF arises and how it presents itself can provide information about how to detect and correct for it.

### ***Limitations of Statistical Detection***

No statistical procedure should be used as a substitute for rigorous, hands-on reviews by content and bias specialists. The statistical results can help organize the review so the effort is concentrated on the most problematic cases. Further, no items should be automatically rejected simply because a statistical method flagged them or accepted because they were not flagged.

Statistical detection of DIF is an inexact science. There have been a variety of methods proposed for detecting DIF, but no single statistic can be considered either necessary or sufficient. Different methods are more or less successful depending on the situation. No analysis can guarantee that a test is free of bias, but almost any thoughtful analysis will uncover the most flagrant problems.

A fundamental shortcoming of all statistical methods used in DIF evaluation is that all are intrinsic to the test being evaluated. If a test is unbiased overall but contains one or two DIF items, any method will locate the problems. If, however, all items on the test show consistent DIF to the disadvantage of a given subpopulation, a statistical analysis of the items will not be able to separate DIF effects from true differences in achievement.

### ***Mantel-Haenszel Procedure for Differential Item Functioning***

For multiple-choice (MC) items, the *Mantel-Haenszel* procedure (Mantel & Haenszel, 1959) for detecting differential item functioning is a commonly used technique in educational testing. It does not depend on the application or the fit of any specific measurement model. However, it does have significant philosophical overlap with the Rasch model since it uses a test's total score to organize the analysis.

The procedure as implemented by DRC contrasts a focal group with a reference group. While it makes no practical difference in the analysis which group is defined as the focal group, the group most apt to be disadvantaged by a biased measurement is typically defined as the focal group. In these analyses, the focal group was female for gender-based DIF and black for ethnicity-based DIF; reference groups were male and white, respectively. The Mantel-Haenszel (MH) statistic for each item is computed from a contingency table. It has two groups (focal and reference) and two outcomes (right or wrong). The ability groups are defined by the test's score distribution for the total examinee populations.

The basic MH statistic is a single degree of freedom chi-square that compares the observed number in each cell to the expected number. The expected counts are computed to ensure that the analysis is not confounded with differences in the achievement level of the two groups.

For OE items, a comparable statistic is computed based on the standardized mean difference (SMD) (Dorans, Schmitt, & Bleistein, 1992), which is computed as the differences in mean scores for the focal and reference groups if both groups had the same score distribution.

To assist the review committees in interpreting the analyses, the items are assigned a severity code based on the magnitude of the MH statistic. Items classified as A+ or A- have little or no statistical indication of DIF. Items classified as B+ or B- have some indication of DIF but may be judged to be acceptable for future use. Items classified as C+ or C- have strong evidence of DIF and should be reviewed and possibly rejected from the eligible item pool. The plus sign indicates that the item favors the focal group and a minus sign indicates that the item favors the reference group.

### ***Results and Observations***

Counts of the number of items from each grade and subject area that were assigned to each severity code are shown below in Table 5–2A (MC items) and 5–2B (OE items). DIF analyses were conducted on the 2010 PSSA field test items and maybe compared to the 2009 results.

The number of field test items in each DIF category across the two years were quite similar. Overall, relatively few items had B or C DIF for the Male/Female or White/Black reference and focal groups. Generally speaking, there were more items showing White/Black DIF than Male/Female DIF. However, it was the Male/Female DIF for OE items in Reading and Writing that exhibited the highest proportion of B or C classifications, with Reading having relatively more C DIF codes. While this matches historical trends, additional monitoring and study of DIF in these areas may be warranted.<sup>1</sup>

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<sup>1</sup> As suggested earlier, only a subset of items showing DIF will actually be biased. For example, any given B or C DIF code might be a false positive. It may also be the result of one of a number of systematic factors not actually attributable to bias. Of course, only items approved by teacher review committees will actually appear on operational PSSA tests.

Table 5–2A. DIF Summary—MC Items

	Grade	Male/Female													White/Black														
		2009						2010						2009						2010									
		A+	A-	B+	B-	C+	C-	Tot	A+	A-	B+	B-	C+	C-	Tot	A+	A-	B+	B-	C+	C-	Tot	A+	A-	B+	B-	C+	C-	Tot
Mathematics	3	51	35	4	0	0	0	90	45	42	0	3	0	0	90	4	54	0	20	0	12	90	2	53	0	18	0	17	90
	4	52	35	2	1	0	0	90	55	34	1	0	0	0	90	5	60	0	17	0	8	90	10	53	0	18	0	9	90
	5	43	46	1	0	0	0	90	46	42	1	1	0	0	90	10	61	0	13	0	6	90	12	63	0	11	0	4	90
	6	48	39	1	2	0	0	90	57	28	2	3	0	0	90	13	70	1	5	0	1	90	15	63	0	11	0	1	90
	7	51	34	0	5	0	0	90	48	34	2	6	0	0	90	11	69	0	10	0	0	90	19	66	0	5	0	0	90
	8	50	32	5	3	0	0	90	48	39	2	2	0	0	91	12	64	0	11	0	3	90	15	62	1	9	0	4	91
11	46	35	1	8	0	0	90	37	46	1	6	0	1	91	28	55	0	6	0	1	90	17	67	0	6	0	1	91	
Reading	3	51	39	0	0	0	0	90	54	34	2	0	0	0	90	11	72	0	6	0	1	90	10	72	0	7	0	1	90
	4	53	37	0	0	0	0	90	57	29	2	0	0	2	90	12	66	0	10	0	2	90	5	77	0	6	0	2	90
	5	57	31	0	2	0	0	90	40	49	1	0	0	0	90	10	65	0	15	0	0	90	6	69	0	13	0	2	90
	6	45	37	1	5	0	2	90	47	41	0	1	0	1	90	11	68	0	9	0	2	90	12	68	0	6	0	4	90
	7	51	34	2	2	0	1	90	41	43	0	4	0	2	90	14	70	0	6	0	0	90	16	66	0	7	0	1	90
	8	38	45	2	4	0	1	90	33	51	1	3	0	2	90	12	64	0	13	0	1	90	6	75	0	4	0	5	90
11	51	36	2	1	0	0	90	40	46	2	2	0	0	90	6	71	0	11	0	2	90	10	54	3	18	0	5	90	
Science	4	48	48	0	0	0	0	96	48	44	1	3	0	0	96	7	80	0	8	0	1	96	15	69	0	11	0	1	96
	8	69	48	1	1	0	1	120	50	65	1	3	1	0	120	22	98	0	0	0	0	120	24	89	0	7	0	0	120
	11	27	52	0	1	0	0	80	19	53	1	7	0	0	80	17	61	0	1	0	1	80	17	60	0	3	0	0	80
Writing	5	18	30	0	0	0	0	48	25	23	0	0	0	0	48	4	36	0	8	0	0	48	3	36	0	4	0	5	48
	8	24	24	0	0	0	0	48	23	25	0	0	0	0	48	5	34	0	6	0	3	48	7	32	0	7	0	2	48
	11	25	22	0	1	0	0	48	20	27	0	1	0	0	48	2	30	0	12	0	4	48	3	31	0	9	0	5	48

Table 5–2B. DIF Summary—OE Items

	Grade	Male/Female														White/Black													
		2009							2010							2009						2010							
		A+	A-	B+	B-	C+	C-	Tot	A+	A-	B+	B-	C+	C-	Tot	A+	A-	B+	B-	C+	C-	Tot	A+	A-	B+	B-	C+	C-	Tot
Mathematics	3	6	3	0	0	0	0	9	5	4	0	0	0	0	9	0	6	0	1	0	2	9	0	3	0	4	0	2	9
	4	8	0	0	0	0	0	8	8	1	0	0	0	0	9	1	2	0	2	0	3	8	0	4	0	1	0	4	9
	5	6	1	2	0	0	0	9	6	2	1	0	0	0	9	2	5	0	1	0	1	9	0	8	0	0	0	1	9
	6	7	1	1	0	0	0	9	4	4	0	0	1	0	9	1	6	1	0	0	1	9	1	5	0	3	0	0	9
	7	5	4	0	0	0	0	9	7	2	0	0	0	0	9	1	8	0	0	0	0	9	1	3	0	3	0	2	9
	8	5	3	1	0	0	0	9	7	2	0	0	0	0	9	1	7	0	0	0	1	9	0	6	0	3	0	0	9
	11	6	2	1	0	0	0	9	3	5	1	0	0	0	9	1	5	0	2	0	1	9	1	7	0	1	0	0	9
Reading	3	6	0	3	0	0	0	9	6	0	2	0	1	0	9	1	7	0	1	0	0	9	4	5	0	0	0	0	9
	4	7	0	1	0	1	0	9	5	0	3	0	1	0	9	1	6	0	2	0	0	9	5	2	0	1	0	1	9
	5	1	0	6	0	2	0	9	3	0	4	0	2	0	9	1	4	2	2	0	0	9	3	4	0	1	0	1	9
	6	5	0	3	0	1	0	9	3	0	2	0	4	0	9	7	0	0	1	0	1	9	5	2	0	2	0	0	9
	7	2	0	5	0	2	0	9	0	0	4	0	5	0	9	3	6	0	0	0	0	9	7	2	0	0	0	0	9
	8	0	0	5	0	4	0	9	1	1	2	0	5	0	9	4	4	1	0	0	0	9	6	2	1	0	0	0	9
	11	1	0	3	0	5	0	9	2	0	1	0	6	0	9	4	3	2	0	0	0	9	1	7	0	1	0	0	9
Science	4	11	1	0	0	0	0	12	2	9	1	0	0	0	12	2	7	0	3	0	0	12	3	8	0	1	0	0	12
	8	5	3	1	2	0	1	12	5	7	0	0	0	0	12	1	6	0	3	0	2	12	1	5	0	1	0	5	12
	11	10	4	1	0	1	0	16	10	5	0	1	0	0	16	2	11	0	2	0	1	16	4	7	0	1	0	4	16
Writing	5	2	0	7	0	3	0	12	2	0	8	0	2	0	12	2	6	0	4	0	0	12	0	11	0	1	0	0	12
	8	6	0	6	0	0	0	12	3	0	5	0	4	0	12	0	7	0	3	0	2	12	1	9	0	1	0	1	12
	11	6	0	6	0	0	0	12	2	0	10	0	0	0	12	1	6	0	2	0	3	12	6	6	0	0	0	0	12



## ***Chapter Six: Operational Forms Construction for 2010***

### **FINAL SELECTION OF ITEMS AND 2010 PSSA FORMS CONSTRUCTION**

When the final selection of items for the operational 2010 test was ready to begin, the candidate items that emerged from the spring 2009 field test had undergone multiple reviews, including:

- Reviews by DRC and WestEd content-area test development specialists and curriculum specialists to ensure that all items were properly aligned with content standards.
- Formal bias, fairness, and sensitivity review by the Bias, Fairness, and Sensitivity Committee consisted of a multi-ethnic group of men and women having expertise with special needs students and English Language Learners.
- Formal review by the content committees consisting of Pennsylvania educators, including teachers as well as district personnel.
- PDE review.
- Item data review by members of the PDE subject-area teacher committees.

The item and bias reviews are detailed in Chapter Three. The results of the data review are summarized in Chapter Five.

The end product of the above process was an item status designation for each field tested item. All items having an item status code of Acceptable/Active were candidates to be selected for the 2010 PSSA. To have an item status code of Acceptable/Active meant that the item met the following criteria:

- Appropriately aligned with its designated Assessment Anchor Content Standard (Assessment Anchor) and sub-classifications.
- Acceptable in terms of bias/fairness/sensitivity issues, including differential item functioning (for gender and ethnicity).
- Acceptable in terms of psychometric standards, including a special review of flagged items.

Next, all relevant information regarding the acceptable items, including associated graphics, was entered into the item banking system known as IDEAS (Item Development and Education Assessment System). From IDEAS and other database sources, Microsoft Excel files were created for each content area at each grade. These files contained all relevant content codes and statistical characteristics. IDEAS also created an item card displaying each acceptable item, any associated graphic, and all relevant content codes and item statistics for use by the content-area test development specialists and psychometric services staff.

DRC test development specialists reviewed the test design blueprint, including the number of items per strand for each content-area test. Special considerations, such as calculator use and manipulatives, were noted.

Psychometricians provided content-area test development specialists with an overview of the psychometric guidelines for forms construction, including guidelines for selecting linking items to link to previous test forms.

Senior DRC content-area test development specialists reviewed all items in the operational pool to make an initial selection for common (core) and equating block (equating items) positions according to test blueprint requirements and psychometric guidelines. Changes to items were not encouraged since alterations could affect how an item performs on subsequent testing.

For the common items, this meant that the combination of MC and OE items would yield the appropriate range of points while tapping an appropriate variety of the Assessment Anchors and related Eligible Content within each Reporting Category. Items selected in the first round were examined with regard to how well they went together as a set. Of particular concern were the following:

- One item providing cues as to the correct answer to another item.
- Context redundancy (e.g., mathematics items with a sports context).
- Presence of clang (distractors not unique from one another).
- Diversity of names and artwork for gender and ethnicity.

The first round of items was then evaluated for statistical features such as an acceptable point biserial correlation and whether correct answers were distributed equally—that is, whether approximately 25 percent of correct answers appeared in each of the four possible positions (A, B, C, or D). Selected items that were deemed psychometrically less advantageous in contrast to the overall psychometric characteristics of the core resulted in a search by the senior reviewer for suitable replacements. At this point, the second round of items was analyzed. If necessary, this iterative process between content-based selections and statistical properties continued in an effort to reach the best possible balance.

In the case of the core-to-core linking items (part of the overall core pull), content considerations remained relevant, together with statistical features, such as an acceptable point-biserial correlation and whether the items, as a collection, had an average logit value and a test characteristic curve approximating that of the previous year.

The process for selecting equating block items was slightly different. The chief consideration was that items in equating block positions of the various forms mirrored the psychometric considerations of the core. In some cases, the selection of equating block items also required multiple rounds of selection and evaluation until the best possible balance of content and statistical properties was obtained. The content-area test development specialist's task was to distribute these items in equating block positions across the nine forms so that the MC items assigned to a particular form would go well with one another and reflect the same content and statistical considerations as previously outlined. Additionally, the forms needed to display similar difficulty levels.

Once the recommendations were finalized for the core items, core-to-core linking items, and equating block items, they were submitted to PDE for review. Department staff provided feedback, which could be in the form of approval or recommendations for replacing certain items. Any item replacement was accomplished by the collective effort of the test development specialists, psychometricians, and PDE staff until final PDE approval was given.

## **SPECIAL FORMS USED IN THE 2010 PSSA**

### ***Braille and Large Print***

Students with visual impairments were able to respond to test materials that were available in either Braille or large print. At each grade level assessed, one form was selected for the creation of a Braille and a large print edition. School district personnel ordered Braille or large print assessment materials directly from DRC. They could also contact PaTTAN for technical assistance regarding students with visual impairments.

School personnel were directed to transcribe all student answers (MC and OE) into scannable answer documents exactly as the student responded. No alterations or corrections of student work were permitted, and the transcribed answer document had to have the same form designation as the Braille and large print version.

### ***Spanish Translation of the Mathematics and Science Assessments***

Starting with the 2005 assessment and continuing through the 2010 assessment, school personnel had the option of allowing Spanish-speaking students who had been enrolled in schools in the United States for less than three years to respond to a Spanish version of the PSSA for mathematics. In 2009, a Spanish version was also added for the science component of the PSSA. The original translation of the items and the *Directions for Administration Manual* was initiated by Second Language Testing, Incorporated, and completed by DRC. Second Language Testing, Incorporated, uses translators with varying cultural and regional backgrounds to create the Spanish versions of the mathematics and science assessments. After discussions with PDE and Second Language Testing, Incorporated, the mathematics sections of the mathematics and reading test booklets for Grades 4–8 and 11 and the entire science assessment for Grades 4 and 8 were designed with a side-by-side format with the English text and Spanish translated text on facing pages. The Spanish translated text was on the left-hand side followed by the original English text on the right-hand (facing) side.

The mathematics sections of the answer booklets for Grades 4–8 and 11 and the science answer booklets for Grades 4 and 8 were also presented in Spanish and English. In the case of mathematics, each open-ended item covered a total of four pages in the answer booklet. In the case of science, each open-ended item covered either two or four pages in the answer booklet, depending on the length of the original English-language item. In the case of four-page open-ended items, the first set of facing pages of an item was presented in Spanish. The second set of facing pages of an item was presented in the original English. Those students using this accommodated version of the mathematics assessment could write their answers on either the English language pages or on the translated Spanish language pages. Their answers could be written in English, Spanish, or a combination of both Spanish and English as all pages were evaluated and scored, and the highest possible scores from those combinations recorded for the students.

The mathematics sections of the scannable booklets for the Grade 3 and Grade 11 science assessment scannable booklets were also presented in Spanish and English using a modified over/under format, with the Spanish presented directly above or to the left of the English. To assist the presentation of the two languages on the same page, the English portion was presented in italics and in a smaller font. Those students using this accommodated version of the mathematics assessment could write their answers in English, Spanish, or a combination of both

Spanish and English, with the highest possible scores from those combinations recorded for the students.

Spanish translated versions of the mathematics assessment were used by a total of 2,392 students at Grades 3–8 and 11 in 2010. Spanish translated versions of the science assessment were used by a total of 926 students at Grades 4, 8, and 11 in 2010.

Instructions for the appropriate use of these special forms are detailed in the *2010 Accommodations Guidelines for Students with IEPs and Students with 504 Plans* (PDE, January 2010).

### ***Summary of the Translation Verification Study by SLTI of the 2009 PSSA Science Assessments***

From November 2009 through January 2010, Second Language Testing, Incorporated, conducted a translation verification study of the 2009 PSSA science assessments titled “Translation Verification Study of the 2009 Pennsylvania System of School Assessment (PSSA) of Science for Grades 4, 8, and 11.” In this study, the appropriateness of the transadaptation of the PSSA Science Assessments into Spanish was investigated. Three independent reviewers, specialists in bilingual science education and science translation, were used to determine the appropriateness of each translated or adapted item. The purpose of the report was to conduct qualitative research on the comparability of the Spanish and English versions of the PSSA Science assessments.

The report of this study by Second Language Testing, Incorporated, described the assessments, the purpose of the translation verification study, the reviewers, the translation verification process, and the translation verification results. A total of 185 items covering tests at Grades 4 (63 items), 8 (63 items), and 11 (59 items) were reviewed. The study shows that none of the 185 reviewed items were judged by the reviewers to be inappropriately translated or adapted into Spanish. The study did provide suggestions for nine items that were judged as appropriate but the translation could still be improved in the event the items were used again.

Overall, the report concluded that the transadaptation of the 2009 PSSA Science Assessments was clearly appropriate. Since both the English and Spanish versions are comparable in the sense that both versions assess the same content, use the same format, have equal numbers of items, follow the same test administration and scoring procedures, and are used and interpreted in the same way, the study concluded that the English and Spanish versions of the science assessments measured the same content in two different languages. Thus, the study indicated that both language versions showed the same degree of alignment and the same depth-of-knowledge described in the Assessment Anchors alignment study. As a result, the report concluded that there is no need to conduct a separate alignment study of the Spanish version of the PSSA Science Assessments.

Beyond the findings presented in the study, the report recommended that appropriate quantitative analyses be carried out on construct equivalence. Unless such analyses clearly demonstrate a lack of equivalence, it is appropriate to assume that there is no need to conduct a separate linking study or a separate standard setting study for the Spanish versions of the tests. Both versions can be scored on the same scale and scores on each version have the same meaning in terms of student mastery of the Science Assessment Anchors as defined by the Eligible Content.

The full report can be obtained by request from the Pennsylvania Department of Education.

***Summary of Comparability Report from Sireci Psychometric Services***

In addition to the study conducted by Second Language Testing, Incorporated, a second comparability study of the 2009 PSSA Spanish translations for science was completed in February 2010 by Sireci Psychometric Services. The report of the study is titled “Evaluating the Comparability of English and English-Spanish Science Tests from the Pennsylvania System of School Assessment.”

In this study, the data from the English-language and English-Spanish dual-language Pennsylvania science tests for Grades 4, 8, and 11 were analyzed. These analyses were designed to evaluate the consistency of the structure of the data and the consistency of item functioning across the English and Spanish versions of these assessments using various psychometrics methods.

The full report can be obtained by request from the Pennsylvania Department of Education.



## Chapter Seven: Test Administration Procedures

### TEST SESSIONS, TEST SECTIONS, TEST TIMING, AND TEST LAYOUT

Some assessments utilized separate test booklets and answer booklets. An answer booklet was used to respond to the multiple-choice and open-ended items and to collect demographic information. The multiple-choice items and all stimulus-text were placed within the test booklet. Other assessments use a single consumable booklet. When a single scannable answer booklet was utilized, the contents of the answer booklet and the test booklet were combined into one integrated booklet.

**Table 7–1. Booklet Type by Administration**

Assessment	Grade	Test Booklet	Answer Booklet	Single Consumable Booklet
<b>Mathematics &amp; Reading</b>	3			✓
	4	✓	✓	
	5	✓	✓	
	6	✓	✓	
	7	✓	✓	
	8	✓	✓	
<b>Science</b>	11	✓	✓	
	4	✓	✓	
	8	✓	✓	
<b>Writing</b>	11			✓
	5			✓
	8			✓

Generally, a separate test booklet and answer booklet were used to separate the multiple-choice items and the open-ended items. For the Grade 3 mathematics and reading assessment, a single booklet was used to accommodate the younger age of the students. Grade 11 science utilized one booklet to allow the science scenarios to be presented along with the corresponding scenario open-ended items. The writing assessments also utilized one booklet, since sections 2, 3, and 4 all required student writing only.

The number of sections for the 2010 operational assessment varied based on the content area of the assessment. The reading and mathematics assessments consisted of six sections. The science assessments consisted of three sections. The writing assessments consisted of four sections. See also Appendix G.

**Table 7–2. PSSA Test Section Information**

	Assessment	No. of Sections per Content	No. of Sections per Form
1.	Mathematics	3	6
	Reading	3	
2.	Writing	4	4
3.	Science	3	3

**Table 7–3. PSSA Duration and Testing Load by Subject by Grade**

Assessment	Grade	Total No. of MC Items per Form per Administration	Total No. of OE Items per Form per Administration	Total Estimated Administration Time per Form (in Minutes)
Mathematics	3	72	4	200 to 245
	4	72	4	200 to 245
	5	72	4	200 to 245
	6	72	4	200 to 245
	7	72	4	200 to 245
	8	72	4	200 to 245
	11	72	4	200 to 245
Reading	3	58	3	210 to 255
	4	58	5	220 to 260
	5	58	5	220 to 265
	6	58	5	225 to 270
	7	58	5	230 to 275
	8	58	5	230 to 275
	11	58	5	220 to 265
Science	4	68	6	120 to 150
	8	70	6	130 to 160
	11	62	11	190 to 235
Writing	5	20	3	270 to 330
	8	20	3	270 to 330
	11	20	3	270 to 330

**Table 7–4. PSSA Duration and Testing Load by Grade by Subject**

Grade	Content	Total No. of Items per Form per Administration	Total Estimated Administration Time per Form (in Minutes)	Total No. of Items per Student	Total Estimated Administration Time per Student (in Minutes)
3	Mathematics	76	200 to 245	137	410 to 500
	Reading	61	210 to 255		
4	Mathematics	76	200 to 245	213	530 to 655
	Reading	63	220 to 260		
	Science	74	120 to 150		
5	Mathematics	76	200 to 245	162	690 to 840
	Reading	63	220 to 265		
	Writing	23	270 to 330		
6	Mathematics	76	200 to 245	139	425 to 515
	Reading	63	225 to 270		
7	Mathematics	76	200 to 245	139	430 to 520
	Reading	63	230 to 275		
8	Mathematics	76	200 to 245	238	830 to 1010
	Reading	63	230 to 275		
	Science	76	130 to 160		
	Writing	23	270 to 330		
11	Mathematics	76	200 to 245	235	880 to 1075
	Reading	63	220 to 265		
	Science	73	190 to 235		
	Writing	23	270 to 330		

In general, the estimated testing times allowed 1–3 minutes per multiple-choice item, depending on the content area. The open-ended items were estimated to take approximately 5–10 minutes per item, also depending on the content area. Writing prompts were estimated to take approximately 55–65 minutes per prompt.

Test administrators were instructed that each section in a form should be scheduled as one assessment session. However, they were allowed to combine multiple sections into a single session, as long as the sections were administered in the sequence in which they are printed in the test booklets. In all cases, individual assessment sections had to be completed within one school day.

Since not all students finished the assessment sections at the same time, test administrators were advised to use the flexibility of the time limits to the students' advantage. For example, test administrators managed the testing time so that students did not feel rushed while they were taking any assessment section, and no student was penalized because he or she worked slowly. It was equally stressed to test administrators that a student should not be given an opportunity to waste time. Students were told to close their booklets when they had finished the section of the assessment in which they had been working. Students who finished early were allowed to sit quietly or read for pleasure until all students had finished. Students with special requirements and/or abilities (i.e., physical, visual, auditory, or learning disabilities as defined by their IEP or service contracts) and students who just worked slowly may have required extended time. Special assessment situations were arranged for these students. When all students in a testing session indicated that they had finished an assessment section, test administrators ended the section and began the next section or allowed the students to return to regular activities.

Scheduled extended time was provided by a test administrator, and students were allowed to request extended time if they indicated that they had not completed the task. Such requests were granted if the test administrator found the request to be educationally valid. Test administrators were advised that not permitting ample time for students to complete the assessment might impact the students' and school's performance.

As a general guideline, however, when all students indicated that they had finished a section, that section was closed. Students requiring time beyond the majority of the student population were allowed to continue immediately following the regularly scheduled session in another setting. When such accommodations were made, school personnel ensured that students were monitored at all times to prevent sharing of information. Students were not permitted to continue a section of the assessment after a significant lapse of time from the original session.

Additional information concerning testing time and test layouts can be found in Chapter Three.

## **TESTING WINDOW**

The testing windows for the 2010 operational assessments were as follows:

- Mathematics and Reading – April 7 through April 16, 2010
- Writing – April 19 through April 23, 2010
- Science – April 26 through April 30, 2010
- Make-up – May 3 through May 7, 2010

Additional information concerning testing time and test layouts can be found in Chapter Three.

## SHIPPING, PACKAGING, AND DELIVERY OF MATERIALS

There were two shipments sent out by DRC for the 2010 PSSA operational assessment:

- Shipment one contained the *Handbook for Assessment Coordinators* and the *Directions for Administration Manuals* for each grade tested at a school participating in the mathematics, reading, science, and writing assessments. Shipment one was delivered by March 10, 2010.
- Shipment two contained the administrative materials (e.g., Return Shipping labels, District/School labels, Do Not Score labels, and Student Precode labels) and secure materials (e.g., consumable test/answer booklets) for each grade tested at a school participating in the mathematics, reading, science, and writing assessments. Shipment two was delivered by March 24, 2010.

DRC ensured that all assessment materials were assembled correctly prior to shipping. DRC operations staff used the automated Operations Materials Management System (Ops MMS) to assign secure materials to a school at the time of ship out. This system used barcode technology to provide an automated quality check between items requested for a site and items shipped to a site. A shipment box manifest was produced for and placed in each box shipped. DRC operations staff double-checked all box contents with the box manifest prior to sealing the box for shipping to ensure accurate delivery of materials. DRC operations staff performed lot acceptance sampling on both shipments. Districts and schools were selected at random and examined for correct and complete packaging and labeling. This sampling represented a minimum of 10 percent of all shipping sites.

DRC's materials management system, along with the systems of shippers, allowed DRC to track materials from DRC's warehouse facility to receipt at the district, school, or testing site. All DRC shipping facilities, materials processing facilities, and storage facilities are secure. Access is restricted by security code. Non-DRC personnel are escorted by a DRC employee at all times. Only DRC inventory control personnel have access to stored secure materials. DRC employees are trained in and made aware of the high level of security that is required.

DRC packed 3,566,419 assessment booklets and 198,787 *Directions for Administration Manuals* for 3,382 testing sites. DRC used United Parcel Service (UPS) and Advanced Shipping Technologies to deliver the secure materials to the testing sites.

## MATERIALS RETURNED

DRC used UPS for all returns. The return windows for the PSSA materials were as follows:

- Primary return window – April 14 through April 20, 2010
- Make-up return window – April 19 through May 7, 2010

## **TEST SECURITY MEASURES**

Test security is essential to obtaining reliable and valid scores for accountability purposes. A test security affidavit was sent to all sites that received PSSA testing material. Every principal or director was to sign and return the test security affidavit with the return of the testing material. DRC received 3,232 signed test security affidavits sent to the testing sites participating in the 2010 PSSA. The purpose of the affidavit was to serve as a tool to document that the individuals responsible for administering the assessments both understood and acknowledged the importance of test security and accountability. The test security affidavit attested that all security measures were followed concerning the handling of secure materials.

## **SAMPLE MANUALS**

Copies of the *Handbook for Assessment Coordinators* and the *Directions for Administration Manuals* can be found on the PDE website at [www.education.state.pa.us](http://www.education.state.pa.us).

## **TESTING WINDOW ASSESSMENT ACCOMMODATIONS**

Three accommodations manuals, *PSSA & PSSA-M Accommodations Guidelines for Students with IEPs and Students with 504 Plans*, *Accommodations for English Language Learners*, and *Accommodations Guidelines for All Students*, were developed for use with the 2010 PSSA. Additional information regarding assessment accommodations can be found in Chapter Four of this report.

## ***Chapter Eight: Processing and Scoring***

### **RECEIPT OF MATERIALS**

Receipt of PSSA test materials began on April 14, 2010, for the mathematics and reading assessment and concluded on May 14, 2010, for all assessments. DRC's Operations Materials Management System (Ops MMS) was utilized to receive assessment materials securely, accurately, and efficiently. This system features innovative automation and advanced barcode scanners. Captured data were organized into reports, which provided timely information with respect to suspected missing material.

The first step in the Ops MMS was the Box Receipt System. When a shipment arrived at DRC, the boxes were removed from the carrier's truck and passed under a barcode reader, which read the barcode printed on the return label and identified the district and school. If the label could not be read automatically, a floor operator entered the information into the system manually. The data collected in this process were stored in the Ops MMS database. After the barcode data were captured, the boxes were placed on a pallet and assigned a corresponding pallet number.

Once the box receipt process was completed, the materials separation phase began. Warehouse personnel opened the boxes and materials were sorted by grade and status (used or unused booklets) into new boxes. Once filled, a sorted box's documents were loaded into an automated counter, which recorded a booklet count for each box. An on-demand DRC box label was produced that contained a description of each box's contents and quantity in both barcode and human-readable format. This count remained correlated to the box as an essential quality-control step throughout secure booklet processing and provided a target number for all steps of the check-in process.

Once labeled, the sorted and counted boxes proceeded to booklet check-in. This system used streamfeeder automation to carry documents past oscillating scanners that captured data from up to two representative barcodes and stored it in the Ops MMS database.

The secure booklet check-in operator used a hand scanner to scan the counted box label. This procedure identified the material type and quantity parameters for what the Ops MMS should expect within a box. The box's contents were then loaded into the streamfeeder.

The documents were fed past oscillating scanners that captured both the security code and precode from the booklets. A human operator monitored an Ops MMS screen, which displayed scan errors, an ordered accounting of what was successfully scanned, and the document count for each box.

When all materials were scanned and the correct document count was reached, the box was sealed and placed on a pallet. If the correct document count was not reached, or if the operator encountered difficulties with material scanning, the box and its contents were delivered to an exception handling station for resolution.

This check-in process occurred immediately upon receipt of materials; therefore, DRC provided feedback to districts and schools regarding any missing materials based on actual receipts versus expected receipts. Sites that had 100 percent of their materials missing after the date they were due to DRC were contacted and any issues were resolved.

Throughout the process of secure booklet check-in, DRC project management ran a daily missing materials report. Every site that was missing any number of booklets was contacted by DRC. Results of these correspondences were recorded for inclusion in the final Missing Materials Report if the missing booklets were not recorded by the testing site. DRC produced the Missing Materials Report for PDE upon completion of secure booklet check-in. The report listed all schools in each participating district along with security barcodes for any booklets not returned to DRC.

After scannable materials (used answer booklets) were processed through booklet check-in, the materials became available to the DRC Document Processing log-in staff for document log-in. The booklets were logged-in using the following process:

- A DRC scannable barcode batch header was scanned, and a batch number was assigned to each box of booklets.
- The DRC box label barcode was scanned into the system to link the box and booklets to the newly created batch and to create a Batch Control Sheet.
- The DRC box label barcode number, along with the number of booklets in the box, was printed on the Batch Control Sheet for document tracking purposes. All booklets that were linked to the box barcode were assigned to the batch number and tracked through all processing steps. As booklets were processed, DRC staff dated and initialed the Batch Control Sheet to indicate that proper processing and controls were observed.

Before the booklets were scanned, all batches went through a quality inspection to ensure batch integrity and correct document placement.

After a quality check-in at the DRC Document Processing log-in area, the spines were cut off the scannable documents, and the pages were sent to DRC's Imaging and Scoring System.

## **SCANNING OF MATERIALS**

Customized scanning programs for all scannable documents were prepared to read the booklets and to format the scanned information electronically. Before materials arrived, all image scanning programs went through a quality review process that included scanning of mock data from production booklets to ensure proper data collection.

DRC's image scanners were calibrated using a standard deck of scannable pages with 16 known levels of gray. On a predefined page location, the average pixel darkness was compared to the standard calibration to determine the level of gray. Marks with an average darkness level of 4 or above on a scale of 16 (0 through F) were determined to be valid responses, per industry standards. If multiple marks were read for a single item and the difference of the grayscale reads was greater than four levels, the lighter mark was discarded. If the multiple marks had fewer than four levels of grayscale difference, the response was flagged systematically and forwarded to an editor for resolution.

DRC's image scanners read selected-response, demographic, and identification information. The image scanners also used barcode readers to read pre-printed barcodes from a label on the booklet.

The scannable documents were automatically fed into the image scanners where pre-defined processing criteria determined which fields were to be captured electronically. Open-ended response images were separated out for image-based scoring.

During scanning, a unique serial number was printed on each sheet of paper. This serial number was used for document integrity and to maintain sequencing within a batch of booklets.

A monitor randomly displayed images, and the human operator adjusted or cleaned the scanner when the scanned image did not meet DRC's strict quality standards for image clarity.

All images passed through a process and a software clean-up program that despeckled, deskewed, and desmeared the images. A random sample of images was reviewed for image quality approval. If any document failed to meet image quality standards, the document was returned for rescanning.

Page-scan verification was performed to ensure that all pre-defined portions of the booklets were represented in their entirety in the image files. If a page was missing, the entire booklet was flagged for resolution.

After each batch was scanned, booklets were processed through a computer-based editing program to detect potential errors as a result of smudges, multiple marks, and omissions in predetermined fields. Marks that did not meet the pre-defined editing standards were routed to editors for resolution.

Experienced DRC Document Processing editing staff reviewed all potential errors detected during scanning and made necessary corrections to the data file. The imaging system displayed each suspected error. The editing staff then inspected the image and made any needed corrections using the unique serial number printed on the document during scanning.

Upon completion of editing, quality control reports were run to ensure that all detected potential errors were reviewed again and a final disposition was determined.

Before batches of booklets were extracted for scoring, a final edit was performed to ensure that all requirements for final processing were met. If a batch contained errors, it was flagged for further review before being extracted for scoring and reporting.

During this processing step, the actual number of documents scanned was compared to the number of booklets assigned to the box during book receipt. Count discrepancies between book receipt and booklets scanned were resolved at this time.

Once all requirements for final processing were met, the batch was released for scoring and student level processing.

Table 8–1 shows the number of answer booklets received through booklet check-in, the number of booklets that contained student responses that were scanned and scored, the number of test booklets received, and the total number of booklets received for the writing assessment (W), the mathematics and reading assessment (MR), and the science assessment (S).

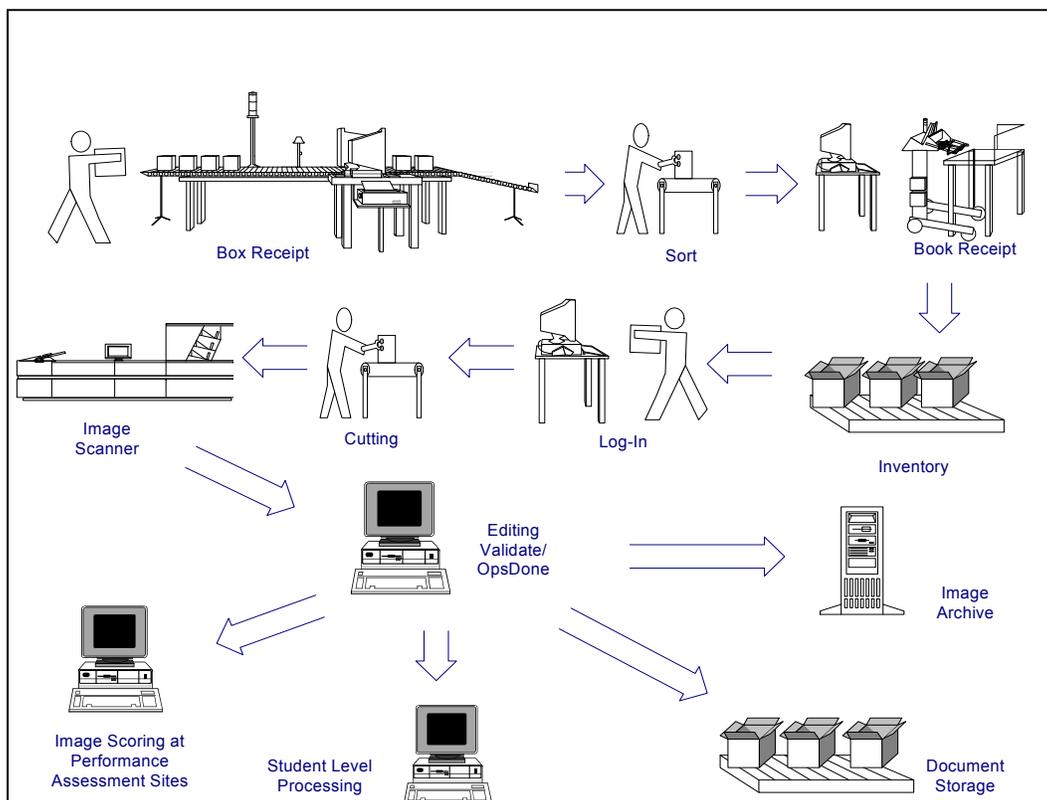
**Table 8–1. Counts of 2010 PSSA Materials Received: Grades 3–8 and 11**

	<b>Answer Booklets Received</b>	<b>Used Answer Booklets Received</b>	<b>Test Booklets Received</b>	<b>Total Booklets Received</b>	<b>Total Booklets Shipped</b>
<b>Grade 3 MR</b>	165,113	129,583	n/a*	165,113	165,268
<b>Grade 4 MR</b>	166,887	131,346	166,904	333,791	334,102
<b>Grade 4 S</b>	166,889	130,998	166,868	333,757	334,202
<b>Grade 5 MR</b>	166,518	131,712	166,507	333,025	333,341
<b>Grade 5 W</b>	166,454	131,489	n/a*	166,454	166,614
<b>Grade 6 MR</b>	162,942	131,782	162,923	325,865	326,194
<b>Grade 7 MR</b>	163,632	133,609	163,621	327,253	327,566
<b>Grade 8 MR</b>	167,873	136,497	167,876	335,749	336,019
<b>Grade 8 S</b>	167,792	136,068	167,788	335,580	335,894
<b>Grade 8 W</b>	167,677	136,148	n/a*	167,677	167,826
<b>Grade 11 MR</b>	170,729	137,696	170,721	341,450	341,702
<b>Grade 11 S</b>	170,643	136,608	n/a*	170,643	170,804
<b>Grade 11 W</b>	170,578	136,915	n/a*	170,578	170,790

\* Grades 5, 8, and 11 writing; Grade 3 mathematics and reading; and Grade 11 science were presented in a single, integrated test/answer booklet.

Figure 8–1 illustrates the production workflow for DRC’s Ops MMS and Image Scanning and Scoring System from receipt of materials through all processing of materials and the presentation of scanned images for scoring.

**Figure 8–1. Workflow System**



## MATERIALS STORAGE

Upon completion of processing, student response documents were boxed for security purposes and final storage:

- Project-specific box labels were created containing unique customer and project information, material type, batch number, pallet/box number, and the number of boxes for a given batch.
- Boxes were stacked on pallets that were labeled with the project information and a list of the pallet’s contents before delivery to the Materials Distribution Center for final secure storage.
- Materials will be destroyed one year after contract year ends with PDE written approval.

## **SCORING MULTIPLE-CHOICE ITEMS**

The scoring process included the scoring of multiple-choice items against the answer key and the aggregation of raw scores from the open-ended responses. A student's raw score is the actual number of points achieved by the student for tested elements of an assessment. From the raw scores, the scale scores were calculated.

The student file was scored against the final and approved multiple-choice answer key. Items were scored as right, wrong, omitted, or double-gridded (more than one answer was bubbled for an item). Sections of the test were evaluated as a whole and an attempt status was determined for each student for each subject. The score program defined all data elements at the student level for reporting.

## **RANGEFINDING**

After student answer documents were received and processed, DRC's Performance Assessment Services (PAS) staff assembled groups of responses that exemplified the different score points represented in the 0–4 item-specific scoring guidelines for mathematics, the 0–3 item-specific scoring guidelines for reading, the 0–2 item-specific scoring guidelines for science, and the 1–4 mode specific and revising and editing scoring guidelines for writing.

Examples of student essays were identified from the operational writing assessment and student responses were also pulled from the new 2010 field test items. Once examples for all score points were identified, sets were put together for each item, and copies were made for each rangefinding participant. Rangefinding committees consisted of Pennsylvania educators, PDE staff members, DRC Test Development staff, and DRC Performance Assessment Services staff. The rangefinding meetings for 2010 were as follows:

- Reading and Science Field Test Rangefinding, May 24–25, Sheraton, Harrisburg
- Mathematics and Writing Field Test Rangefinding, May 26–27, Sheraton, Harrisburg

Rangefinding meetings began in a joint session with a review of the history of the 2010 assessment and then broke into subject/grade-level groups. Copies of student responses were presented to the committees, one item at a time. The committees initially reviewed and scored the student samples together to ensure that everyone was interpreting the scoring guidelines consistently. Committee members then went on to score responses independently, and those scores were discussed until a consensus was reached. Only responses for which a high agreement rate among committee members was attained were chosen as training materials for DRC readers. Discussions of responses included the mandatory use of scoring guideline language, assuring PDE and all involved that the score point examples clearly illustrated the specific requirements of each score level. DRC PAS staff made notes of how and why the committees arrived at score point decisions, and this information was used by the individual scoring directors in reader training.

DRC and PDE discussed scoring guideline edits that the committees suggested. Changes approved by PDE were then made by DRC Test Development staff, and the scoring guidelines were used by PAS staff in the preparation of materials and training of readers.

## **READER RECRUITMENT/QUALIFICATIONS**

DRC retains a number of readers from year to year. This pool of experienced readers was used to staff the approximate 2,800 readers who were needed for the 2010 scoring season. To complete the reader staffing for this project, DRC placed advertisements in local papers and also utilized a variety of websites. Open houses were held and applications for reader positions were screened by the DRC recruiting staff. Candidates were personally interviewed and a mandatory, on-demand writing sample, plus a mathematics sample for those applying to score mathematics, were collected, along with references and proof of a four-year college degree. In this screening process, preference was given to candidates with previous experience scoring large-scale assessments and with degrees emphasizing expertise in the subjects being scored. Since readers had to have a strong content-specific background, the reader pool consisted of educators, writers, editors, and other professionals who were valued for their experience, but who were also able to set aside their own biases about student performance and accept the scoring standards.

## **LEADERSHIP RECRUITMENT/QUALIFICATIONS**

Scoring directors and team leaders were chosen by the content specialists from a pool consisting of experienced individuals who were successful readers and leaders on previous DRC contracts and had strong backgrounds in scoring mathematics, reading, science, or writing. Those selected demonstrated organization, leadership, and management skills. A majority of the scoring directors and team leaders had at least five years of leadership experience on large-scale assessments, including the PSSA. All scoring directors, team leaders, and readers were required to sign confidentiality agreements before any training or handling of secure materials began.

Each room of readers was assigned a scoring director. This individual was monitored by the project director and project content specialist and led handscoring for the duration of the project. The scoring director assisted in rangefinding, worked with supervisors to create training materials, conducted the team leader training, and was responsible for training the readers. The scoring director also made sure that reports were available and interpreted reports for the readers. The scoring director supervised the team leaders.

Team leaders assisted the scoring director with reader training and monitoring by working with their teams in small group discussions and answering individual questions that readers may not have felt comfortable asking in a large group. Once readers had qualified, the team leaders were responsible for maintaining the accuracy and workload of team members. The ongoing monitoring identified those readers who were having difficulty scoring accurately and resulted in the reader receiving one-on-one retraining or being paired with a stronger reader. This process corrected any inaccuracies in scoring or, if not, that reader was released from the project and any responses scored by that reader were routed back through the imaging system and rescored by other readers.

## **TRAINING**

As part of the training for the common items for 2010, DRC's PAS staff assembled the approved scoring guidelines and the scored student responses from training materials that were identified by rangefinding committees, into sets used for training the readers. The same process was used to assemble field test training materials upon completion of the Field Test Rangefinding. Responses that were relevant in terms of the scoring concepts they illustrated were annotated for use in an anchor set. The item-specific scoring guidelines for mathematics, reading, and science, and the mode specific and revising and editing guidelines for writing, served as the readers' constant reference.

Training and qualifying sets consisted of examples of student responses reviewed by the rangefinding committees. Responses were selected to show the readers the range of each score point, such as high, mid, and low 4, 3, 2, 1. Examples of different types of 0s were also included. Readers were instructed on how to apply the guidelines and were required to demonstrate a clear comprehension of each anchor set by performing well on the training materials that were presented for each subject, grade, and item. This helped to train the readers to recognize the various ways that a student could respond to earn the score point that was outlined and defined in the item-specific scoring guidelines. All ranges of score points were represented and clearly annotated in the Anchor Set, which was used for reference by the readers throughout the scoring of the project.

The scoring director conducted the team leader training before the reader training. The team leader training followed the same procedures as the reader training, but qualifying standards were more stringent because of the responsibilities required of the team leaders. During team leader training, all materials were reviewed and discussed, and anticipated reader questions and concerns were addressed. Team leaders were required to annotate all of their training responses with the official annotations received from the content committee members at the rangefinding meetings. To facilitate scoring consistency, it was imperative that each team leader imparted the same rationale for each response that other team leaders used. Once the team leaders qualified, leadership responsibilities were reviewed and team assignments were given. A ratio of one team leader for each 8–10 readers ensured adequate monitoring of the readers.

The 2010 assessment included the opportunity for students to respond in Spanish to the Grades 3–8 and 11 mathematics and Grades 4, 8, and 11 science sections. The scoring director responsible for this was a bilingual Hispanic with a strong mathematics and science background who had also worked with the PSSA for over ten years. All of the readers were bilingual and were hired specifically to score the Spanish portion of the assessment. They were required to meet the same training and scoring standards that were set for the readers of the English version of the assessment.

Reader training began with the scoring director providing an intensive review of the scoring guidelines and anchor papers to all readers. Next, the readers practiced by independently scoring the responses in the training sets. Afterwards, the scoring director or team leaders led a thorough discussion of each set in either a small-group or room-wide setting.

Once the scoring guidelines, anchor sets, and all the training sets were discussed, readers were required to apply the scoring criteria by qualifying (i.e., scoring with acceptable agreement to the true scores) on at least one of the qualifying sets. The true scores were those assigned by the rangefinding committees and agreed upon by the content staff of PDE and DRC. If readers could not accept or recognize the rationale and purpose for assigning the correct score and did not perform accordingly on the training materials, it was determined that they did not understand the parameters of scoring correctly. Readers who failed to achieve the 70 percent level of exact agreement were given additional training to acquire the highest degree of accuracy possible. Readers who did not perform at the required level of agreement by the end of the qualifying process were not allowed to score any student responses. These readers were removed from the pool of potential scorers in DRC's imaging system and released from the project.

### **HANDSCORING PROCESS**

Student responses were scored independently and by multiple readers. All responses were read once with 10 percent double read, and additional read behinds above the 10 percent double reads were done to ensure reliability. The data collected from this 10 percent double read was used to calculate the exact and adjacent agreement rates in the Scoring Summary Reports. The responses that were used for the 10 percent read behind were randomly chosen by the imaging system at the item level.

Readers scored the imaged student responses on PC monitors at the DRC Scoring Centers in Pittsburgh, Pennsylvania; Sharonville and Columbus, Ohio; Austin, Texas; and Plymouth and Woodbury, Minnesota. Readers were seated at tables with two imaging stations at each table. Image distribution was controlled, thus ensuring that student images were sent to designated groups of readers qualified to score those items. Imaged student responses were electronically separated for routing to individual readers by item, and readers were only provided with student responses that they were qualified to score. Readers read each response and keyed in the scores.

To handle possible alerts (i.e., student responses indicating potential issues related to the student's safety and well-being that may require attention at the state or local level), the imaging system allowed readers to forward responses needing attention to the scoring director. Although no alerts were flagged during the scoring of this project, if there had been, these alerts would be reviewed by the project director, who would notify the students' schools and PDE of the occurrences. However, PDE would not receive the students' responses or any other identifying information on the students. Also, at no time would the reader know anything about the students' personal identities.

Once handscoring was completed, PAS compiled anecdotal reviews of the field test items for all grade levels in all subjects. This information was presented to DRC's Test Development group.

### **HANDSCORING VALIDITY PROCESS**

One of the quality/training tools PAS utilized to ensure reader accuracy was the validity process. The goal of the validity process is to ensure that scoring standards are maintained. Specifically, the objective is to make sure that scorers rate student responses in a manner consistent with statewide standards both within a single administration of the PSSA and across consecutive administrations. This scoring consistency was maintained, in part, through the validity process.

The validity process began with the selection of scored responses from a previous administration of the assessment. The content specialist for each subject selected 40 validity papers for each core open-ended response item. These 40 papers were drawn from a pool of exemplars (responses that are representative of a score point and have been verified by the scoring director and the content specialist). The scores on validity papers are considered criterion or true scores.

The validity papers were then implemented to test reader accuracy. The responses were scanned into the imaging system and dispersed intermittently to the readers. The dispersal rates varied by subject, but by the end of the project, readers in all subjects had scored all 40 validity papers for any items they were qualified to score. Readers were unaware that they were being fed pre-scored responses and assumed that they were scoring live student responses. This helped bolster the internal validity of the process. It is important to note that all readers who received validity papers had already successfully completed the training/qualifying process.

Next, the scores that the readers assigned to the validity papers were compared to the true scores in order to determine the validity of the readers' scores. For each item, the percentage of exact agreement as well as the percentage of high and low scores was computed. This data was accessed through the Validity Item Detail Report. The same kind of data was also computed for each specific reader. This data was accessed through the Validity Reader Detail Report. Both of these can be run as a daily or cumulative report.

The Validity Reader Detail Report was used to identify particular readers for retraining. If a reader on a certain day generated a lower rate of agreement on a group of validity papers, it was immediately apparent in the Validity Reader Detail Report. A lower rate of agreement was defined as anything below 70 percent exact agreement with the true scores. Anytime a reader's validity agreement rate fell below 70 percent, this cued the scoring director to examine that reader's scoring. First, the scoring director tried to figure out what kind of validity papers the reader was scoring incorrectly. This was done to determine whether there was any kind of a trend (e.g., tending to go low on the 1–2 line or failing to notice copied text). Once the source of the low agreement was determined, the reader was retrained. If it was determined that the reader had been scoring live papers inaccurately, then his/her scores were purged for that day and the responses were re-circulated and scored by other readers.

The cumulative Validity Item Detail Report was utilized to identify potential room-wide trends in need of correction. For instance, if a particular validity response with a true score of three was given a score of two by a significant number of readers, that trend would be revealed in the Validity Item Detail Report. To correct a trend of this sort, the scoring director would look for student responses similar to the validity paper being scored incorrectly. Once located, these responses would be used in room-wide training, usually in the form of an annotated handout or a short set of papers without printed scores given to readers as a recalibration test. Sometimes, when a particular validity paper generated low agreement, an example of a similar response could be found in the already-extant training materials. If this was the case, a quick review of that particular training paper was usually enough to get readers re-aligned.

Validity was employed on all core open-ended items in all subject areas (mathematics, reading, writing, and science). Each 40-paper validity set was formulated to mimic the score point distribution that the item generated during its previous administration. Each validity set included at least five examples of each score point. Examples of different types of responses were included to ensure that readers were tested on the full spectrum of response types. The total number of validity papers circulated in 2010 was 840 for mathematics, 1,040 for reading, 760 for science, and 240 for writing.

The exact reader agreement rate generated during the validity process was often higher than the inter-rater agreement rate for the same item. The reason for this discrepancy has to do with how validity sets are formulated. The 40 validity papers for each item, chosen by the content specialist, are intended to cover the full breadth of each score point. For example, each validity set contains examples of high, low, and middle 2s. This scope ensures that the validity process is truly valid in terms of addressing the complete spectrum of response types. However, certain types of responses are generally not included in validity sets. These include line papers (i.e., examples of scorepoints that are so close to the adjacent scorepoint that readers are instructed to consult with a supervisor before assigning a score) and responses that, because of poor word choice/writing, are difficult to understand. The reason for these exclusions is that confusing/line/illegible papers often do not impart a teachable lesson. Since these types of papers are usually unique, any potential lesson the paper might teach would apply only to that specific response. Conversely, the papers in validity sets are chosen because they represent common response-types and teach lessons that can be applied to other similar papers. Due to this distinction, validity sets generate a slightly higher agreement rate than is normally generated during operational scoring. PAS could change this practice in the future by including some line papers in validity sets. However, this change might also have the unintended effect of confusing the training process. Since line papers are already included in the training sets given to readers prior to qualifying, putting them into validity sets might complicate the process unnecessarily.

## **QUALITY CONTROL**

Reader accuracy was monitored throughout the scoring session by producing both daily and on-demand reports, ensuring that an acceptable level of scoring accuracy was maintained. Inter-reader reliability was tracked and monitored with multiple quality control reports that were reviewed by quality assurance analysts. These reports and other quality control documents were generated at the handscoring centers and were reviewed by the scoring directors, team leaders, content specialists, and project directors. The following reports and documents were used during the scoring of the open-ended responses:

The Scoring Summary Report (includes two related reports)

1. The Reader Monitor Report monitored how often readers were in exact agreement with one another and ensured that an acceptable agreement rate was maintained. This report provided daily and cumulative exact and adjacent inter-rater agreement on the 10 percent that was double read.
2. The Score Point Distribution Report monitored the percentage of responses given each of the score points. For example, the mathematics daily and cumulative report showed how many 0s, 1s, 2s, 3s, and 4s a reader had given to all the responses scored at the time the report was produced. It also indicated the number of responses read by each reader so that production rates could be monitored.

The Item Status Report monitored the progress of handscoring. This report tracked each response and indicated the status (e.g., needs second read or complete). This report ensured that all responses were scored by the end of the project.

The Read Behind Report identified all responses scored by an individual reader. This report was useful if any responses needed rescoring because of possible reader drift.

The Validity Reports tracked how the readers performed by comparing pre-determined scored responses to readers' scores for the same set of responses. If the readers' scoring fell below the 70 percent determined agreement rate, remediation occurred. Readers who did not retrain to the required level of agreement were released from the project.

The Read-Behind Log was used by the team leader/scoring director to monitor individual reader reliability. Student responses were randomly selected and team leaders read scored items from each team member. If the team leader disagreed with the reader's score, remediation occurred. This proved to be a very effective type of feedback because it was done with live items scored by a particular reader.

Recalibration Sets were used throughout the scoring sessions to ensure accuracy by comparing each reader's scores with the true scores on a set of preselected responses. Recalibration sets helped to refocus readers on Pennsylvania scoring standards. This check made sure there was no change in the scoring pattern as the project progressed. Readers failing to achieve 70 percent agreement with the recalibration true scores were given additional training to achieve the highest degree of accuracy possible. Readers who were unable to recalibrate were released from the project. The procedure for creating and administering recalibration sets was similar to the one used for training sets.

Tables 8–2 through 8–5 show exact and adjacent agreement rates of readers on the core open-ended responses for the mathematics, reading, science, and writing items in the 2010 PSSA. All student responses were read once with a 10 percent double read. The data collected from this 10 percent double read was used to calculate the exact and adjacent agreement rates.

**Table 8–2. Inter-rater Agreement for  
2010 Grades 3–8 and 11 PSSA Mathematics Open-ended Response Items and Validity**

<b>Mathematics</b>	<b>Common Item</b>	<b>% Exact Agreement</b>	<b>% Adjacent Agreement</b>	<b>% Exact + Adjacent Agreement</b>	<b>% Exact Validity Agreement</b>
<b>Grade 3</b>	1	93	7	100	98
	2	95	5	100	97
	3	87	13	100	97
<b>Grade 4</b>	1	91	9	100	99
	2	93	7	100	91
	3	92	8	100	88
<b>Grade 5</b>	1	82	18	100	92
	2	84	16	100	89
	3	92	8	100	98
<b>Grade 6</b>	1	95	5	100	99
	2	85	15	100	84
	3	85	15	100	87
<b>Grade 7</b>	1	86	14	100	94
	2	84	15	99	88
	3	83	16	99	89
<b>Grade 8</b>	1	89	11	100	95
	2	85	15	100	94
	3	85	15	100	92
<b>Grade 11</b>	1	89	11	100	96
	2	88	12	100	94
	3	87	13	100	91

*Note.* 0–4 possible score points

**Table 8–3. Inter-rater Agreement for  
2010 Grades 3–8 and 11 PSSA Reading Open-ended Response Items and Validity**

<b>Reading</b>	<b>Common Item</b>	<b>% Exact Agreement</b>	<b>% Adjacent Agreement</b>	<b>% Exact + Adjacent Agreement</b>	<b>% Exact Validity Agreement</b>
<b>Grade 3</b>	1	74	26	100	77
	2	75	24	99	87
<b>Grade 4</b>	1	82	17	99	88
	2	83	16	99	79
	3	84	16	100	81
	4	86	14	100	90
<b>Grade 5</b>	1	82	18	100	81
	2	85	15	100	84
	3	90	10	100	88
	4	84	16	100	84
<b>Grade 6</b>	1	77	22	99	75
	2	78	21	99	83
	3	78	22	100	77
	4	78	22	100	78
<b>Grade 7</b>	1	79	21	100	75
	2	78	22	100	80
	3	75	25	100	80
	4	76	24	100	85
<b>Grade 8</b>	1	78	22	100	86
	2	77	23	100	86
	3	81	19	100	95
	4	81	19	100	96
<b>Grade 11</b>	1	86	14	100	76
	2	76	23	99	80
	3	78	22	100	81
	4	76	24	100	78

Note. 0–3 possible score points

**Table 8–4. Inter-rater Agreement for  
2010 Grades 4, 8, and 11 PSSA Science Open-ended Response Items and Validity**

Science	Common Item	% Exact Agreement	% Adjacent Agreement	% Exact + Adjacent Agreement	% Exact Validity Agreement
<b>Grade 4</b>	1	93	7	100	96
	2	94	6	100	98
	3	91	9	100	96
	4	87	13	100	95
	5	91	9	100	98
<b>Grade 8</b>	1	89	11	100	94
	2	90	10	100	98
	3	87	13	100	90
	4	86	14	100	92
	5	88	12	100	95
<b>Grade 11</b>	1	87	13	100	83
	2a	95	5	100	95
	2b	84	16	100	90
	3a	83	17	100	85
	3b	84	16	100	85
	4	85	15	100	91
	5	83	17	100	88
	6	82	18	100	85
	7a	79	21	100	88
	7b	96	4	100	88
	8	90	10	100	93
	9	86	14	100	92

Note. 0–2 possible score points

**Table 8–5. Inter-rater Agreement for  
2010 Grades 5, 8, and 11 PSSA Writing Prompts and Validity**

Writing		Composition % Agreement			Revising and Editing % Agreement		
Grade	Prompt	Exact	Adjacent	Exact + Adjacent	Exact	Adjacent	Exact + Adjacent
5	1	82	18	100	79	21	100
	2	81	19	100	78	22	100
	1 Validity	82	18	100	80	20	100
	2 Validity	82	18	100	74	26	100
8	1	79	21	100	77	23	100
	2	79	21	100	77	23	100
	1 Validity	85	15	100	84	16	100
	2 Validity	77	23	100	75	25	100
11	1	82	18	100	80	20	100
	2	83	17	100	82	18	100
	1 Validity	84	16	100	81	18	100
	2 Validity	86	14	100	86	14	100

Note. 1–4 possible score points

Table 8–6 shows the distribution of scores for the mathematics items. All mathematics items are scored with a 0–4 score point range.

**Table 8–6. Percentages Awarded for Each Possible Score Point  
Mathematics Grades 3–8 and 11**

Mathematics	Common Item	%0	%1	%2	%3	%4	%B/NS*
Grade 3	1	8	24	19	26	23	0
	2	2	7	15	28	47	1
	3	9	20	25	25	21	0
Grade 4	1	8	14	23	23	31	2
	2	10	12	20	44	11	3
	3	8	18	14	35	22	2
Grade 5	1	14	22	24	22	16	2
	2	11	36	20	22	8	3
	3	6	24	27	29	12	2
Grade 6	1	8	13	19	27	30	3
	2	12	32	17	20	15	4
	3	10	39	31	11	6	3
Grade 7	1	23	34	21	12	7	3
	2	16	10	22	28	18	5
	3	4	31	30	19	13	3
Grade 8	1	18	36	10	25	8	3
	2	11	34	24	13	13	5
	3	4	12	38	26	17	3
Grade 11	1	28	24	15	13	15	5
	2	9	11	34	20	19	7
	3	15	37	13	17	7	10

\*B=blank and NS=non-scoreable

Table 8–7 shows the distribution of scores for the reading items. All reading items are scored with a 0–3 score point range.

**Table 8–7. Percentages Awarded for Each Possible Score Point  
Reading Grades 3–8 and 11**

Reading	Common Item	% 0	% 1	% 2	%3	%B/NS*
Grade 3	1	9	46	36	8	1
	2	6	45	41	7	1
Grade 4	1	9	21	35	34	1
	2	15	23	31	25	6
	3	3	36	46	14	1
	4	17	38	29	15	1
Grade 5	1	5	43	38	13	2
	2	5	43	37	14	1
	3	15	23	50	11	1
	4	5	36	53	6	1
Grade 6	1	5	15	54	22	4
	2	10	20	48	21	1
	3	6	40	30	23	1
	4	7	37	37	17	1
Grade 7	1	3	27	58	11	2
	2	6	26	51	17	1
	3	11	32	37	20	1
	4	16	22	30	30	1
Grade 8	1	3	26	52	19	1
	2	9	34	41	15	1
	3	2	23	56	18	1
	4	6	22	54	16	2
Grade 11	1	3	16	56	23	2
	2	5	42	35	14	5
	3	4	18	50	25	3
	4	3	18	53	23	3

\*B=blank and NS=non-scoreable

Table 8–8 shows the distribution of scores for the science items. All Grades 4 and 8 science items were scored with a 0–2 score point range. Grade 11 had items scored 0–2 and scenario items where 0–2 was possible in part A and part B.

**Table 8–8. Percentages Awarded for Each Possible Score Point  
Science Grades 4, 8, and 11**

Science	Common Item	% 0	% 1	% 2	%B/NS*
<b>Grade 4</b>	1	16	26	58	1
	2	2	26	70	1
	3	27	34	36	3
	4	15	40	44	1
	5	6	58	34	1
<b>Grade 8</b>	1	50	31	16	2
	2	39	35	24	3
	3	16	40	38	5
	4	39	35	22	3
	5	23	51	24	2
<b>Grade 11</b>	1	50	29	10	11
	2a	72	10	5	12
	2b	24	40	24	12
	3a	57	24	7	12
	3b	46	33	9	12
	4	22	36	34	8
	5	30	40	21	9
	6	39	33	18	10
	7a	32	33	25	10
	7b	79	10	0	10
	8	43	33	15	9
	9	40	37	12	11

\*B=blank and NS=non-scoreable

Table 8–9 shows the distribution of scores for the writing prompts. All prompts are scored with a 1–4 score point range for both Composition and for Revising and Editing.

**Table 8–9. Percentages Awarded for Each Possible Score Point  
Writing Grades 5, 8, and 11**

Writing		Composition					Revising and Editing				
Grade	Prompt	% 1	% 2	% 3	%4	%NS/NT*	% 1	% 2	% 3	%4	%NS/NT*
5	1	5	37	51	7	1	6	38	49	7	1
	2	5	39	49	6	1	6	39	49	6	1
8	1	3	27	58	10	1	4	28	57	10	1
	2	5	33	52	9	1	5	32	52	10	1
11	1	6	26	58	7	3	6	26	57	8	3
	2	4	22	63	9	3	4	22	62	9	3

\*NS= non-scoreable and NT= not taken

## ***Chapter Nine: Description of Data Sources and Sampling Adequacy***

This chapter describes the data sources (e.g., *n*-counts, characteristics of students) used for the various analysis procedures discussed in the remaining chapters of this technical report. Psychometric analyses are conducted at several points for the PSSA: 1) early analyses for quality control purposes; 2) analyses associated with the calibration, scaling, and linking process; 3) analyses used for item banking; and 4) analyses for the technical report. Detailed information regarding the attributes of students used for AYP reporting is provided in Chapter Ten.<sup>2</sup>

### **PRIMARY STUDENT FILTERING CRITERIA**

For many data files, the primary means of filtering students for inclusion/exclusion from any data analysis are based on the state reporting criteria which are outlined below. Within the state reporting rules are separate attempt criteria for individual subject areas. The attempt criteria are discussed more fully below.

#### ***State Reporting Criteria***

The state reporting criteria are as follows:

- The student must be enrolled for the full academic year.
- The student must be attributed to a public district/school (state).
- The student must receive a score (i.e., met the subject attempt logic—see additional information below).
- The student is not a homeschool student.
- The student is not a foreign exchange student.
- The student is not a first year ELL student (mathematics/reading only).

#### ***PSSA Attempt Criteria***

For all data sources, only students who meet the attempt criteria are included. For mathematics, reading, and science, the attempt criteria required a minimum of five items (multiple-choice or open-ended) to be completed in each respective subject area section of the test booklets. Science counts were based on operational items only, while mathematics and reading counts were based on operational and nonoperational items. For writing, a student must complete at least five MC items and respond to both operational writing prompts.

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<sup>2</sup> This data file was delivered to PDE on September 14, 2010.

## **KEY VALIDATION DATA**

These data are only mentioned for the sake of completeness as no formal results from these data are provided in this technical document. An analysis on all operational MC items is conducted early in the scoring process to ensure that the items are performing as expected. This is an important quality check that is always done for the PSSA. This analysis is usually (but not always) done using all students from early-return schools. The sample does not need to be state representative for these quality checks. Available student data typically suffices as long as there is reasonable variability in the total test scores of students.

For 2010 this data included all public school students who had 1) their MC items scanned and scored by May 1 (mathematics/reading), May 3 (writing), or May 10 (science) and 2) met preliminary attempt criteria (i.e., attempt was determined based on MC items only). Note that the full state reporting criteria were not in effect for this file (only attribution to a public school based on tested site and preliminary attempt criteria were used to filter students).

## **CALIBRATION DATA**

Calibration data included students who met the preliminary state reporting criteria (including attempt criteria) by May 23 (mathematics/reading), May 23 (science), or May 24 (writing). The state reporting criteria were preliminary, meaning that attributions and final PIMS<sup>3</sup> information were not complete by this time. No sampling was undertaken in this data (i.e., it included all students who met the above criteria with operational test scores up to this point<sup>4</sup>). This data file was used to provide impact results to the TAC during the linking review process.

## **ITEM BANK DATA**

The item bank data included students who met the state reporting criteria and pre-AYP appeals (including attempt criteria) by June 26 (writing), July 10 (mathematics/reading), or July 10 (science). No sampling was undertaken in this data (i.e., it included all students who met the above criteria with scored field test data up to this point). The data banked for field test items were based on this data file.

## **FINAL DATA**

This file included all students who met state reporting criteria and post-AYP appeals (including attempt criteria) by September 14<sup>5</sup> for all subject areas. The final data was post-appeals data, meaning that schools had an opportunity to correct certain fields within the data during the AYP appeals process (e.g., student ethnicity). All other files contained pre-appeals data. The majority of the results included in this technical report were derived using the final data file.

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<sup>3</sup> Pennsylvania Information Management System

<sup>4</sup> Historically, PSSA has retained all students who met the stated criteria in the calibration data set, even those who had testing accommodations.

<sup>5</sup> The AYP reporting file was delivered to PDE on September 14, 2010. Most analyses in this report were conducted on a stripped-down version of that data file (i.e., some data elements were removed to reduce file size). Hence, two different file dates exist.

## FINAL N-COUNTS FOR ALL DATA SOURCES

The *n*-counts for all data sources are provided in Table 9–1. The calibration count includes students who met the preliminary state reporting criteria, while the final count includes students who met the final state reporting criteria.<sup>6</sup>

**Table 9–1. Data Source *N*-Counts**

		Key Validation	Calibration	Item Bank	Final
<b>Mathematics</b>	<b>3</b>	106904	126321	126675	126676
	<b>4</b>	101558	125925	126335	126333
	<b>5</b>	101420	125907	126411	126419
	<b>6</b>	102259	125675	126263	126288
	<b>7</b>	107659	126838	127650	127685
	<b>8</b>	108255	128764	129950	129983
	<b>11</b>	101085	127705	129874	129910
<b>Reading</b>	<b>3</b>	106664	126245	126587	126588
	<b>4</b>	103092	128008	128453	128452
	<b>5</b>	103239	128393	128925	128933
	<b>6</b>	104201	128262	128893	128921
	<b>7</b>	109689	129479	130337	130376
	<b>8</b>	110474	131630	132866	132906
	<b>11</b>	103407	130984	133248	133291
<b>Science</b>	<b>4</b>	68948	128101	128564	128565
	<b>8</b>	64853	131191	132440	132452
	<b>11</b>	105307	127879	129911	129926
<b>Writing</b>	<b>5</b>	54643	127698	128193	128201
	<b>8</b>	54587	130584	131741	131780
	<b>11</b>	53794	128304	130305	130352

## SPIRALING OF FORMS

During the PSSA administration, test forms were spiraled within classrooms. All students were administered the same set of operational items but different field test and equating-block items. The goal of spiraling is to achieve randomly equivalent samples of students across forms. When spiraling achieves randomly equivalent samples, the forms will have equal standard deviations and means (within sampling error) over the operational items.

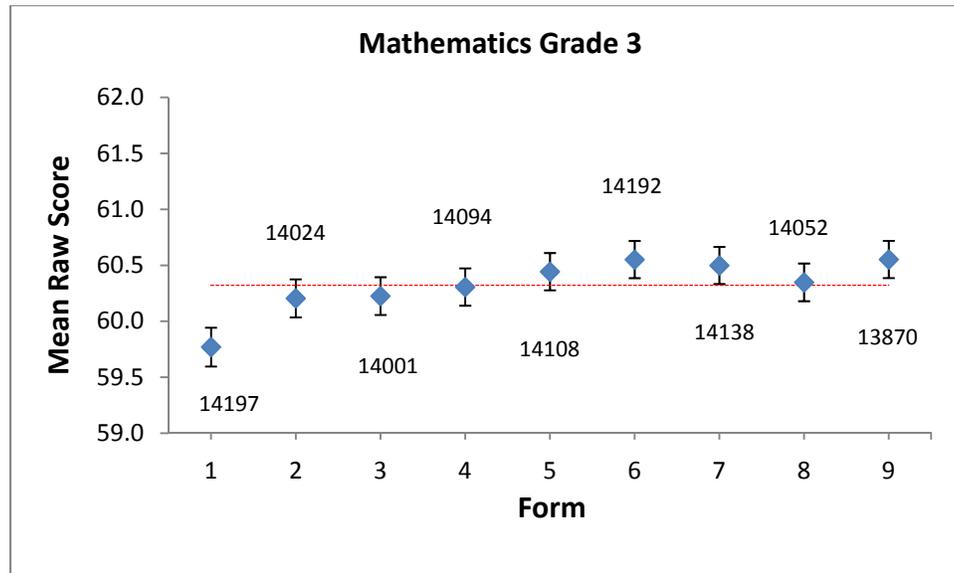
<sup>6</sup> For this reason, the final count may be smaller than the calibration count in any given year.

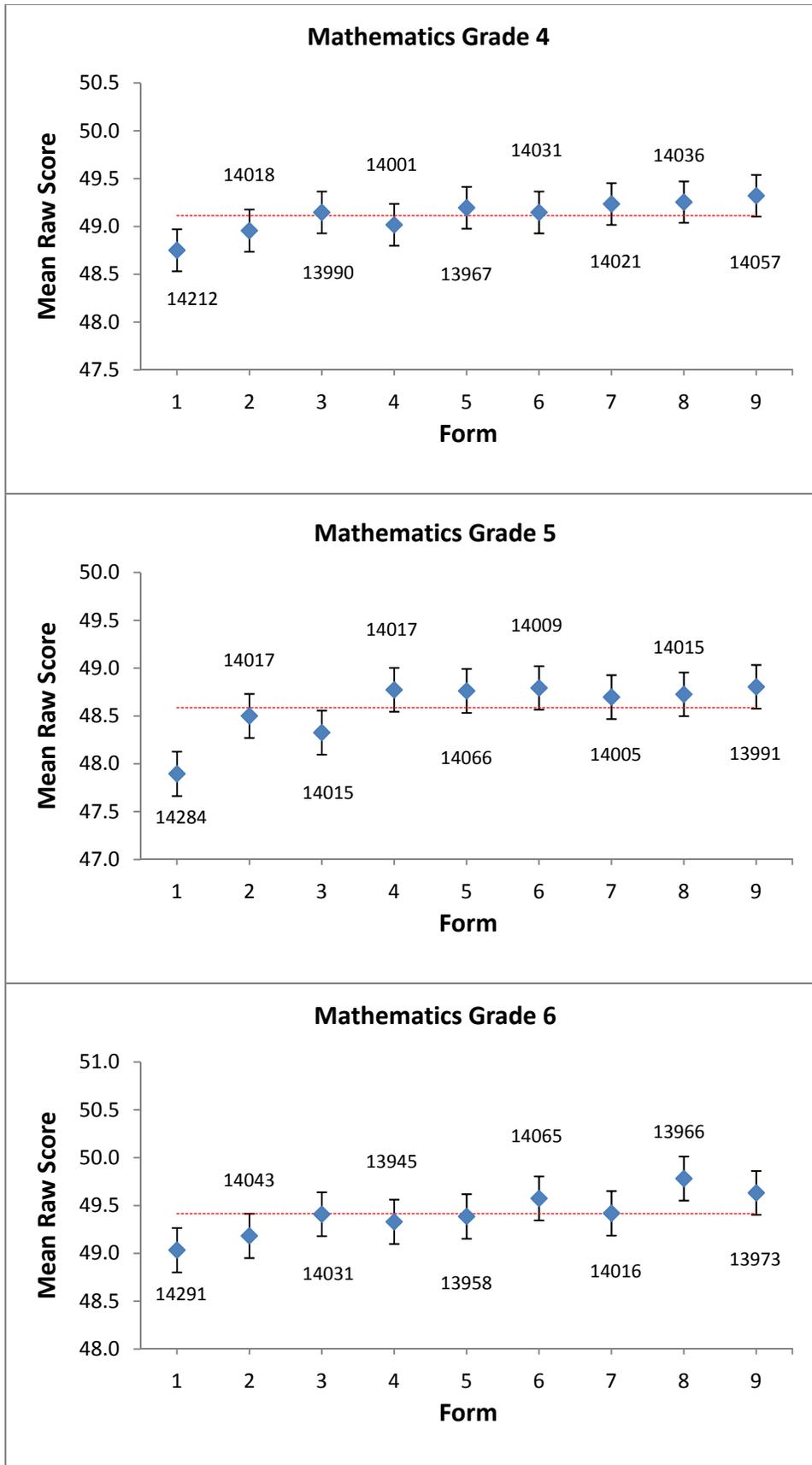
Appendix H provides summary statistics for all test forms for each grade and subject area test. The tables provide the form number (Form), the number of students (N), test length in items (L), total points (Pts.), the minimum (Min) score, the maximum (Max) score, the mean (Mean) score, the median score (Med), and the standard deviation (SD). The extent to which the mean raw scores across forms are similar indicates the extent to which the student populations taking each form are of approximately equal ability. This equivalence of ability distributions across forms is the desired outcome of spiraling and allows for optimum analysis of the embedded field test items.

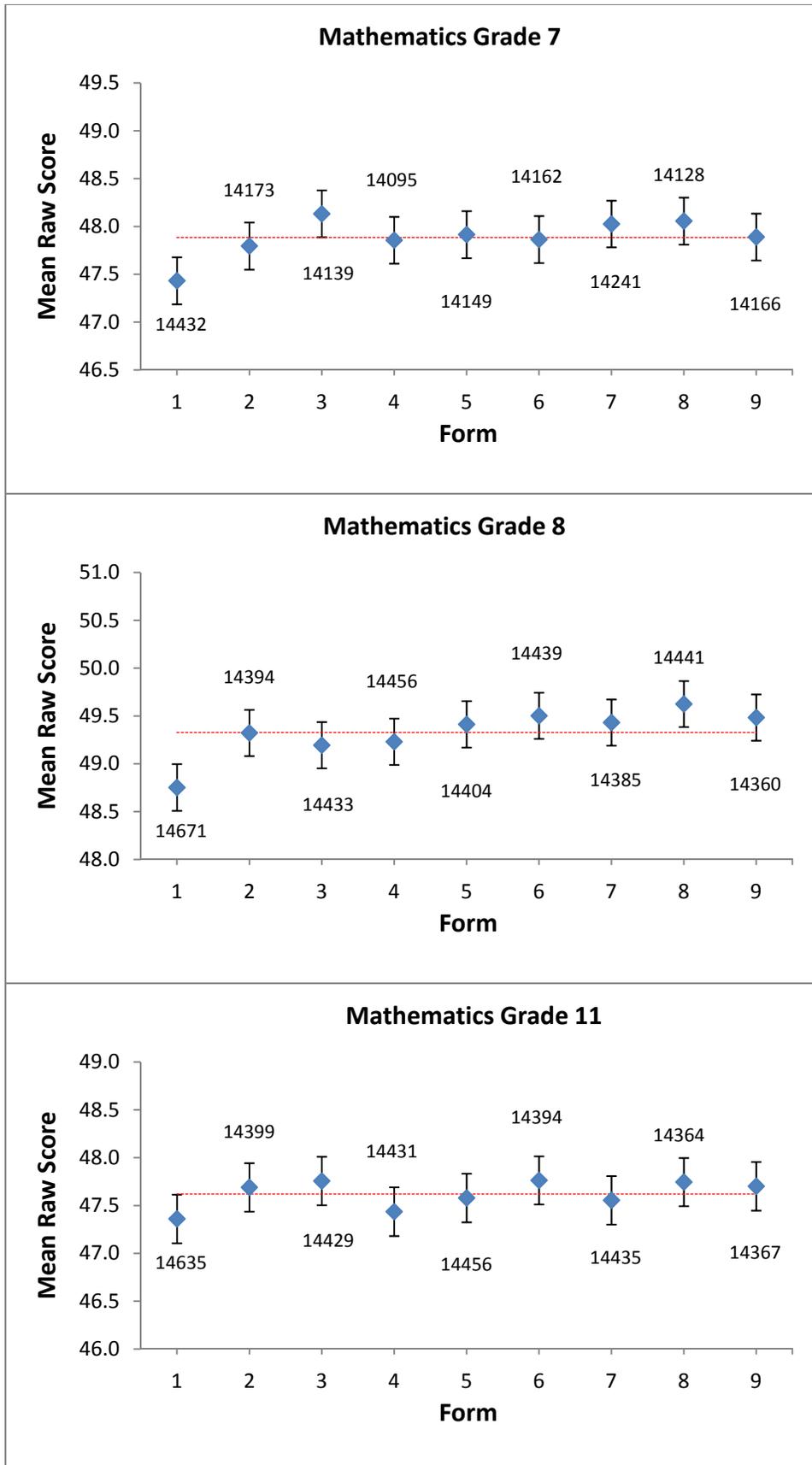
In Figure 9–1, the form means are plotted (diamond-shaped marker) with standard error (SE) lines. *N*-counts for each form are shown above or below the markers. For each form, the standard error was computed by taking the standard deviation of all student scores (assumed as the population standard deviation divided by the square-root of the form *n*-count). The mean score across all forms is indicated by the horizontal line. If a form’s standard error band captures the horizontal line, then that suggests only random differences exist between the form mean and the population mean. This was true in nearly all instances.

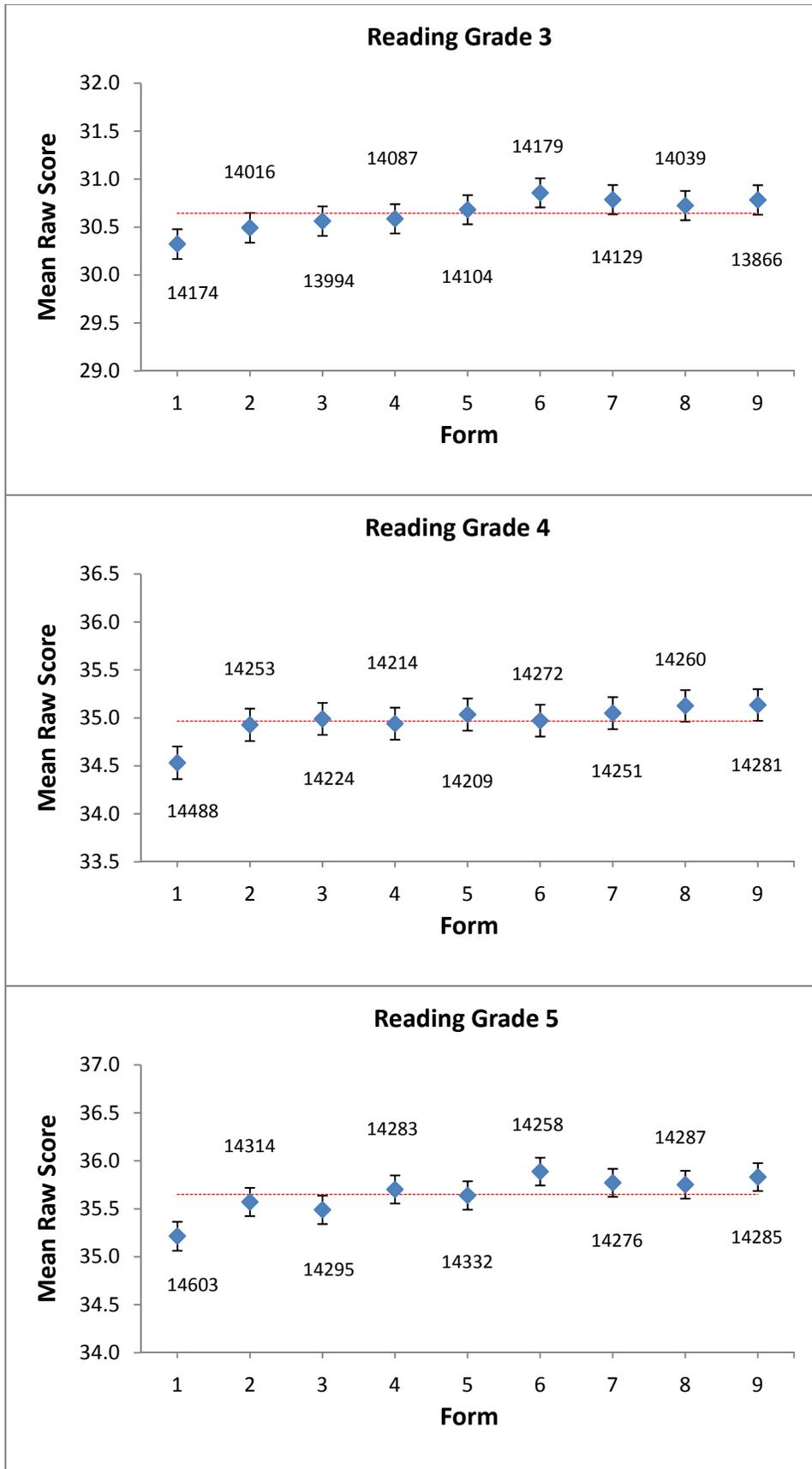
One exception occurring frequently across grades involves Form 1. Form 1 was used to generate accommodated versions (e.g., Large Print and Braille) of the operational form; thus, the averages for these forms are somewhat lower because its sample is not entirely derived from the spiraling process.

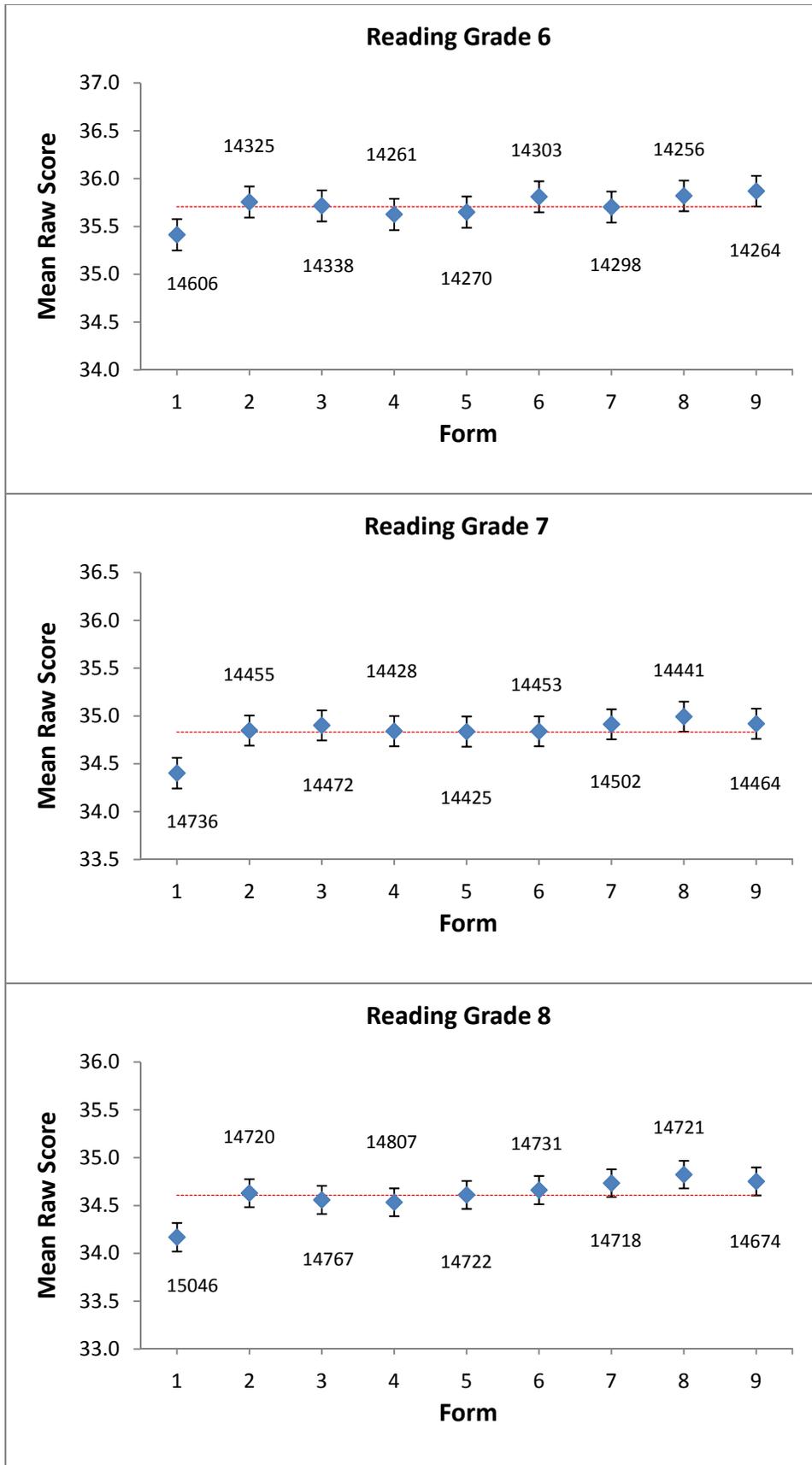
**Figure 9–1. Form Mean Scores with +/- One Standard Error (SE) Bands**

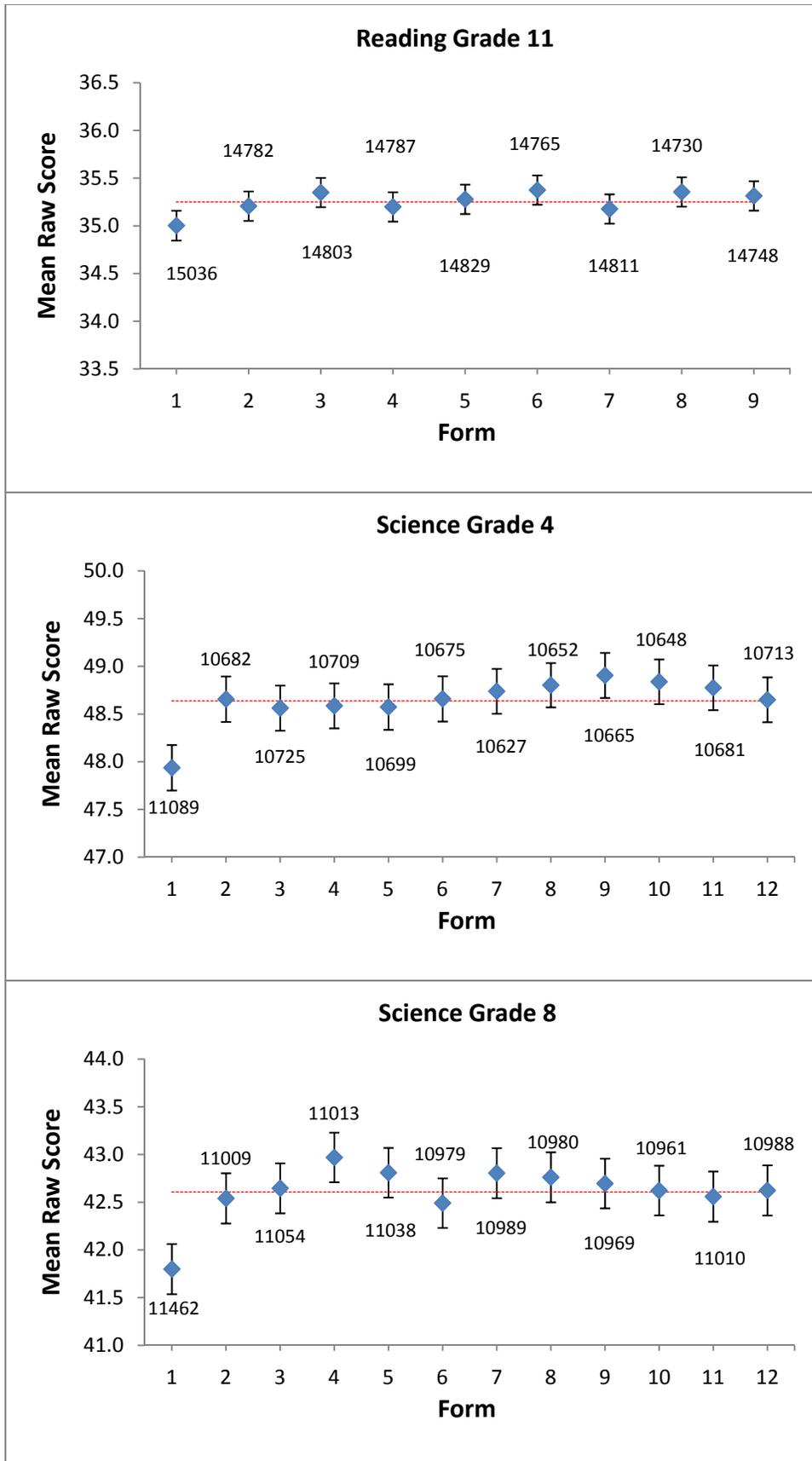


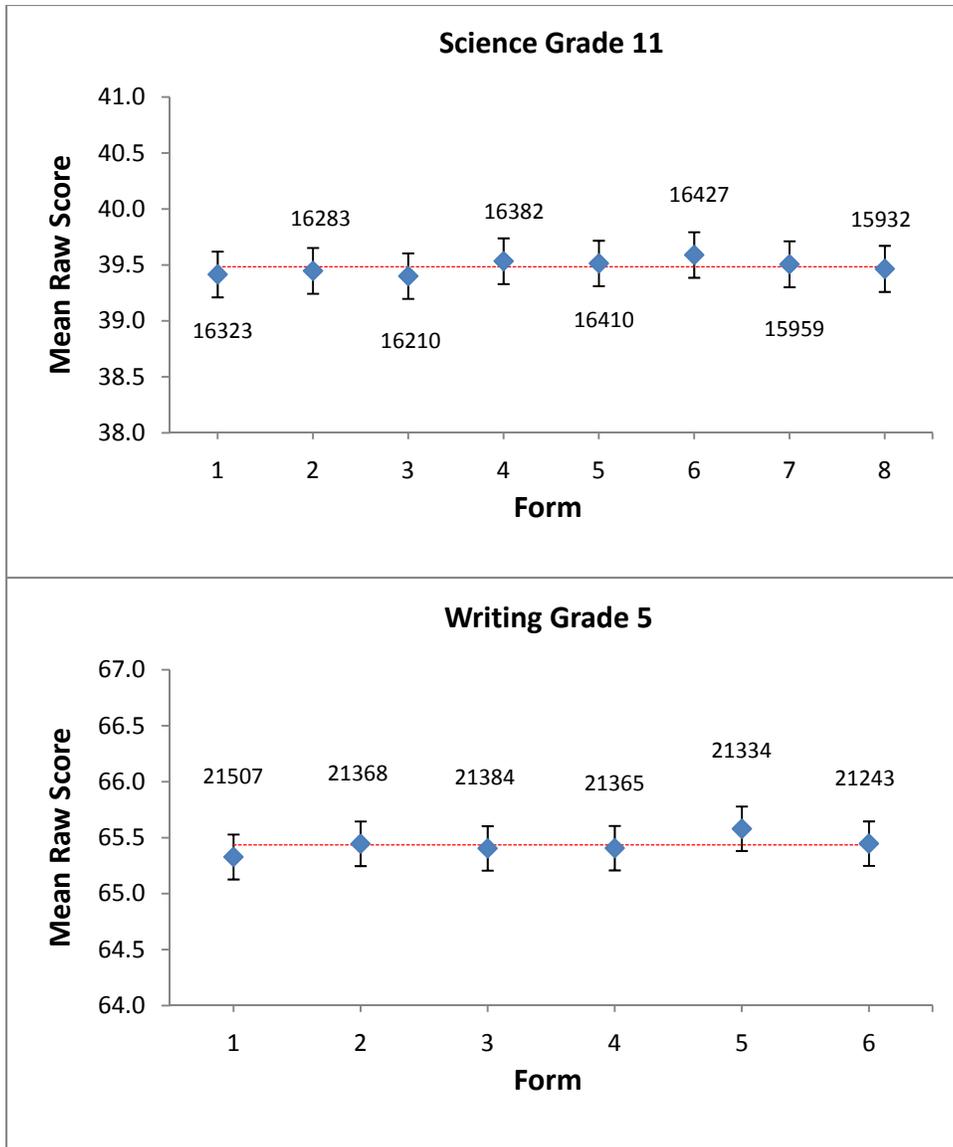


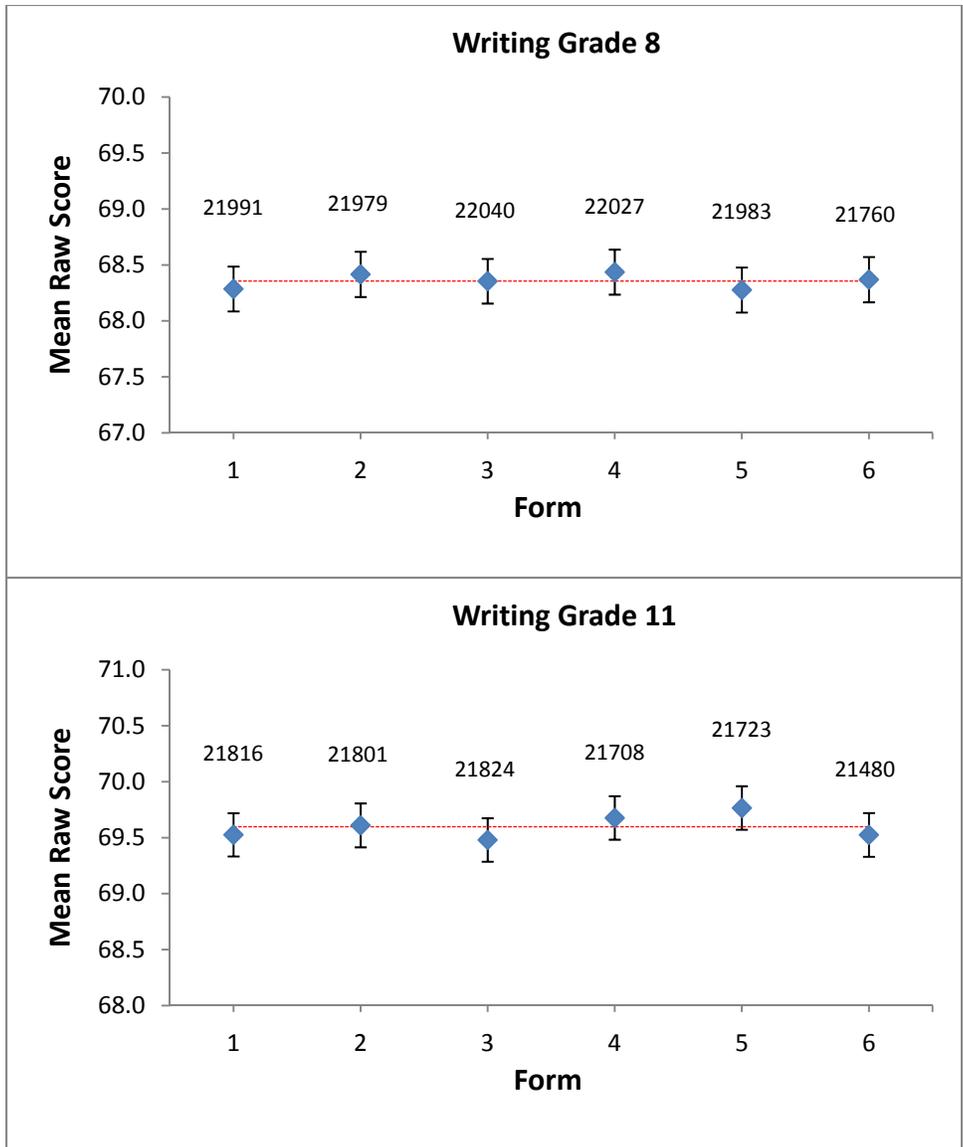














## ***Chapter Ten: Summary Demographic, Program, and Accommodation Data for the 2010 PSSA***

### **ASSESSED STUDENTS**

The PSSA assessed students include those from public schools who are required to participate as well as those from a small number of non-public schools (numbering fewer than 500 students per grade level) that elected to participate. Also included were home-schooled students, who numbered fewer than 100 per grade, and a small number of foreign exchange students who are more frequently found at Grade 11. An exception was granted for those IEP students with significant cognitive impairments who met each of the following criteria, making them eligible to participate in the Pennsylvania Alternate System of Assessment (PASA) for reading, mathematics, and science, and a school administered alternate assessment for writing: 1) was enrolled in the assessed grade level for the subject area, 2) had a significant cognitive disability, 3) required intensive instruction, 4) required adaptation and support to perform or participate meaningfully, 5) required substantial modification of the general education curriculum, and 6) participation in the general education curriculum differed markedly in form and substance from that of other students (see *The 2009–2010 PSSA Handbook for Assessment Coordinators and Administrators: Writing, Reading and Mathematics, Science*, PDE, 2010, p.8).

In 2010 a PSSA modified assessment (PSSA-M) became available for the first time in the area of mathematics, which will be expanded in 2011 to include reading and science. Eligibility for the PSSA-M requires that a student 1) is not eligible for the PASA, 2) has a grade-level standards aligned IEP that clearly documents that the student requires significant instructional accommodations to successfully access grade level content, 3) demonstrates persistent academic difficulties and 4) demonstrates a lack of academic progress. More detailed information on the PSSA-M eligibility criteria may be accessed by going to [www.education.state.pa.us](http://www.education.state.pa.us). On the left side of the navigation bar, click on “Programs”, then “Programs S–Z”, then “Special Education.” From the “Special Education” page click on “Assessment” to access the relevant documents.

Results for this chapter are presented in sets of tables for the four PSSA subject areas (reading, mathematics, science, and writing). Accompanying each numbered table is a letter (R, M, S, or W) to designate the subject area. Table set 10–1R through 10–1W provides a summary of the assessed students for each subject. Presented on the first line is the total number of non-blank answer documents processed by grade level for the 2010 PSSA. This number pertains to the total number of records on the student file and is typically less than the “Used Answer Booklets Scanned” column shown in Table 8–1. The reason for the difference is that completely blank answer booklets (no student name and no items responded to) get removed from the initial batch of materials scanned. See Chapter Eight for more details on processing. The second line shows the number and percentage of students with a PSSA score in the subject area, followed by the number and percentage not receiving a score. The final line shows the number of students contributing to state summary statistics, which is especially relevant for all tables following 10–2 (R through W). (See the section of this chapter entitled “Composition of Sample Used in Subsequent Tables” for additional explanation.)

Noteworthy in the 2010 assessment is the relatively lower number of students taking the PSSA mathematics relative to those taking reading. This departure from previous years is due to the advent of the modified assessment (PSSA-M) in mathematics implemented for the first time this year in Grades 4–8 and 11. Consequently, the number taking the PSSA mathematics was reduced by 2,203 in Grade 4 and 3,572 at Grade 11. This represents about 1.7 percent of students with mathematics test scores at Grade 4 and 2.6 percent at Grade 11. Since all students taking a modified assessment have an IEP, the mathematics demographics are also slightly affected. In 2011 a similar reduction in the number of students taking the PSSA in reading and science will occur with implementation of a modified assessment in those subject areas.

**Table 10–1R. Students Assessed on the 2010 PSSA: Reading**

	<b>Gr. 3</b>	<b>Gr. 4</b>	<b>Gr. 5</b>	<b>Gr. 6</b>	<b>Gr. 7</b>	<b>Gr. 8</b>	<b>Gr. 11</b>
	<b>N / Pct</b>						
Number of non-blank answer documents processed	129,639	131,347	131,708	131,777	133,607	136,489	137,685
Students with a reading score	129,050 99.5	130,733 99.5	131,126 99.6	131,094 99.5	132,594 99.2	135,281 99.1	135,479 98.4
Number processed but not assessed (without a total score)	589 0.5	614 0.5	582 0.4	683 0.5	1,013 0.8	1,208 0.9	2,206 1.6
Students with a reading score used in state summaries	126,588	128,452	128,933	128,921	130,376	132,906	133,291

**Table 10–1M. Students Assessed on the 2010 PSSA: Mathematics**

	<b>Gr. 3</b>	<b>Gr. 4</b>	<b>Gr. 5</b>	<b>Gr. 6</b>	<b>Gr. 7</b>	<b>Gr. 8</b>	<b>Gr. 11</b>
	<b>N / Pct</b>						
Number of non-blank answer documents processed	129,639	129,192	129,162	129,087	130,817	133,482	134,197
Students with a mathematics score	129,408 99.8	128,844 99.7	128,824 99.7	128,635 99.6	130,132 99.5	132,528 99.3	132,190 98.5
Number processed but not assessed (without a total score)	231 0.2	348 0.3	338 0.3	452 0.4	685 0.5	954 0.7	2,007 1.5
Students with a mathematics score used in state summaries	126,676	126,333	126,419	126,288	127,685	129,983	129,910

**Table 10–1S. Students Assessed on the 2010 PSSA: Science**

	Gr. 4		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
Number of non-blank answer documents processed	131,152		136,143		136,599	
Students with a science score	130,630	99.6	134,578	98.9	131,864	96.5
Number processed but not assessed (without a total score)	522	0.4	1,565	1.1	4,735	3.5
Students with a science score used in state summaries	128,565		132,452		129,926	

**Table 10–1W. Students Assessed on the 2010 PSSA: Writing**

	Gr. 5		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
Number of non-blank answer documents processed	131,487		136,141		136,911	
Students with a writing score	130,294	99.1	134,012	98.4	132,395	96.7
Number processed but not assessed (without a score)	1,193	0.9	2,129	1.6	4,516	3.3
Students with a writing score used in state summaries	128,201		131,780		130,352	

As may be observed from Tables 10–1R through 10–1W, not all students were assessed. Although there are a variety of reasons for this, the major ones pertain to:

- Extended absence from school that continued beyond the assessment window.
- Absence without make-up for at least one section of a subject area test.
- Failure to meet the attempt criteria on one or more subject area test sections and no exclusion code was marked by school personnel. For mathematics, reading, and science, the attempt criteria required a minimum of five items to be completed in each subject area section. For writing, the attempt criteria required is at least five multiple-choice items and respond to both operational writing prompts.
- ELL students in the first year in U.S. schools.
- Medical emergency.
- Other reasons (these include parental request due to religious reasons, students who are court-agency placed, students with multiple reasons coded, and the category of other).

The numbers of students without test scores for these reasons are presented in Tables 10–2R through 10–2W.

**Table 10–2R. Counts of Students without Scores on the 2010 PSSA: Reading**

Reason for Non-Assessment	Gr. 3	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N / Pct						
Extended Absence from School	15 2.5	21 3.4	33 5.7	47 6.9	99 9.8	155 12.8	416 18.9
Absent Without Make-up	23 3.9	19 3.1	34 5.8	49 7.2	124 12.2	147 12.2	408 18.5
Non-Attempt	219 37.2	217 35.3	184 31.6	234 34.3	340 33.6	376 31.1	673 30.5
ELL in First Year in U.S. Schools	245 41.6	242 39.4	215 36.9	179 26.2	223 22.0	177 14.7	108 4.9
Medical emergency	44 7.5	57 9.3	63 10.8	88 12.9	106 10.5	150 12.4	216 9.8
Other Reasons	43 7.3	58 9.4	53 9.1	86 12.6	120 11.8	203 16.8	384 17.4
Total Not Assessed	589	614	582	683	1,013	1,208	2,206

**Table 10–2M. Counts of Students without Scores on the 2010 PSSA: Mathematics**

Reason for Non-Assessment	Gr. 3	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N / Pct						
Extended Absence from School	16 6.9	20 5.7	32 9.5	44 9.7	99 14.5	153 16.0	400 19.9
Absent Without Make-up	13 5.6	10 2.9	28 8.3	42 9.3	89 13.0	116 12.2	363 18.1
Non-Attempt	117 50.6	206 59.2	165 48.8	198 43.8	272 39.7	325 34.1	646 32.2
Medical Emergency	44 19.0	55 15.8	59 17.5	81 17.9	99 14.5	145 15.2	206 10.3
Other Reasons	41 17.7	57 16.4	54 16.0	87 19.2	126 19.1	215 22.5	392 19.5
Total Not Assessed	231	348	338	452	685	954	2,007

**Table 10–2S. Counts of Students without Scores on the 2010 PSSA: Science**

Reason for Non-Assessment	Gr. 4		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
Extended Absence from School	61	11.7	356	22.7	888	18.8
Absent Without Make-up	52	10.0	261	16.7	1,127	23.8
Non-Attempt	225	43.1	434	27.7	1,804	38.1
Medical Emergency	84	16.1	215	13.7	297	6.3
Other Reasons	100	19.2	299	19.1	619	13.1
Total Not Assessed	522		1,565		4,735	

**Table 10–2W. Counts of Students without Scores on the 2010 PSSA: Writing**

Reason for Non-Assessment	Gr. 5		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
Extended Absence from School	53	4.4	251	11.8	709	15.7
Absent Without Make-up	45	3.8	245	11.5	794	17.6
Non-Attempt	852	71.4	1,135	53.3	2,244	49.7
ELL in First Year in U.S. Schools	78	6.5	40	1.9	33	0.7
Medical Emergency	75	6.3	173	8.1	241	5.3
Other Reasons	90	7.5	285	13.4	495	11.0
Total Not Assessed	1,193		2,129		4,516	

### COMPOSITION OF SAMPLE USED IN SUBSEQUENT TABLES

Students included in the following demographic analyses were those who contributed to state summary statistics, using the Post-Appeals (AYP) individual student data file provided to the Pennsylvania Department of Education on September 14, 2010. Students not included in the present state summary data were those who were 1) enrolled in a Pennsylvania school after October 1, 2009, 2) coded as ELL and enrolled after March 27, 2009, except for science, 3) a foreign exchange student, 4) home schooled, 5) enrolled in a non-public school, or 6) without a subject area test score.

Demographic data for students taking the PSSA is presented separately for each subject area (Tables 10–3R, 10–3M, 10–3S, and 10–3W). Results for accommodations received were collected separately by subject area and are presented in separate tables as well. For example, tables involving accommodations for reading were calculated for those students having a reading score (Tables 10–4R, 10–5R, 10–6R, and 10–7R).

**COLLECTION OF STUDENT DEMOGRAPHIC INFORMATION**

Data for analyses involving demographic characteristics were obtained primarily from information supplied by school district personnel through the Pennsylvania Information Management System (PIMS) and subsequently transmitted to DRC. Updates of attribution data (for AYP) were carried out through the DRC Attribution System. Some data such as accommodation information is marked directly on the student answer document at the time the PSSA is administered.

**DEMOGRAPHIC CHARACTERISTICS**

Frequency data for each category is presented in Tables 10–3R through 10–3W. Percentages are based on students with a score in a subject area and are shown at the bottom of the appropriate table. Included are students receiving education in a non-traditional setting, such as a court-agency placement.

**Table 10–3R. Demographic Characteristics of Students Taking the 2010 PSSA: Reading**

Demographic or Educational Characteristic	Gr. 3	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N / Pct						
<b>Gender</b>							
Female	61,715 48.8	62,718 48.8	62,799 48.7	62,660 48.6	63,872 49.0	64,293 48.4	65,562 49.2
Male	64,712 51.1	65,564 51.0	65,967 51.2	66,087 51.3	66,306 50.9	68,332 51.4	67,246 50.5
<b>Race/Ethnicity</b>							
American Indian or Alaskan Native	185 0.1	198 0.2	189 0.1	182 0.1	179 0.1	201 0.2	201 0.2
Asian or Pacific Islander	4,141 3.3	4,105 3.2	3,815 3.0	3,844 3.0	3,811 2.9	3,772 2.8	3,628 2.7
Black/African American non-Hispanic	19,561 15.5	19,700 15.3	20,061 15.6	19,696 15.3	19,782 15.2	19,636 14.8	18,542 13.9
Latino/Hispanic	10,205 8.1	9,902 7.7	10,028 7.8	9,830 7.6	9,609 7.4	9,405 7.1	7,798 5.9
White non-Hispanic	90,591 71.6	92,735 72.2	93,149 72.2	93,759 7.7	95,542 73.3	98,452 74.1	101,881 76.4
Multi-Racial/Ethnic	1,731 1.4	1,647 1.3	1,523 1.2	1,439 1.1	1,265 1.0	1,169 0.9	764 0.6
<b>Educational Category and Other Demographic Groups</b>							
IEP (not gifted)	18,593 14.7	20,600 16.0	20,696 16.1	20,261 15.7	19,971 15.3	20,402 15.4	18,480 13.9
Student exited IEP in last 2 years	2,127 1.7	2,490 1.9	2,740 2.1	2,750 2.1	2,244 1.7	1,785 1.3	971 0.7

Demographic or Educational Characteristic	Gr. 3	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N / Pct						
<b>Educational Category and Other Demographic Groups (continued)</b>							
Title I	32,635 25.8	30,852 24.0	28,704 22.3	21,818 16.9	16,026 12.3	14,745 11.1	10,089 7.6
Title III Served	2,291 1.8	1,897 1.5	1,623 1.3	1,548 1.2	1,379 1.1	1,397 1.1	1,015 0.8
Title III Not Served	1,820 1.4	1,522 1.2	1,332 1.0	1,093 0.8	1,103 0.8	992 0.7	767 0.6
Migrant Student	116 0.1	110 0.1	99 0.1	118 0.1	89 0.1	80 0.1	41 0.0
ELL (enrolled after 3-27-09)	0 0.0						
ELL (enrolled before 3-27-09)	4,111 3.2	3,419 2.7	2,955 2.3	2,641 2.0	2,482 1.9	2,389 1.8	1,782 1.3
Exited ESL/bilingual program and in first year of monitoring	986 0.8	1,108 0.9	799 0.6	640 0.5	468 0.4	440 0.3	253 0.2
Exited ESL/bilingual program and in second year of monitoring	313 0.2	582 0.5	722 0.6	571 0.4	508 0.4	359 0.3	217 0.2
Former ELL no longer monitored	516 0.4	771 0.6	1,310 1.0	1,674 1.3	1,676 1.3	1,900 1.4	1,384 1.0
Economically Disadvantaged	54,246 42.9	53,860 41.9	53,374 41.4	52,066 40.4	51,095 39.2	49,882 37.5	40,186 30.1
<b>Enrollment</b>							
Current Enrollment in school of residence after 10-1-09	3,475 2.7	3,389 2.6	3,083 2.4	3,096 2.4	3,439 2.6	3,322 2.5	3,466 2.6
Current Enrollment in district of residence after 10-1-09	1,772 1.4	1,738 1.4	1,632 1.3	1,651 1.3	1,840 1.4	1,960 1.5	1,899 1.4
Current Enrollment as PA resident after 10-1-09	0 0.0						
Enrolled in school of residence after 10-1-08 but on/before 10-1-09	23,389 18.5	23,541 18.3	30,000 23.3	54,105 42.0	41,518 31.8	20,283 15.3	19,650 14.7
Enrolled in district of residence after 10-1-08 but on/before 10-1-09	12,326 9.7	12,056 9.4	12,238 9.5	12,593 9.8	12,847 9.9	11,942 9.0	11,569 8.7
<b>Education in Non-Traditional Settings</b>							
Court / agency placed	36 0.0	74 0.1	89 0.1	115 0.1	210 0.2	399 0.3	705 0.5
Students with reading scores used in state summaries	126,588	128,452	128,933	128,921	130,376	132,906	133,291

**Table 10–3M. Demographic Characteristics of Students Taking the 2010 PSSA: Mathematics**

Demographic or Educational Characteristic	Gr. 3	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N / Pct						
<b>Gender</b>							
Female	61,745 48.7	61,818 48.9	61,743 48.8	61,606 48.8	62,766 49.2	63,128 48.6	64,275 49.5
Male	64,769 51.1	64,345 50.9	64,509 51.0	64,513 51.1	64,719 50.7	66,579 51.2	65,182 50.2
<b>Race/Ethnicity</b>							
American Indian or Alaskan Native	184 0.1	194 0.2	183 0.1	175 0.1	175 0.1	192 0.1	196 0.2
Asian or Pacific Islander	4,149 3.3	4,085 3.2	3,801 3.0	3,819 3.0	3,784 3.0	3,755 2.9	3,603 2.8
Black/African American non-Hispanic	19,592 15.5	19,307 15.3	19,594 15.5	19,197 15.2	19,313 15.1	19,116 14.7	17,855 13.7
Latino/Hispanic	10,222 8.1	9,710 7.7	9,819 7.8	9,615 7.6	9,386 7.4	9,163 7.0	7,583 5.8
White non-Hispanic	90,621 71.5	91,254 72.2	91,371 72.3	91,915 72.8	93,596 73.3	96,343 74.1	99,492 76.6
Multi-Racial/Ethnic	1,733 1.4	1,622 1.3	1,485 1.2	1,402 1.1	1,242 1.0	1,147 0.9	729 0.6
<b>Educational Category and Other Demographic Groups</b>							
IEP (not gifted)	18,626 14.7	18,467 14.6	18,167 14.4	17,596 13.9	17,198 13.5	17,426 13.4	15,040 11.6
Student exited IEP in last 2 years	2,128 1.7	2,490 2.0	2,739 2.2	2,754 2.2	2,246 1.8	1,783 1.4	973 0.7
Title I	32,662 25.8	30,343 24.0	28,116 22.2	21,278 16.8	15,618 12.2	14,311 11.0	9,743 7.5
Title III Served	2,300 1.8	1,842 1.5	1,565 1.2	1,480 1.2	1,342 1.1	1,348 1.0	1,007 0.8
Title III Not Served	1,835 1.4	1,499 1.2	1,307 1.0	1,077 0.9	1,083 0.8	974 0.7	751 0.6
Migrant Student	116 0.1	110 0.1	97 0.1	107 0.1	85 0.1	75 0.1	40 0.0
ELL (enrolled after 3-27-09)	0 0.0						
ELL (enrolled before 3-27-09)	4,135 3.3	3,341 2.6	2,872 2.3	2,557 2.0	2,425 1.9	2,322 1.8	1,758 1.4

Demographic or Educational Characteristic	Gr. 3	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N / Pct						
<b>Educational Category and Other Demographic Groups (continued)</b>							
Exited ESL/bilingual program and in first year of monitoring	986 0.8	1,101 0.9	793 0.6	637 0.5	462 0.4	433 0.3	251 0.2
Exited ESL/bilingual program and in second year of monitoring	313 0.2	579 0.5	720 0.6	565 0.4	505 0.4	358 0.3	215 0.2
Former ELL no longer monitored	516 0.4	760 0.6	1,296 1.0	1,655 1.3	1,652 1.3	1,864 1.4	1,348 1.0
Economically Disadvantaged	54,299 42.9	52,599 41.6	51,851 41.0	50,588 40.1	49,577 38.8	48,279 37.1	38,541 29.7
<b>Enrollment</b>							
Current Enrollment in school of residence after 10-1-09	3,478 2.7	3,341 2.6	3,039 2.4	3,064 2.4	3,382 2.6	3,284 2.5	3,376 2.6
Current Enrollment in district of residence after 10-1-09	1,774 1.4	1,711 1.4	1,611 1.3	1,634 1.3	1,806 1.4	1,941 1.5	1,856 1.4
Current Enrollment as PA resident after 10-1-09	0 0.0						
Enrolled in school of residence after 10-1-08 but on/before 10-1-09	23,425 18.5	23,115 18.3	29,364 23.2	53,032 42.0	40,669 31.9	19,755 15.2	19,077 14.7
Enrolled in district of residence after 10-1-08 but on/before 10-1-09	12,347 9.7	11,831 9.4	11,969 9.5	12,315 9.8	12,558 9.8	11,619 8.9	11,204 8.6
<b>Education in Non-Traditional Settings</b>							
Court/agency placed	37 0.0	73 0.1	85 0.1	111 0.1	197 0.2	382 0.3	664 0.5
Students with mathematics scores used in state summaries	126,676	126,333	126,419	126,288	127,685	129,983	129,910

**Table 10–3S. Demographic Characteristics of Students Taking the 2010 PSSA: Science**

Demographic or Educational Characteristic	Gr. 4		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
<b>Gender</b>						
Female	62,737	48.8	64,111	48.4	63,919	49.2
Male	65,603	51.0	68,092	51.4	65,643	50.5
<b>Race/Ethnicity</b>						
American Indian or Alaskan Native	196	0.2	197	0.1	195	0.2
Asian or Pacific Islander	4,199	3.3	3,876	2.9	3,599	2.8
Black/African American non-Hispanic	19,614	15.3	19,377	14.6	16,901	13.0
Latino/Hispanic	10,098	7.9	9,467	7.1	7,424	5.7
White non-Hispanic	92,572	72.0	98,095	74.1	100,692	77.5
Multi-Racial/Ethnic	1,637	1.3	1,179	0.9	734	0.6
<b>Educational Category and Other Demographic Groups</b>						
IEP (not gifted)	20,554	16.0	20,230	15.3	17,802	13.7
Student exited IEP in last 2 years	2,480	1.9	1,773	1.3	944	0.7
Title I	30,880	24.0	14,622	11.0	9,692	7.5
Title III - Served	2,136	1.7	1,572	1.2	1,114	0.9
Title III - Not Served	1,724	1.3	1,162	0.9	769	0.6
Migrant Student	116	0.1	87	0.1	38	0.0
ELL (enrolled after 3-27-09)	448	0.3	356	0.3	204	0.2
ELL (enrolled before 3-27-09)	3,412	2.7	2,378	1.8	1,679	1.3
Exited ESL/bilingual program – 1 yr	1,106	0.9	441	0.3	250	0.2
Exited ESL/bilingual program – 2 yr	579	0.5	357	0.3	210	0.2
Former ELL no longer monitored	770	0.6	1,888	1.4	1,276	1.0
Economically Disadvantaged	53,914	41.9	49,589	37.4	38,167	29.4
<b>Enrollment</b>						
Current Enrollment in school of residence after 10-1-09	3,381	2.6	3,280	2.5	3,103	2.4
Current Enrollment in district of residence after 10-1-09	1,732	1.3	1,944	1.5	1,797	1.4
Current Enrollment as PA resident after 10-1-09	0	0.0	0	0.0	0	0.0
Enrolled in school of residence after 10-1-08 but on/before 10-1-09	23,768	18.5	20,285	15.3	19,181	14.8

Demographic or Educational Characteristic	Gr. 4		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
<b>Enrollment (continued)</b>						
Enrolled in district of residence after 10-1-08 but on/before 10-1-09	12,329	9.6	12,074	9.1	11,436	8.8
<b>Education in Non-Traditional Settings</b>						
Court/agency placed	77	0.1	374	0.3	704	0.5
Students with science scores used in state summaries	128,565		132,452		129,926	

**Table 10–3W. Demographic Characteristics of Students Taking the 2010 PSSA: Writing**

Demographic or Educational Characteristic	Gr. 5		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
<b>Gender</b>						
Female	62,583	48.8	63,959	48.5	64,377	49.4
Male	65,420	51.0	67,596	51.3	65,513	50.3
<b>Race/Ethnicity</b>						
American Indian or Alaskan Native	186	0.1	199	0.2	198	0.2
Asian or Pacific Islander	3,808	3.0	3,745	2.8	3,552	2.7
Black/African American non-Hispanic	19,774	15.4	19,297	14.6	17,208	13.2
Latino/Hispanic	9,907	7.7	9,226	7.0	7,389	5.7
White non-Hispanic	92,797	72.4	97,900	74.3	100,796	77.3
Multi-Racial/Ethnic	1,516	1.2	1,173	0.9	721	0.6
<b>Educational Category and Other Demographic Groups</b>						
IEP (not gifted)	20,355	15.9	19,968	15.2	17,660	13.5
Student exited IEP in last 2 years	2,730	2.1	1,772	1.3	942	0.7
Title I	28,471	22.2	14,511	11.0	9,773	7.5
Title III - Served	1,597	1.2	1,355	1.0	967	0.7
Title III - Not Served	1,311	1.0	955	0.7	660	0.5
Migrant Student	99	0.1	79	0.1	38	0.0
ELL (enrolled after 3-27-09)	0	0.0	0	0.0	0	0.0
ELL (enrolled before 3-27-09)	2,908	2.3	2,310	1.8	1,627	1.2
Exited ESL/bilingual program – 1 yr	796	0.6	438	0.3	250	0.2

Demographic or Educational Characteristic	Gr. 5		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
<b>Educational Category and Other Demographic Groups (continued)</b>						
Exited ESL/bilingual program – 2 yr	717	0.6	356	0.3	210	0.2
Former ELL no longer monitored	1,303	1.0	1,878	1.4	1,311	1.0
Economically Disadvantaged	52,842	41.2	49,136	37.3	38,368	29.4
<b>Enrollment</b>						
Current Enrollment in school of residence after 10-1-09	3,010	2.3	3,226	2.4	3,156	2.4
Current Enrollment in district of residence after 10-1-09	1,613	1.3	1,911	1.5	1,784	1.4
Current Enrollment as PA resident after 10-1-09	0	0.0	0	0.0	0	0.0
Enrolled in school of residence after 10-1-08 but on/before 10-1-09	29,776	23.2	19,968	15.2	19,077	14.6
Enrolled in district of residence after 10-1-08 but on/before 10-1-09	12,126	9.5	11,750	8.9	11,305	8.7
<b>Education in Non-Traditional Settings</b>						
Court/agency placed	84	0.1	360	0.3	672	0.5
Students with writing scores used in state summaries	128,201		131,780		130,352	

### TEST ACCOMMODATIONS PROVIDED

School personnel supplied information regarding accommodations that a student may have received while taking the PSSA. Accommodations are classified in terms of presentation, response, setting, and timing to enable students to better manage disabilities that hinder their ability to learn and respond to assessments. An accommodations manual for the PSSA entitled *PSSA and PSSA-M Accommodations Guidelines for Students with IEPs and Students with 504 Plans* (PDE, revised 1/11/2010) was developed for use with the 2010 PSSA. The manual can be accessed by going to [www.education.state.pa.us](http://www.education.state.pa.us). On the left, click on “Programs”, then “Programs O–R”, then “Pennsylvania System of School Assessment (PSSA)” and then “Testing Accommodations & Security”.

The frequency with which these accommodations were utilized is summarized separately for each subject area in Tables 10–4R through 10–7W. Tabled values are based on all students receiving a score, which contributed to state summary statistics in a given subject area. A glossary of accommodation terms as applied to the PSSA is provided in Table 10–10 at the end of this chapter.

## **PRESENTATION ACCOMMODATIONS RECEIVED**

Presentation Accommodations are those that provide alternate ways for students to access and process printed instructional material and assessments. These include auditory, tactile, visual, and combined auditory/visual modes of presentation. The number of presentation accommodations provided in the 2010 PSSA varied by subject as follows: reading, 9, mathematics, 12, science, 12, and writing, 11. As depicted in Tables 10–4R through 10–4W, the actual frequencies are quite low, generally representing less than two-tenths of one percent of assessed students statewide (65 to 80 percent of the instances depending on subject area). The most notable exceptions were test directions read aloud (each subject), test items read aloud (mathematics and science), and test prompts recorded (writing).

## **RESPONSE ACCOMMODATIONS RECEIVED**

Response Accommodations permit students to complete assignments, tests, and activities in different ways to solve or organize problems using some type of assistive device or organizer. The number of response accommodations provided on the 2010 PSSA varied by subject as follows: reading, 9, mathematics, 12, science, 12, and writing, 8. The frequency with which these accommodations were utilized is summarized in Tables 10–5R through 10–5W. The actual frequencies are quite low, most representing less than two-tenths of one percent of assessed students statewide, regardless of subject area (76 to 89 percent of the instances).

## **SETTING ACCOMMODATIONS RECEIVED**

Setting Accommodations permit a change in location in which a student receives instruction or participates in an assessment. There were four categories of setting accommodations for each subject area on the 2010 PSSA. As depicted in Tables 10–6R through 10–6W, the most common accommodation was small group testing with nearly twice the frequency of testing in a separate setting. For reading and mathematics the percentage of students tested in separate or small group settings was largest in Grades 3–5, followed by a steady decrease from Grades 6 to 11. Similarly, usage of these two accommodations was greatest at the elementary level for science (Grade 4) and writing (Grade 5) with diminishing percentages at Grades 8 and 11.

## **TIMING ACCOMMODATIONS RECEIVED**

Timing Accommodations involve a change in the allowable length of time to complete assignments or assessments, including the way in which time is organized. There were four categories of timing accommodations on the 2010 PSSA for each subject area. As depicted in Tables 10–7R through 10–7W, the most common accommodations were scheduled extended time and requested extended time. Science and Writing demonstrated a clear and consistent pattern as scheduled extended time diminished across grades while requested scheduled time revealed peak usage at Grade 8. For reading and mathematics, usage of scheduled extended time peaked at Grade 5 while requested scheduled time steadily increased across grade levels for mathematics and exhibited an uneven pattern for reading.

**Table 10–4R. Incidence of Presentation Accommodations Received on the 2010 PSSA: Reading**

Type of Presentation Accommodation	Gr. 3	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N / Pct						
Braille Format	8 0.0	6 0.0	10 0.0	4 0.0	7 0.0	9 0.0	6 0.0
Large Print Format	95 0.1	106 0.1	106 0.1	77 0.1	68 0.1	72 0.1	51 0.0
Electronic Screen Reader	5 0.0	2 0.0	2 0.0	2 0.0	2 0.0	2 0.0	2 0.0
Test directions read aloud (provided by live reader)	5,996 4.7	6,774 5.3	6,516 5.1	4,847 3.8	3,675 2.8	3,651 2.7	1,986 1.5
Test directions signed, interpreted for ELL student, or recorded	142 0.1	129 0.1	140 0.1	147 0.1	111 0.1	107 0.1	103 0.1
Amplification device	57 0.0	48 0.0	66 0.1	34 0.0	10 0.0	14 0.0	7 0.0
Magnification device	15 0.0	22 0.0	20 0.0	19 0.0	9 0.0	17 0.0	8 0.0
Reading windows, reading guides	1,027 0.8	951 0.7	603 0.5	181 0.1	124 0.1	60 0.0	11 0.0
Other (per <i>Accommodations Guidelines</i> )	374 0.3	357 0.3	393 0.3	388 0.3	312 0.2	255 0.2	178 0.1

**Table 10–4M. Incidence of Presentation Accommodations Received on the 2010 PSSA: Mathematics**

Type of Presentation Accommodation	Gr. 3	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct
Braille Format	9 0.0	7 0.0	8 0.0	2 0.0	8 0.0	4 0.0	7 0.0
Large Print Format	96 0.1	99 0.1	97 0.1	67 0.1	63 0.0	63 0.0	51 0.0
Electronic Screen Reader	5 0.0	0 0.0	0 0.0	2 0.0	2 0.0	1 0.0	4 0.0
Test directions read aloud (provided by live reader)	7,277 5.7	6,596 5.2	6,071 4.8	4,447 3.5	3,229 2.5	3,268 2.5	1,614 1.2
Test directions signed, interpreted for ELL student, or recorded	208 0.2	185 0.1	197 0.2	162 0.1	125 0.1	113 0.1	100 0.1
Test items/questions read aloud (provided by live reader) or signed	12,708 10.0	11,561 9.2	10,299 8.1	6,959 5.5	4,493 3.5	3,755 2.9	1,042 0.8
Test items/questions interpreted for ELL student	263 0.2	264 0.2	225 0.2	174 0.1	137 0.1	106 0.1	32 0.0
Amplification device	69 0.1	43 0.0	63 0.0	30 0.0	9 0.0	15 0.0	6 0.0
Magnification device	16 0.0	19 0.0	16 0.0	9 0.0	11 0.0	16 0.0	9 0.0
Reading windows, reading guides	293 0.2	218 0.2	155 0.1	54 0.0	45 0.0	10 0.0	7 0.0
Other (per <i>Accommodations Guidelines</i> )	335 0.3	309 0.2	293 0.2	312 0.2	244 0.2	219 0.2	149 0.1
Spanish version for mathematics	104 0.1	143 0.1	187 0.1	207 0.2	233 0.2	251 0.2	200 0.2

**Table 10–4S. Incidence of Presentation Accommodations Received on the 2010 PSSA: Science**

Type of Presentation Accommodation	Gr. 4		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
Braille Format	4	0.0	4	0.0	6	0.0
Large Print Format	93	0.1	67	0.1	51	0.0
Electronic Screen Reader	4	0.0	1	0.0	2	0.0
Test directions read aloud (provided by live reader)	6,100	4.7	3,216	2.4	1,685	1.3
Test directions signed, interpreted for ELL student, or recorded	225	0.2	126	0.1	105	0.1
Test items/questions read aloud (provided by live reader) or signed	11,829	9.2	3,529	2.7	1,062	0.8
Test items/questions interpreted for ELL student	175	0.1	92	0.1	66	0.1
Amplification device	41	0.0	9	0.0	1	0.0
Magnification device	5	0.0	8	0.0	5	0.6
Reading windows, reading guides	161	0.1	5	0.0	8	0.0
Other (per <i>Accommodations Guidelines</i> )	191	0.1	134	0.1	122	0.1
Spanish version for science	202	0.2	326	0.2	213	0.2

**Table 10–4W. Incidence of Presentation Accommodations Received on the 2010 PSSA: Writing**

Type of Presentation Accommodation	Gr. 5		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
Braille Format	7	0.0	9	0.0	6	0.0
Large Print Format	99	0.1	66	0.1	52	0.0
Electronic Screen Reader	1	0.0	2	0.0	3	0.0
Test directions read aloud (provided by live reader)	5,017	3.9	3,063	2.3	1,700	1.3
Test directions signed, interpreted for ELL student, or recorded	126	0.1	98	0.1	106	0.1
Writing prompts read aloud	7,472	5.8	3,249	2.5	1,353	1.0
Writing prompts signed, interpreted for ELL student, or recorded	75	0.1	49	0.0	62	0.0
Amplification device	30	0.0	12	0.0	7	0.0
Magnification device	13	0.0	10	0.0	8	0.0
Reading windows, reading guides	111	0.1	20	0.0	12	0.0
Other	196	0.2	195	0.1	105	0.1

**Table 10–5R. Incidence of Response Accommodations  
Received on the 2010 PSSA: Reading**

Type of Response Accommodation	Gr. 3	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct
Test administrator marked multiple-choice responses at student’s direction	188 0.1	636 0.5	593 0.5	311 0.2	144 0.1	111 0.1	45 0.0
Test administrator scribed open-ended	1,124 0.9	1,163 0.9	935 0.7	499 0.4	224 0.2	206 0.2	78 0.1
Test administrator transcribed student responses	402 0.3	629 0.5	600 0.5	446 0.3	283 0.2	274 0.2	124 0.1
Typewriter, word processor, or computer	25 0.0	73 0.1	112 0.1	140 0.1	142 0.1	160 0.1	65 0.0
Braille/Notetaker	3 0.0	3 0.0	7 0.0	4 0.0	4 0.0	4 0.0	1 0.0
Augmentative communication device	10 0.0	5 0.0	6 0.0	1 0.0	1 0.0	2 0.0	0 0.0
Audio recording of student responses	1 0.0	1 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
Electronic Screen Reader	3 0.0	0 0.0	0 0.0	0 0.0	0 0.0	2 0.0	5 0.0
Other (approved by PDE)	116 0.1	168 0.1	177 0.1	135 0.1	116 0.1	72 0.1	53 0.0

**Table 10–5M. Incidence of Response Accommodations  
Received on the 2010 PSSA: Mathematics**

Type of Response Accommodation	Gr. 3	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N / Pct	N/Pct	N / Pct				
Test administrator marked multiple-choice responses	186 0.1	547 0.4	523 0.4	254 0.2	118 0.1	97 0.1	40 0.0
Test administrator scribed open-ended responses at student’s direction	956 0.8	834 0.7	686 0.5	358 0.3	138 0.1	127 0.1	54 0.0
Test administrator transcribed student responses	339 0.3	477 0.4	453 0.4	286 0.2	180 0.1	138 0.1	78 0.1
Qualified interpreter for ELL student	60 0.0	49 0.0	32 0.0	30 0.0	28 0.0	39 0.0	18 0.0
Typewriter, word processor, or computer	12 0.0	29 0.0	49 0.0	50 0.0	55 0.0	38 0.0	22 0.0
Braille/Notetaker	3 0.0	4 0.0	6 0.0	2 0.0	5 0.0	4 0.0	1 0.0
Augmentative communication device	11 0.0	6 0.0	4 0.0	2 0.0	1 0.0	1 0.0	1 0.0
Audio recording of student responses	1 0.0	1 0.0	0 0.0	0 0.0	0 0.0	0 0.0	1 0.0
Electronic Screen Reader	2 0.0	0 0.0	0 0.0	0 0.0	0 0.0	1 0.0	5 0.0
Manipulative	393 0.3	174 0.1	101 0.1	47 0.0	6 0.0	13 0.0	2 0.0
Translation dictionary for ELL student	29 0.0	20 0.0	37 0.0	131 0.1	80 0.1	82 0.1	180 0.1
Other (approved by PDE)	100 0.1	139 0.1	146 0.1	120 0.1	86 0.1	70 0.1	45 0.0

**Table 10–5S. Incidence of Response Accommodations  
Received on the 2010 PSSA: Science**

Type of Response Accommodation	Gr. 4		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
Test administrator marked multiple-choice responses	575	0.4	95	0.1	38	0.0
Test administrator scribed open-ended responses at student’s direction	1,053	0.8	139	0.1	46	0.0
Test administrator transcribed student responses	561	0.4	210	0.2	87	0.1
Qualified interpreter for ELL student	42	0.0	27	0.0	2	0.0
Typewriter, word processor, or computer	47	0.0	89	0.1	32	0.0
Braille/Notetaker	3	0.0	3	0.0	0	0.0
Augmentative communication device	4	0.0	1	0.0	1	0.0
Audio recording of student responses	0	0.0	1	0.0	1	0.0
Electronic Screen Reader	1	0.0	0	0.0	4	0.0
Manipulative	0	0.0	10	0.0	0	0.0
Translation dictionary for ELL student	34	0.0	93	0.1	112	0.1
Other (approved by PDE)	98	0.1	50	0.0	43	0.0

**Table 10–5W. Incidence of Response Accommodations  
Received on the 2010 PSSA: Writing**

Type of Response Accommodation	Gr. 5		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
Test administrator marked multiple-choice responses at student’s direction	162	0.1	50	0.0	31	0.0
Test administrator transcribed student responses	1,015	0.8	533	0.4	269	0.2
Typewriter, word processor, or computer	330	0.3	287	0.2	184	0.1
Braille/Notetaker	11	0.0	4	0.0	7	0.0
Augmentative communication device	7	0.0	0	0.0	6	0.0
Audio recording of student responses	3	0.0	2	0.0	5	0.0
Electronic Screen Reader	3	0.0	3	0.0	12	0.0
Other (approved by PDE)	102	0.1	54	0.0	41	0.0

**Table 10–6R. Incidence of Setting Accommodations  
Received on the 2010 PSSA: Reading**

Type of Setting Accommodation	Gr. 3	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct
Hospital/Home Testing	57 0.0	61 0.0	62 0.0	67 0.1	76 0.1	101 0.1	120 0.1
Separate Setting	8,538 6.7	9,229 7.2	8,829 6.8	6,052 4.7	5,406 4.1	5,125 3.9	3,605 2.7
Small Group Testing	16,932 13.4	17,767 13.8	17,139 13.3	14,177 11.0	12,037 9.2	12,189 9.2	9,057 6.8
Other (PDE Approved)	190 0.2	153 0.1	177 0.1	227 0.2	176 0.1	188 0.1	81 0.1

**Table 10–6M. Incidence of Setting Accommodations  
Received on the 2010 PSSA: Mathematics**

Type of Setting Accommodation	Gr. 3	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct
Hospital/Home Testing	55 0.0	59 0.0	62 0.0	69 0.1	70 0.1	89 0.1	110 0.1
Separate Setting	8,541 6.7	8,294 6.6	7,746 6.1	5,240 4.1	4,536 3.6	4,221 3.2	2,872 2.2
Small Group Testing	17,103 13.5	16,342 12.9	15,334 12.1	12,317 9.8	10,216 8.0	10,219 7.9	7,138 5.5
Other (PDE Approved)	170 0.1	135 0.1	156 0.1	183 0.1	135 0.1	170 0.1	51 0.0

**Table 10–6S. Incidence of Setting Accommodations  
Received on the 2010 PSSA: Science**

Type of Setting Accommodation	Gr. 4		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
Hospital/Home Testing	42	0.0	70	0.1	73	0.1
Separate Setting	8,152	6.3	4,598	3.5	3,194	2.5
Small Group Testing	14,631	11.4	10,436	7.9	8,014	6.2
Other (PDE Approved)	85	0.1	127	0.1	66	0.1

**Table 10–6W. Incidence of Setting Accommodations  
Received on the 2010 PSSA: Writing**

Type of Setting Accommodation	Gr. 5		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
Hospital/Home Testing	39	0.0	71	0.1	87	0.1
Separate Setting	7,015	5.5	4,073	3.1	2,979	2.3
Small Group Testing	13,572	10.6	10,169	7.7	8,109	6.2
Other (PDE Approved)	44	0.0	139	0.1	53	0.0

**Table 10–7R. Incidence of Timing Accommodations  
Received on the 2010 PSSA: Reading**

Type of Timing Accommodation	Gr. 3	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N / Pct						
Scheduled Extended Time	5,047 4.0	6,296 4.9	6,498 5.0	5,189 4.0	3,771 2.9	3,999 3.0	3,278 2.5
Requested Extended Time	2,062 1.6	3,559 2.8	3,348 2.6	4,238 3.3	3,787 2.9	3,708 2.8	4,329 3.2
Multiple Test Sessions	945 0.7	1,035 0.8	1,161 0.9	1,166 0.9	944 0.7	1,028 0.8	985 0.7
Changed Test Schedule	312 0.2	317 0.2	323 0.3	228 0.2	257 0.2	239 0.2	318 0.2

**Table 10–7M. Incidence of Timing Accommodations  
Received on the 2010 PSSA: Mathematics**

Type of Timing Accommodation	Gr. 3	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N / Pct						
Scheduled Extended Time	4,816 3.8	5,398 4.3	5,563 4.4	4,487 3.6	3,377 2.6	3,659 2.8	3,097 2.4
Requested Extended Time	1,031 0.8	2,139 1.7	2,468 2.0	2,963 2.3	3,740 2.9	4,506 3.5	5,630 4.3
Multiple Test Sessions	925 0.7	901 0.7	1,051 0.8	1,031 0.8	826 0.6	932 0.7	842 0.6
Changed Test Schedule	288 0.2	269 0.2	257 0.2	194 0.2	184 0.1	204 0.2	258 0.2

**Table 10–7S. Incidence of Timing Accommodations Received on the 2010 PSSA: Science**

Type of Timing Accommodation	Gr. 4		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
Scheduled Extended Time	4,744	3.7	2,997	2.3	2,390	1.8
Requested Extended Time	1,705	1.3	3,395	2.6	1,712	1.3
Multiple Test Sessions	693	0.5	721	0.5	677	0.5
Changed Test Schedule	209	0.2	113	0.1	171	0.1

**Table 10–7W. Incidence of Timing Accommodations Received on the 2010 PSSA: Writing**

Type of Timing Accommodation	Gr. 5		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
Scheduled Extended Time	4,816	3.8	3,196	2.4	2,359	1.8
Requested Extended Time	3,172	2.5	4,488	3.4	2,127	1.6
Multiple Test Sessions	921	0.7	797	0.6	710	0.5
Changed Test Schedule	194	0.2	131	0.1	230	0.2

### ACCOMMODATION RATE FOR NON-IEP AND IEP STUDENTS

A comparison between students without an IEP (non-IEP Students) and those with an IEP (IEP Students) with regard to having received an accommodation is provided in Tables 10–8R through 10–8W). In this data, Accommodated means that a student received one or more of the total number of accommodations available for a given subject area as follows: reading, 26, mathematics, 32, science, 32, and writing, 27. The category of Non-Accommodated indicates that a student did not receive any accommodation during testing.

The general pattern of findings provided in Tables 10–8R through 10–8W reveals a consistent and substantially higher percentage of IEP Students receiving an accommodation, in contrast to non-IEP Students. For example, of the non-IEP students taking the reading test in Grade 3 (see Table 10–8R), 9.2 percent received an accommodation of some type as contrasted with 57.1 percent of IEP Students. For reading and mathematics the percentage of accommodated IEP students reached a peak at Grade 5 before diminishing slightly through Grade 11.

**Table 10–8R. Accommodation Rate for Non-IEP and IEP Students: Reading**

Student Subgroup	Gr. 3	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct
<b>Non-IEP Students</b>	107,995	107,852	108,237	108,660	110,405	112,504	114,811
Non-Accommodated	98,070 90.8	97,850 90.7	99,410 91.8	101,811 93.7	105,341 95.4	107,431 95.5	110,295 96.1
Accommodated	9,925 9.2	10,002 9.3	8,827 8.2	6,849 6.3	5,064 4.6	5,073 4.5	4,516 3.9
<b>IEP Students</b>	18,593	20,600	20,696	20,261	19,971	20,402	18,480
Non-Accommodated	7,974 42.9	7,659 37.2	7,064 34.1	7,365 36.4	7,659 38.4	8,015 39.3	8,874 48.0
Accommodated	10,619 57.1	12,941 62.8	13,632 65.9	12,896 63.6	12,312 61.6	12,387 60.7	9,606 52.0

**Table 10–8M. Accommodation Rate for Non-IEP and IEP Students: Mathematics**

Student Subgroup	Gr. 3	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct
<b>Non-IEP Students</b>	108,050	107,866	108,252	108,692	110,487	112,557	114,870
Non-Accommodated	97,868 90.6	98,139 91.0	99,665 92.1	102,552 94.4	104,934 95.0	106,387 94.5	108,563 94.5
Accommodated	10,182 9.4	9,727 9.0	8,587 7.9	6,140 5.6	5,553 5.0	6,170 5.5	6,307 5.5
<b>IEP Students</b>	18,626	18,467	18,167	17,596	17,198	17,426	15,040
Non-Accommodated	7,897 42.4	7,339 39.7	6,667 36.7	6,854 39.0	6,926 40.3	7,200 41.3	7,464 49.6
Accommodated	10,729 57.6	11,128 60.3	11,500 63.3	10,742 61.0	10,272 59.7	10,226 58.7	7,576 50.4

**Table 10–8S. Accommodation Rate for Non-IEP and IEP Students: Science**

Student Subgroup	Gr. 4		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
<b>Non-IEP Students</b>	108,011		112,222		112,124	
Non-Accommodated	100,577	93.1	107,568	95.9	109,603	97.8
Accommodated	7,434	6.9	4,654	4.1	2,521	2.2
<b>IEP Students</b>	20,554		20,230		17,802	
Non-Accommodated	8,884	43.2	9,200	45.5	9,656	54.2
Accommodated	11,670	56.8	11,030	54.5	8,146	45.8

**Table 10–8W. Accommodation Rate for Non-IEP and IEP Students: Writing**

Student Subgroup	Gr. 5		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
<b>Non-IEP Students</b>	107,846		111,812		112,692	
Non-Accommodated	100,911	93.6	106,256	95.0	110,013	97.6
Accommodated	6,935	6.4	5,556	5.0	2,679	2.4
<b>IEP Students</b>	20,355		19,968		17,660	
Non-Accommodated	8,721	42.8	9,268	46.4	9,438	53.4
Accommodated	11,634	57.2	10,700	53.6	8,222	46.6

### THE INCIDENCE OF ACCOMMODATIONS AND IEP AND ELL STATUS

As noted in Tables 10–8R through 10–8W students with an IEP received an accommodation of some type far more often than non-IEP students. Certain accommodations with very low frequencies are specific to particular disabilities while others are far more common and may also apply to students classified as English Language Learners (ELL). As observed in Tables 10–4R through 10–7W, the most frequently occurring accommodations for assessed students were:

- Test directions read aloud
- Test items/questions read aloud or signed (mathematics and science only)
- Test prompts recorded (writing only)
- Tested in separate setting
- Small group testing
- Scheduled extended time
- Requested extended time

Because the accommodations with the largest frequencies can potentially supply the most stable data when separated out for subgroup analysis, these are displayed in Tables 10–9R through 10–9W.

Coding for IEP is dichotomous, as students are classified IEP and non-IEP. For purposes of this analysis, an English Language Learner (ELL) is a student classified ELL and enrolled in a U.S. school on or before March 27, 2009. All other assessed students, including those who have exited an ESL/bilingual program and are in the first or second year of monitoring are regarded as non-ELL. Students coded as ELL and enrolled in a U.S. school after March 27, 2009 are excluded from state summary statistics as stated earlier in this chapter.

Customarily, a considerably larger percentage of IEP students receive a given accommodation than non-IEP students. Likewise, certain accommodations occur more frequently for ELL students than for non-ELL students. To separate out the effect of being classified IEP or ELL, four possible combinations are presented in Tables 10–9R through 10–9W. These include general education students (who are neither IEP nor ELL), students who are IEP but non-ELL, students who are ELL but non-IEP, and students who are both IEP and ELL. The bottom row for

each grade provides the total number of students with a subject area score in each of the four classifications.

A great deal of consistency in the general findings may be gleaned from Tables 10–9R through 10–9W. Because the combination of tabled accommodations and grades assessed differs somewhat by subject area, it is useful to reference the number of instances of accommodations for which the following results apply. For example, reading with five accommodations displayed and seven assessed grade levels results in 35 possible instances. There are 42 instances for mathematics, 18 for science, and 18 for writing. The general findings for each of the four classifications of students may be summarized as follows:

- General education, neither IEP nor ELL, students had a very low incidence of accommodations in general, and less than the other three groups in all but one instance. The frequency of accommodations was less than one percent, mainly above Grade 6, in 13 of 35 instances for reading and in 16 of 42 instances for mathematics. Similar results were observed for the other subject areas: science (12 of 18 instances, mainly Grades 8 and 11), and writing (11 of 18 instances, mainly Grades 8 and 11).
- The IEP and non-ELL students had the second largest percentage of these accommodations for reading in all 15 instances for Grades 3–5, and the largest or second largest percentage at Grades 6–8 and 11. A similar pattern was observed for mathematics in which the second largest percentage occurred in all 18 instances for Grades 3–5, and the largest or second largest percentage for Grades 6–8 and 11. Similar results were observed for the other subject areas: mathematics (largest in 21 and second largest in 25 instances), science (largest in 7 and second largest in 9 instances), and writing (largest in 9 and second largest in 6 instances).
- The ELL and non-IEP students received a larger percent of these accommodations than the general education students in nearly all instances for each subject area, and fewer than IEP and non-ELL students in most instances: reading (33 of 35), mathematics (40 of 42), science (15 of 18), and writing (15 of 18). Uniformly, requested extended time was the only accommodation that had the largest frequency of the four groups for each subject, but only at Grade 11.
- Both IEP and ELL students had the largest percent of these accommodations for reading in all 15 instances for Grades 3–5, and the largest or second largest percent at Grades 6–8 and 11. Scheduled extended time was the only accommodation that had the largest frequency at all seven grades. A similar pattern was observed for mathematics in which the largest percent occurred in all 18 instances for Grades 3–5, and the largest or second largest percent at Grades 6–8 and 11. Mathematics test items/questions read aloud or signed and scheduled extended time were the only accommodations with the largest frequency at all seven grades.

**Table 10–9R. Incidence of IEP and ELL Students Receiving Selected Accommodations: Reading**

Reading Accommodation Received	Classification of Students Regarding IEP and ELL							
	General Education (non-IEP or ELL)		IEP and non-ELL		ELL and non-IEP		Both IEP and ELL	
Gr. 3	N	Pct	N	Pct	N	Pct	N	Pct
Test directions read aloud	1,025	1.0	4,364	24.3	394	11.2	213	35.3
Tested in separate setting	2,940	2.8	4,778	26.6	630	18.0	190	31.5
Small group testing	6,199	5.9	9,180	51.0	1,172	33.4	381	63.2
Scheduled extended time	1,174	1.1	3,288	18.3	410	11.7	175	29.0
Requested extended time	1,381	1.3	574	3.2	80	2.3	27	4.5
Column N for Gr. 3	104,487		17,990		3,508		603	
Gr. 4	N	Pct	N	Pct	N	Pct	N	Pct
Test directions read aloud	875	0.8	5,448	27.3	245	8.9	206	31.2
Tested in separate setting	2,529	2.4	5,954	29.9	513	18.6	233	35.2
Small group testing	5,358	5.1	11,104	55.7	875	31.7	430	65.1
Scheduled extended time	1,431	1.4	4,362	21.9	309	11.2	194	29.3
Requested extended time	2,533	2.4	871	4.4	105	3.8	50	7.6
Column N for Gr. 4	105,094		19,939		2,758		661	
Gr. 5	N	Pct	N	Pct	N	Pct	N	Pct
Test directions read aloud	610	0.6	5,485	27.3	224	9.6	197	31.7
Tested in separate setting	2,084	2.0	6,205	30.9	330	14.1	210	33.8
Small group testing	4,419	4.2	11,640	58.0	679	29.1	401	64.5
Scheduled extended time	1,514	1.4	4,462	22.2	330	14.1	192	30.9
Requested extended time	2,228	2.1	974	4.9	98	4.2	48	7.7
Column N for Gr. 5	105,904		20,074		2,333		622	
Gr. 6	N	Pct	N	Pct	N	Pct	N	Pct
Test directions read aloud	349	0.3	4,246	21.6	129	6.3	123	20.2
Tested in separate setting	1,079	1.0	4,639	23.6	216	10.6	118	19.4
Small group testing	2,491	2.3	10,936	55.6	422	20.8	328	53.9
Scheduled extended time	1,143	1.1	3,693	18.8	210	10.3	143	23.5
Requested extended time	2,690	2.5	1,393	7.1	107	5.3	48	7.9
Column N for Gr. 6	106,628		19,652		2,032		609	

Reading	Classification of Students Regarding IEP and ELL							
	General Education (non-IEP or ELL)		IEP and non-ELL		ELL and non-IEP		Both IEP and ELL	
Accommodation Received	N	Pct	N	Pct	N	Pct	N	Pct
<b>Gr. 7</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>
Test directions read aloud	170	0.2	3,365	17.3	68	3.4	72	14.9
Tested in separate setting	710	0.7	4,463	22.9	144	7.2	89	18.4
Small group testing	1,384	1.3	10,103	51.8	332	16.6	218	45.1
Scheduled extended time	644	0.6	2,883	14.8	164	8.2	80	16.6
Requested extended time	2,403	2.2	1,251	6.4	85	4.3	48	9.9
Column N for Gr. 7	108,406		19,488		1,999		483	
<b>Gr. 8</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>
Test directions read aloud	196	0.2	3,303	16.6	77	4.0	75	16.3
Tested in separate setting	778	0.7	4,101	20.6	188	9.7	58	12.6
Small group testing	1,465	1.3	10,193	51.1	320	16.6	211	45.9
Scheduled extended time	695	0.6	3,094	15.5	137	7.1	73	15.9
Requested extended time	2,336	2.1	1,228	6.2	116	6.0	28	6.1
Column N for Gr. 8	110,575		19,942		1,929		460	
<b>Gr. 11</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>
Test directions read aloud	100	0.1	1,795	9.8	78	4.8	13	9.0
Tested in separate setting	279	0.2	3,216	17.5	82	5.0	28	19.4
Small group testing	757	0.7	7,992	43.6	249	15.2	59	41.0
Scheduled extended time	567	0.5	2,498	13.6	180	11.0	33	22.9
Requested extended time	2,690	2.4	1,296	7.1	328	20.0	15	10.4
Column N for Gr. 11	113,173		18,336		1,638		144	

**Table 10–9M. Incidence of IEP and ELL Students Receiving Selected Accommodations: Mathematics**

Mathematics	Classification of Students Regarding IEP and ELL							
	General Education (non-IEP or ELL)		IEP and non-ELL		ELL and non-IEP		Both IEP and ELL	
Accommodation Received	N	Pct	N	Pct	N	Pct	N	Pct
<b>Gr. 3</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>
Test directions read aloud	1,397	1.3	5,105	28.3	535	15.2	240	39.7
Mathematics test items/ questions read aloud or signed	3,862	3.7	7,477	41.5	1,021	28.9	348	57.6
Tested in separate setting	2,917	2.8	4,753	26.4	677	19.2	194	32.1
Small group testing	6,242	6.0	9,250	51.3	1,223	34.6	388	64.2
Scheduled extended time	1,037	1.0	3,199	17.8	404	11.4	176	29.1
Requested extended time	554	0.5	416	2.3	43	1.2	18	3.0
Column N for Gr. 3	104,519		18,022		3,531		604	
<b>Gr. 4</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>
Test directions read aloud	1,125	1.1	4,964	27.7	324	11.7	183	32.1
Mathematics test items/ questions read aloud or signed	3,186	3.0	7,406	41.4	674	24.3	295	51.8
Tested in separate setting	2,536	2.4	5,023	28.1	537	19.4	198	34.7
Small group testing	5,481	5.2	9,605	53.7	887	32.0	369	64.7
Scheduled extended time	1,284	1.2	3,667	20.5	290	10.5	157	27.5
Requested extended time	1,438	1.4	600	3.4	67	2.4	34	6.0
Column N for Gr. 4	105,095		17,897		2,771		570	
<b>Gr. 5</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>
Test directions read aloud	738	0.7	4,892	27.7	267	11.4	174	33.1
Mathematics test items/ questions read aloud or signed	2,143	2.0	7,364	41.7	530	22.6	262	49.8
Tested in separate setting	2,059	1.9	5,166	29.3	343	14.6	178	33.8
Small group testing	4,448	4.2	9,861	55.9	688	29.3	337	64.1
Scheduled extended time	1,373	1.3	3,710	21.0	314	13.4	166	31.6
Requested extended time	1,607	1.5	745	4.2	85	3.6	31	5.9
Column N for Gr. 5	105,906		17,641		2,346		526	

Mathematics	Classification of Students Regarding IEP and ELL							
	General Education (non-IEP or ELL)		IEP and non-ELL		ELL and non-IEP		Both IEP and ELL	
Accommodation Received	N	Pct	N	Pct	N	Pct	N	Pct
<b>Gr. 6</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>
Test directions read aloud	415	0.4	3,779	22.1	147	7.2	106	20.7
Mathematics test items/ questions read aloud or signed	1,057	1.0	5,454	31.9	265	13.0	183	35.7
Tested in separate setting	1,015	1.0	3,903	22.8	227	11.1	95	18.6
Small group testing	2,477	2.3	9,130	53.4	440	21.5	270	52.7
Scheduled extended time	1,100	1.0	3,059	17.9	216	10.6	112	21.9
Requested extended time	1,781	1.7	1,056	6.2	87	4.3	39	7.6
Column N for Gr. 6	106,647		17,084		2,045		512	
<b>Gr. 7</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>
Test directions read aloud	199	0.2	2,873	17.1	92	4.6	65	15.9
Mathematics test items/ questions read aloud or signed	420	0.4	3,802	22.6	149	7.4	122	29.8
Tested in separate setting	698	0.6	3,619	21.6	148	7.3	71	17.4
Small group testing	1,409	1.3	8,291	49.4	336	16.7	180	44.0
Scheduled extended time	734	0.7	2,429	14.5	148	7.3	66	16.1
Requested extended time	2,588	2.4	1,039	6.2	81	4.0	32	7.8
Column N for Gr. 7	108,471		16,789		2,016		409	
<b>Gr. 8</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>
Test directions read aloud	203	0.2	2,903	17.0	96	5.0	66	17.1
Mathematics test items/ questions read aloud or signed	296	0.3	3,195	18.7	155	8.0	109	28.3
Tested in separate setting	756	0.7	3,221	18.9	195	10.1	49	12.7
Small group testing	1,480	1.3	8,241	48.4	326	16.8	172	44.7
Scheduled extended time	837	0.8	2,616	15.4	150	7.7	56	14.5
Requested extended time	3,187	2.9	1,154	6.8	147	7.6	18	4.7
Column N for Gr. 8	110,620		17,041		1,937		385	
<b>Gr. 11</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>
Test directions read aloud	99	0.1	1,408	9.4	95	5.8	12	10.4
Mathematics test items/ questions read aloud or signed	81	0.1	906	6.1	44	2.7	11	9.6
Tested in separate setting	293	0.3	2,473	16.6	85	5.2	21	18.3
Small group testing	735	0.6	6,104	40.9	253	15.4	46	40.0
Scheduled extended time	864	0.8	2,022	13.5	184	11.2	27	23.5
Requested extended time	4,136	3.7	1,157	7.8	323	19.7	14	12.2
Column N for Gr. 11	113,227		14,925		1,643		115	

**Table 10–9S. Incidence of IEP and ELL Students Receiving Selected Accommodations: Science**

Science	Classification of Students Regarding IEP and ELL							
	General Education (non-IEP or ELL)		IEP and non-ELL		ELL and non-IEP		Both IEP and ELL	
Accommodation Received	N	Pct	N	Pct	N	Pct	N	Pct
<b>Gr. 4</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>
Test directions read aloud	745	0.7	4,860	24.5	295	9.3	200	28.6
Science test items/questions read aloud or signed	2,589	2.5	8,164	41.1	721	22.8	355	50.8
Tested in separate setting	1,928	1.8	5,478	27.6	544	17.2	202	28.9
Small group testing	3,528	3.4	9,855	49.6	833	26.4	415	59.4
Scheduled extended time	904	0.9	3,418	17.2	274	8.7	148	21.2
Requested extended time	1,070	1.0	533	2.7	72	2.3	30	4.3
Column N for Gr. 4	104,850		19,855		3,161		699	
<b>Gr. 8</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>
Test directions read aloud	216	0.2	2,795	14.2	137	6.1	68	13.8
Science test items/questions read aloud or signed	252	0.2	2,995	15.2	168	7.5	114	23.2
Tested in separate setting	630	0.6	3,715	18.8	195	8.7	58	11.8
Small group testing	1,091	1.0	8,831	44.7	336	15.0	178	36.3
Scheduled extended time	596	0.5	2,215	11.2	139	6.2	47	9.6
Requested extended time	2,049	1.9	1,168	5.9	142	6.3	36	7.3
Column N for Gr. 8	109,979		19,739		2,243		491	
<b>Gr. 11</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>	<b>N</b>	<b>Pct</b>
Test directions read aloud	84	0.1	1,516	8.6	71	4.1	14	9.0
Science test items/questions read aloud or signed	36	0.0	983	5.6	30	1.7	13	8.3
Tested in separate setting	265	0.2	2,805	15.9	102	5.9	22	14.1
Small group testing	736	0.7	6,949	39.4	272	15.7	57	36.5
Scheduled extended time	266	0.2	1,927	10.9	173	10.0	24	15.4
Requested extended time	845	0.8	638	3.6	219	12.7	10	6.4
Column N for Gr. 11	110,397		17,646		1,727		156	

**Table 10–9W. Incidence of IEP and ELL Students Receiving Selected Accommodations: Writing**

Writing Accommodation Received	Classification of Students Regarding IEP and ELL							
	General Education (non-IEP or ELL)		IEP and non-ELL		ELL and non-IEP		Both IEP and ELL	
Gr. 5	N	Pct	N	Pct	N	Pct	N	Pct
Test directions read aloud	412	0.4	4,352	22.0	125	5.4	128	21.5
Prompts read aloud	874	0.8	6,185	31.3	211	9.1	202	33.9
Tested in separate setting	1,464	1.4	5,193	26.3	193	8.3	165	27.7
Small group testing	2,803	2.7	9,986	50.5	469	20.3	314	52.7
Scheduled extended time	1,141	1.1	3,366	17.0	185	8.0	124	20.8
Requested extended time	2,391	2.3	699	3.5	62	2.7	20	3.4
Column N for Gr. 5	105,534		19,759		2,312		596	
Gr. 8	N	Pct	N	Pct	N	Pct	N	Pct
Test directions read aloud	181	0.2	2,726	14.0	94	5.0	62	14.1
Prompts read aloud	203	0.2	2,851	14.6	96	5.1	99	22.5
Tested in separate setting	593	0.5	3,336	17.1	99	5.3	45	10.2
Small group testing	1,073	1.0	8,693	44.5	241	12.9	162	36.8
Scheduled extended time	762	0.7	2,297	11.8	96	5.1	41	9.3
Requested extended time	3,259	3.0	1,157	5.9	52	2.8	20	4.5
Column N for Gr. 8	109,942		19,528		1,870		440	
Gr. 11	N	Pct	N	Pct	N	Pct	N	Pct
Test directions read aloud	91	0.1	1,524	8.7	74	4.9	11	8.4
Prompts read aloud	50	0.0	1,258	7.2	35	2.3	10	7.6
Tested in separate setting	255	0.2	2,622	15.0	83	5.5	19	14.5
Small group testing	667	0.6	7,127	40.7	267	17.8	48	36.6
Scheduled extended time	280	0.3	1,937	11.1	120	8.0	22	16.8
Requested extended time	1,264	1.1	709	4.0	145	9.7	9	6.9
Column N for Gr. 11	111,196		17,529		1,496		131	

## GLOSSARY OF ACCOMMODATION TERMS

Table 10–10 provides a brief description of accommodation terms as used in the PSSA. School personnel identified the accommodations a student received by marking the relevant bubble(s) in the student answer document as noted in the left column. The right column contains an explanation from the *PSSA and PSSA-M Accommodations Guidelines for Students with IEPs and Students with 504 Plans* (PDE, 2010, 24–46).

**Table 10–10. Glossary of Accommodation Terms as Applied in the PSSA**

Type of Testing Accommodation	Explanation
<b>Student used the following Presentation Accommodations</b>	
Braille format	Students may use a Braille format of the test. Answers must then be transcribed into the answer booklet without alteration.
Large print format	Students with visual impairments may use a large print format. Answers must then be transcribed into the answer booklet without alteration.
Magnification device	Devices to magnify print may be used for students with visual impairments and/or print disabilities.
Reading windows, reading guides	Students with visual impairments may use reading windows and reading guides in all assessments.
Electronic screen reader (PDE approval required)	Students with a severe visual disability may use an electronic screen reader; however, PDE must approve the program and functions prior to the test window.
Sign language interpreter	Deaf/hearing impaired students may receive test directions from a qualified interpreter. Signing is also permitted for essay prompts in writing and all items in mathematics and science.
Qualified interpreter for ELL student	An interpreter may translate directions or clarify instructions for the assessments. They may translate, but not define specific words or test questions on the mathematics and science tests. On the reading test, interpreters may only translate directions and may not translate or define words in the passages or test questions.
Test directions read aloud, signed, or recorded (provided by live reader)	Directions for all PSSA tests may be read aloud, signed, or presented by audio recording.
Test items/questions read aloud or signed (provided by live reader)	Students unable to decode text visually may have items/questions read aloud for mathematics and science only; however, words may not be defined.
Test prompts recorded	Writing essay prompts may be presented by audio recording.
Amplification device	In addition to using hearing aids, students may require an amplification device to enhance clarity.

Type of Testing Accommodation	Explanation
Other (PDE approval required)	Other presentation accommodations indicated in the <i>Accommodation Guidelines</i> may be provided; however, PDE approval is required prior to the test window.
Spanish version for mathematics and science	Students whose first language is Spanish and who have been enrolled in U.S. schools for fewer than three years may take this version.
<b>Student used the following Response Accommodations</b>	
Braille / Note taker (per <i>Accommodations Guidelines</i> )	Students using this device as part of their regular instructional program may use it on the PSSA; however, without thesaurus, spell-or grammar check.
Test administrator scribed open-ended responses at student's direction	A test administrator may record word-for-word exactly what a student dictated directly into the PSSA test booklet. This includes MC and OE responses for reading, mathematics, and science. For writing, this includes MC items only.
Test administrator marked multiple-choice responses at student's direction	A test administrator may mark an answer booklet at the direction of a student (e.g., a student may point to a multiple-choice answer with the test administrator marking the response in the answer booklet).
Test administrator transcribed (copied) student responses (per <i>Accommodations Guidelines</i> )	For writing prompts, the test administrator may transcribe handwriting that is extremely difficult to read. On reading, mathematics, or science, illegible handwriting may be transcribed for open-ended items only.
Qualified Interpreter for ELL student (translated, transcribed, and/or scribed student responses)	A qualified interpreter may interpret a student's non-English oral responses into written English for mathematics and science assessments. Interpreters are not permitted to make corrections or change the meaning of the response.
Augmentative communication device	Students with severe communication difficulties may use a special device to convey responses, which must be transcribed into the test booklet by the test administrator.
Typewriter, word processor, or computer (per <i>Accommodations Guidelines</i> )	An allowable accommodation as a typing function only for students with identified need. Supports such as dictionaries, thesauri, spell checkers, and grammar checkers must be turned off. Answers must then be transcribed into the answer booklet without alteration.
Audio recording of student responses (per <i>Accommodations Guidelines</i> )	An electronic recording device may be used to record responses, which must be transcribed into the test booklet by the test administrator. (Students who are unable to use a pencil or have illegible handwriting may answer reading, mathematics, and writing multiple-choice questions orally. Answers must be recorded in the answer booklet without alteration during the testing period.)
Manipulative (Cranmer Abacus, number line)	An adaptive calculator or a Cranmer Abacus may be used for the calculator portion of the test only. Eligible students are only those with blindness, low vision, or partial sight.

Type of Testing Accommodation	Explanation
Translation dictionary for ELL student	A word-to-word dictionary that translates native language to English (or vice versa) without word definitions or pictures is allowed on any portion of the mathematics test and open-ended section of the reading test but not for the reading passage or multiple-choice items. It cannot be used on any section of the writing test.
Electronic screen reader (PDE approval required)	Students with blindness or extremely low vision may use computer software that converts text to synthesized speech or Braille.
Other (per <i>Accommodations Guidelines</i> or PDE approval)	Other accommodations may be appropriate and available if they do not compromise the integrity of the assessment. Documentation must be provided to PDE.
<b>Student used the following Setting Accommodations</b>	
Hospital/home testing	A student who is confined to a hospital or to home during the testing window may be tested in that environment.
Tested in a separate setting	A separate room may be used to reduce distraction.
Small group testing	Some students may require a test setting with fewer students or a setting apart from all other students.
Other (per <i>Accommodations Guidelines</i> or PDE approval)	Other accommodations may be appropriate and available if they do not compromise the integrity of the assessment. Documentation must be provided to PDE.
<b>Student used the following Timing Accommodations</b>	
Scheduled extended time	Extended time may be allotted for each section of the test as a planned accommodation to enable students to finish.
Student-requested extended time	A student may request extended time if working productively.
Multiple test sessions	Multiple test sessions (breaks within a test section) may be scheduled for the completion of each test section; however, a test section must be completed within one school day.
Changed test schedule	Students whose disabilities prevent them from following a regular, planned test schedule may follow an individual schedule enabling test completion.

## Chapter Eleven: Classical Item Statistics

This chapter provides an overview of the two most familiar item-level statistics obtained from any classical (traditional) item analysis: item difficulty and item discrimination. The following results pertain only to operational PSSA items (i.e., those items that contributed to a student's total test score). Rasch item statistics are discussed in Chapter Twelve, and test-level statistics are found in Chapter Seventeen.

### ITEM-LEVEL STATISTICS

Appendix I provides classical item statistics for all PSSA items. Results are organized by subject and grade. These statistics represent the item characteristics most often used to determine if an item functioned properly and/or how a group of students performed on a particular item. The item statistics in the appendices include: *p*-values for multiple-choice (MC) items and item means for open-ended (OE) items (indicators of item difficulty); point-biserial correlations for MC items and item-test correlations for OE items (indicators of item discrimination); and the proportion selecting each MC item option or earning each OE item score point.

### ITEM DIFFICULTY

At the most general level, an item's difficulty is indicated by its mean score in some specified group (e.g., grade level).

$$\bar{x} = \frac{1}{n} \cdot \sum_{i=1}^n x_i$$

In the mean score formula above, the individual item scores ( $x_i$ ) are summed and then divided by the total number of students ( $n$ ). For multiple-choice items, student scores are represented by 0s and 1s (0 = wrong, 1 = right). With 0–1 scoring, the equation above also represents the number of students correctly answering the item divided by the total number of students. So, this is also the proportion correct for the item, or the *p*-value. In theory, *p*-values can range from 0.00<sup>7</sup> to 1.00 on the proportion-correct scale. For example, if an item has a *p*-value of 0.89, it means 89 percent of the students answered the item correctly. Additionally, this value might also suggest that the item was relatively easy, and/or the students who attempted the item were relatively high achievers. In other words, item difficulty and student ability are somewhat confounded.

For OE items, mean scores can range from the minimum possible score (usually zero) to the maximum possible score (e.g., four points in the case of some mathematics, science, and writing items). Sometimes a pseudo *p*-value is provided for an OE item. This is done by dividing the mean item score by the maximum possible item score.

The minimum and maximum extremes of the difficulty scale are virtually never seen in applied practice. However, understanding what those values are helps illustrate that relatively lower values correspond to more difficult items, and that relatively higher values correspond to easier items. (Because of this, some assert that this index would be better referred to as the item's easiness.)

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<sup>7</sup> For MC items with four response options, pure random guessing would lead to an expected *p*-value of 0.25.

Item difficulty is an important consideration for the PSSA tests because of the ranging achievement levels of students in Pennsylvania (Below Basic, Basic, Proficient, and Advanced). Items that are either very hard or very easy provide little information about student differences in achievement. However, an item answered correctly by a high percentage of students would suggest that the knowledge or skill the item taps has been mastered by most students. Conversely, an item answered incorrectly by a low percentage of students would suggest few students have mastered the knowledge or skill the item taps. On a standards-referenced test like the PSSAs, a test development goal is to include a wide range of item difficulties.

### **ITEM DISCRIMINATION**

At the most general level, item discrimination<sup>8</sup> indicates an item's ability to differentiate between high and low achievers. It is expected that students with high ability (i.e., those who perform well on the PSSA overall) would be more likely to answer any given PSSA item correctly, while students with low ability (i.e., those who perform poorly on the PSSA overall) would be more likely to answer the same item incorrectly. For the PSSA tests, Pearson's product-moment correlation coefficient between item scores and test scores is used to indicate discrimination. (As commonly practiced, DRC removes the item score from the total score so the resulting correlations will not be spuriously high.) The correlation coefficient can range from -1.0 to +1.0. If the aforementioned expectation is met (high-scoring students tend to get the item right while low-scoring students do not) the correlation between the item score and the total test score will be both positive and noticeably large in its magnitude (i.e., well above zero) meaning the item is a good discriminator between high and low ability students. This should be the case for all PSSA operational test items.

In summary, the correlation will be positive in value when the mean test score of the students answering the item correctly is higher than the mean test score of the students answering the item incorrectly.<sup>9</sup> In other words, this indicates that students who did well on the total test tended to do well on the item as well. However, an interaction can exist between item discrimination and item difficulty. Items answered correctly (or incorrectly) by a large proportion of examinees (i.e., they have extreme *p*-values) can have reduced power to discriminate, and thus, can have lower correlations.

Discrimination is an important consideration for the PSSA because the use of more discriminating items on a test is associated with more reliable test scores. This in turn means that score estimates will be more precise (i.e., there will be smaller confidence intervals around the scores) and, perhaps more importantly, that more accurate performance level placements will be made. The issues of reliability, confidence intervals, and performance level classifications are further discussed in Chapter Eighteen.

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<sup>8</sup> As noted earlier, the discrimination index for PSSA dichotomous MC items is typically referred to as the point-biserial correlation coefficient. For OE items, the term item-test correlation is sometimes used.

<sup>9</sup> It is legitimate to view the point-biserial correlation as a standardized mean difference. A positive value indicates students who chose that response had a higher mean score than the average student; a negative value indicates students who chose that response had a lower than average mean score.

## DISCRIMINATION ON DIFFICULTY SCATTERPLOTS

Figure 11–1 contains a series of scatterplots showing item discrimination values ( $y$ -axis) on the item difficulty ( $x$ -axis) for each grade and subject area test. Note that pseudo  $p$ -values (described above) are used for mapping the OE items in these plots. These plots provide maximum information about item discrimination and difficulty in a single visual image for each PSSA test. This is because the  $x$ - and  $y$ -axes visually represent many important univariate distributional indices:

- Minimum and maximum values are listed.
- Mean scores are indicated by the dot.
- $P_{25}$ ,  $P_{50}$ , and  $P_{75}$  are indicated by the raised/indented portions of the axes.
- Marginal “rugs” indicate the density of the individual data points.

The bivariate relationship between item discrimination (item-test *correlations*) and difficulty (item *mean* scores) is also presented through scatterplots in these figures. One does not usually expect any type of trend here. However, as noted earlier, it is often the case that items with extreme difficulties can have lower discrimination values, as this can be revealed in such plots.

## OBSERVATIONS AND INTERPRETATIONS

To support the visuals, Table 11–1 provides break-out results for the MC and OE items. The mean  $p$ -values for the MC items ranged from about 0.69 to 0.88, while the mean proportion-correct values for the OE items ranged from about 0.44 to 0.64. Most means were generally close to their historic values<sup>10</sup> and suggest that the PSSA items, overall, were reasonably challenging to most students based on these past trends. A noteworthy outlier was Grade 3 mathematics, which seems to have been easier for students than other PSSA exams. However, this is also consistent with past data for the Grade 3 PSSA mathematics test. From the difficulty distributions illustrated in the plots, a wide range of item difficulties appeared on each exam, which was one test development goal.

The mean item-test correlations ranged from roughly 0.34 to 0.45 and 0.40 to 0.70 for the MC and OE items, respectively. Again, these were similar to historic trends. The writing MC item-test correlations were generally the lowest, but even here were in the mid 0.30s. The writing MC items were correlated against the unweighted writing total scores, which included the prompt scores. The correlations in writing might be suppressed some because the prompt tasks are so different from the MC tasks. The OE correlations tended to be higher than the MC correlations, which is not surprising because the OE items include more score points. Based on the distribution of the discrimination statistics, the overall item quality was quite good.

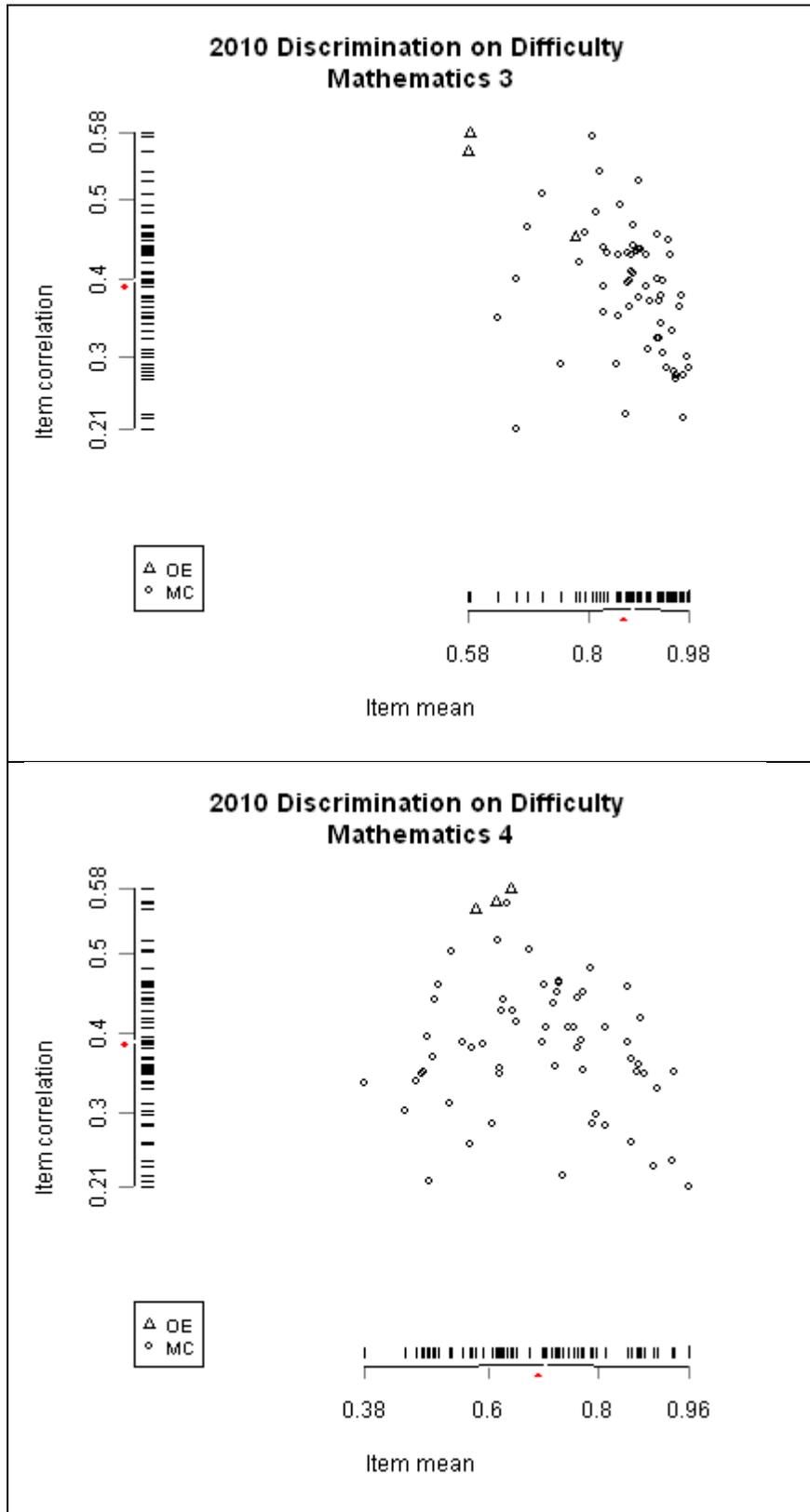
It is difficult to make global conclusions about overall test quality from these item statistics alone. With that caveat in mind, the results presented in this chapter indicate that the PSSA item difficulty and discrimination were in expected and acceptable ranges when using historic trends as a guide.<sup>11</sup>

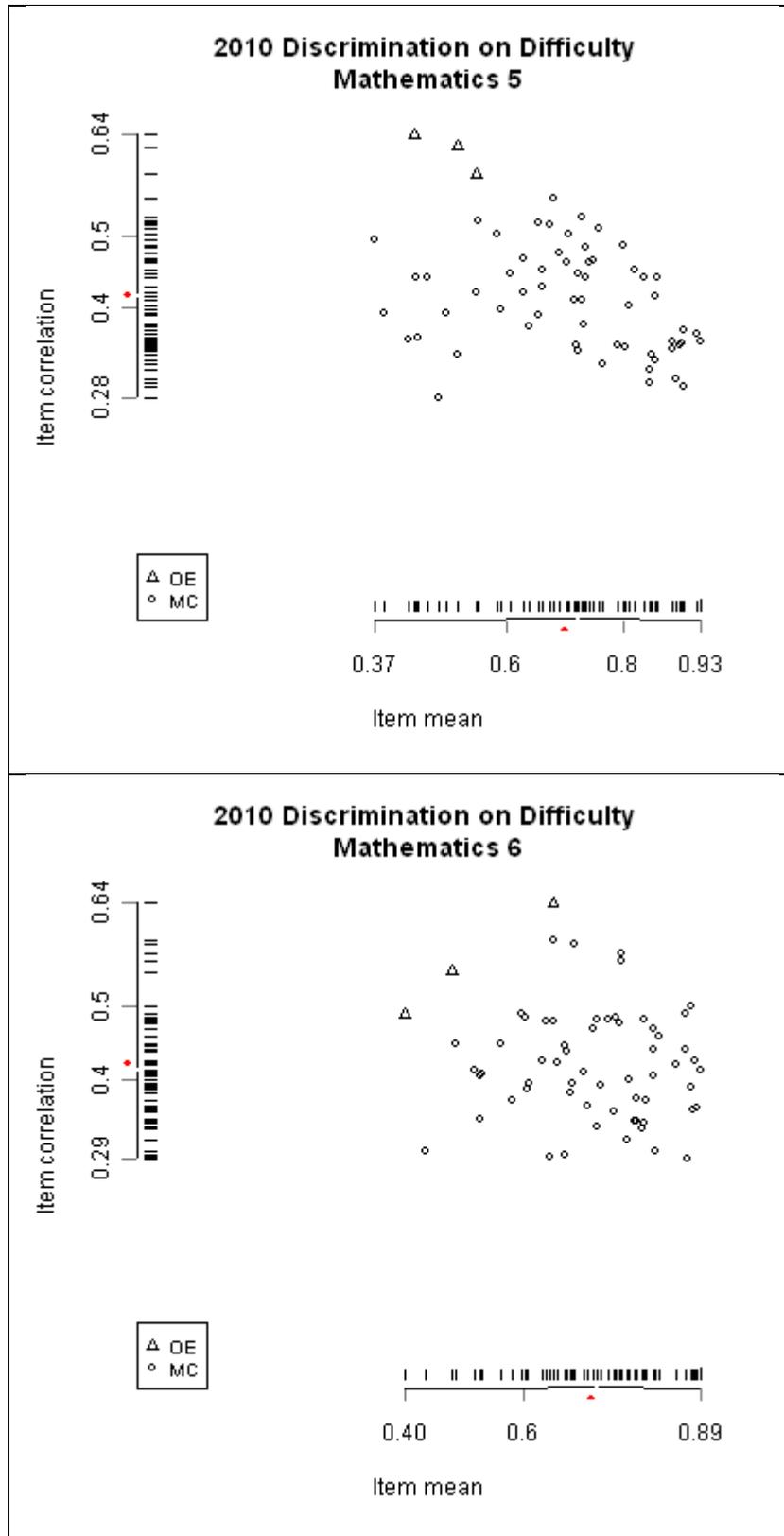
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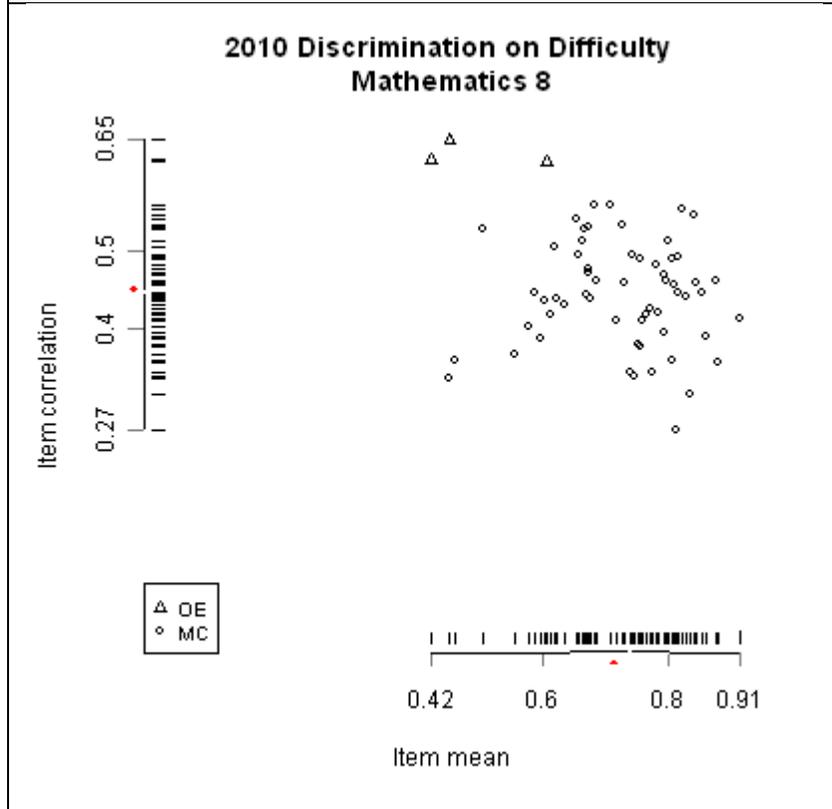
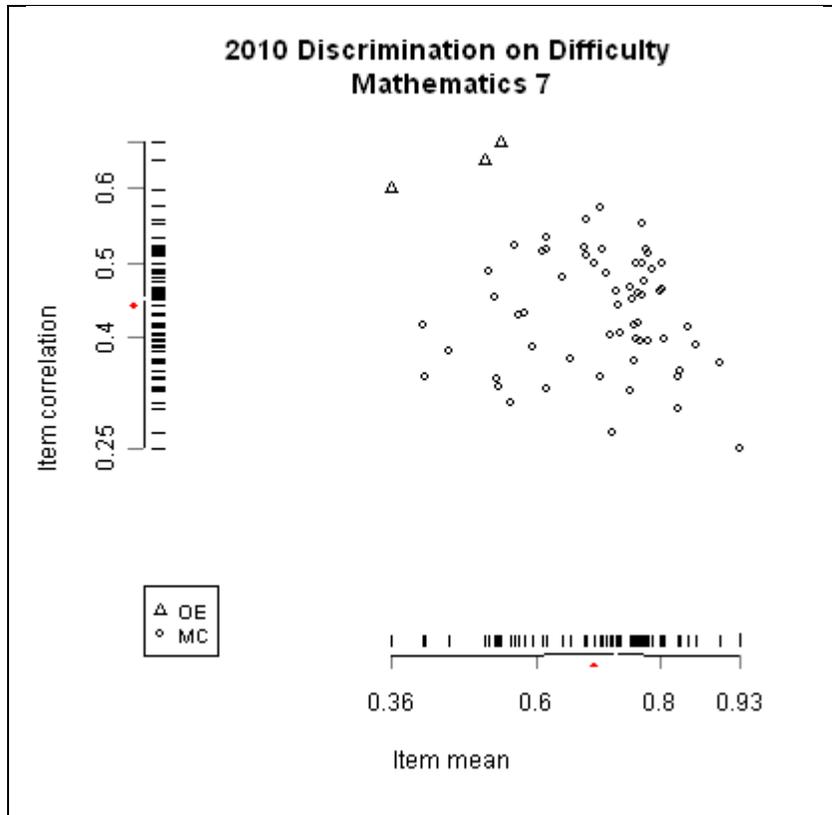
<sup>10</sup> Historically, average item difficulties have ranged from mid 0.60s to low 0.70s for most PSSA tests.

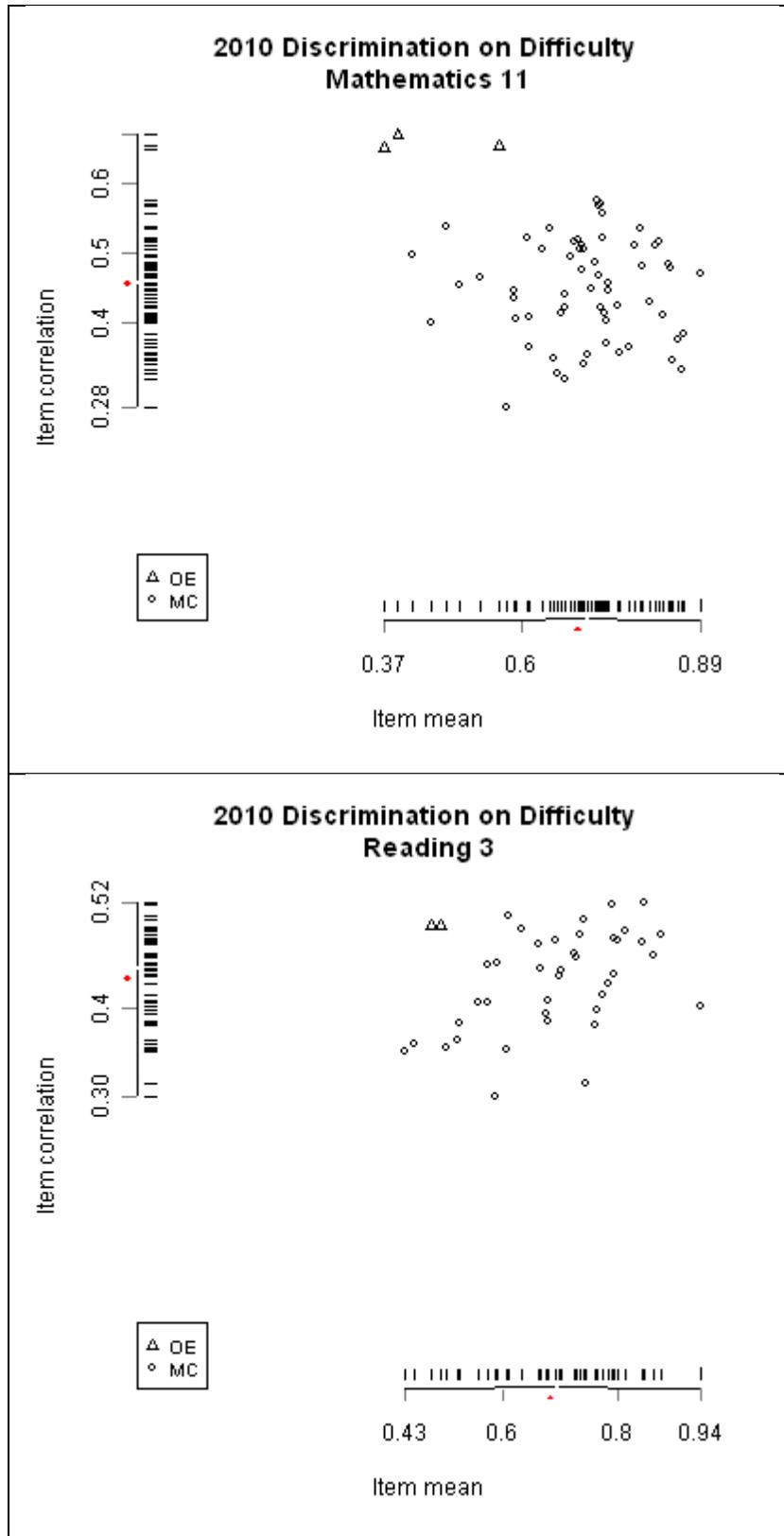
<sup>11</sup> Every year each PSSA test is built to the same content and statistical specifications. Since the average item difficulty and discrimination indices are similar, the historic trend is expected.

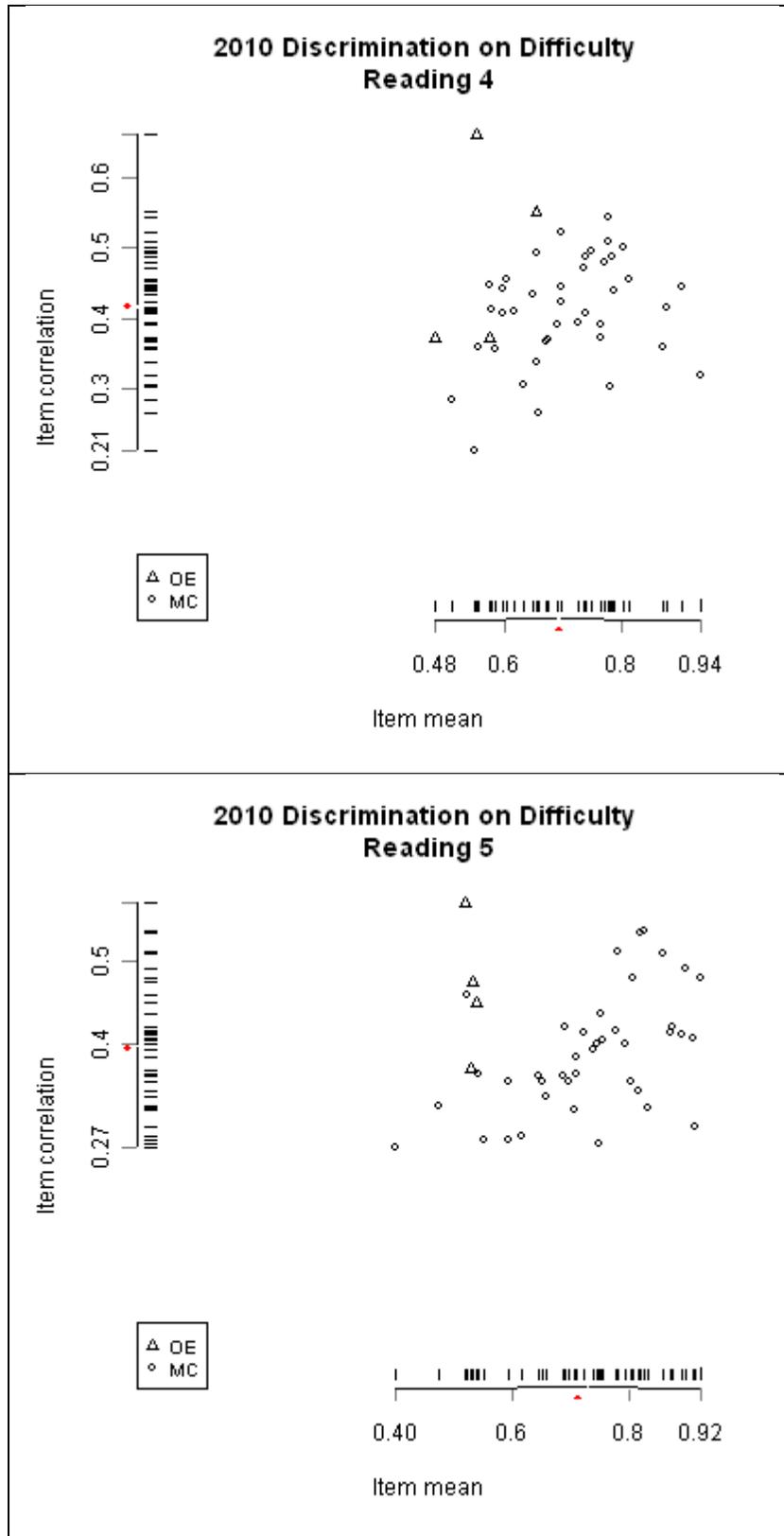
Figure 11–1. Discrimination on Difficulty Scatterplots

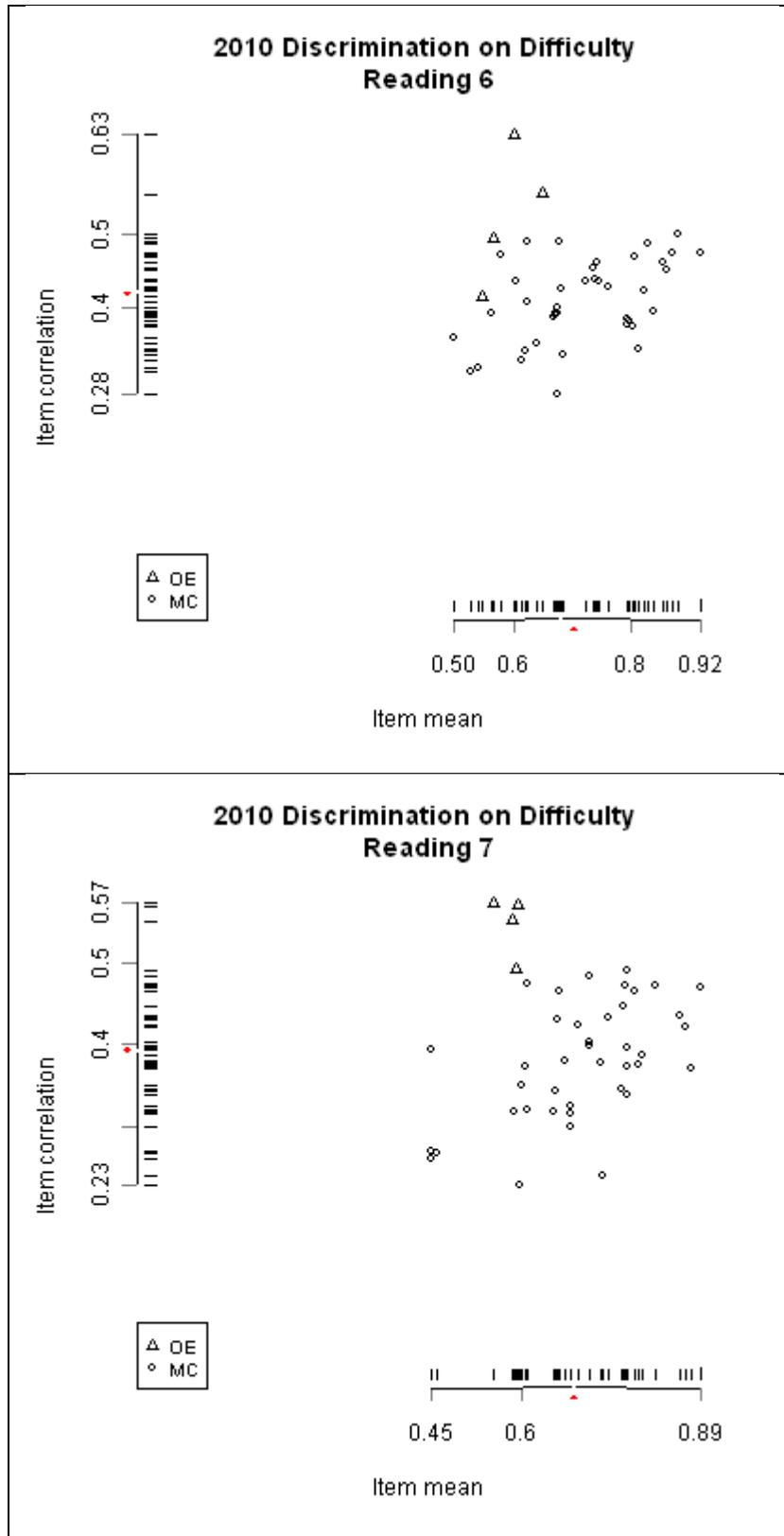


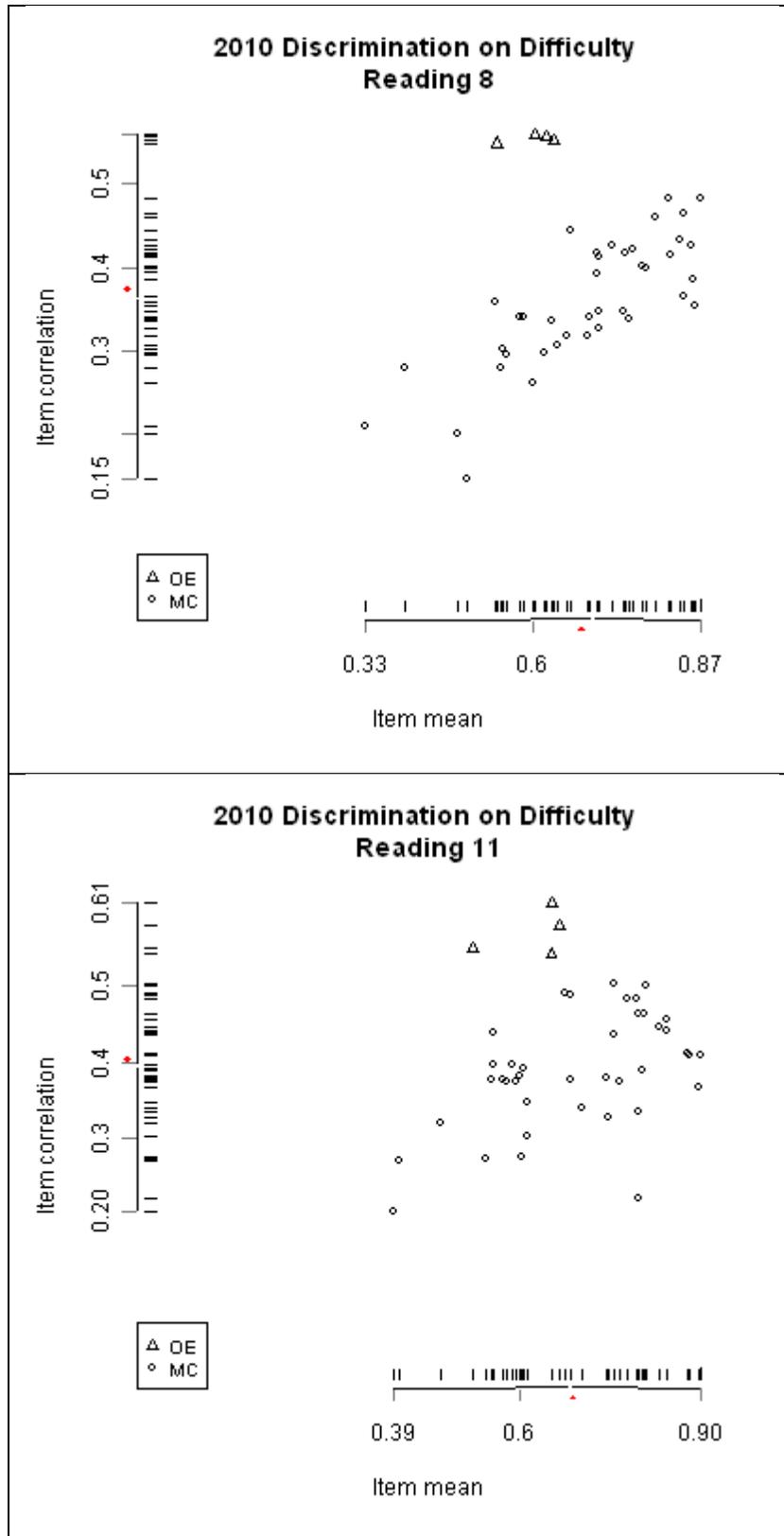


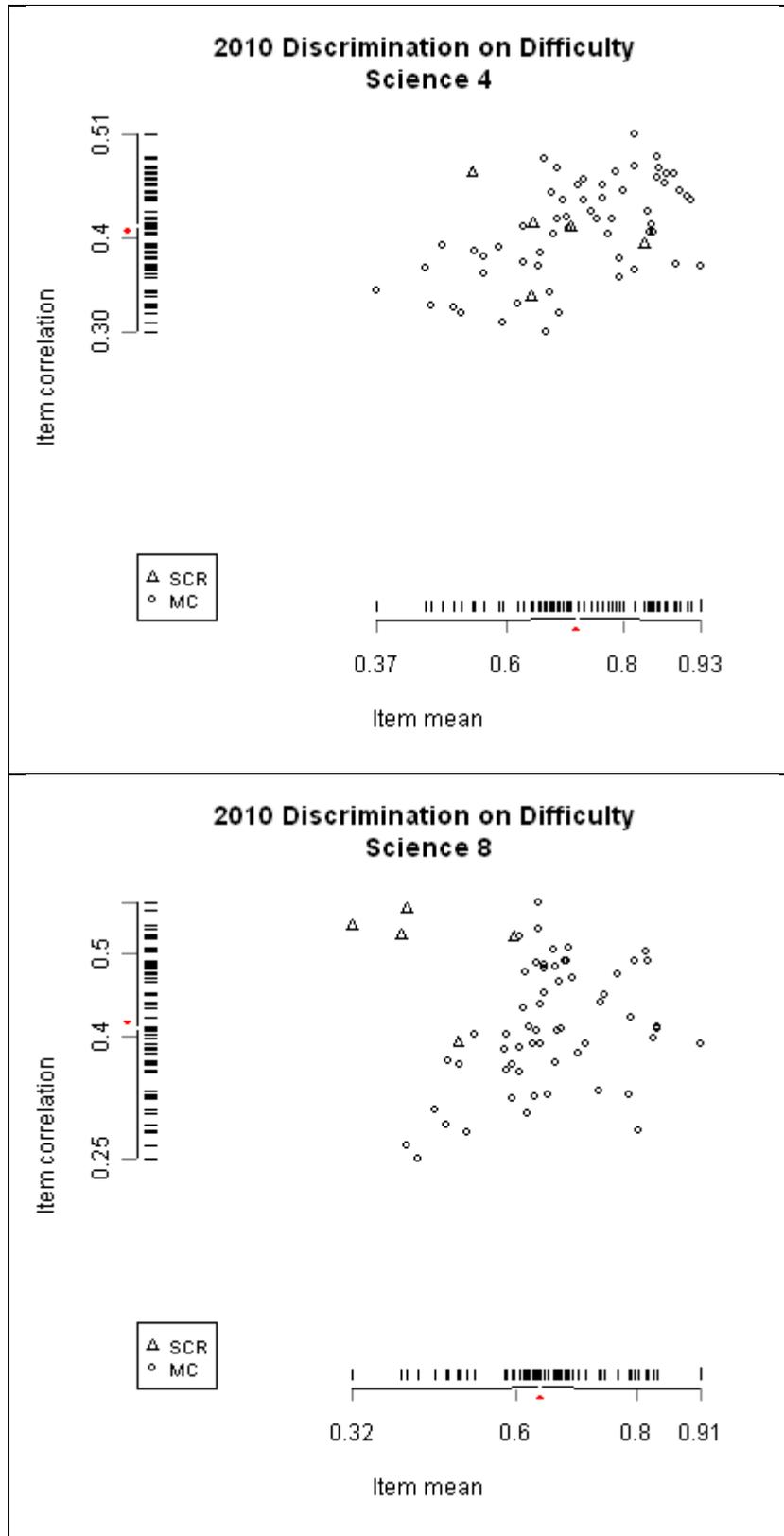


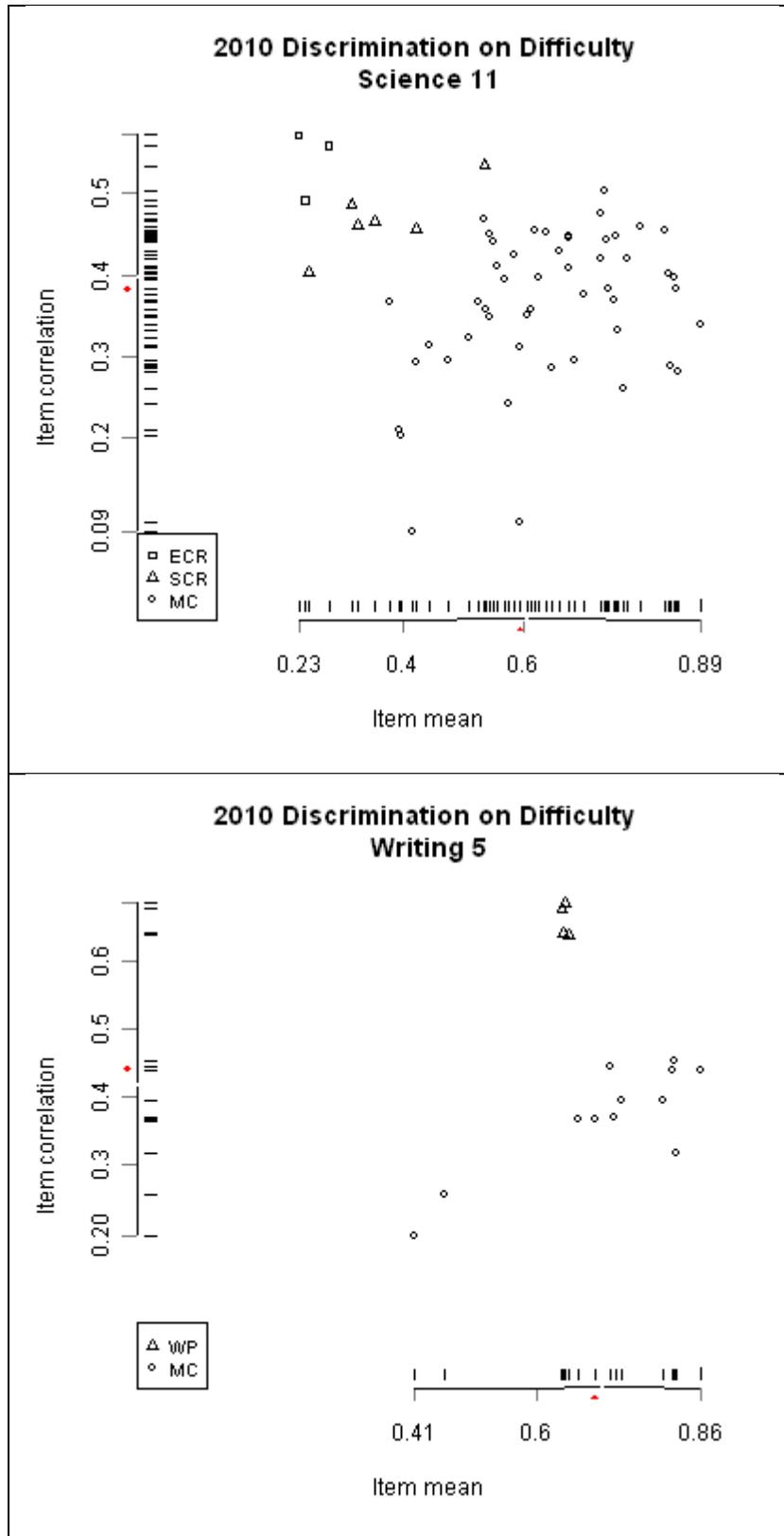


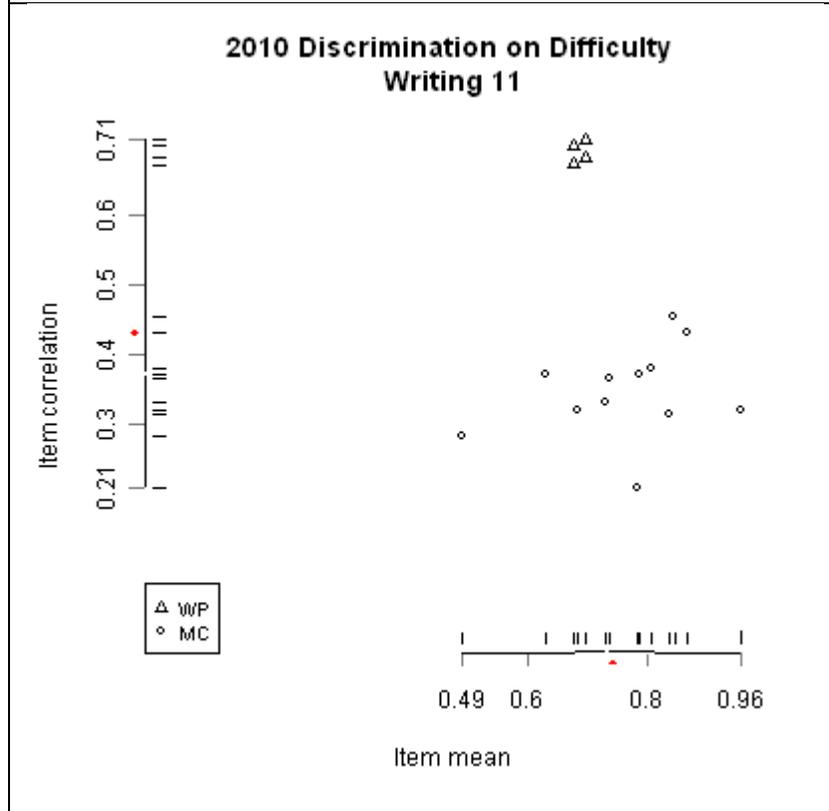
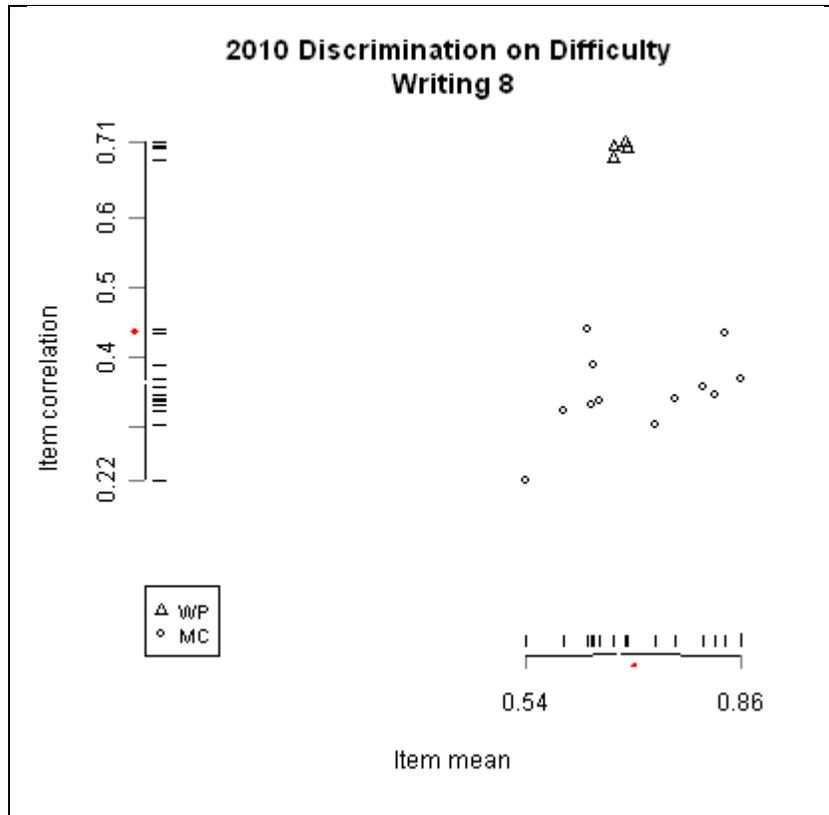












**Table 11–1. Sum and Mean Statistics for MC and OE Items**

Subject	Grade	Multiple-Choice Items				Open-Ended Items			
		Points	Sum	Mean (%/100)	Mean I-T Corr.	Points	Sum	Mean (%/100)	Mean I-T Corr.
Mathematics	3	60	52.593	0.877	0.384	12	7.728	0.644	0.534
	4	60	41.773	0.696	0.377	12	7.341	0.612	0.568
	5	60	42.570	0.709	0.410	12	6.017	0.501	0.613
	6	60	43.277	0.721	0.416	12	6.143	0.512	0.559
	7	60	42.201	0.703	0.432	12	5.687	0.474	0.632
	8	60	43.412	0.724	0.443	12	5.920	0.493	0.628
	11	60	42.301	0.705	0.447	12	5.323	0.444	0.657
Reading	3	40	27.736	0.693	0.430	6	2.908	0.485	0.491
	4	40	28.216	0.705	0.411	12	6.751	0.563	0.489
	5	40	29.283	0.732	0.388	12	6.368	0.531	0.466
	6	40	28.623	0.716	0.408	12	7.087	0.591	0.524
	7	40	27.876	0.697	0.379	12	6.960	0.580	0.547
	8	40	27.418	0.685	0.357	12	7.194	0.599	0.553
	11	40	27.785	0.695	0.387	12	7.469	0.622	0.568
Science	4	58	41.902	0.722	0.409	10	6.736	0.674	0.405
	8	58	38.122	0.657	0.410	10	4.488	0.449	0.504
	11	50	32.079	0.642	0.363	24	7.406	0.309	0.492
Writing	5	12	8.519	0.710	0.369	16	10.322	0.645	0.658
	8	12	8.512	0.709	0.349	16	10.885	0.680	0.697
	11	12	9.157	0.763	0.345	16	10.992	0.687	0.689

*Note.* Results for Grade 11 science have SCR and ECR items combined. I-T Corr. is the item-test score correlation. The means for the I-T correlations were not computed using Fisher’s Z transformation. However, this is not expected to affect any conclusions based on these results.

## Chapter Twelve: Rasch Item Calibration

The particular item response theory (IRT) model used for the PSSA is based on the work of Georg Rasch. Rasch models have had a long-standing presence in applied testing programs and they have been the methodology used to calibrate PSSA items in recent history. IRT has several advantages over classical test theory, so it has become the standard procedure for analyzing item response data in large-scale assessments. However, IRT models make a number of strong assumptions such as unidimensionality and local item independence. Consequently, the resulting inferences derived from any application of IRT rest strongly on the degree to which the underlying assumptions are met, how well the model fits the data, and the degree that important model expectations (such as the property of invariance) holds.

This chapter<sup>12</sup> outlines the procedures used for calibrating the operational PSSA items. Generally, item calibration is the process of assigning a difficulty-parameter estimate to each item on an assessment so that they are placed onto a common scale. This chapter briefly introduces the Rasch model, reports the results from evaluations of the adequacy of the Rasch assumptions, and summarizes the Rasch item statistics for the PSSA mathematics, reading, science, and writing tests. Additional Rasch procedures are discussed with respect to scale linking in Chapter Fifteen.

### DESCRIPTION OF THE RASCH MODEL

The Rasch partial credit model (RPCM) was used to calibrate PSSA items because both multiple-choice (MC) and open-ended (OE) items were part of the assessment (Wright & Masters, 1982). The RPCM extends the Rasch model (Rasch, 1960) for dichotomous (0, 1) items so that it accommodates the polytomous OE item data. Under the RPCM, for a given item  $i$  with  $m_i$  score categories, the probability of person  $n$  scoring  $x$  ( $x = 0, 1, 2, \dots, m_i$ ) is given by

$$P_{ni}(X = x) = \frac{\exp \sum_{j=0}^x (\theta_n - D_{ij})}{\sum_{k=0}^{m_i} \exp \sum_{j=0}^k (\theta_n - D_{ij})},$$

where  $\theta_n$  represents a student's proficiency (ability) level, and  $D_{ij}$  is the step difficulty of the  $j^{\text{th}}$  step on item  $i$ . For dichotomous MC items, the RPCM reduces to the standard Rasch model and the single step difficulty is referred to as the item's difficulty. The Rasch model predicts the probability of person  $n$  getting item  $i$  correct as follows:

$$P_{ni}(X = 1) = \frac{\exp(\theta_n - D_{ij})}{1 + \exp(\theta_n - D_{ij})}.$$

The Rasch model places both student ability and item difficulty (estimated in terms of log-odds or logits) on the same continuum. When the model assumptions are met, it also provides person ability estimates, which are independent of the items employed in the assessment, and conversely, estimates item difficulty independently of the sample of examinees. (As noted in Chapter Eleven, interpretation of item  $p$ -values confounds item difficulty and student ability.)

<sup>12</sup> Please note that some of the material in this chapter is technical in nature.

### ***Software and Estimation Algorithm***

Item calibration was implemented via WINSTEPS 3.54 computer program (Linacre & Wright, 2003), which employs unconditional (UCON), joint-maximum-likelihood estimation (JMLE).

### ***Sample Characteristics***

The characteristics of calibration samples are reported in Chapter Nine.<sup>13</sup> These samples only included the students who attempted the tests. For MC items, all omits (no response) and multiple responses (more than one response selected) were scored as incorrect answers (coded as 0s) for calibration. For OE items, all blank, foreign language, off-task, and unreadable responses were scored as 0s for calibration.

### **CHECKING RASCH ASSUMPTIONS**

Because the Rasch model was the basis of all calibration, scoring, and scaling analyses associated with the PSSA, the validity of the inferences from these results depends on the degree to which the assumptions of the model are met and how well the model fits the test data. Therefore, it is important to check these assumptions.

For the 2009 PSSA tests, DRC evaluated the assumptions of unidimensionality, local item independence, and item fit for the PSSA mathematics, reading, and science tests.<sup>14</sup> Principal Components Analysis (PCA) results from WINSTEPS showed that the PSSA tests essentially measured a single dominant dimension. Residual item correlations provided in WINSTEPS for each item pair were used to assess local dependence among the 2009 PSSA items. Except for a few item pairs, the correlations were very small, suggesting local item independence generally holds for the PSSA mathematics, reading, and science tests. Infit and outfit mean square statistics were used to evaluate the degree to which the Rasch model predicts the observed item responses. Almost all of the items had infit and outfit values falling in the range of (0.7, 1.3), indicating that the Rasch model fits the PSSA item data well. Overall, these results indicated that the Rasch model assumptions held for the PSSA data regarding dimensionality, local independence, and item fit. For detailed results, please refer to the 2009 PSSA technical report (DRC, 2009).

Since the 2010 PSSA tests were developed based on the same content standards and test specifications as the 2009 PSSA, the prior results should generalize to these 2010 tests. Consequently, PDE decided (in consultation with its national TAC) that it would not be necessary to check the same assumptions every year. This year (2010) a different issue for the Rasch model—*item invariance*—was evaluated.

### ***Item Parameter Invariance***

The property of invariance is regarded as the cornerstone of IRT and is its major distinguishing attribute from classical test theory (Hambleton, Swaminathan, & Rogers, 1991). It is this property that makes many IRT applications possible (e.g., equating, item banking, investigation of item bias, and adaptive testing) (Hambleton et al., 1991, p.25). Inferences from these IRT applications are valid to the extent that the property of invariance holds. Therefore, it is important to evaluate invariance whenever applying IRT.

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<sup>13</sup> As noted in Chapter Nine, PSSA has historically retained all students who met the stated criteria in the calibration data set, even those who had special testing accommodations.

<sup>14</sup> IRT assumptions for operational writing items were not studied in 2009 as no calibration was undertaken.

Invariance should hold for both item and ability parameters. Item invariance implies that item parameter estimates do not depend on the particular sample of examinees used to derive them. Person (ability parameter) invariance means that examinees' ability estimates do not depend on which items are administered. For the Rasch item calibrations, it is more important to determine how well the item invariance assumption holds. Therefore, only item invariance is evaluated here.

One method of checking the invariance property for item parameter estimates was discussed by Hambleton, Swaminathan, and Rogers (1991). A scatterplot of  $b$  (item difficulty) parameter estimates for randomly equivalent groups was generated and then compared to the scatter plots of the  $b$  estimates derived from different subgroups. The first plot provides a baseline for interpreting the second reference plot. If the plots are similar, then it is reasonable to assume that the subgroups of interest are no more different in their response processes than the randomly equivalent groups. This evidence would suggest that item parameter invariance holds. On the other hand, if the plots are very different, item parameter invariance would be questionable.

This method was used to evaluate the invariance assumption for the 2010 PSSA items. For each PSSA test, the calibration sample was split into two ability groups<sup>15</sup> based on PSSA performance level. The low-ability group included students scoring Below Basic (BB) or Basic (B) on the 2010 PSSA test. The high-ability group included students at Proficient (P) or Advanced (A). Table 12–1A gives the sample sizes for the ability groups for the PSSA tests. The items were calibrated using both samples, and the results were used to generate the reference scatterplots. In addition, the calibration sample was also split into two random groups with similar sizes to the ability groups. As can be seen from Table 12–1A, the random groups and the ability groups were comparable regarding the N-counts. The items were then recalibrated using both random samples and baseline scatterplots for the two estimates that were generated.

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<sup>15</sup> Often subgroups are formed from ethnic or gender categorizations (e.g., white-black, male-female). High and low ability groupings may provide a more demanding test of item invariance and so this approach was selected here.

**Table 12–1A. Invariance Study N-Counts**

Subject	Grade	B/BB N	A/P N	Random Low N	Random High N
Mathematics	3	19615	107061	19746	106930
	4	19141	107192	19032	107301
	5	32329	94090	32352	94067
	6	27792	98496	27829	98459
	7	28114	99571	28214	99471
	8	32312	97671	32212	97771
	11	52489	77421	52300	77610
Reading	3	31430	95158	31585	95003
	4	34789	93663	34651	93801
	5	46283	82650	45997	82936
	6	40293	88628	40381	88540
	7	34528	95848	34632	95744
	8	24114	108792	24007	108899
	11	43786	89505	43903	89388
Science	4	23835	104730	23876	104689
	8	56702	75750	56697	75755
	11	78273	51653	78482	51444
Writing	5	49042	79159	49188	79013
	8	32758	99022	32877	98903
	11	25198	105154	25217	105135

Figure 12–1 shows the aforementioned scatterplots for operational PSSA items. The right-side plots are for the random groups, and the left-side plots are for the low- and high-ability groups. Fit lines<sup>16</sup> are provided for the MC and OE items, and the diagonal (unity) lines are also shown.

For almost all PSSA tests, the difficulty estimates based on two random groups (right-side graphs) lie on a straight line. Subsequently, these baseline plots had essentially perfect correlations (see Table 12–1) within rounding. One exception is reading Grade 6 in which the three OE items are off the straight line. This occurred for Grade 3 reading also as indicated by the dashed OE fit line, but was much less pronounced.

Compared with the baseline, random-groups, plots, the item estimates based on the low- and high-ability groups appear different, show more scatter, and have lower correlations, indicating relatively greater differences between the sets of estimates and calling the invariance assumption into question. This might be expected given the challenging and rigorous nature of checking invariance with low-and-high ability groups<sup>17</sup>. Additionally, the linear relationships were

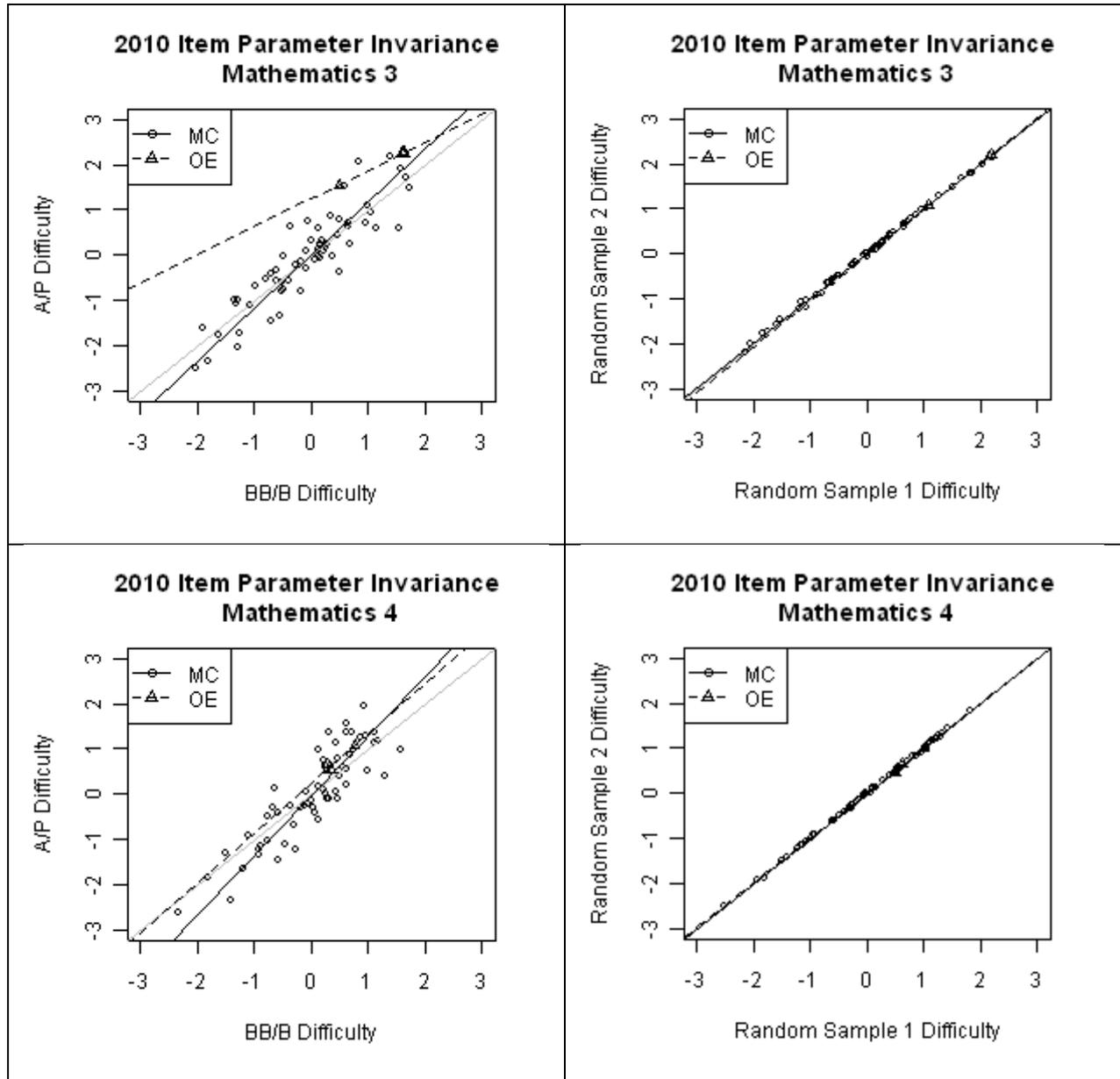
<sup>16</sup> MC and OE fit lines are principal component (a.k.a. orthogonal regression) lines (not least squares regression).

<sup>17</sup> The influence of other factors (e.g., low-ability students being nested in similar schools which may have a different curricular focus or pace) may deserve consideration. Increased estimation error from a greater mismatch between student ability and item difficulty is another potential issue.

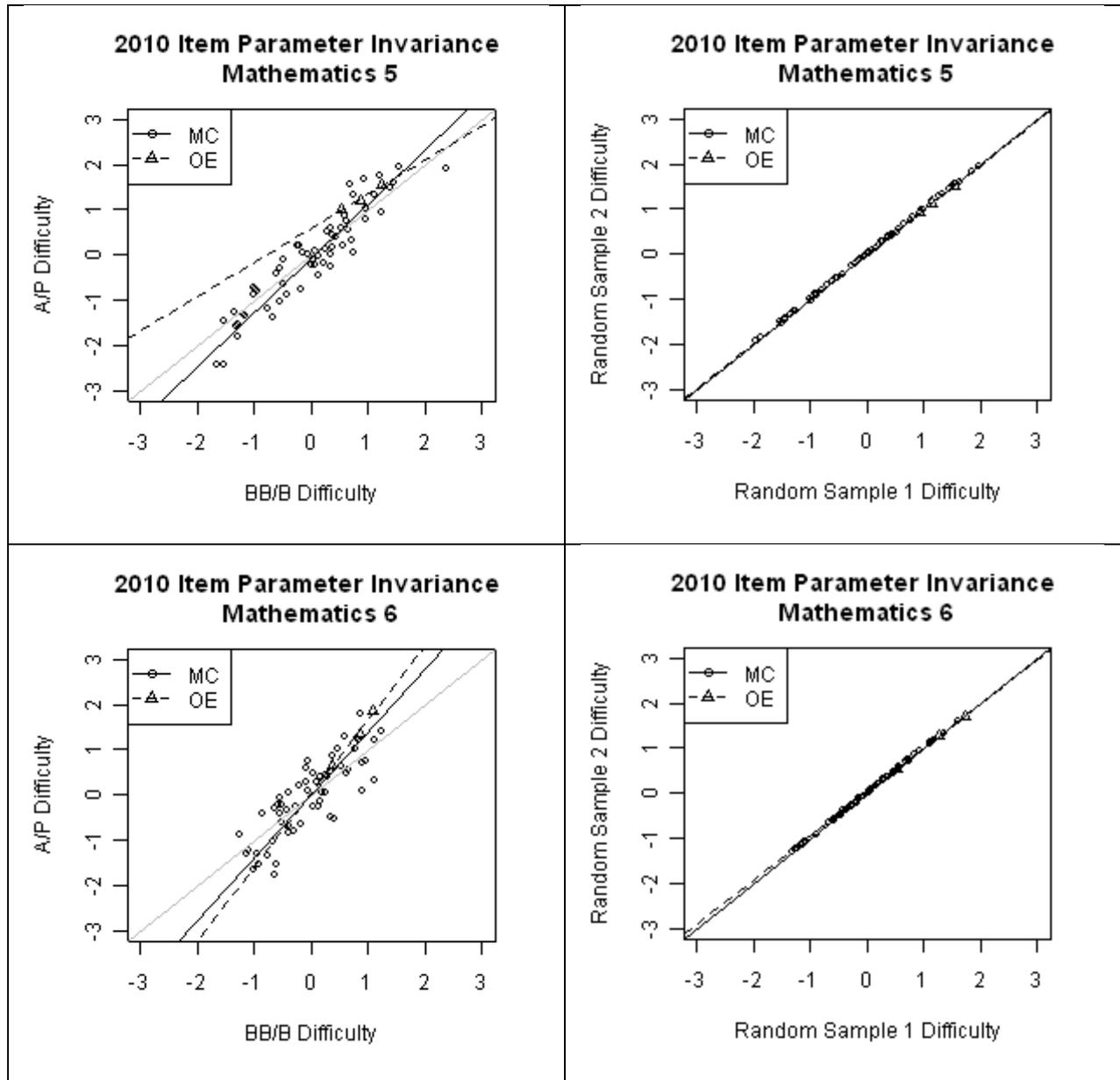
strong,<sup>18</sup> especially in mathematics, reading, and science, where these correlations range from 0.85 to 0.94.

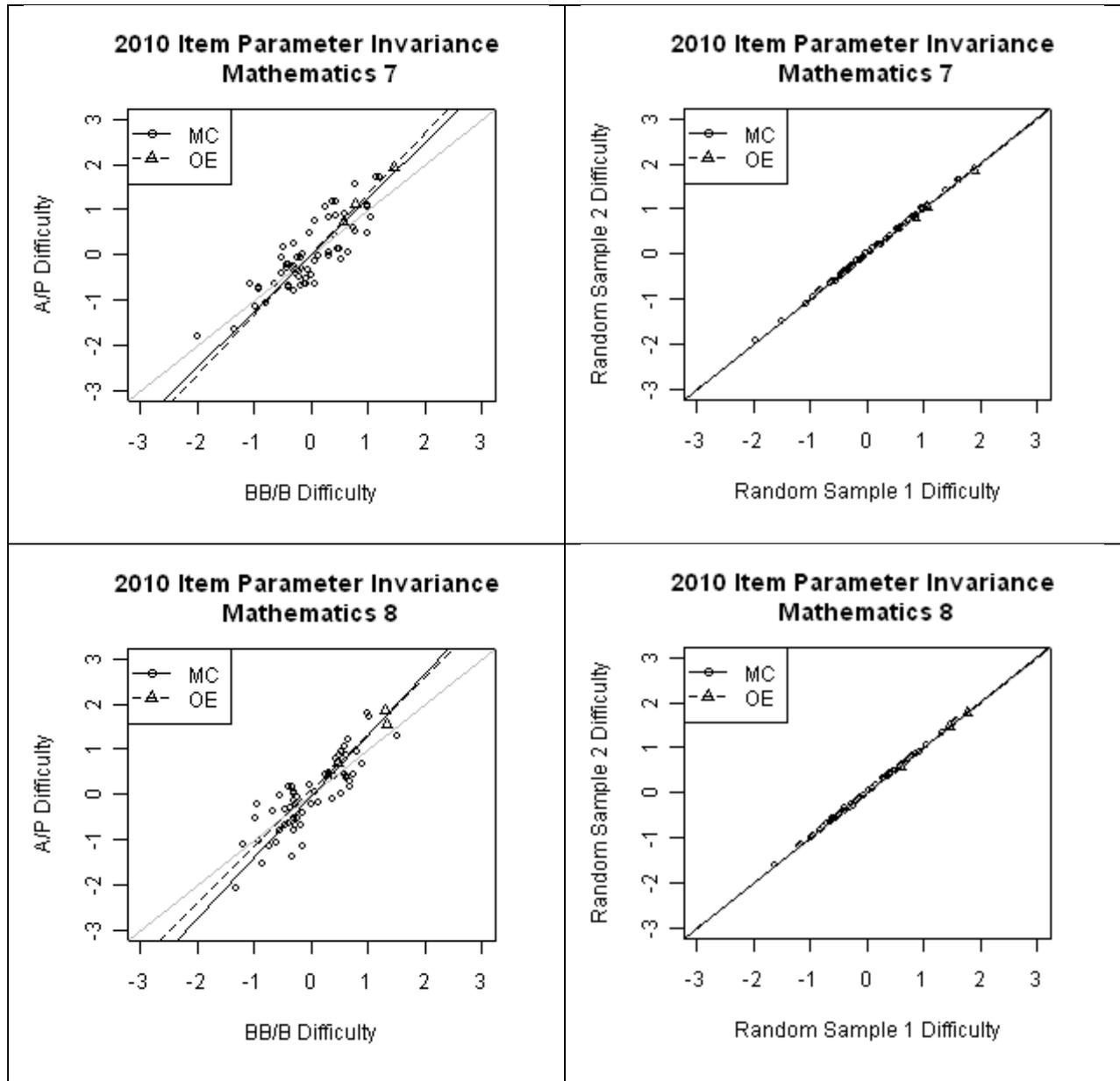
The writing correlations were lower. However, when using only MC items, the correlations were in the 0.90s and comparable with other subject areas. The writing prompts likely tap a different dimension than the writing MC items. Similarly, other subject areas had different fit lines for their MC and OE items. Again, different dimensionality for MC and OE items may be a factor.

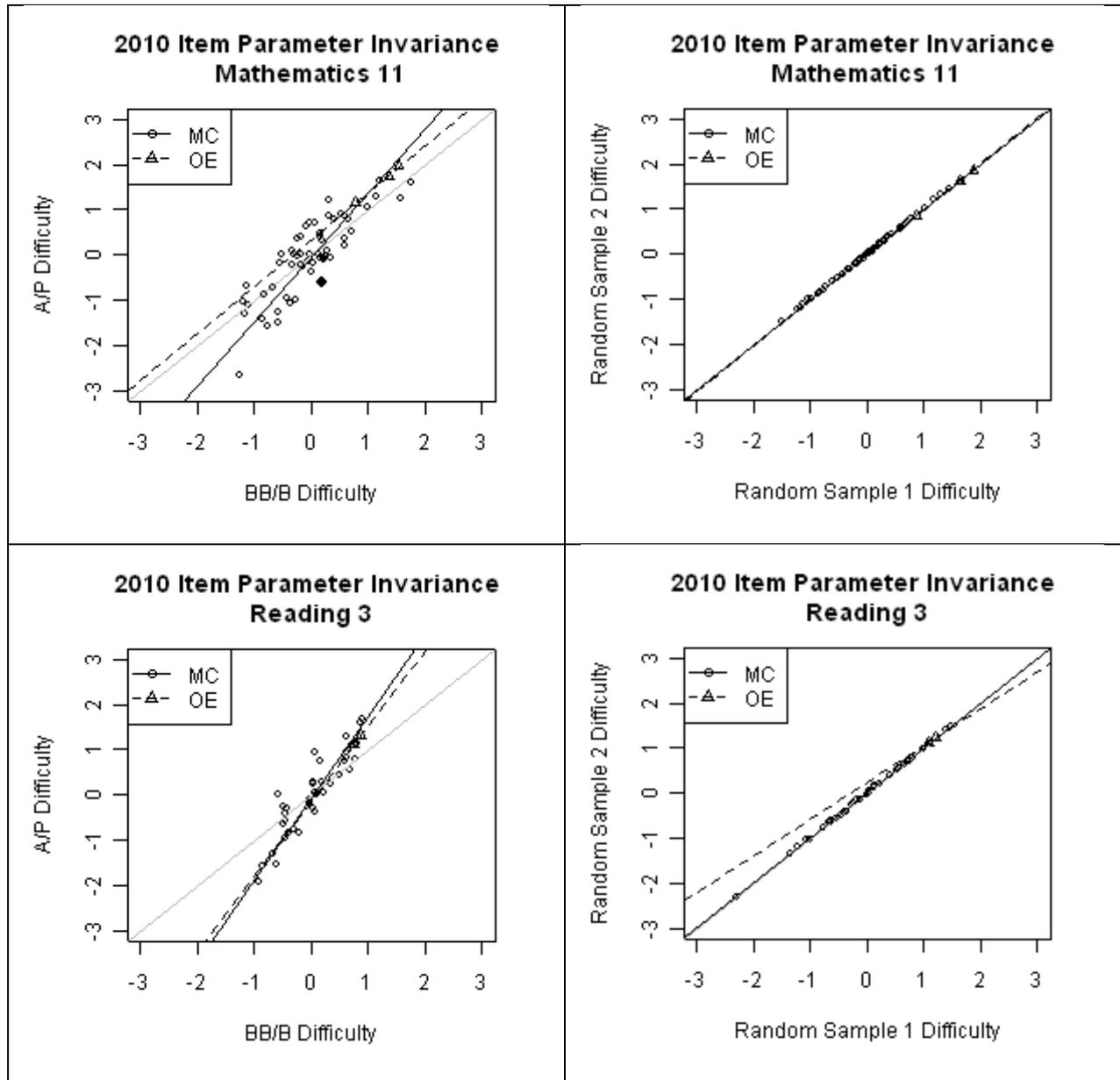
**Figure 12–1. Illustration of Item Parameter Invariance for 2010 PSSA Items**

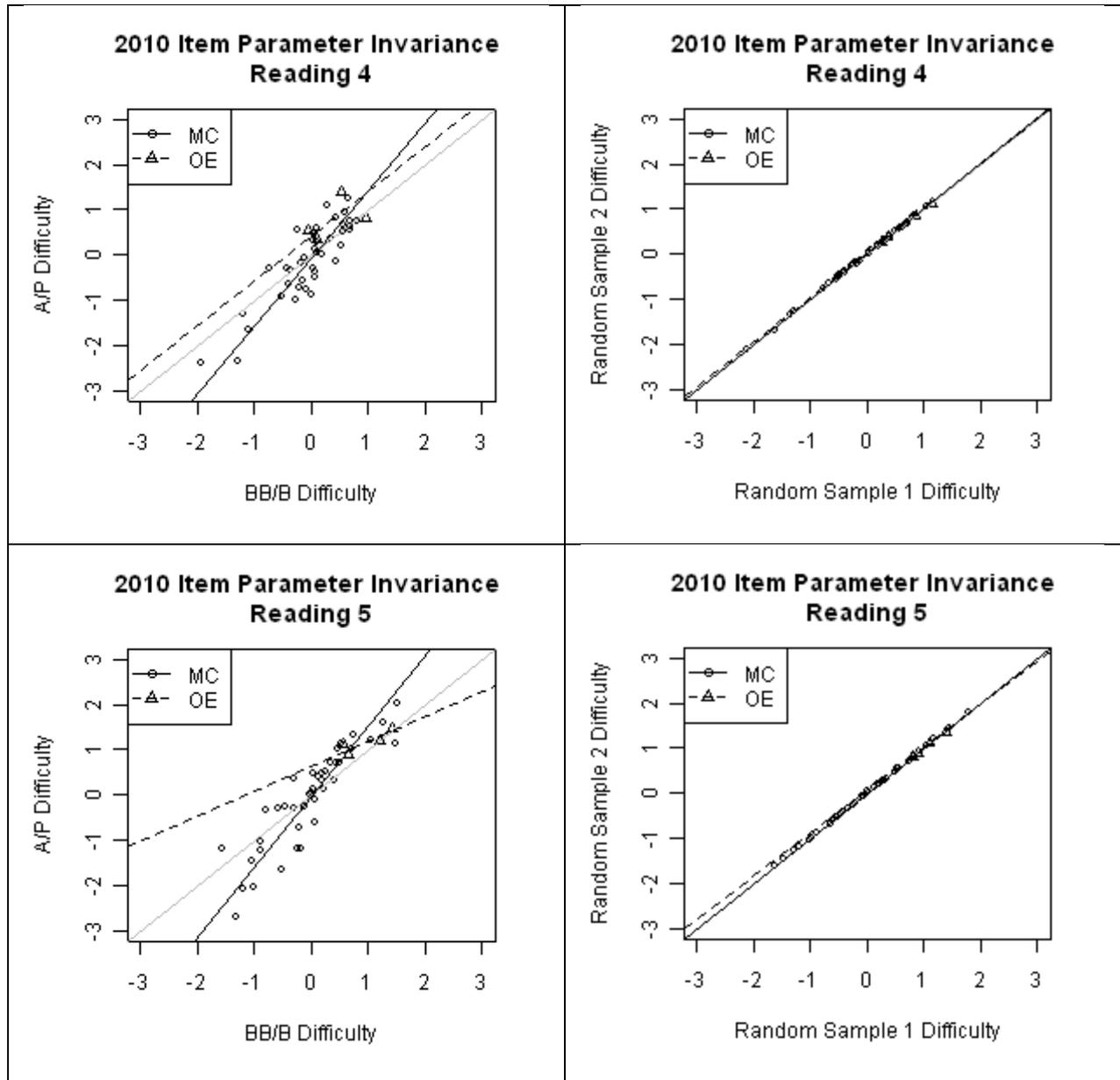


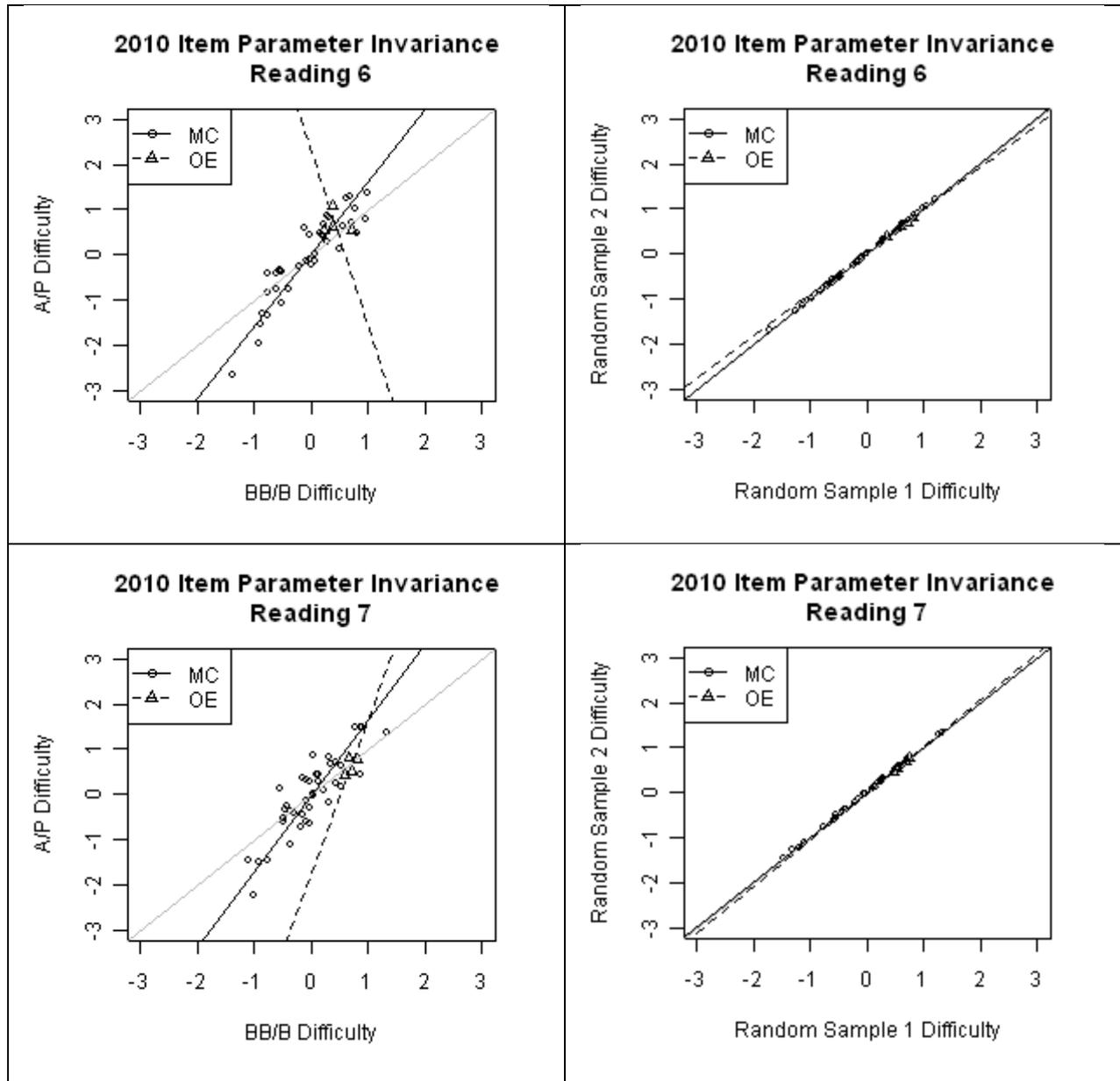
<sup>18</sup> This is important because IRT parameter estimates are invariant up to a linear transformation.

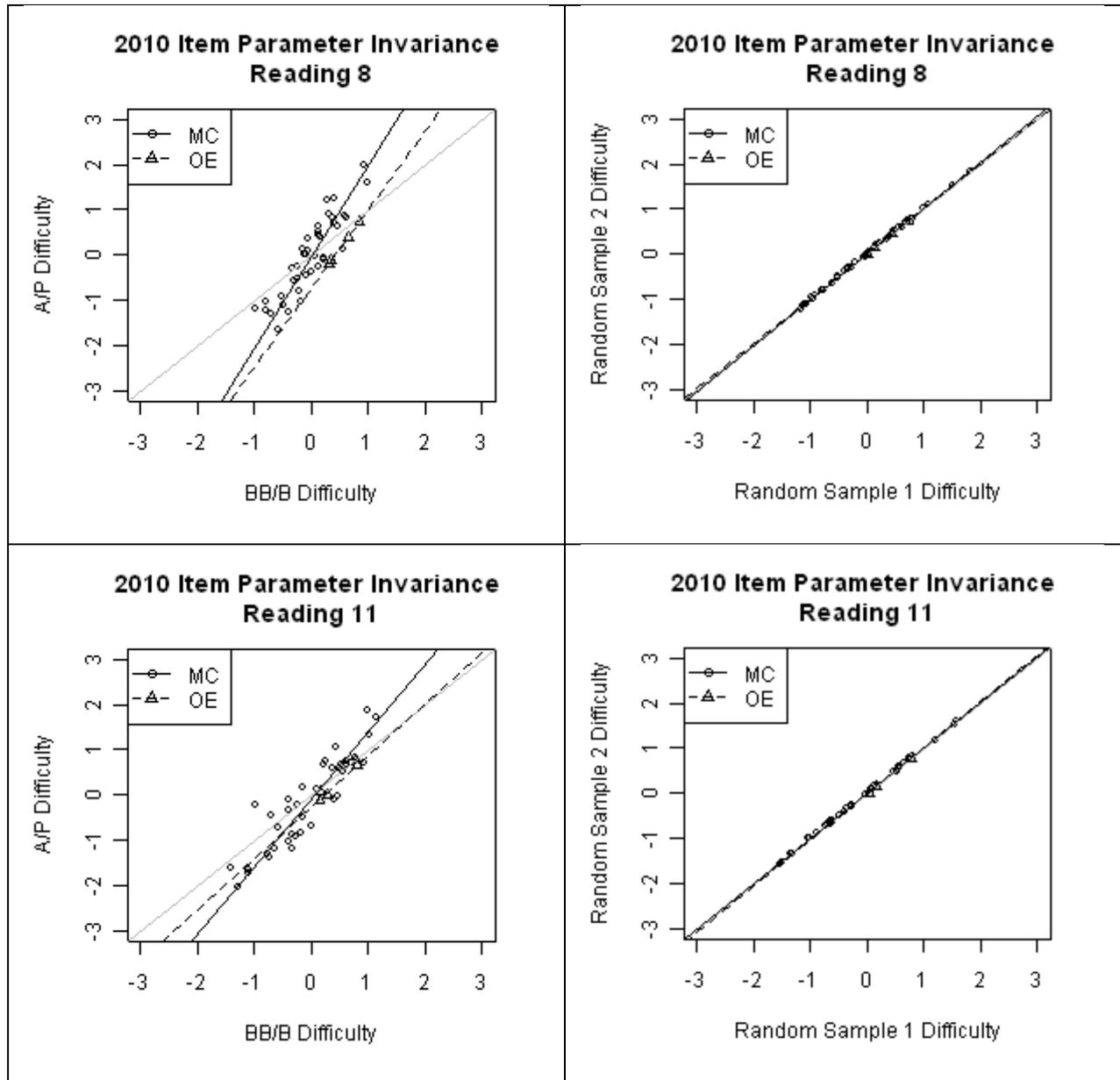


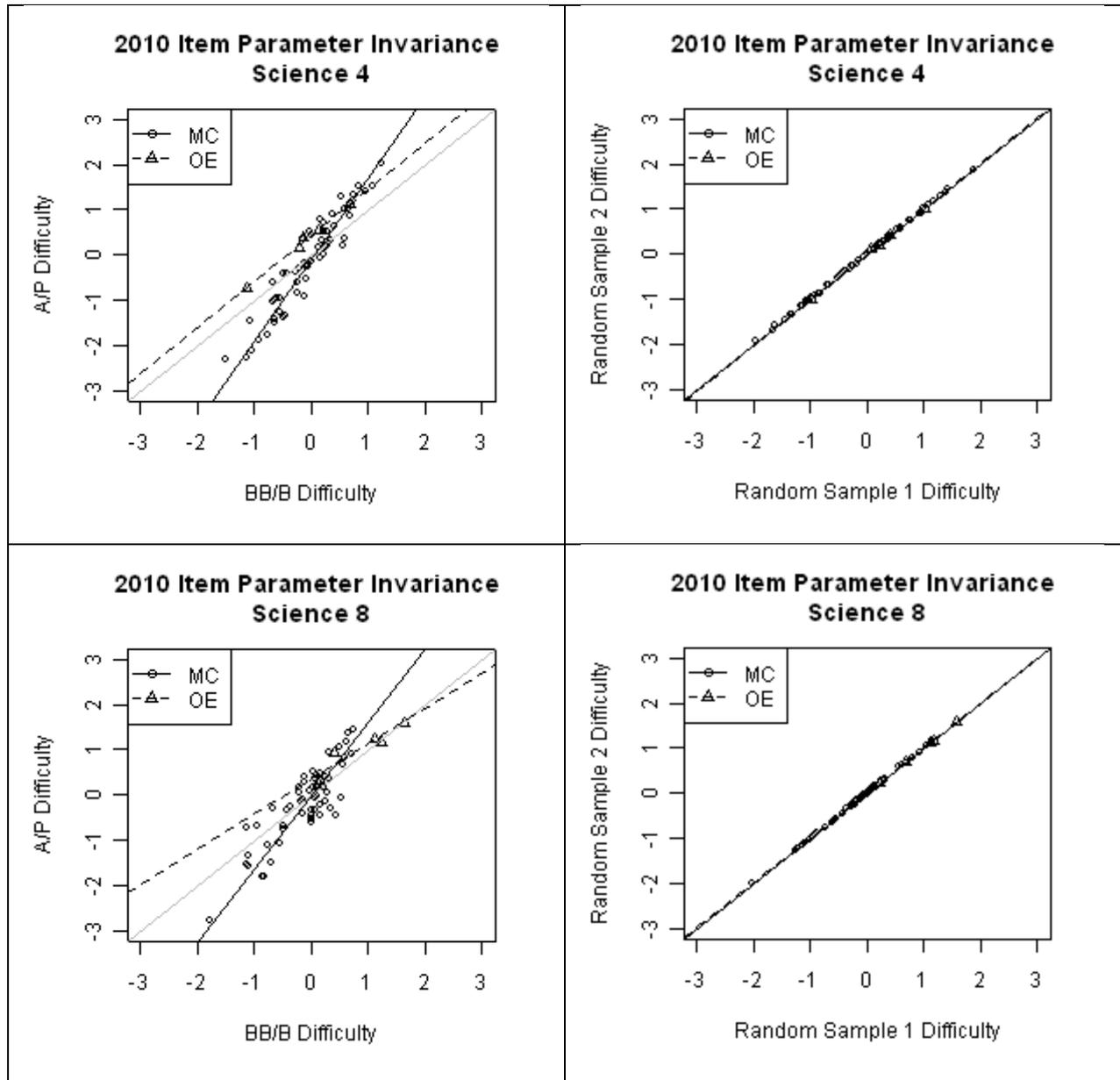


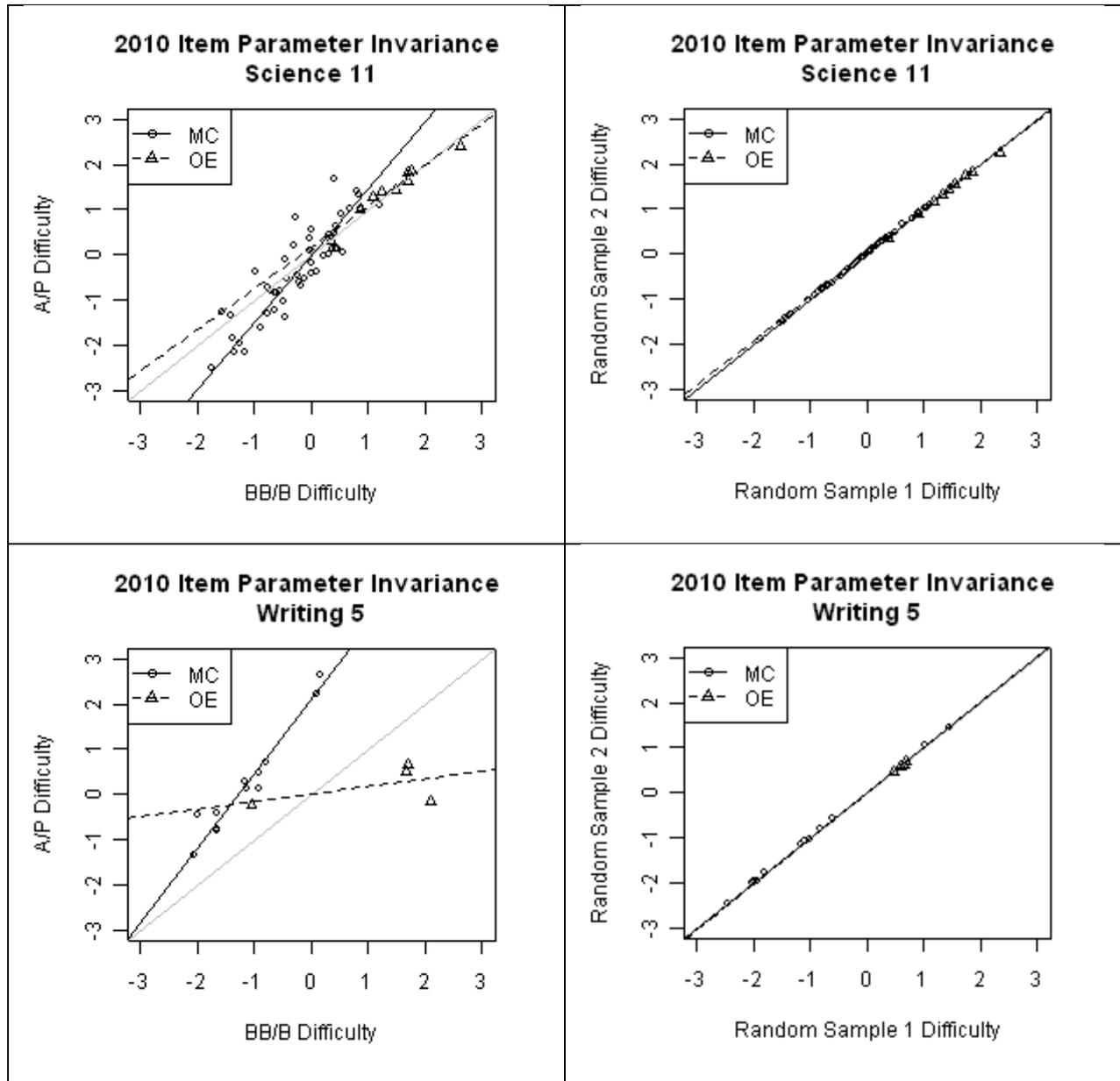


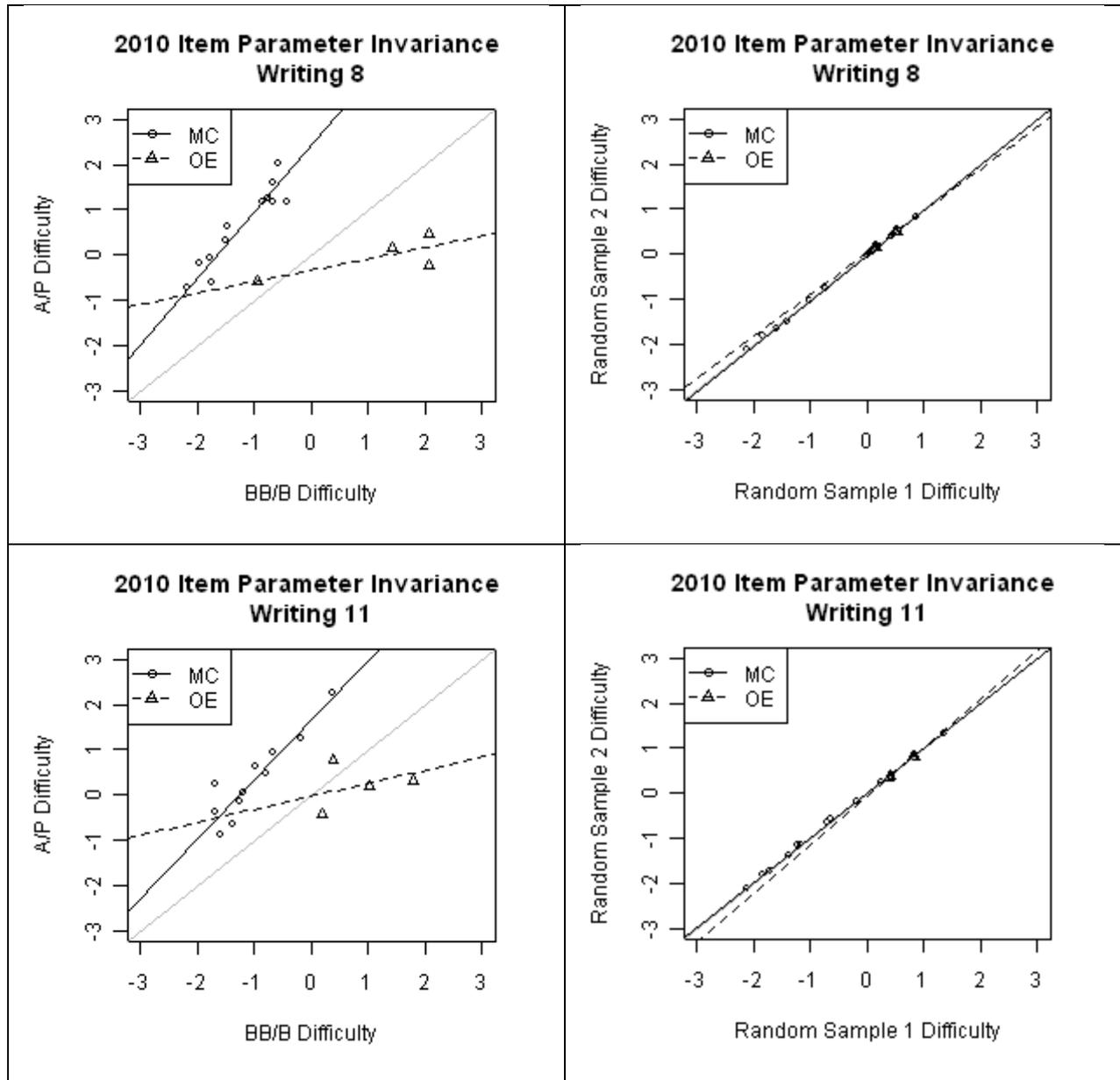












**Table 12–1B. Item Correlations between Two Samples for 2010 PSSA Mathematics, Reading, Science, and Writing**

Subject	Grade	Correlation		
		A/P vs. B/BB	A/P vs. B/BB	Random Samples
		All items	MC only	All items
Mathematics	3	0.91	0.90	1.00
	4	0.88	0.88	1.00
	5	0.94	0.94	1.00
	6	0.85	0.83	1.00
	7	0.87	0.85	1.00
	8	0.87	0.85	1.00
	11	0.86	0.83	1.00
Reading	3	0.94	0.94	1.00
	4	0.87	0.87	1.00
	5	0.91	0.90	1.00
	6	0.91	0.91	1.00
	7	0.87	0.87	1.00
	8	0.87	0.90	1.00
	11	0.91	0.91	1.00
Science	4	0.93	0.95	1.00
	8	0.88	0.86	1.00
	11	0.93	0.89	1.00
Writing	5	0.47	0.97	1.00
	8	0.13	0.93	1.00
	11	0.63	0.96	1.00

## RASCH ITEM STATISTICS

As noted earlier, the Rasch model expresses item difficulty (and student ability) in units referred to as logits, rather than on the percent-correct metric. In the simplest case, a logit is a transformed  $p$ -value with the average  $p$ -value becoming a logit of zero. In this form, logits resemble  $z$ -scores or standard normal deviates; a very difficult item might have a logit of +4.0 and a very easy item might have a logit of -4.0. However, they have no formal relationship to the normal distribution.

The logit metric has several mathematical advantages over  $p$ -values. Logits have an interval scale, meaning that two items with logits of 0.0 and +1.0 (respectively) are the same distance apart as two items with logits of +3.0 and +4.0. Logits are not dependent on the ability level of the students. For example, a test form can have a mean logit of zero, whether the average item  $p$ -value for the student sample is 0.8 or 0.3.

The standard Rasch calibration procedure fixes the mean difficulty of the items on any form at zero. Under normal circumstances where all students are administered the same set of items, any item with a  $p$ -value lower than the average item on the form receives a positive logit and any item with a  $p$ -value higher than the average receives a negative logit. Consequently, the logits for any calibration, whether it is a third-grade reading test or a high-school science test, relate to an arbitrary origin defined by the center of items on that form. The average third-grade reading item will have a logit of zero; the average high-school science item will have a logit of zero. Logits for both item difficulties and student abilities are placed on the same scale and relate to the same mean item difficulty.

There are a number of other arbitrary choices that could be made for centering the item difficulties. Rather than using all the items, the origin could be defined by a subset. For the PSSA, all test forms in a particular grade and subject area share the same operational item set. All items on each form can then be easily adjusted to a single (but still arbitrary) origin by defining the origin as the mean of the operational items. With this done, the origins for all the forms will be statistically equal. For example, items on any two forms that are equally difficult will now have statistically equal logit difficulties. This is partly how PSSA items can be placed on the same logit difficulty scale across years. Chapter Fifteen has more detailed information about the PSSA scale linking procedures.

Appendix I reports the item statistics including classical and Rasch logit difficulties for all the operational items. Table 12–2 summarizes the Rasch logit difficulties of the operational items on each test. For mathematics, Grade 5 had the largest mean logit value (0.58), whereas Grade 11 had the lowest mean logit value (-0.34). The mean logit value of the reading items for most grades was around 0.00, but Grade 8 had a relatively high mean logit value (0.63). For science tests, the mean logits were 0.01, -0.19, and -0.03 for Grades 4, 8, and 11, respectively. For writing, the mean logits were 1.07, 1.18, and 0.35 for Grades 5, 8, and 11, respectively. The minimum and maximum values and standard deviations suggest the PSSA items covered a relative wide range of difficulties.

**Table 12–2. Summary of Rasch Item Difficulties for  
2010 PSSA Mathematics, Reading, Science, and Writing**

	<b>Grade</b>	<b>N</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean*</b>	<b>SD</b>
<b>Mathematics</b>	<b>3</b>	63	-1.95	2.47	0.28	1.03
	<b>4</b>	63	-2.28	2.06	0.30	0.94
	<b>5</b>	63	-1.40	2.49	0.58	0.99
	<b>6</b>	63	-1.15	1.89	0.21	0.77
	<b>7</b>	63	-1.75	2.05	0.23	0.76
	<b>8</b>	63	-1.47	1.94	0.22	0.74
	<b>11</b>	63	-1.92	1.48	-0.34	0.74
<b>Reading</b>	<b>3</b>	42	-2.29	1.50	0.05	0.82
	<b>4</b>	44	-2.08	1.19	0.03	0.71
	<b>5</b>	44	-1.74	1.69	-0.06	0.86
	<b>6</b>	44	-1.86	1.07	-0.12	0.70
	<b>7</b>	44	-1.45	1.35	0.07	0.68
	<b>8</b>	44	-0.62	2.45	0.63	0.73
	<b>11</b>	44	-1.62	1.57	-0.08	0.80
<b>Science</b>	<b>4</b>	63	-1.85	1.97	0.01	0.86
	<b>8</b>	63	-2.15	1.43	-0.19	0.69
	<b>11</b>	59	-1.92	2.26	-0.03	0.94
<b>Writing</b>	<b>5</b>	16	-0.77	3.13	1.07	1.26
	<b>8</b>	16	-0.55	2.40	1.18	0.93
	<b>11</b>	16	-2.96	2.38	0.35	1.36

\*The mean logit values are not necessarily 0.00 (as some may expect) because the items have been placed on a scale that was developed in prior years.

## VISUALIZING THE *P*-VALUE-LOGIT RELATIONSHIP

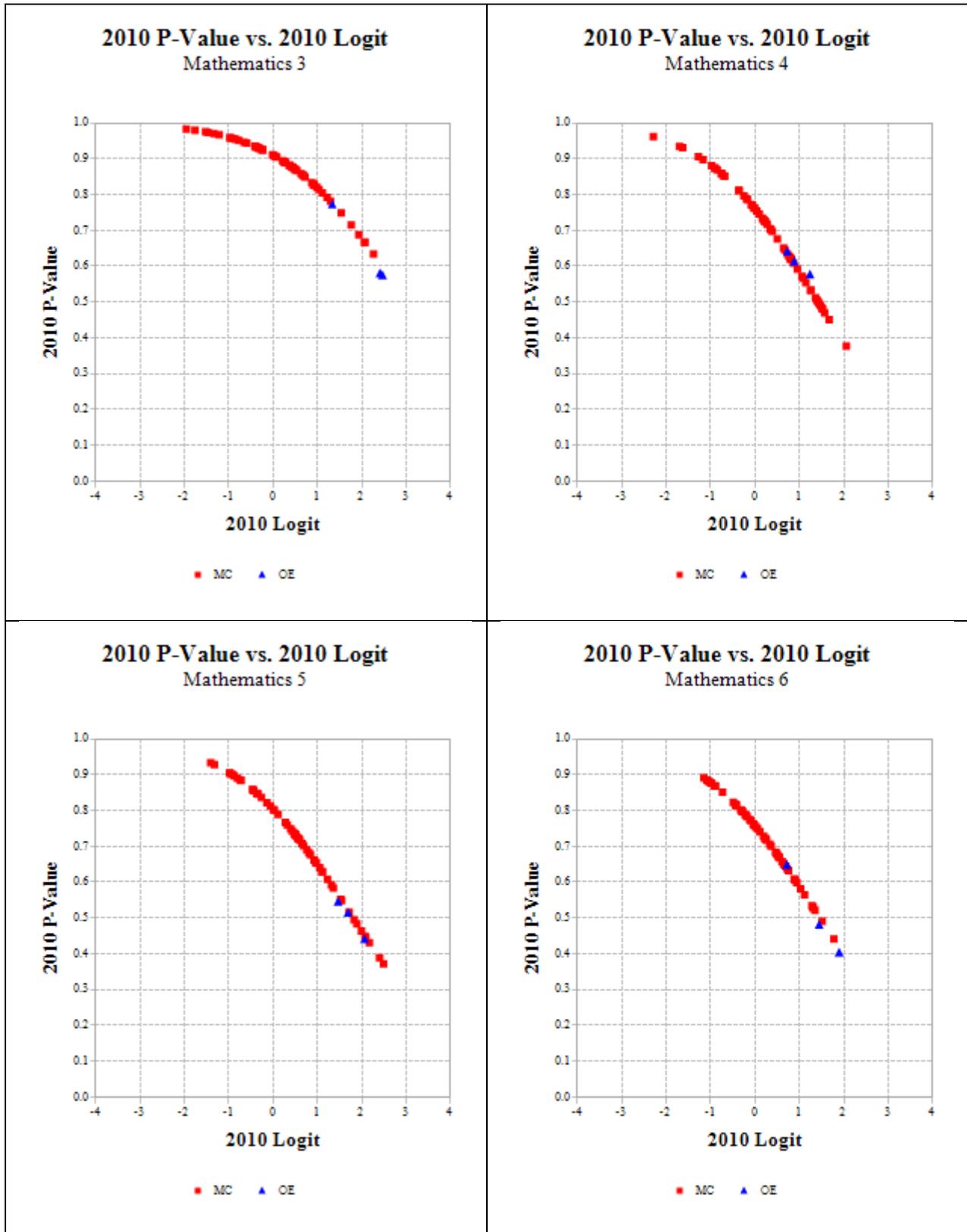
During the PSSA administration, test forms were spiraled within classrooms. In effect, students were administered the same set of common items but different nonoperational items (e.g., field test item sets). Cross checks can be made to ensure the calibration and linking processes are reasonable across forms. The goal of spiraling is to achieve randomly-equivalent samples of students across forms with equal standard deviations and arbitrary means. Any differences in performance observed among the groups should only be due to differences in form difficulty. After linking, the mean of the logit (Rasch student) abilities should be statistically equal for each sample of students. Because of the equivalent samples, common items should have the same *p*-values regardless of which form and sample is being considered. Also, for all items (operational and nonoperational), a plot of the relationship between the item *p*-values and item logits (Rasch item difficulty estimates) should fall along a single, curved line.

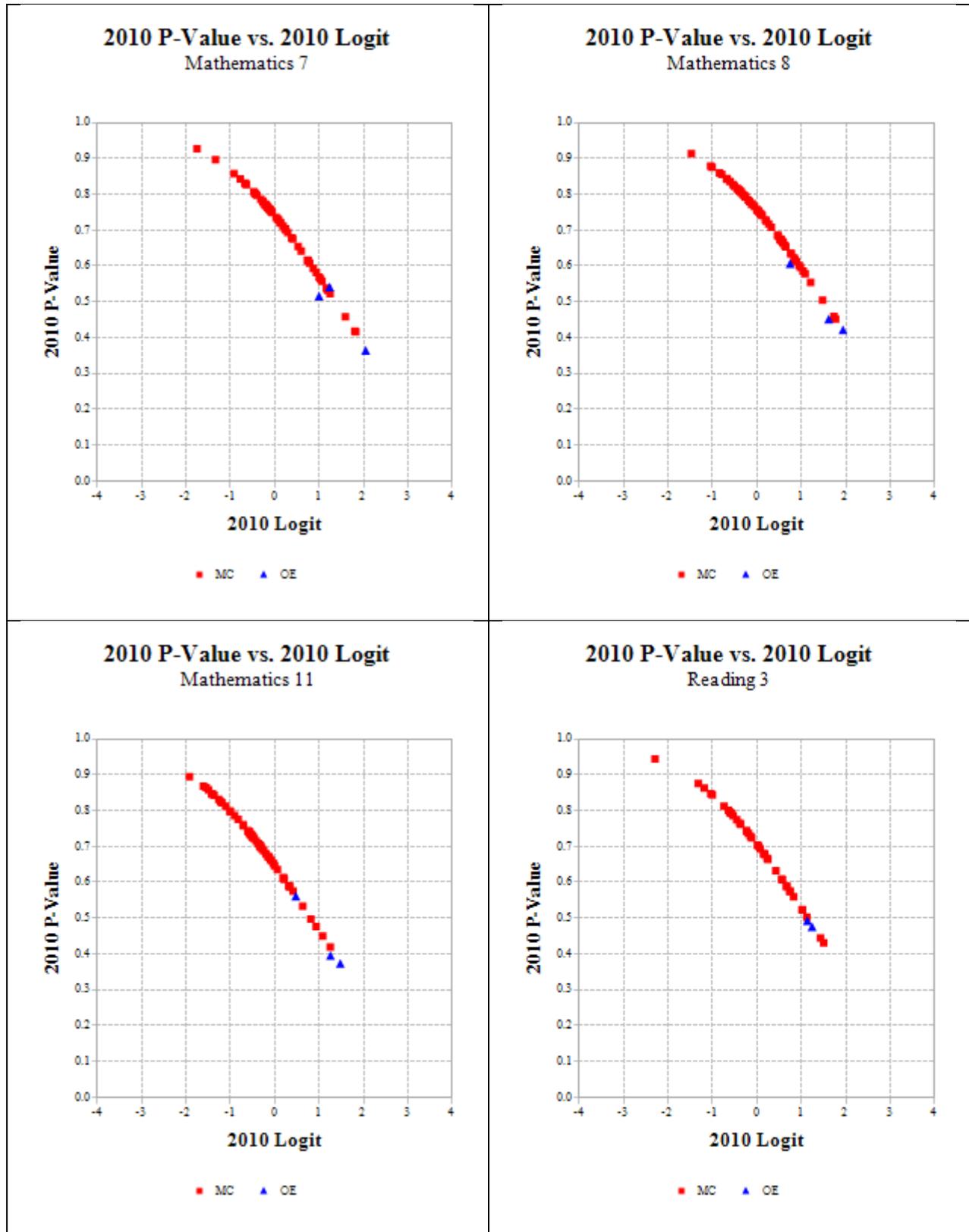
Figure 12–2 shows plots of the *p*-value-logit relationship for the operational items. The curves are nearly linear in the center, but curve towards asymptotes of one and zero, respectively, on the left and right. The graphs show that items with lower *p*-values (indicating a more difficult item that fewer students answered correctly) also had higher logit difficulties, and that items with higher *p*-values had lower logit difficulties (i.e., the *p*-value and logit scales are inversely related).

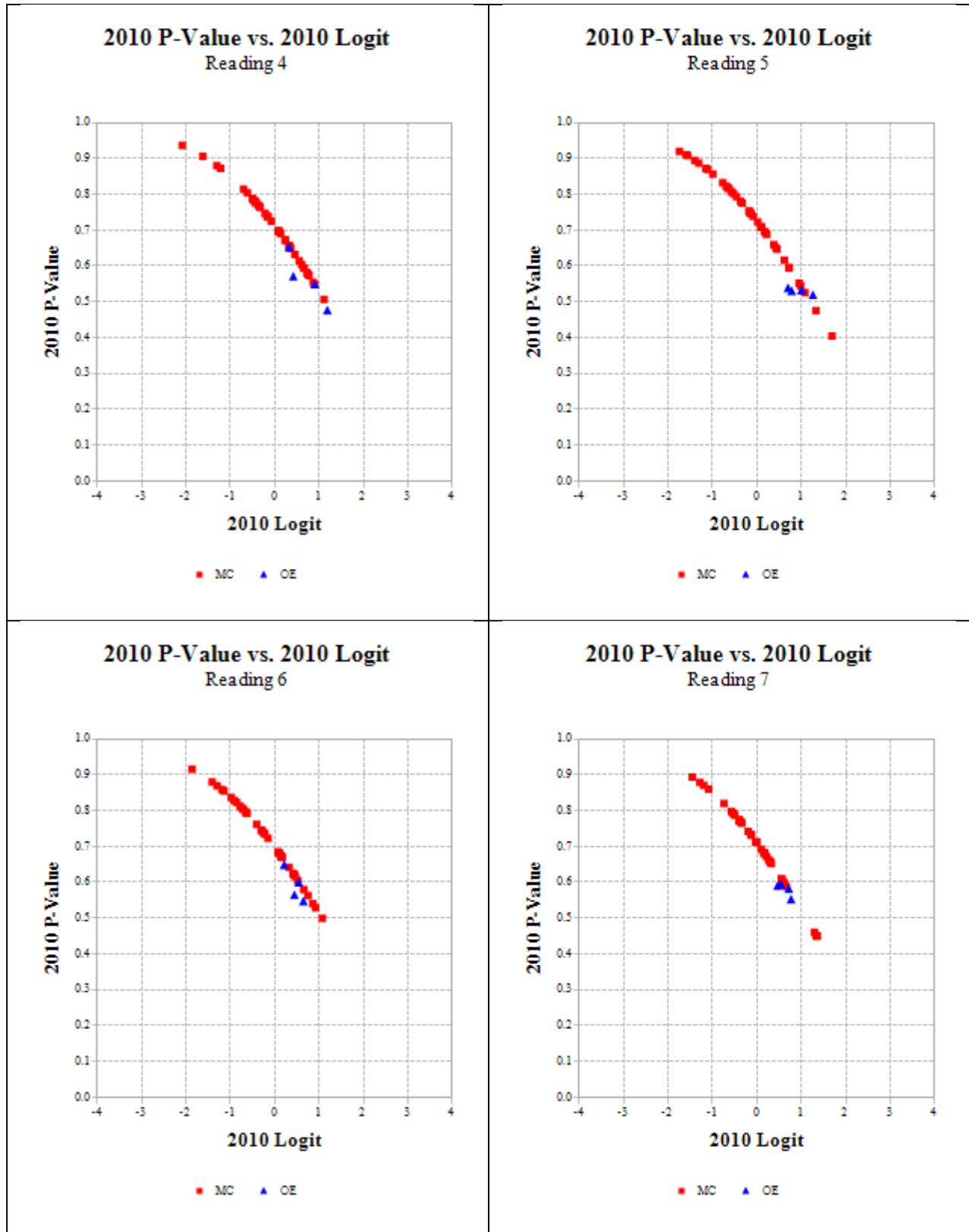
The spread of the graph points is indicative of the dispersion of item difficulties in the operational items. The dispersion and coordinates of items are roughly similar across grades and subjects. (Again, a notable exception would be Grade 3 mathematics, which had a relatively more homogeneous set of *p*-values with a higher *p*-value mean).

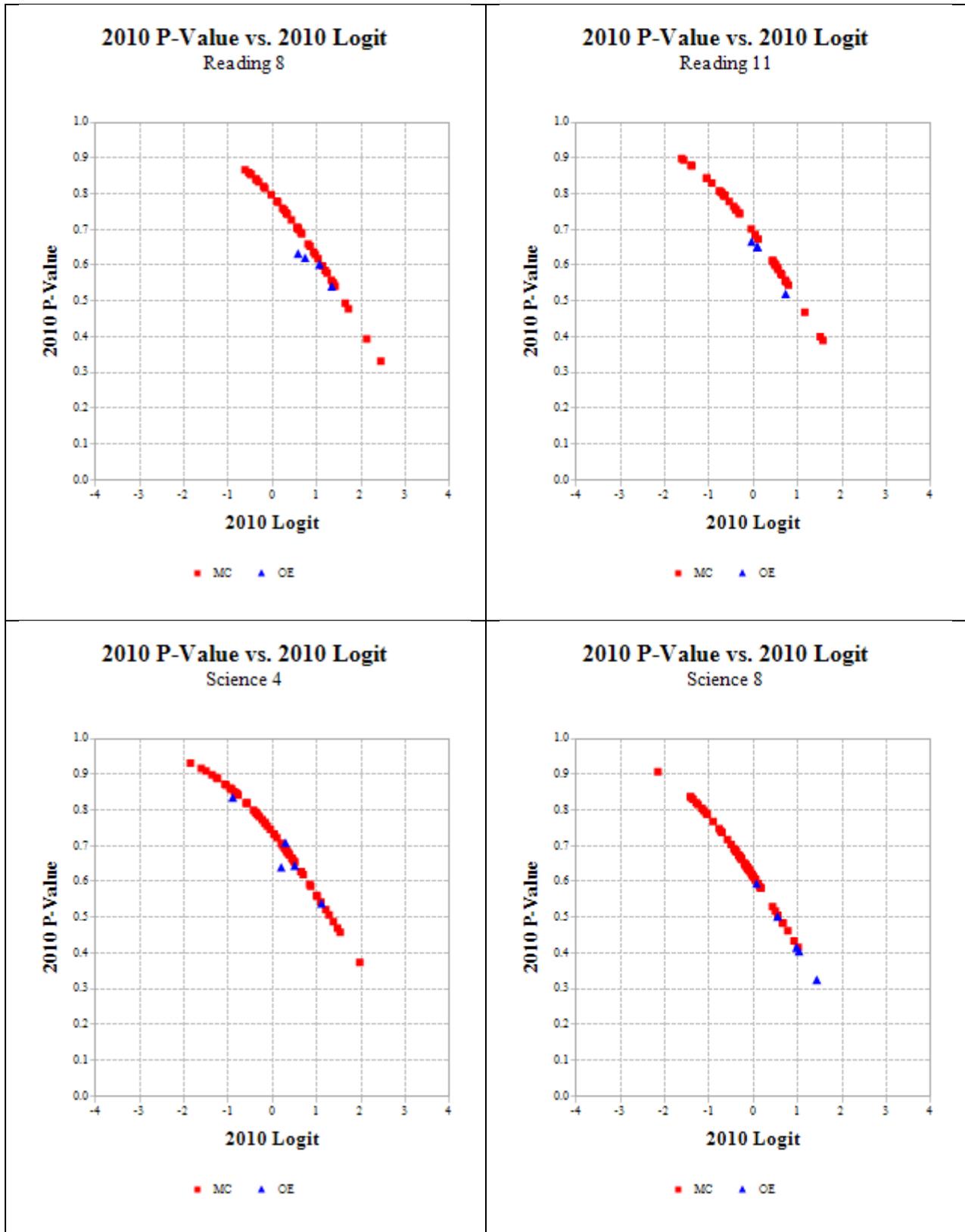
Common OE items are also graphed in Figure 12–2. These items appear with triangular markers. The OE items generally fall on the same curve as the MC items, but subtle differences can occur. The OE items were placed on the MC item difficulty (*p*-value) scale—which ranges from 0.00 to 1.00—by dividing the mean OE item score by the maximum OE score possible. Also, the MC items were calibrated concurrently. The OE items were placed on the MC scale in a separate step (i.e., MC items were concurrently calibrated, then anchored by programmatically fixing their values when the difficulties of OE items were estimated). More information about the scale linking procedure is provided in Chapter Fifteen.

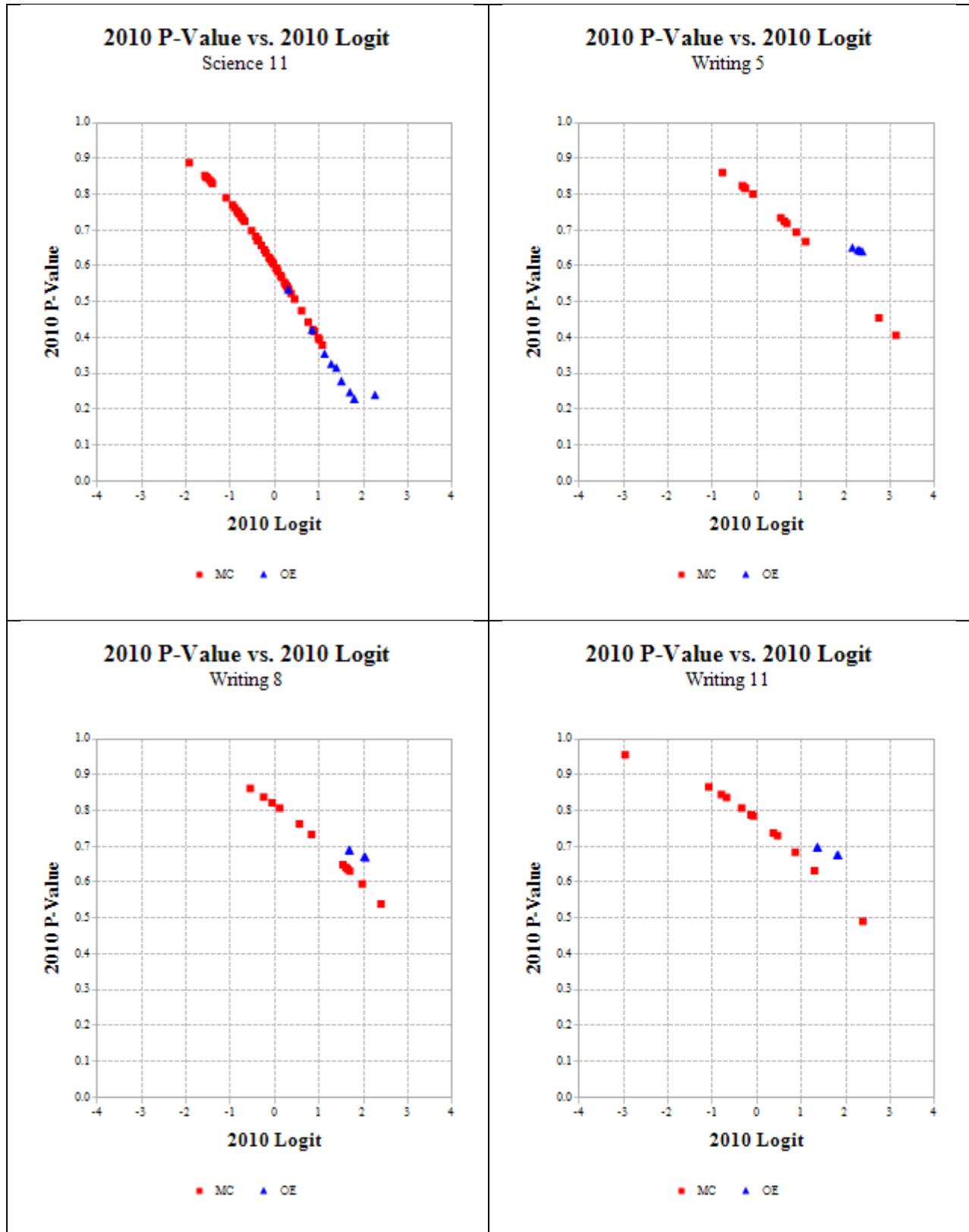
Figure 12–2. 2010 P-Values on 2010 Logit Values











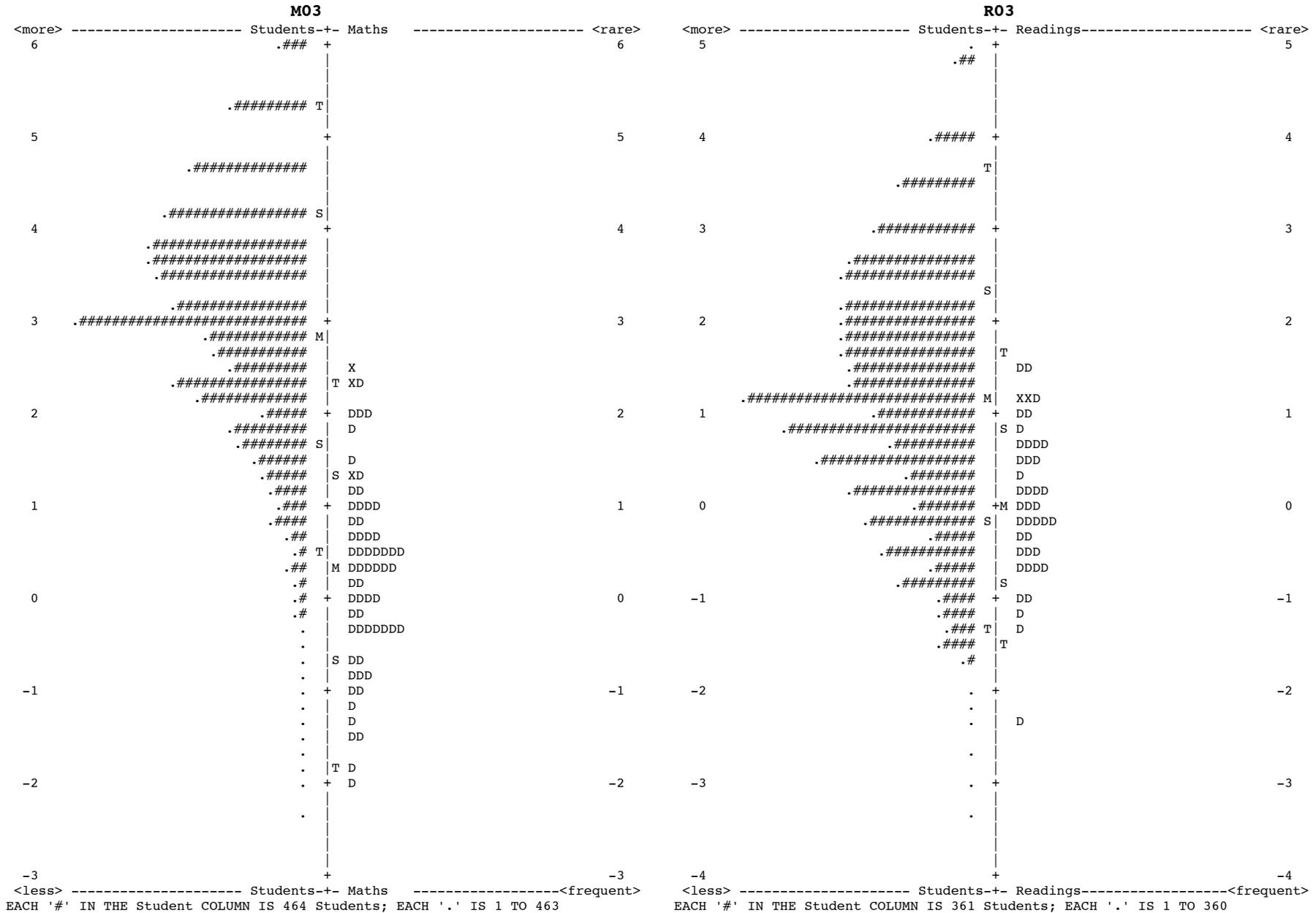
### ***Item Difficulty-Student Ability Maps***

The distributions of the Rasch item logits (item difficulty estimates) are shown on the item difficulty-student ability maps presented in Figure 12–3. In each item-student map, markers on the left-hand side represent student ability values, whereas markers on the right-hand side represent item difficulty parameter estimates. As noted earlier, the Rasch model enables placement of both items and students on the same scale. Consequently, one can easily visualize information about how the difficulty of the test items related to the ability distribution of students who took the test. The students located in the upper left quadrant of any given plot have relatively more ability. Items in the lower right quadrant are relatively easier.<sup>19</sup> Overall, the most predominant pattern seen across all maps was for items to be easier relative to the student ability levels. It is also important to understand where the items are providing more accurate measurement (e.g., near the cut scores or away from the cut scores). This issue is addressed more fully in Chapter Eighteen (see Figure 18–2).

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<sup>19</sup> High-ability students have higher probabilities of correctly answering easier items. Similarly, low ability students (in lower left quadrant of any given plot) have lower probabilities of answering harder items (in upper right quadrant).

Figure 12–3. 2010 PSSA Item-Student Maps



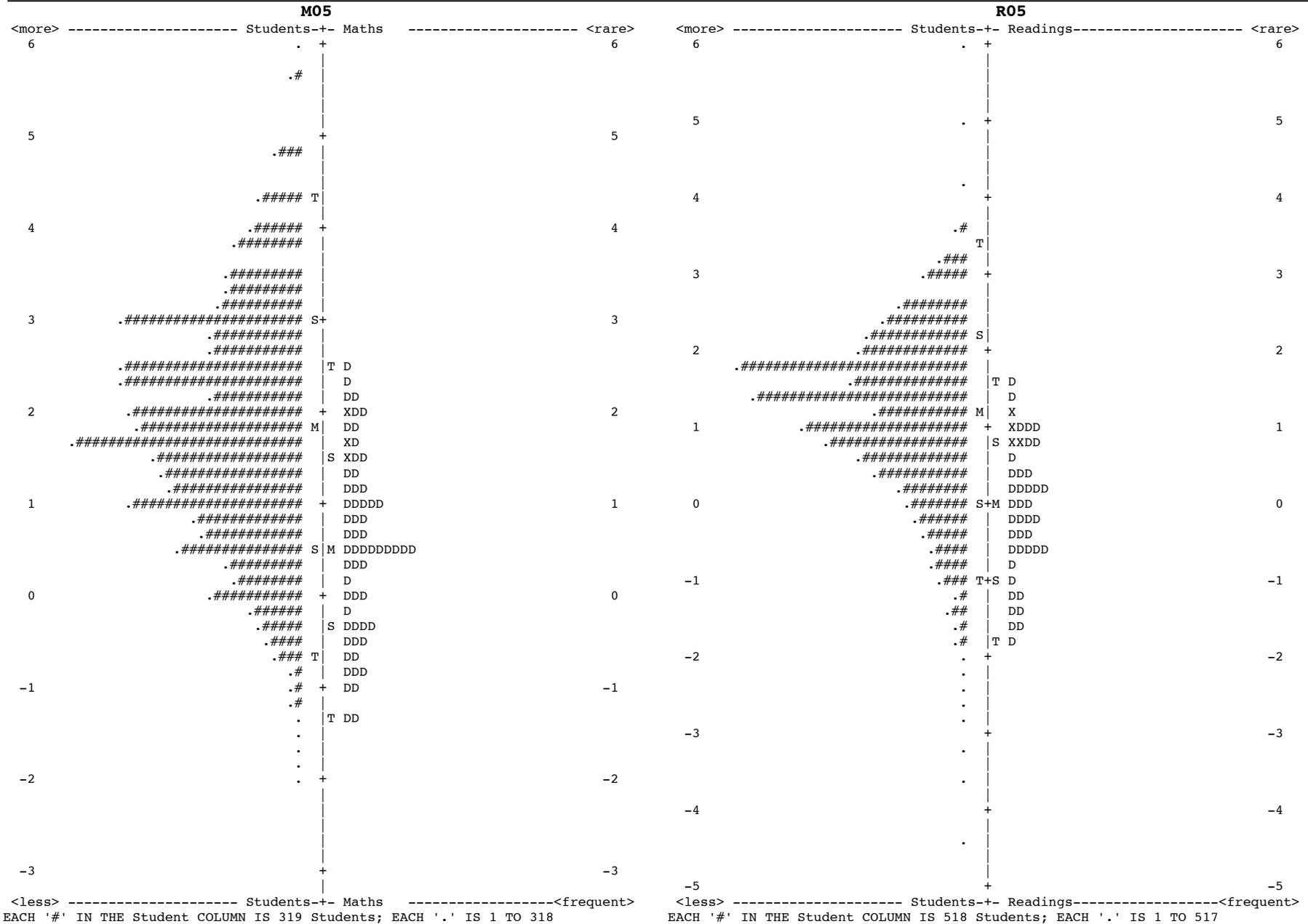
Chapter Twelve: Rasch Item Calibration

M04				R04			
<more>	Students	Maths	<rare>	<more>	Students	Readings	<rare>
6	.	+	6	5	.	+	5
5	.#	+	5	4	.	+	4
	.###				.##		
4	.####	+	4	3	.####	+	3
	.#####	T			.#####	T	
	.#####				.#####		
3	.#####	+	3	2	.#####	+	2
	.#####	S			.#####	S	
	.#####				.#####		
	.#####	T			.#####	T	
2	.#####	+	2	1	.#####	+	1
	.#####	D			.#####	D	
	.#####				.#####		
	.#####	M			.#####	M	
	.#####				.#####		
	.#####	S			.#####	S	
1	.#####	+	1	0	.#####	+	0
	.#####	DD			.#####	DD	
	.#####	XDDDD			.#####	XDDDD	
	.#####	XDD			.#####	XDD	
	.#####	D			.#####	D	
	.#####	S			.#####	S	
	.#####	M			.#####	M	
0	.#####	+	0	-1	.#####	+	-1
	.#####	DDDD			.#####	DDDD	
	.#####	DDDD			.#####	DDDD	
	.#####	DD			.#####	DD	
	.#####				.#####		
	.###	S			.###	S	
	.###	DD			.###	DD	
	.###	DDDD			.###	DDDD	
	.###	T			.###	T	
-1	.##	+	-1	-2	.##	+	-2
	.#	D			.#	D	
	.	D			.	D	
	.	T			.	T	
	.	DD			.	DD	
	.				.		
-2	.	+	-2	-3	.	+	-3
	.	D			.	D	
	.				.		
-3	.	+	-3	-4	.	+	-4
<less>	Students	Maths	<frequent>	<less>	Students	Readings	<frequent>

EACH '#' IN THE Student COLUMN IS 326 Students; EACH '.' IS 1 TO 325

EACH '#' IN THE Student COLUMN IS 446 Students; EACH '.' IS 1 TO 445

Chapter Twelve: Rasch Item Calibration







Chapter Twelve: Rasch Item Calibration

**M08**

<more>	Students	Maths	<rare>
6	.#		6
	.####		
5			5
	.#####		
4			4
	.#####		
3			3
	.#####		
2			2
	.#####		
1			1
	.#####		
0			0
	.#####		
-1			-1
	.#####		
-2			-2
	.#####		
-3			-3
<less>	Students	Maths	<frequent>

EACH '#' IN THE Student COLUMN IS 263 Students; EACH '.' IS 1 TO 262

**R08**

<more>	Students	Readings	<rare>
6	.		6
	.		
5			5
	.#		
4			4
	.##		
3			3
	.###		
2			2
	.####		
1			1
	.#####		
0			0
	.#####		
-1			-1
	.#####		
-2			-2
	.#####		
-3			-3
<less>	Students	Readings	<frequent>

EACH '#' IN THE Student COLUMN IS 442 Students; EACH '.' IS 1 TO 441

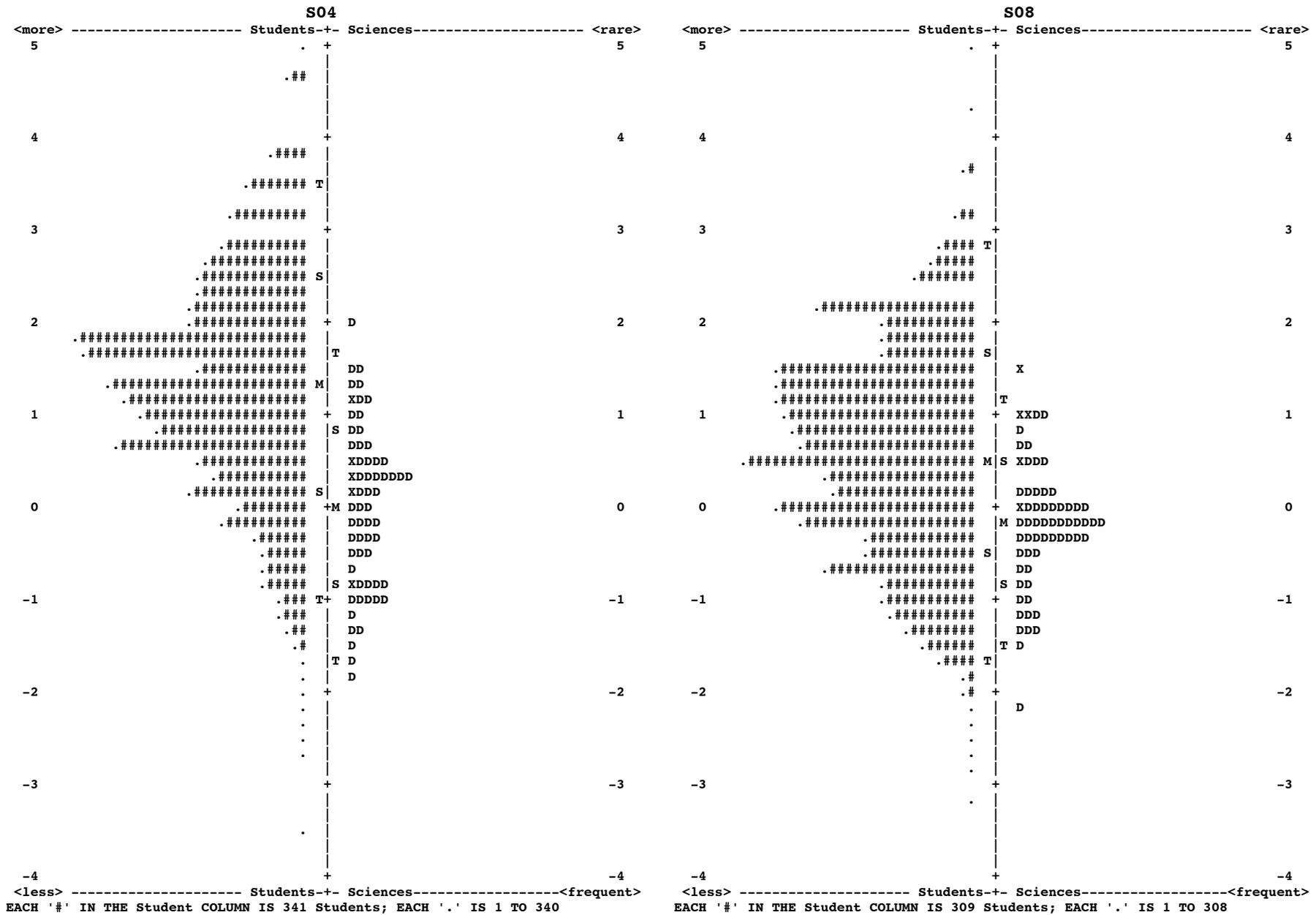
Chapter Twelve: Rasch Item Calibration

M11				R11			
<more>	Students	Maths	<rare>	<more>	Students	Readings	<rare>
5	.#	+	5	5	.	+	5
	.####				.#		
4	+		4	4	+		4
	.#####				.##		
	.#####	T			.###	T	
3	+		3	3	+		3
	.#####				.#####		
	.#####				.#####		
	.#####				.#####		
	.#####	S			.#####	S	
2	+		2	2	+		2
	.#####				.#####		
	.#####				.#####		
	.#####				.#####		
	.#####	X			.#####	T DD	
	.#####	XD			.#####		
	.#####	T			.#####	D	
1	+	DD	1	1	+	M+	1
	.#####	D			.#####	D	
	.#####	D			.#####	S XDDDDD	
	.#####	X			.#####	DDDDDD	
	.#####	S DDDD			.#####	XXD	
	.#####	DDD			.#####	XDD	
0	+	DDDD	0	0	+	M	0
	.#####	DDDDDD			.#####	S	
	.#####	DDDDDDDD			.#####	DDDD	
	.#####	DDDDDDDDDD			.#####	DD	
	.#####	DDDD			.#####	DDDDDD	
	.#####	DD			.###	S D	
-1	+	DD	-1	-1	+	DDD	-1
	.#####	DD			.##	DD	
	.#####	DD			.###	D	
	.#####	DD			.###	T DD	
	.#####	D			.#	D	
	.###	T T			.#	T D	
-2	+	D	-2	-2	+		-2
	.#				.		
	.				.		
	.				.		
	.				.		
-3	+		-3	-3	+		-3
	.				.		
	.				.		
	.				.		
-4	+		-4	-4	+		-4

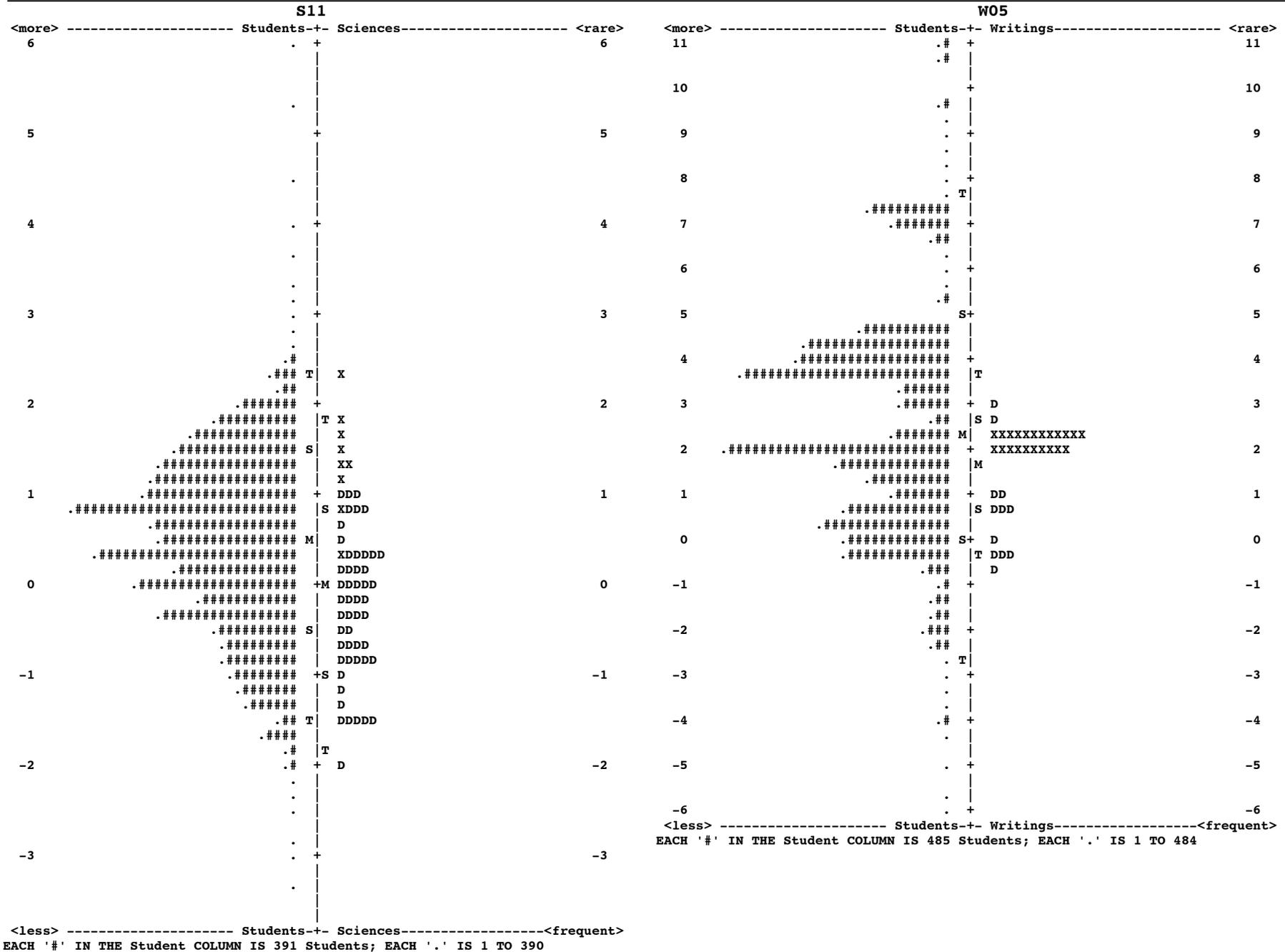
<less> ----- Students+- Maths -----<frequent>  
 EACH '#' IN THE Student COLUMN IS 276 Students; EACH '.' IS 1 TO 275

<less> ----- Students+- Readings-----<frequent>  
 EACH '#' IN THE Student COLUMN IS 435 Students; EACH '.' IS 1 TO 434

Chapter Twelve: Rasch Item Calibration



Chapter Twelve: Rasch Item Calibration



Chapter Twelve: Rasch Item Calibration

<more>	Students	Writings	<rare>
10	.#####	+	10
	.		
9	.	+	9
	.		
8	.	T+	8
	.		
7	.#####	+	7
	.#####		
6	.#####	+	6
	.		
5	.	S	5
	.		
4	.#####	+	4
	.#####		
3	.#####	T	3
	.## M		
2	.#####	S D	2
	.#####		
1	.#####	M XXXXXXXXXXXXD	1
	.#####		
0	.#####	S DD	0
	.#####		
-1	.#####	S+T DD	-1
	.#####		
-2	.#####	D	-2
	.#####		
-3	.#####	D	-3
	.#####		
-4	.#####	D	-4
	.#####		
-5	.#####	D	-5
	.#####		
-6	.#####	D	-6
<less>	Students	Writings	<frequent>

EACH '#' IN THE Student COLUMN IS 555 Students; EACH '.' IS 1 TO 554

<more>	Students	Writings	<rare>
11	.##	+	11
	.		
10	.##	+	10
	.		
9	.##	+	9
	.		
8	.##	+	8
	.		
7	.#####	+	7
	.#####		
6	.#####	+	6
	.		
5	.	+	5
	.		
4	.#####	S+	4
	.#####		
3	.#####	T	3
	.#####		
2	.#####	M D	2
	.#####		
1	.#####	+S	1
	.#####		
0	.#####	XXXXXXXXXXXX	0
	.#####		
-1	.#####	XXXXXXXXXXXX	-1
	.#####		
-2	.#####	+M D	-2
	.#####		
-3	.#####	DD	-3
	.#####		
-4	.#####	+S DD	-4
	.#####		
-5	.#####	D	-5
	.#####		
-6	.#####	D	-6
<less>	Students	Writings	<frequent>

EACH '#' IN THE Student COLUMN IS 520 Students; EACH '.' IS 1 TO 519

## Chapter Thirteen: Performance Level Setting

No performance level setting events occurred this year. A history (dates and methodology) of prior performance level setting or validation events are provided in Table 13–1. Validation events utilized starting values; more details of this are provided in the table footnote. The resulting cut scores from those events are provided in Tables 13–2 and 13–3. For additional details about any given event, refer to the technical report for the year that the event occurred (Data Recognition Corporation, 2005, 2007a, 2007b, 2008a, 2008b).

**Table 13–1. Performance Level Setting/Validation Event Dates and Methodology**

<b>Subject</b>	<b>Grade</b>	<b>Methodology</b>	<b>Validation?</b>	<b>Event Date</b>
Reading	5, 8, 11	Bookmark	Yes <sup>1</sup>	Summer 2005
Mathematics	5, 8, 11	Bookmark	Yes <sup>1</sup>	Summer 2005
Writing	5, 8, 11	Body of Work	Yes <sup>2</sup>	Summer 2006
Reading	4, 6, 7	Bookmark	Yes <sup>2</sup>	Summer 2006
Mathematics	4, 6, 7	Bookmark	Yes <sup>2</sup>	Summer 2006
Reading	3	Bookmark	Yes <sup>3</sup>	Summer 2007
Mathematics	3	Bookmark	Yes <sup>3</sup>	Summer 2007
Science	4, 8, 11	Bookmark	No	Summer 2008

*Notes.* 1. Starting values exponentially smoothed using post-equated 2005 results for Grades 5, 8, and 11.  
 2. Starting values exponentially smoothed using post-equated 2006 results for Grades 4, 6, and 7.  
 3. Starting values were determined using post-equated 2007 results for Grades 4.

### PSSA CUT SCORES

Appendix L provides the Rasch ability and scaled score cuts for each PSSA test. For reader convenience, these are documented next in a different format. Table 13–2 documents the Rasch ability (Theta) cut scores for each grade and subject area test. Table 13–3 documents the same, but provides the cut scores on the scaled-score metric. PSSA scaling procedures are discussed further in Chapter Fourteen.

**Table 13–2. PSSA Theta ( $\theta$ ) Metric Cut Scores by Grade and Subject Area**

Subject	Grade	$\theta$ Cuts		
		BB/B	B/P	P/A
Mathematics	3	0.6192	1.6750	3.1501
	4	-0.1376	0.3124	1.3074
	5	0.1259	0.9373	1.8383
	6	-0.1377	0.4823	1.3723
	7	-0.2114	0.3636	1.2336
	8	-0.0637	0.5729	1.4854
	11	-0.1749	0.4888	1.4819
Reading	3	-0.3207	0.2205	1.8926
	4	-0.2215	0.4935	1.5635
	5	0.2133	0.9074	2.0241
	6	-0.2398	0.5452	1.4352
	7	-0.3170	0.4230	1.3780
	8	0.1376	0.7082	1.5301
	11	-0.0130	0.5777	1.5351
Science	4	-0.4280	0.2792	1.4560
	8	-0.2435	0.4091	1.3958
	11	-0.4390	0.7888	1.4960
Writing	5	-3.2644	1.6456	8.3756
	8	-2.0984	1.1216	6.2416
	11	-2.9230	-0.0830	5.6170

Note. BB = Below Basic; B = Basic; P = Proficient; and A = Advanced.

**Table 13–3. PSSA Scaled-Score Metric Cut Scores by Grade and Subject Area**

Subject	Grade	Scale Score Cuts		
		BB/B	B/P	P/A
Mathematics	3	1044	1180	1370
	4	1156	1246	1445
	5	1158	1312	1483
	6	1174	1298	1476
	7	1183	1298	1472
	8	1171	1284	1446
	11	1167	1304	1509
Reading	3	1168	1235	1442
	4	1112	1255	1469
	5	1137	1275	1497
	6	1121	1278	1456
	7	1131	1279	1470
	8	1146	1280	1473
	11	1112	1257	1492
Science	4	1150	1275	1483
	8	1150	1275	1464
	11	1150	1275	1347
Writing	5	745	1236	1909
	8	914	1236	1748
	11	952	1236	1806

*Note.* BB = Below Basic; B = Basic; P = Proficient; and A = Advanced.



## **Chapter Fourteen: Scaling**

The purpose of a scaling analysis is to create a score scale. Scaling is used to transform test score values onto a scale more easily interpreted by users. For the PSSA, the resulting scale scores will be used for score reporting and performance level classification. The PSSA classifies students into four achievement levels: Below Basic, Basic, Proficient, and Advanced.

### **HISTORICAL INFORMATION**

Prior to 2000, when the PSSA design was heavily matrix sampling, estimating school-level scaled scores presented some statistical and psychometric challenges. The statistically correct method to compute the school-level scaled score often gave an answer different from what would be obtained by averaging student ability estimates. To avoid this source of misunderstanding, the school-level scores were made to equal the average of the appropriate students. The matrix sampling component of the design, together with items from the common section, was used at the academic standard category level to estimate relative strengths and weaknesses for schools.

The adoption of the Pennsylvania Academic Standards in 1999 brought structural changes to the PSSA that were implemented in 2000. Beginning with the new reporting design in 2000, subject area total scores for students and schools were based exclusively on the common sections. Thus, greater emphasis was placed on ensuring that the common sections possessed optimal balance at the content standard level and yielded reliable estimates of student-level abilities, as indicated by the standard errors. It was then possible to aggregate all scaled scores at the school, district, and state levels without resorting to any complex algorithms, making the results more understandable.

Because the original design of the PSSA was intended to produce school-level estimates only, the reporting metric was defined at the school level. For the 1996 base year, the mean of all schools in the norming sample was set at 1300 and the standard deviation at 100. The distribution to which these parameters applied was the subject area scaled score with all schools weighted equally. Consequently, the expectation in the base year was for the state-level means to be near 1300 and for standard deviations to be near 100. The state mean of student-level scaled scores was, in general, somewhat different. This difference occurred because the mean of the school-level scores counted schools equally, regardless of size, while the mean of the student-level scores counted students equally.

Although it affected very few students, many administrators believed that their schools were being penalized by the presence of extremely low scoring special-needs students who took the PSSA. A change was made to reduce the impact of these students on the overall school score. Namely, a minimum scaled score of 700 was implemented for all PSSA mathematics, reading, and writing tests beginning in 2002. The Grade 3 mathematics and Grade 3 reading tests as well as all grade levels of science were added after 2002. The minimum of 700 was not applied to these other tests in order to preserve other scale characteristics (e.g., the percentages in performance level categories recommended by standard setting participants and preventing students from achieving Proficient level through random response). Table 14–1 documents the minimum possible scaled scores for all PSSA tests. (There is no prescribed maximum scaled score or upper bound for the PSSA.)

Beginning with the design changes implemented for the 2000 PSSA, student-level scores were based on the common items only. This ensured that any decision made about students was done in the most equitable manner. School-level scaled scores for the subject areas were based on the mean of the student-level scaled scores. This ensured that the scaled scores used for school accountability directly reflected the student-level results. Thus, it is a simple matter to aggregate up to the school, district, and state levels.

As noted above, the PSSA scaled score metric was originally anchored to the mean school-level scaled score for a base year and arbitrarily labeled as 1300. In the base year, the standard deviation of the school-level scaled scores was set to a value of 100. If school scores are approximately normally distributed, a scaled score of 1400, one standard deviation above the base year mean, means the school did better than about five-sixths of the schools in the base year. About two-thirds of the schools will have scaled scores between 1200 and 1400. About 16 percent of the schools will be below 1200. Scaled scores of 1000 and 1600 are three standard deviations from the mean, so scores more extreme than this are very rare.

These labels of 1300, 1200, etc., are completely arbitrary; they could have been called zero and one, or 100 and 110, or any other ordered pair without affecting any of the relationships among schools, years, students, or items. Changing the scale would simply be changing the labels on the axis of a graph without moving any of the points.

Setting the mean at 1300 and the standard deviation at 100 was originally chosen to avoid producing negative scores and so that scores on the PSSA would not be confused with the results from any other testing program. Users would acquire greater knowledge of the PSSA scales with experience.

## **SCALED SCORES**

Individual student scores are reported as scaled scores. However, they are initially estimated as Rasch abilities (more information on the Rasch model is given in Chapter Twelve). Generally, scaled scores are preferred over Rasch ability values for reporting purposes. One issue is that Rasch ability values are on a scale that includes negative and decimal values. By transforming the Rasch ability values to scaled scores, all reported values can become positive integers. Scaled scores are usually obtained through some linear transformation of the Rasch ability values. The linear transformations used for the PSSA produces numeric values with three or four digits that are unit interval scaled scores. Each grade and subject has its own unique PSSA scaled score. Positive scores with no decimals make more sense to parents and students. Since Rasch ability values are comparative after linking to the base year, the transformed scaled scores have a common scale across years, even though the corresponding raw scores may differ. (Linking is discussed further in Chapter Fifteen.)

Essentially, PSSA scaled scores are derived through a two step process. First, there is a nonlinear transformation that converts number correct scores to Rasch ability logits. Second, a linear transformation is used to convert logits to scaled scores. These and some additional considerations (e.g., rounding rules) are discussed further below.

### ***Definition of Scoreability***

Answer documents are considered scoreable if they meet the criteria for inclusion in the data files (see Chapter Nine). For MC items, all omit (no response) and multiple marks (more than one response selected, without machine-discernable erasures) were scored as zeroes. For OE items, all blank, foreign language, off-task, or unreadable responses were scored as zeroes.

### ***WINSTEPS Scaling***

Parameter estimates are derived using the WINSTEPS 3.54 computer program (Linacre & Wright, 2003), which employs unconditional (UCON), joint-maximum-likelihood estimation (JMLE). WINSTEPS provides a conversion table that maps raw scores to logits (Rasch ability estimates). The logits are transformed to scaled scores as discussed below. Every year each test is scaled separately and then linked (see Chapter Fifteen).

### **ZERO AND PERFECT SCORES**

WINSTEPS does not provide a direct ability estimate for zero (no points earned) or perfect (all points earned) raw scores. However, WINSTEPS has a default procedure for estimating such extreme scores and this was used for the PSSA. Essentially, a fractional raw score (a value less than one) is added to zero scores and subtracted from perfect scores to determine the corresponding logit values for these extreme scores.

### ***Linear Transformation Formulas***

PSSA scaled scores are obtained through a linear transformation of the Rasch ability estimates ( $\hat{\theta}$ ). Specifically,

$$SS=m\hat{\theta}+b,$$

where  $m$  is the slope and  $b$  is the intercept. The slopes and intercepts for deriving PSSA scaled scores are provided in Table 14–2. For reference purposes, the PSSA theta cut scores have been reproduced in this table as well.

### ***Rounding***

The linearly transformed scaled scores are generally rounded to the nearest integer value for reporting purposes. Values greater than or equal to 0.50 are rounded up. Values less than 0.50 are rounded down. However, at each performance level cut point, scores are rounded up (even if less than 0.50) if this action would put the rounded score into a higher performance level. As an example, the Grade 3 reading proficient cut score (in scaled score units) is 1235. If there had been a raw score that converted to an unrounded scaled score of 1234.20, this scaled score would have been rounded up to 1235 for reporting purposes.

### ***Lowest Obtainable Scaled Scores***

Most PSSA mathematics, reading, and writing tests have a lowest obtainable scale score (LOSS) of 700. The exception is Grade 3 mathematics and reading, which have LOSS values of 1000 and 750, respectively. For PSSA science, the LOSS values have been set to 1050 at Grades 4 and 11, and 925 for Grade 8. These LOSS values are documented in Table 14–1. See tables in Appendix N for LOSS  $n$ -counts.

### ***Highest Obtainable Scaled Scores***

A highest obtainable scale score (HOSS) is not set for the PSSA. Thus, the maximum possible scaled score value is allowed to float for each subject and grade. The upper bound varies from year to year, depending on the difficulty of the test form. Table 14–1 shows the maximum possible observed score for the current year’s test. (Note: It may be that no student actually earned the maximum possible.) See tables in Appendix N for HOSS  $n$ -counts.

**RAW-SCORE-TO-SCALED-SCORE TABLES**

Raw-to-scaled score tables can be found in Appendix N.

**Table 14–1. PSSA Scaled Score Cuts  
for each Performance Level by Grade and Subject Area**

Subject	Grade	Scaled Score Cuts <sup>1</sup>				Max <sup>2</sup>
		Min	BB/B	B/P	P/A	
Mathematics	3	750	1044	1180	1370	1816
	4	700	1156	1246	1445	2446
	5	700	1158	1312	1483	2432
	6	700	1174	1298	1476	2447
	7	700	1183	1298	1472	2475
	8	700	1171	1284	1446	2314
	11	700	1167	1304	1509	2377
Reading	3	1000	1168	1235	1442	1966
	4	700	1112	1255	1469	2294
	5	700	1137	1275	1497	2357
	6	700	1121	1278	1456	2293
	7	700	1131	1279	1470	2373
	8	700	1146	1280	1473	2635
	11	700	1112	1257	1492	2520
Science	4	1050	1150	1275	1483	2254
	8	925	1150	1275	1464	2258
	11	1050	1150	1275	1347	1862
Writing	5	700	745	1236	1909	2249
	8	700	914	1236	1748	2245
	11	700	952	1236	1806	2382

Notes. 1. BB = Below Basic; B = Basic; P = Proficient; and A = Advanced.  
2. Scaled Score Maximum Values are unique for the current year's test.

**Table 14–2. PSSA Cut Scores (on  $\theta$  metric), Intercept, and Slope by Grade and Subject Area**

Subject	Grade	$\theta$ Cuts			Intercept	Slope
		BB/B	B/P	P/A		
Mathematics	3	0.6192	1.6750	3.1501	964.24	128.81
	4	-0.1376	0.3124	1.3074	1183.52	200.00
	5	0.1259	0.9373	1.8383	1134.10	189.80
	6	-0.1377	0.4823	1.3723	1201.54	200.00
	7	-0.2114	0.3636	1.2336	1225.28	200.00
	8	-0.0637	0.5729	1.4854	1182.30	177.53
	11	-0.1749	0.4888	1.4819	1203.10	206.42
Reading	3	-0.3207	0.2205	1.8926	1207.70	123.80
	4	-0.2215	0.4935	1.5635	1156.30	200.00
	5	0.2133	0.9074	2.0241	1094.60	198.80
	6	-0.2398	0.5452	1.4352	1168.96	200.00
	7	-0.3170	0.4230	1.3780	1194.40	200.00
	8	0.1376	0.7082	1.5301	1113.70	234.82
	11	-0.0130	0.5777	1.5351	1115.20	245.45
Science	4	-0.4280	0.2792	1.4560	1225.65	176.75
	8	-0.2435	0.4091	1.3958	1196.64	191.54
	11	-0.4390	0.7888	1.4960	1194.69	101.81
Writing	5	-3.2644	1.6456	8.3756	1071.44	100.00
	8	-2.0984	1.1216	6.2416	1123.84	100.00
	11	-2.9230	-0.0830	5.6170	1244.30	100.00

Notes. Linear Transformation Intercepts and Slopes are used to derive the Scaled Scores.  
 BB = Below Basic; B = Basic; P = Proficient; and A = Advanced

## **DOMAIN SCORE STRENGTH PROFILE**

Strength profiles for domain (strand) scores have been provided since 2009. The following process was followed to derive the profile:

- The items for each domain were identified.
- WINSTEPS runs were undertaken that anchored the logit values for each domain's items to get the raw-to-logit score table for each domain. This is sometimes referred to as fixed item parameter scaling.
- The appropriate linear transformations (based on content and grade from Table 14–2) were applied to the logit values to derive domain scaled scores.

The domain scale scores were categorized as follows: L=Low (equivalent to Below Basic and Basic); M=Medium (equivalent to Proficient); H=High (equivalent to Advanced). The maximum possible domain score was converted to H in cases where no domain scaled score equaled or exceeded the Advanced scaled score cut. See Chapter Sixteen for more information on domain scores and how they are used in score reports.

## **Chapter Fifteen: Linking**

In large-scale testing programs it is a common practice to have different item sets appear in test forms within and/or across years. Linking operational scores from the different test forms ensures that all forms for a given grade and subject area provide comparable scores. Consequently, students are not given an unfair advantage or disadvantage because the particular test form they took is easier or harder than a test form taken by other students.

When multiple forms are administered, students who have the same ability could obtain different raw (number-correct) scores over the different test forms. As discussed further in Chapter Sixteen, raw scores can only be interpreted relative to the particular set of items used. This is because item difficulty distributions are nearly always different across different item sets.

Just like raw scores are not necessarily interchangeable across forms, Item Response Theory (IRT) item parameters and ability estimates are not necessarily interchangeable across separate calibration runs either. Application of an IRT scale linking methodology is usually required to place the item parameters and student ability estimates on the same scale as other forms. (As cautioned earlier, the success of these methods depends on how well the IRT assumptions are met.) The IRT model used for the PSSA is the Rasch Partial Credit Model (RPCM; Masters, 1982). Further descriptions of the RPCM are given in Chapter Twelve.

A chained linking design is utilized for the PSSA operational scores in mathematics, reading, and science. Here, scores from the new test form are linked to the scale of previous test forms. The chain originates from each test's base form, which is used as the reference for calibrating all items in the item pool. The base form is usually the form upon which the cut scores were established (see Chapter Thirteen). When the item parameters from the new test are placed on the bank's scale, the resulting scaled scores for the new test form will be the same as the scaled scores of the base form. In order to compare students' PSSA scaled scores across different years, the new operational items need to be placed on the bank scale via scale linking. Without linking, the Rasch item calibrations for the new test items will be unique to the new test administration.

This chapter begins with a brief summary of the entire PSSA linking procedure. This is followed by more detailed explanation of selected design elements and processes. Some summary results are also provided. Procedures for mathematics, reading, and science are reviewed first. Writing is addressed at the end of the chapter.

### **BRIEF SUMMARY OF THE PSSA LINKING PROCEDURE**

The following steps outline the linking procedure. It should be noted that the first two steps are actually item calibration, which is referred to as within-year linking in this chapter.

1. Calibrate selected multiple-choice (MC) items in an unanchored run:
  - Include all MC items in the core operational section (OP MC).
  - Include all equating block (EB) items.
  - Do not include any field test (FT) items.

2. Calibrate selected open-ended (OE) items in an anchored run by putting them on the MC item scale from Step 1:
  - Include all OE items in the Core section (OP OE).
  - Do not include any FT items.
  - Fix all MC items from Step 1.
3. Compute the rater-effect constant for each OE-Link item:
  - Pull a sample responses from 2009 (N ~ 1,000 students)<sup>20</sup> and create a data file including the selected students' MC and OE response scores (from 2009 raters).
  - Have the new (2010) raters score the selected OE responses.
  - Calibrate the difficulty parameters for OE items based on the 2010 scores. (This is done separately for each OE item.)
    - Calibrate all MC items (from the 2009 test) in an unanchored run using the data file from Step 3.a.
    - Calibrate each OE item separately using an anchored run for each item.
  - Compute the rater-effect constant for each OE-Link item based on OE parameters from Step 3.c.ii.
    - Use 2010 and 2009 rater raw score means as the true/expected raw scores.
    - Using expected score =  $f(\theta)$  for the 2009 rater scores, determine the two theta values that map to the two expected raw scores (i.e., the 2010 and 2009 rater score means).
    - The rater-effect constant is the difference between the two thetas.
4. For each OE linking item, adjust the item parameter estimate obtained in Step 2 by the Step 3 Value—remove the rater effect:
  - Each OE linking item (LK OE) has a specific rater-effect adjustment value.
5. Evaluate the stability of the linking items using Robust Z:
  - Include all core linking (LK) items—LK MC and LK OE.
  - Include all EB items.
  - LK OE item parameters should be obtained from Step 4.
  - Calculate Robust Z for each item in the linking.

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<sup>20</sup> This sample is generally stratified on 2009 total test scores; however, a minimum of 100 responses are selected for each possible score point.

Once the above calculations were made, the following guidelines were used in determining possible sets of linking items used for the equating:

- Items with an absolute value of Robust  $Z$  exceeding 1.645 may be considered for exclusion.
- No more than 20 percent of the pool of linking items may be considered for exclusion.
- The ratio of the standard deviations of previous year and current Rasch difficulties should be in the 90 to 110 percent range.
- The correlation of previous year and current year Rasch difficulties is greater than 0.95.

Final decisions about the linking items were made in the national technical advisory committee (TAC) meeting in collaboration with PDE and DRC staff following these rules:

- Drop items that DRC identified as having a large Robust  $Z$  and were out of sequence because they were pulled from a separate FT form.
- If an item has been changed in any way from the previous year, it may no longer be used for linking.

A scatterplot of the linking item difficulties (logits) were constructed (i.e., the current year values were plotted against those from the prior year). Ideally, these plots should have a strong linear trend. Items straying from the trend line did not perform in the same way in both years. As noted above, items that departed significantly from this were further evaluated. The scatterplots with final LK/EB item sets are shown in Figure 15–1.

6. Calculate the mean shift over MC and OE linking items using global item difficulties (weighted by number of score points) for OE items:
  - Include all core linking (LK) items—LK MC and LK OE.
  - Include all EB items.
  - Weight LK OE items by maximum possible score.
7. Apply the mean shift to the item parameters calibrated in Steps 1 and 2:
  - All OP items (OP MC + OP OE).
  - All EB items.
8. Scale the operational test by fixing all operational (OP) items obtained in Step 7:
  - The result from this step is a Raw-to-Logit (Rasch Ability) table.
9. Apply the appropriate linear transformation to the logit values to derive the scaled scores and SEMs:
  - The result from this step is a Raw-to-Scaled Score table.

## **PSSA MATHEMATICS, READING, AND SCIENCE**

The test designs for the operational PSSA mathematics, reading, and science assessments used multiple test forms that shared several common elements. The operational items are the same on all forms and for all students. Student total raw scores and scaled scores, as well as AYP reporting, are based exclusively on the operational items. In addition, each test form had a different set of nonoperational items (i.e., they were not part of student scores). One such example is the embedded field test items that are tested for possible inclusion in the PSSA item pool. An extra block of items (EBs) was included to bolster the linking design (discussed further below). The forms containing the nonoperational items were spiraled to ensure the items would have randomly equivalent samples of students responding to them. In summary, each test form for 2010 mathematics, reading, and science was composed of core operational, EB, and FT sections.

### ***Data Collection Design***

The item status codes used in the IDEAS item banking system are given in Table 15–1. For brevity, these codes are used for the remainder of this chapter.

The link between years was based on the core linking (LK) and equating block (EB) items. These items had been used in previous administrations (most often from the prior year). The LK and EB items were used in approximately the same context. The same context in this situation means the items are not altered in any way, they appeared in about the same position in the booklet, and they are administered at about the same time of year.

The equivalence of student samples across years cannot be assumed. Further, the same item can have different properties in different years because of changes in the item’s position or changes in the students’ experiences. Consequently, between-year linking requires more scrutiny than within-year linking. This chapter focuses more on the linking between years.

The linking design employed for PSSA is often referred to as a common-item nonequivalent groups (CINEG) design. Test forms contained a set of common items, called core linking (LK) items or equating block (EB) items, which served as anchors for comparison of test forms across years. LK items were internal anchor items (i.e., contributed to student test scores) and EB items were external anchor items (i.e., did not contribute to student test scores).

Because LK items were in the tests’ operational sections, they were common across all test forms within year. All LK items were also common between years as well since all came from the prior year’s administration. The forms containing EB items were spiraled, and thus, randomly distributed across the student population. Reading used two EB item sets across forms. All EB items in the 2010 PSSA tests were pulled from the 2009 tests.

The proportion of the LK/EB items was different depending on the subject and grade. These are summarized in Table 15–2. Specifically, there were 11 to 16 LK multiple-choice items and 1 to 2 LK open-ended items for all mathematics, reading, and science grade levels. There were two sets of EB items in reading. Each set had eight MC items. Forms 1 through 5 contained one set, while Forms 6 through 9 contained the second set.<sup>21</sup> In mathematics and science, each form had two EB MC items. There were 40 core MC items in reading and 60 core MC items in mathematics. Science had 58 MC items in Grades 4 and 8 and 50 in Grade 11. There were four core OE items

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<sup>21</sup> In other words, Forms 1 and 2 had the same set of EB MC items, while Forms 6 and 7 shared a different set of EB MC items.

in reading with the exception of Grade 3 which had two. There were three core OE items in mathematics. Science had five OE items at Grades 4 and 8 and nine at Grade 11.

**Table 15–1. Item Status Codes in IDEAS**

Item	Comments	Code in IDEAS
Core	Include core linking (i.e., anchor) items and unique core items	OP
Core linking	Linking items in the core section which include MC and OE items	LK
Equating Block	All items in the EB are MC linking items	EB
Field Test	Items in the embedded FT section	FT

**Table 15–2. 2010 PSSA Linking Designs: Mathematics, Reading, and Science Mathematics Grades 3–8 and 11**

N <sub>i</sub>	Core		Core Links		Form Blocks								
	MCs (1 pt)	OE (4 pts)	MC(1)	OE(4)	EB1	EB2	EB3	EB4	EB5	EB6	EB7	EB8	EB9
N <sub>1</sub>	44	1	16	2	2								
N <sub>2</sub>	44	1	16	2		2							
N <sub>3</sub>	44	1	16	2			2						
N <sub>4</sub>	44	1	16	2				2					
N <sub>5</sub>	44	1	16	2					2				
N <sub>6</sub>	44	1	16	2						2			
N <sub>7</sub>	44	1	16	2							2		
N <sub>8</sub>	44	1	16	2								2	
N <sub>9</sub>	44	1	16	2									2

Notes. Table 15–2 presents the 2010 PSSA linking designs. Each test form contains the core operational, core linking, and EB sections (FT sections are not illustrated as they are not used for linking). The core operational section includes MC and OE items, but the EB Section only has MC items. The operational section contains unique operational items and core-to-core linking items.

**Grades:** 3–8 and 11  
**Form Blocks:** 9  
**Core MC Links:** 16  
**Core OE Links:** 2 (4pts)  
**EB MC Links:** 2 (per form)  
**Total Core MC:** 60  
**Total Core OE:** 3 (4pts)

Reading Grade 3

N <sub>i</sub>	Core		Core Links		Form Passage-EBs								
	MCs (1 pt)	OE (3 pts)	MC(1)	OE(3)	EB1	EB2	EB3	EB4	EB5	EB6	EB7	EB8	EB9
N <sub>1</sub>	24	1	13	1	P1-7								
N <sub>2</sub>	24	1	13	1		P1-7							
N <sub>3</sub>	24	1	13	1			P1-7						
N <sub>4</sub>	24	1	13	1				P1-7					
N <sub>5</sub>	24	1	13	1					P1-7				
N <sub>6</sub>	24	1	13	1						P2-8			
N <sub>7</sub>	24	1	13	1							P2-8		
N <sub>8</sub>	24	1	13	1								P2-8	
N <sub>9</sub>	24	1	13	1									P2-8

**Grade:** 3  
**Form Blocks:** 9 (two passage sets)  
**Core MC Links:** 13  
**Core OE Links:** 1 (3pts)  
**EB MC Links:** 7-8 (per passage set)  
**Total Core MC:** 40  
**Total Core OE:** 2 (3pts)

Reading Grades 4-8 and 11

N <sub>i</sub>	Core		Core Links		Form Passage-EBs								
	MCs (1 pt)	OE (3 pts)	MC(1)	OE(3)	EB1	EB2	EB3	EB4	EB5	EB6	EB7	EB8	EB9
N <sub>1</sub>	24	2	11-14	2	P1-8								
N <sub>2</sub>	24	2	11-14	2		P1-8							
N <sub>3</sub>	24	2	11-14	2			P1-8						
N <sub>4</sub>	24	2	11-14	2				P1-8					
N <sub>5</sub>	24	2	11-14	2					P1-8				
N <sub>6</sub>	24	2	11-14	2						P2-8			
N <sub>7</sub>	24	2	11-14	2							P2-8		
N <sub>8</sub>	24	2	11-14	2								P2-8	
N <sub>9</sub>	24	2	11-14	2									P2-8

**Grades:** 4-8 and 11  
**Form Blocks:** 9 (two passage sets)  
**Core MC Links:** 11-14  
**Core OE Links:** 2 (3pts)  
**EB MC Links:** 8 (per passage set)  
**Total Core MC:** 40  
**Total Core OE:** 4 (3pts)

Science Grade 4

N <sub>i</sub>	Core		Core Links		Form Blocks												
	MCs (1 pt)	OE (2 pts)	MC(1)	OE(2)	EB1	EB2	EB3	EB4	EB5	EB6	EB7	EB8	EB9	EB10	EB11	EB12	
N <sub>1</sub>	42	3	16	2	2												
N <sub>2</sub>	42	3	16	2		2											
N <sub>3</sub>	42	3	16	2			2										
N <sub>4</sub>	42	3	16	2				2									
N <sub>5</sub>	42	3	16	2					2								
N <sub>6</sub>	42	3	16	2						2							
N <sub>7</sub>	42	3	16	2							2						
N <sub>8</sub>	42	3	16	2								2					
N <sub>9</sub>	42	3	16	2									2				
N <sub>10</sub>	42	3	16	2										2			
N <sub>11</sub>	42	3	16	2											2		
N <sub>12</sub>	42	3	16	2													2

**Grade:** 4  
**Form Blocks:** 12  
**Core MC Links:** 16  
**Core OE Links:** 2 (2pts)  
**EB MC Links:** 2 (per form)  
**Total Core MC:** 58  
**Total Core OE:** 5 (2pts)

Science Grade 8

N <sub>i</sub>	Core		Core Links		Form Blocks											
	MCs (1 pt)	OE (2 pts)	MC(1)	OE(2)	EB1	EB2	EB3	EB4	EB5	EB6	EB7	EB8	EB9	EB10	EB11	EB12
N <sub>1</sub>	42	3	16	2	2											
N <sub>2</sub>	42	3	16	2		2										
N <sub>3</sub>	42	3	16	2			2									
N <sub>4</sub>	42	3	16	2				2								
N <sub>5</sub>	42	3	16	2					2							
N <sub>6</sub>	42	3	16	2						2						
N <sub>7</sub>	42	3	16	2							2					
N <sub>8</sub>	42	3	16	2								2				
N <sub>9</sub>	42	3	16	2									2			
N <sub>10</sub>	42	3	16	2										2		
N <sub>11</sub>	42	3	16	2											2	
N <sub>12</sub>	42	3	16	2												2

Grade: 8  
 Form Blocks: 12  
 Core MC Links: 16  
 Core OE Links: 2 (2pts)  
 EB MC Links: 2 (per form)  
 Total Core MC: 58 (note: 4 core MCs go with XOs)  
 Total Core OE: 5 (2pts)

Science Grade 11

N <sub>i</sub>	Core		Core Links		Form Blocks							
	MCs (1 pt)	OEs (2/4 pts)	MC(1)	OE(3)	EB1	EB2	EB3	EB4	EB5	EB6	EB7	EB8
N <sub>1</sub>	34	4/3	15	2	2							
N <sub>2</sub>	34	4/3	15	2		2						
N <sub>3</sub>	34	4/3	15	2			2					
N <sub>4</sub>	34	4/3	15	2				2				
N <sub>5</sub>	34	4/3	15	2					2			
N <sub>6</sub>	34	4/3	15	2						2		
N <sub>7</sub>	34	4/3	15	2							2	
N <sub>8</sub>	34	4/3	15	2								2

Grade: 11  
 Form Blocks: 8  
 Core MC Links: 15  
 Core OE Links: 2 (2pts)  
 EB MC Links: 2 (per form)  
 Total Core MC: 50 (note: 12 core MCs go with XOs)  
 Total Core OE: 6 (2pt) + 3XO (4pt)

## LINKING METHOD FOR PSSA MATHEMATICS, READING, AND SCIENCE

The overall linking procedure was summarized at the start of this chapter. In review, the first step was to conduct a within-year linking to place all 2010 item parameters on the same scale. This was accomplished by first concurrently calibrating all OP (including LK) and EB MC items. Next, the resulting MC item parameters were anchored in WINSTEPS while all OE items in the operational section (including OP LKs) items were calibrated.<sup>22</sup> At this point all OP and EB item parameters were on a unique scale for 2010. Between-year linking was required to place these items on the bank scale.

Between-year linking utilized the 2010 LK and EB item parameters and their banked counterparts. The scale transformation methodology used for PSSA is known as the mean-shift procedure. This has been the procedure employed by the PSSA program for some time. After evaluating the robustness of the link by identifying items that did not maintain their relative difficulty across years, the difference between the 2010 and banked parameters was then determined. The mean of the differences was then used to statistically adjust the 2010 parameters to the bank scale. The final (linking) item parameters were then used to estimate student abilities, which were, in turn, transformed to scaled scores. (Transformation formulas are provided in Chapter Fourteen.)

### *Rater Drift*

Before the final mean-shift value was determined, a rater-effect adjustment was applied to the OE LK items. All OE linking items were in the Core section (LK OE). Students' responses from the 2009 administration ( $n = 1,000$  per item) for the OE linking items were selected for the rater drift study (DRC jointly stratified by point value and on ability). The selected responses were scored by 2010 raters. Thus, the selected students' responses had scores from 2009 and 2010 raters and the difference between them was used to adjust for the rater effect. See Tables 18–11 through 18–13 for the correlations between the old and new scores for these OE LK items.

## RESULTS SUMMARY

Table 15–3 shows the number of linking items started with and ended with the shift parameters associated with those over the two years, and the correlation of item difficulties across years for each grade/content area. No LK/EB items were dropped in any content area. At first glance, some of the mean shift values may appear large. However, the shift constants are being applied to parameter estimates from Step 1 in the equating process (where the mean of the unanchored MC items is fixed at zero). The adjustment needed to place the Step 1 estimates on the current scale can be large in magnitude as it must take into account multiple factors (e.g., weighting in the case of the writing test, rater drift, changes in student ability since the base-year administration, and differences in difficulty).

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<sup>22</sup> No field test items were included in any of these calibrations. FT items were calibrated after the operational linking by anchoring all OP and EB items. This placed all FT items on the bank scale.

Table 15–3. Summary Data for Linking Items

Subject	Grade	Initial Counts		Final Counts		Initial Shift	Final Shift*	Final Correlation
		MC	OE	MC	OE			
Mathematics	3	34	2	34	2	0.2588	0.2588	0.9753
	4	34	2	34	2	0.2399	0.2399	0.9810
	5	34	2	34	2	0.5510	0.5510	0.9815
	6	34	2	34	2	0.1721	0.1721	0.9807
	7	34	2	34	2	0.1873	0.1873	0.9687
	8	33	2	33	2	0.1644	0.1644	0.9843
	11	33	2	33	2	-0.3779	-0.3779	0.9874
Reading	3	29	1	29	1	0.0276	0.0276	0.9781
	4	30	2	30	2	0.0523	0.0523	0.9855
	5	30	2	30	2	-0.1086	-0.1086	0.9866
	6	27	2	27	2	-0.1470	-0.1470	0.9790
	7	29	2	29	2	0.0213	0.0213	0.9841
	8	27	2	27	2	0.6171	0.6171	0.9870
	11	30	2	30	2	-0.0354	-0.0354	0.9908
Science	4	40	2	40	2	0.0941	0.0941	0.9488
	8	40	2	40	2	-0.1422	-0.1422	0.9762
	11	31	2	31	2	-0.0397	-0.0397	0.9942
Writing	5	12	2	12	2	1.6856	1.6856	0.9762
	8	12	2	12	2	1.5415	1.5415	0.9499
	11	12	2	12	2	1.0133	1.0133	0.9760

\*No items were dropped for the final shift calculation. See Appendix J for individual item statistics for final item set.

Appendix J provides the statistics for the linking items used. The previous and current values for item sequence,  $p$ -values, and logits are also provided. Appendix M provides the mean raw and scaled score points across years. Together, these appendices provide a summary of how the items and test changed across years.

### VISUALIZATION SUPPLEMENT

As noted earlier, between-year linking requires considerable scrutiny. This is partly because student samples are not equivalent across years. Additionally, identical items can have different properties in different years because of changes in any given item's context or changes in the students' experiences. Since the linking process forces the logit difficulties for the linking items to have the same mean in the new year as they did in the old year, the current-year logit item difficulties will be displaced from the estimates they would have received from an independent calibration. The size of the displacements reflects the difference, if any, in the origins. The variation among the displacements corresponds to the approximate size of the standard errors for

the items. The graphs in Figure 15–1 should help visualize this information. The calibration data file described in Chapter Nine was used to construct these plots.

### **Graphs**

This technical report uses figures to help one visualize the across-year differences in linking items for mathematics, reading, and science at each grade. This section presents four types of figures, three of which illustrate the stability between the old (banked) and new (2010) item data:

1. Scatterplot of new-year  $p$ -values (2010) on old-year  $p$ -values (2009 generally).
2. Scatterplot of new-year logits (2010) on old-year logits (2009 generally).
3. Scatterplot of old and new  $p$ -values on new logits.
4. Test Characteristic Curves (TCCs) for the linked score distribution.

All four plots are presented for each grade and subject-area test. It should be noted that some of the linking items were not used to determine the final linking adjustments. These items are not included in the following scatterplots. As a consequence, some graphs will have fewer MC and/or OE items than expected. Each plot is described further below and Grade 3 mathematics results are considered as an example of each.

#### **NEW-YEAR $P$ -VALUES ON OLD-YEAR $P$ -VALUES**

The top left-hand plot in Figure 15–1 describes the relationship between the item  $p$ -values for the two years. The data points in these plots should have a clear trend where the vertical axis values rise as the horizontal axis values increases (i.e, as one moves from left to right). If the  $p$ -values for both years were correlated at 1.0, the relationship would be expected to fall on a straight line. Generally, linking items are not perfectly stable across years, so some scatter is expected. As an example, the plot for Grade 3 mathematics shows excellent across-year stability. The extent to which the trend does not pass through the origin indicates a change in student performance.

Many test score users are familiar with the  $p$ -value metric, which is why these charts are provided. However, the logit charts discussed below have advantages for visualizing this trend data.

#### **NEW-YEAR LOGITS ON OLD-YEAR LOGITS**

The top right-hand plot in Figure 15–1 focuses on the logit difficulties. It shows more clearly the relationship between new and old-year item difficulties. Logit plots often provide more defined trends, but still can present varying degrees of scatter and in some instances reveal outlier data points. As with the associated  $p$ -value plot, this figure for Grade 3 mathematics suggests excellent across-year stability (with a very strong, but not perfect relationship).

#### **OLD- AND NEW-YEAR $P$ -VALUES ON NEW-YEAR LOGITS**

Plotting  $p$ -values against logit difficulties across years is not as reliable as it is within year. Using spiraled forms within year, a given  $p$ -value will translate to a given logit regardless of the form on which it is used, within the limits of statistical precision. Within a year, the  $p$ -values-on-logit plot should be a single curved line (see plots in Chapter Twelve as examples). The corresponding between-year plots could have separate lines for each year. The difference between the two lines is a reflection of the adjustment (positive or negative) that is required to link the two item sets.

In the bottom left-hand plot of Figure 15–1, the two lines sloping downward toward the right relate item  $p$ -values for the two years to the new-year logit difficulties. Again, these graphs have some similarity with the set of graphs that were part of Chapter Twelve. Both show the  $p$ -value-on-logit relationship, with the Chapter Twelve plots showing the current year  $p$ -values for operational items, while Figure 15–1 shows the  $p$ -values for linking items from the current year and the prior year. Both illustrate the curvilinear relationship required by the model, with low  $p$ -values being translated into high logit difficulties and high  $p$ -values being converted into low logit difficulties.

To bolster the number of linking items, different sets of EB linking items were included on different forms. Because the forms were spiraled within classrooms, the samples generated are randomly equivalent and the same  $p$ -values would be expected to translate into roughly the same logit, with some random variation expected. This is the case with the Grade 3 mathematics data as the relative smoothness of this curve indicates very good agreement among the forms.

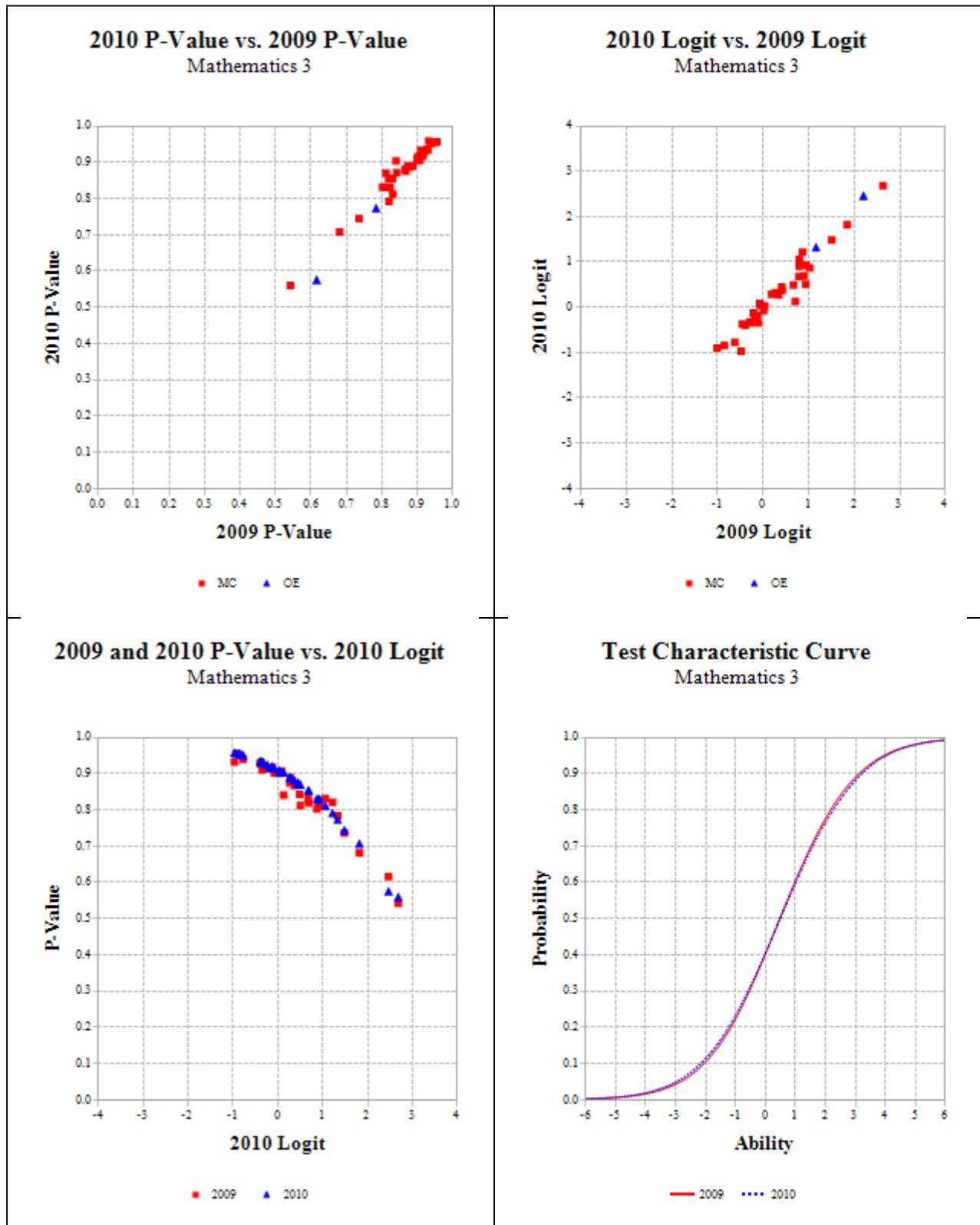
### TEST CHARACTERISTIC CURVES

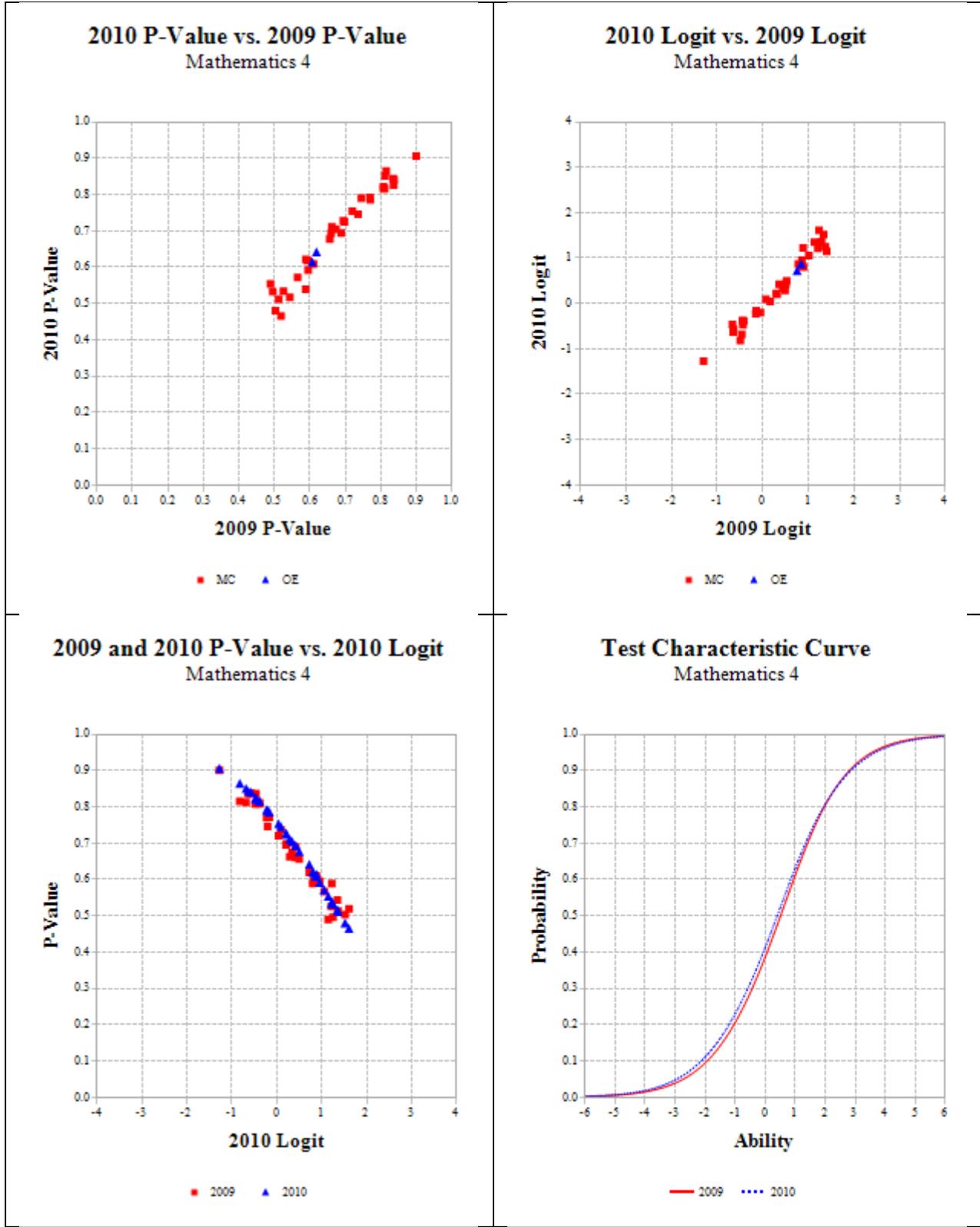
The old and new-year Test Characteristic Curves (TCCs) by grade and subject are shown in the bottom right-hand plot figures.<sup>23</sup> The TCCs show the similarity between the new- and old-year tests in terms of difficulty in the logit metric (new-year results are for the final, linked values). Assuming equal numbers of items for the two years, curves that are close to being coincident will translate into similar raw-score cut points. With extreme differences in test difficulties, some loss of precision and reliability may result. However, this is generally not evidenced in the figures, which display a close match across years. For Grade 3 mathematics the TCCs were essentially coincident.

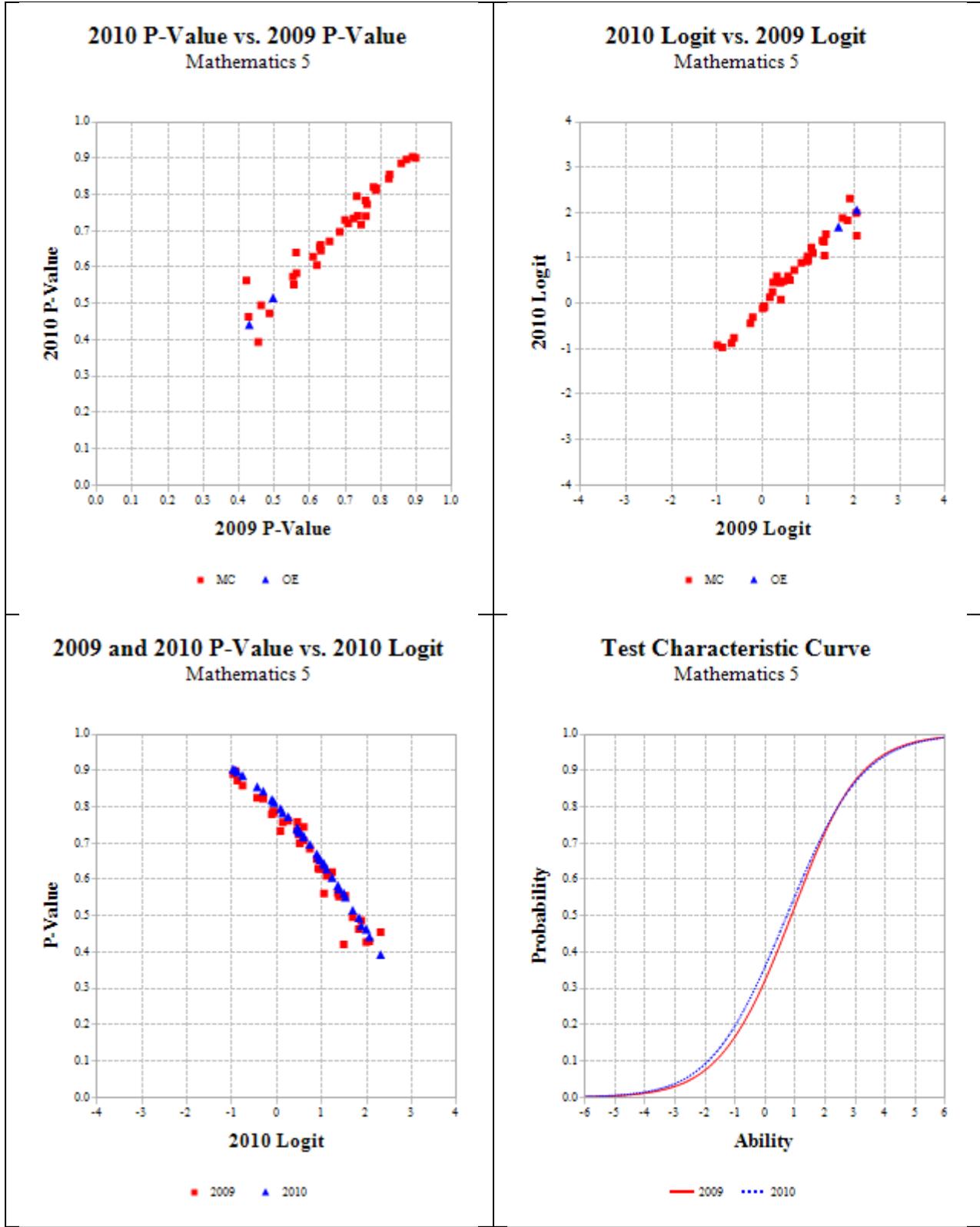
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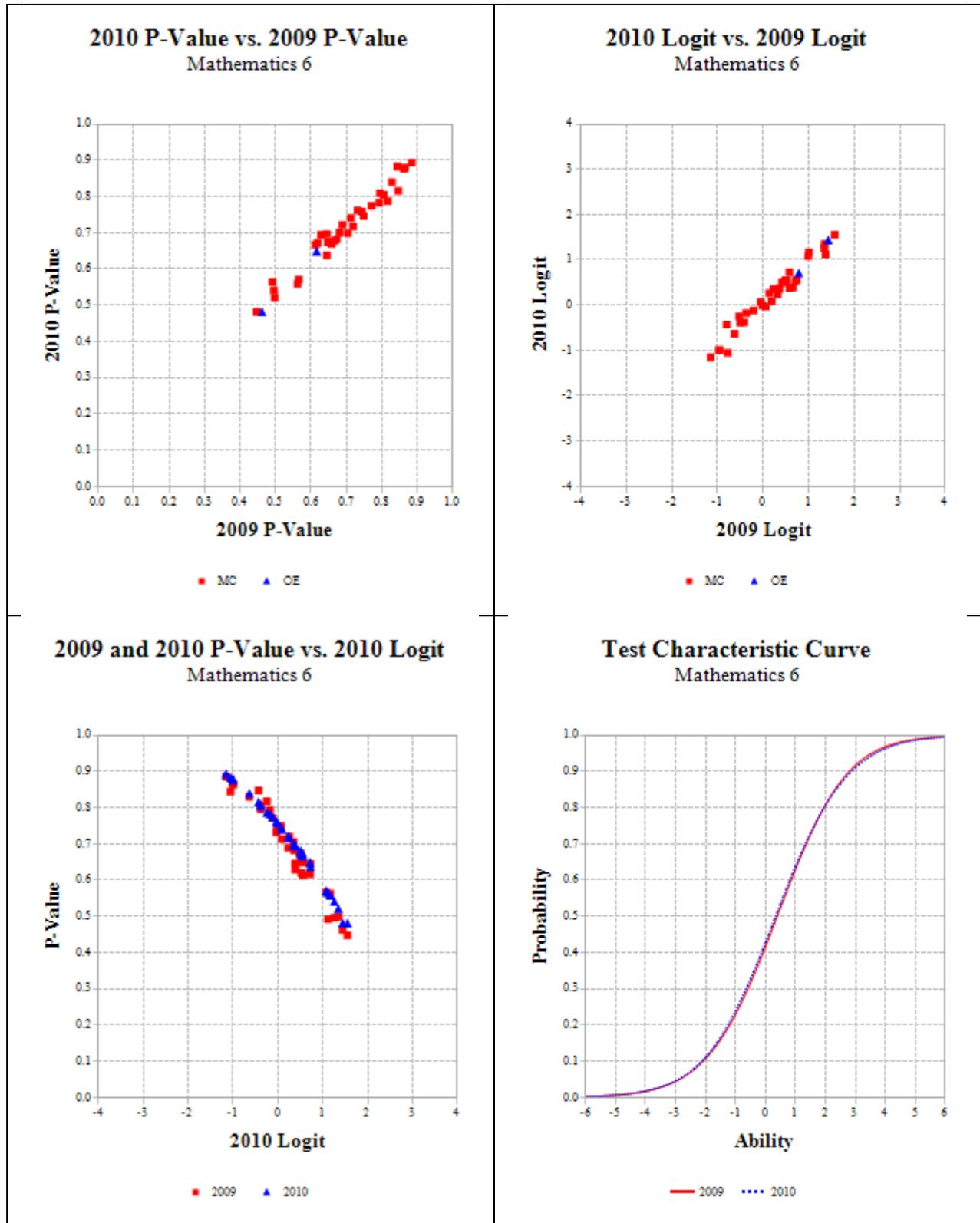
<sup>23</sup> In the TCC figures, the  $y$ -axis *Probability* represents total test raw score expressed on a proportion-correct metric.

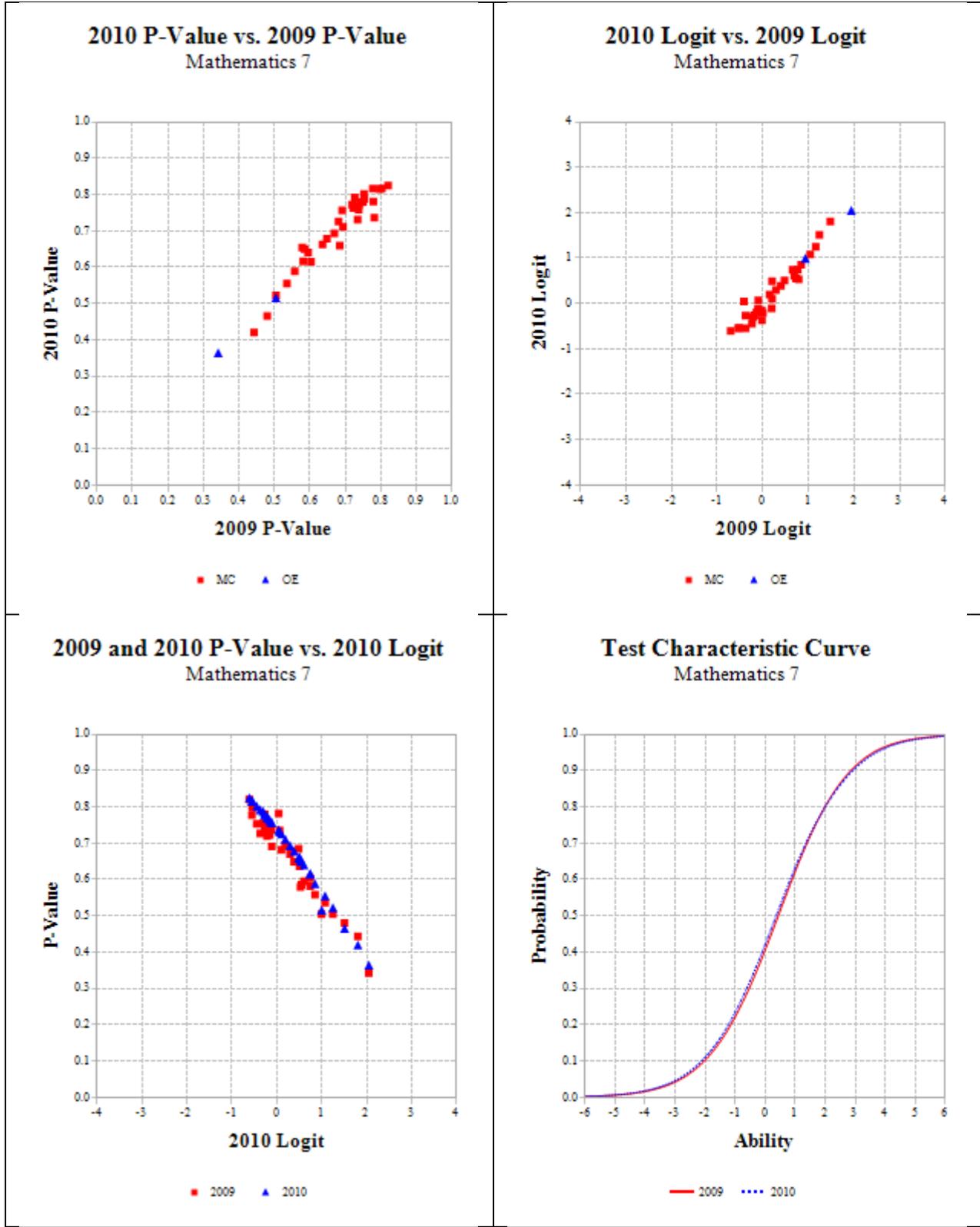
Figure 15–1. Item Stability Plots and Test Characteristic Curves

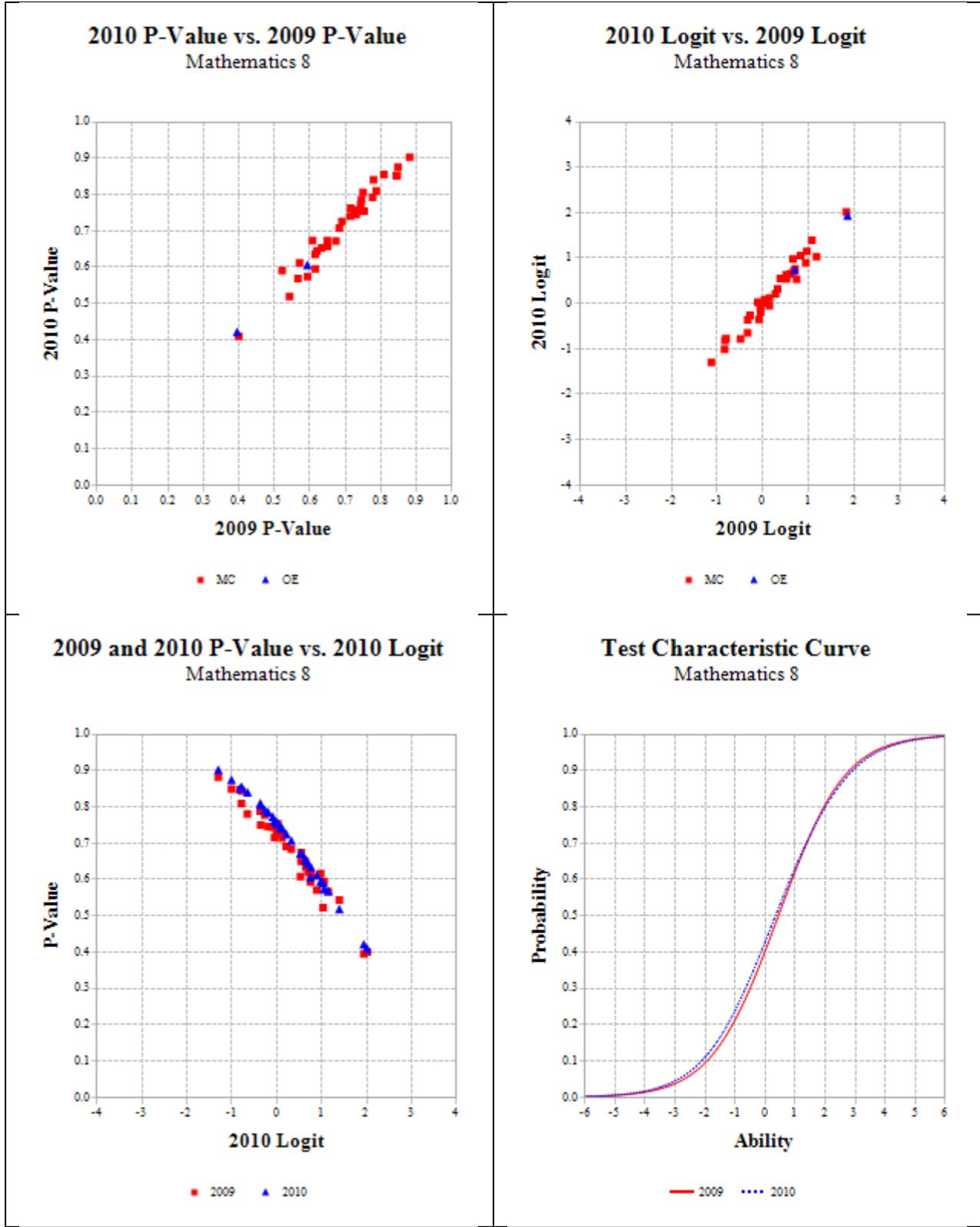


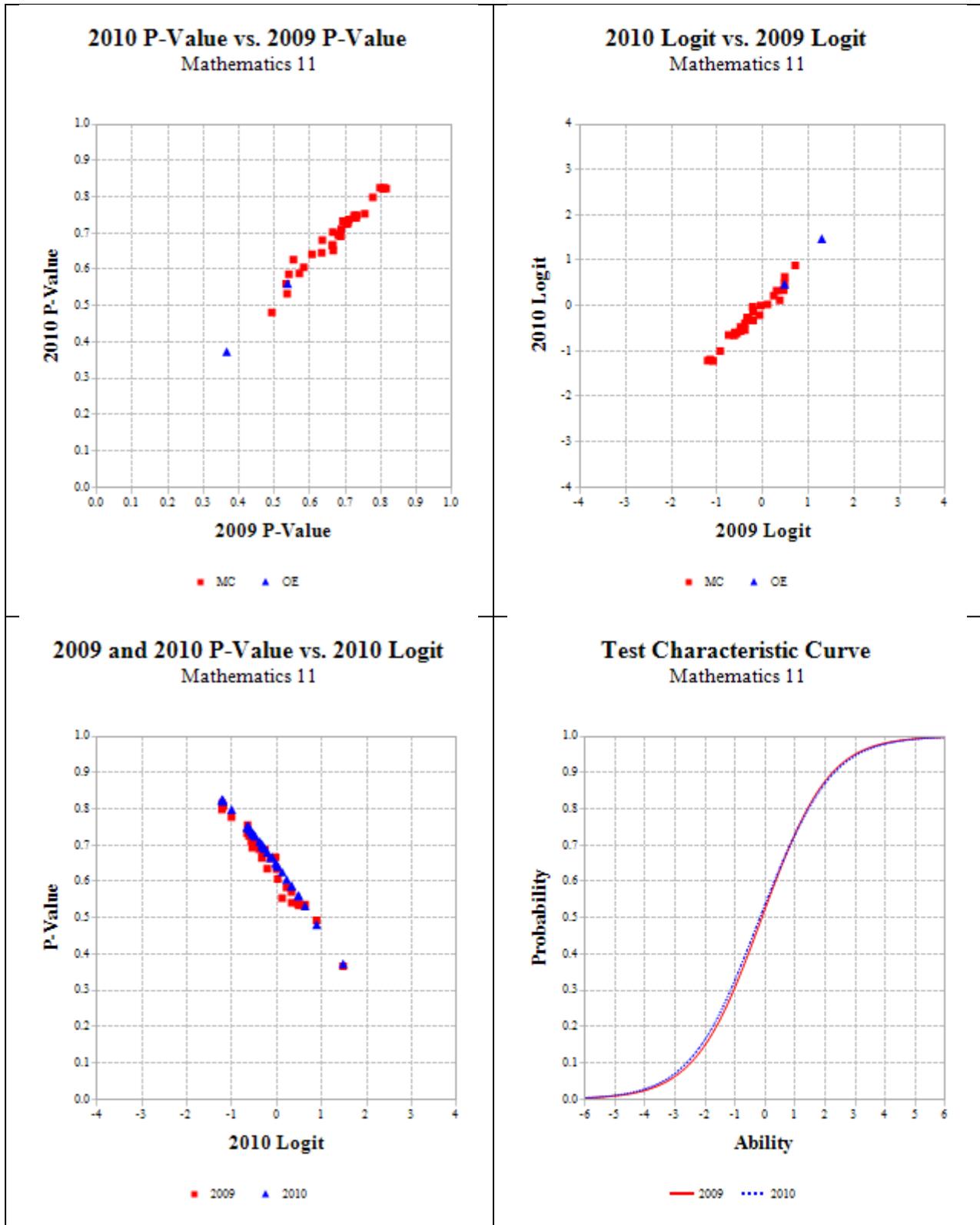


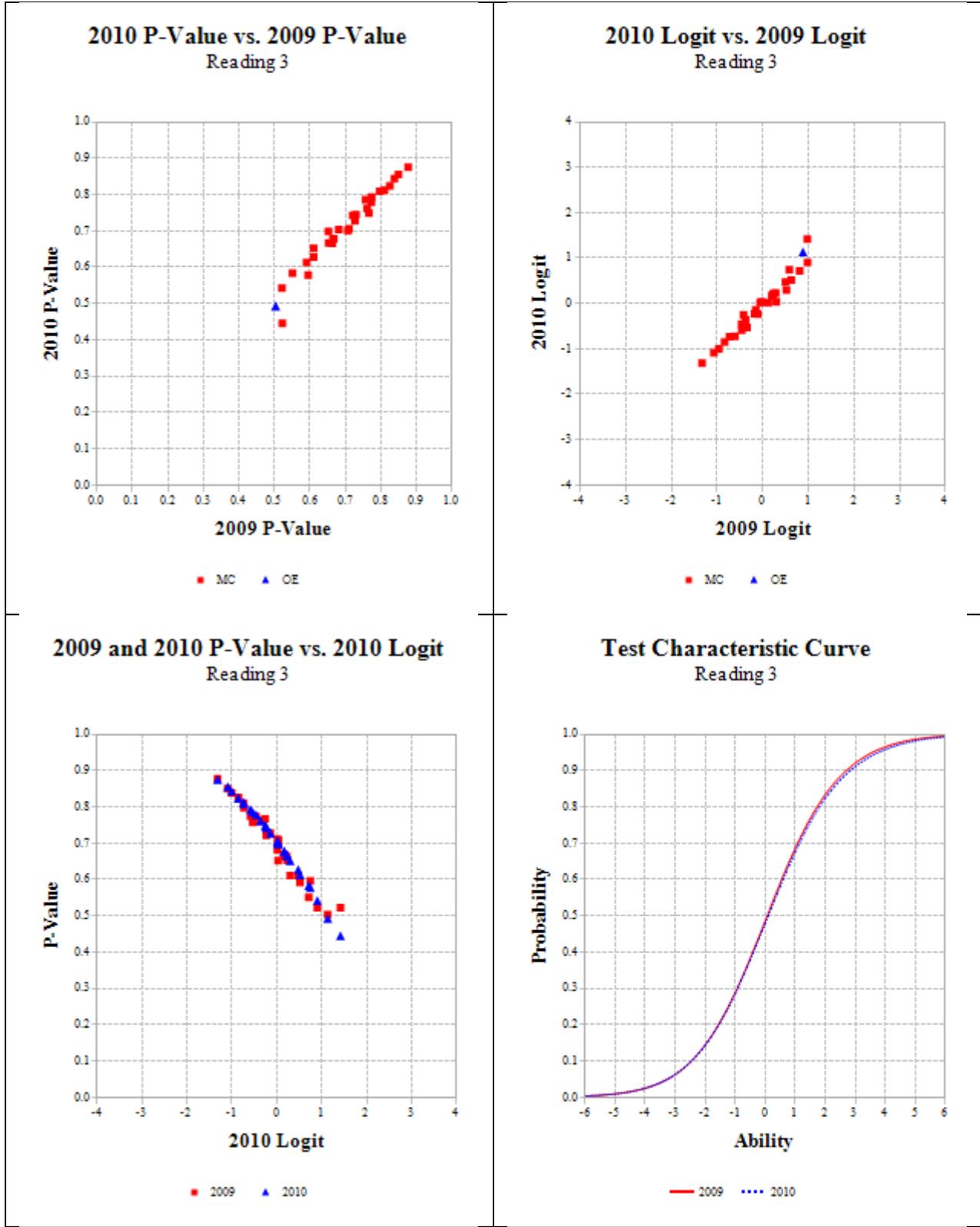


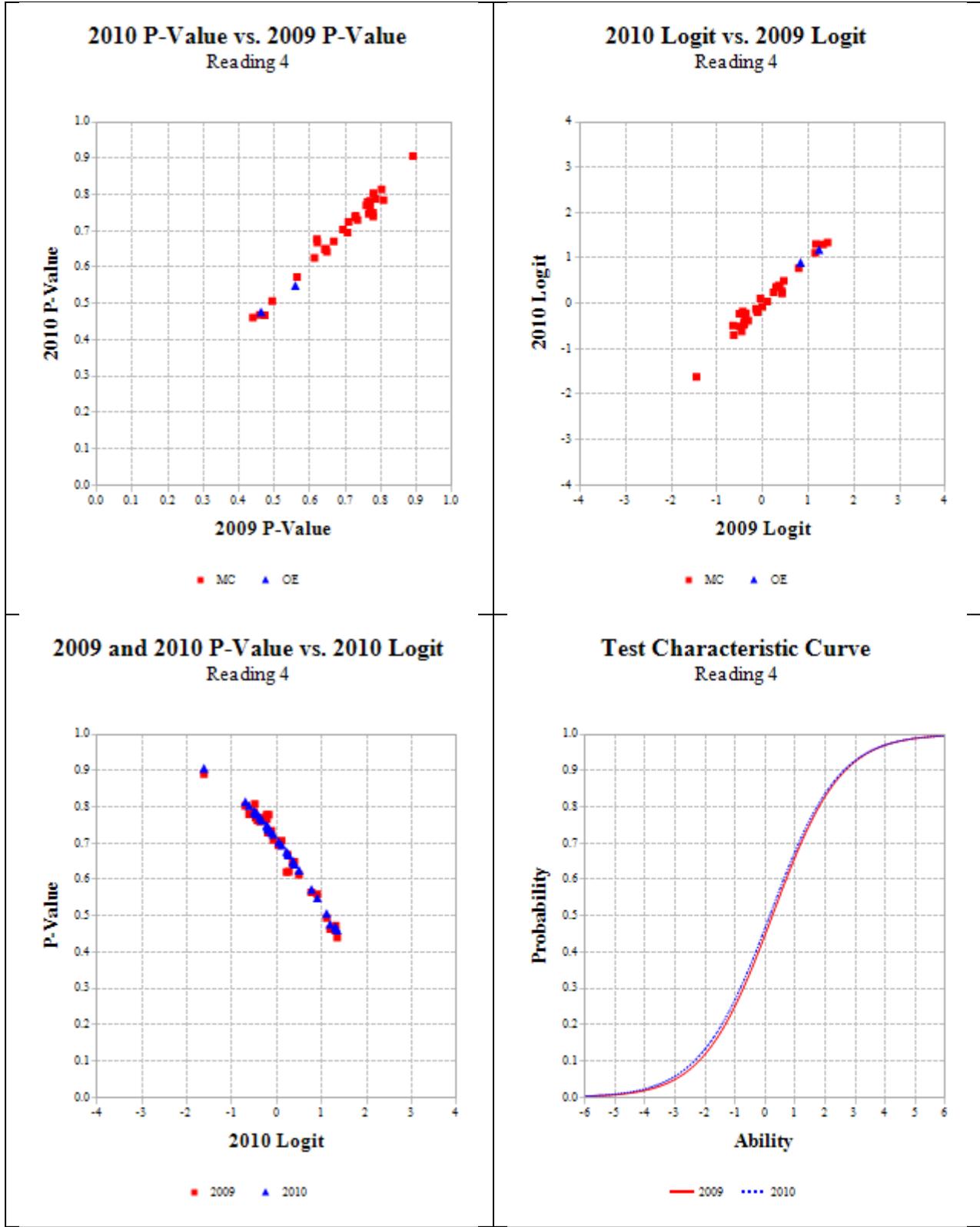


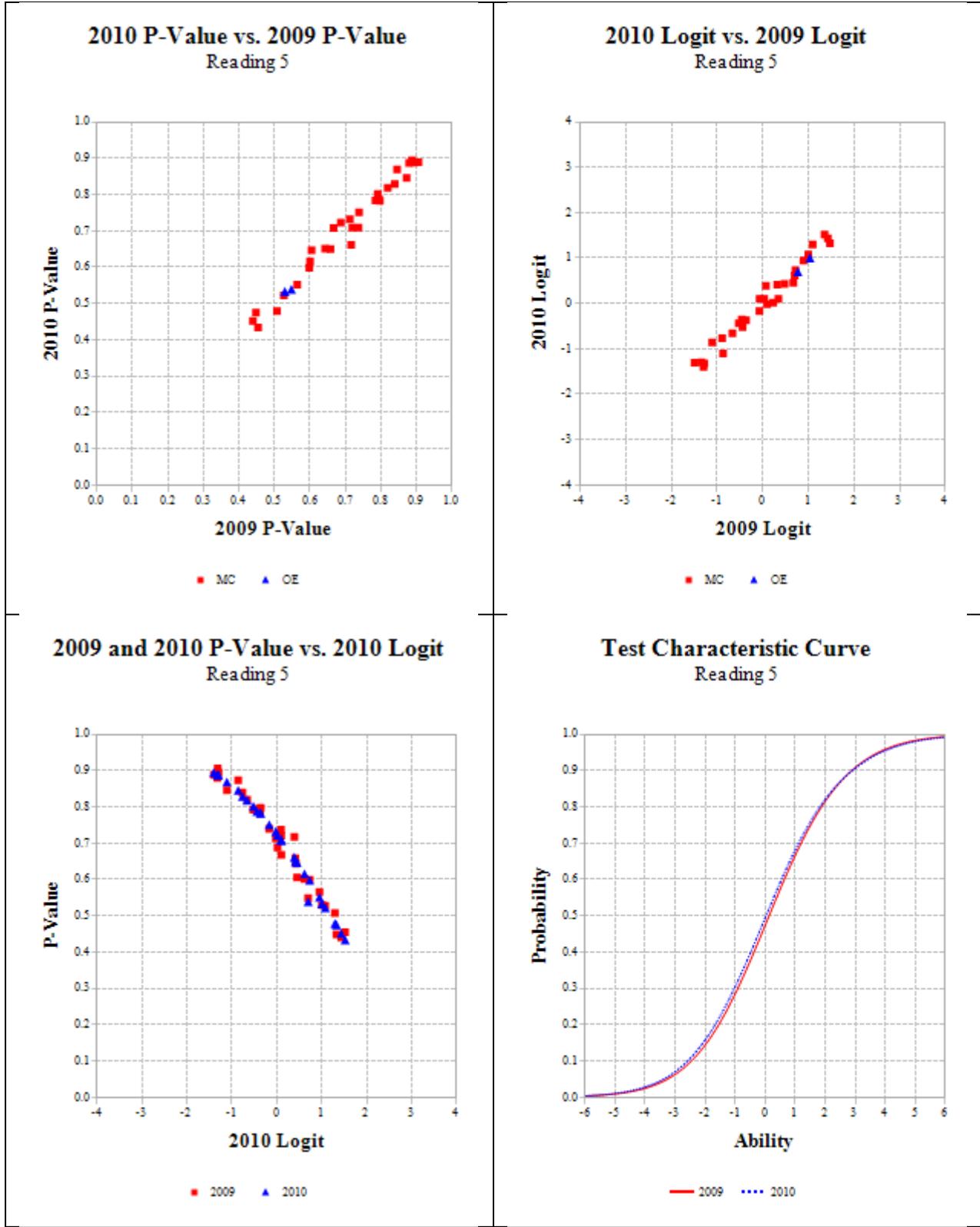


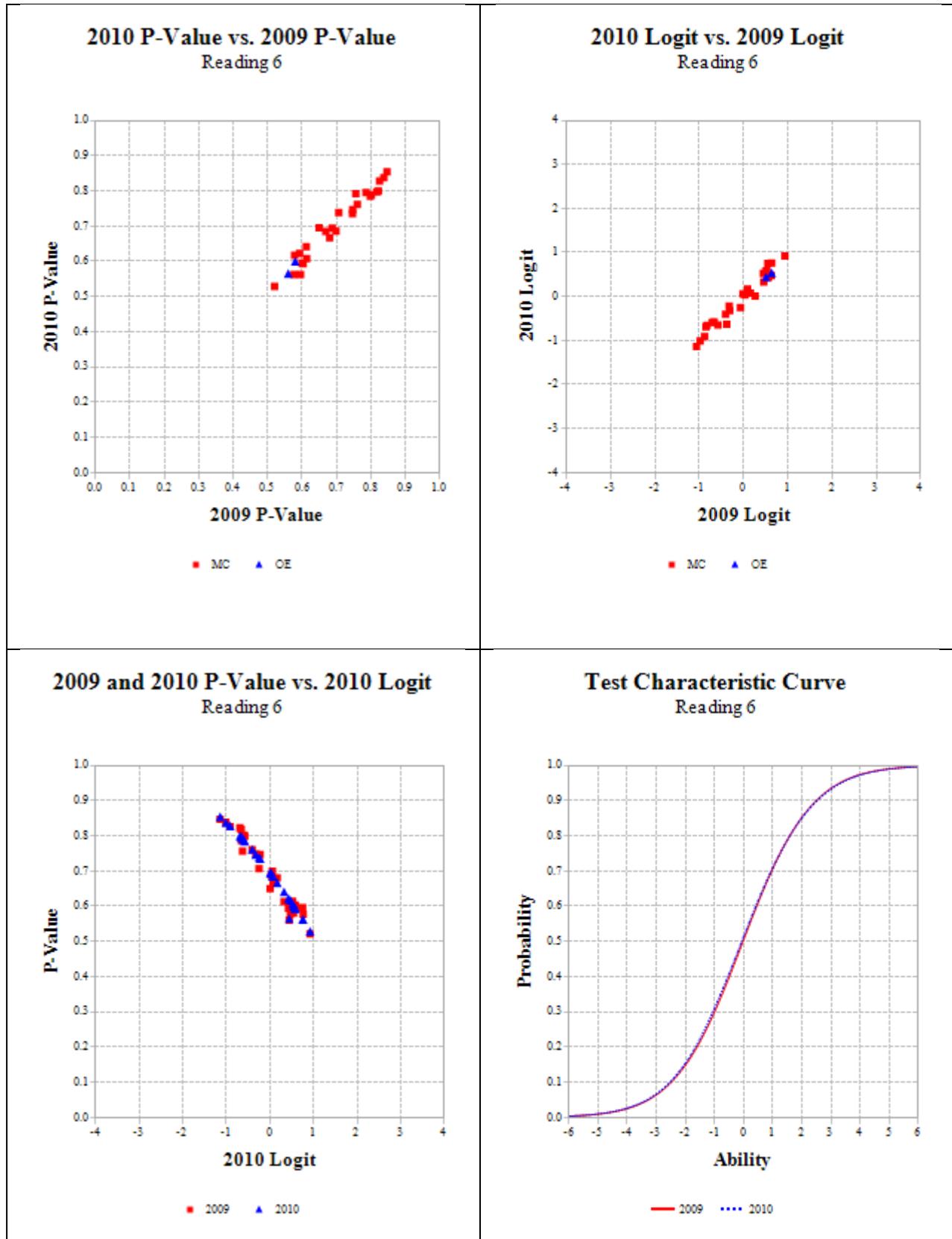


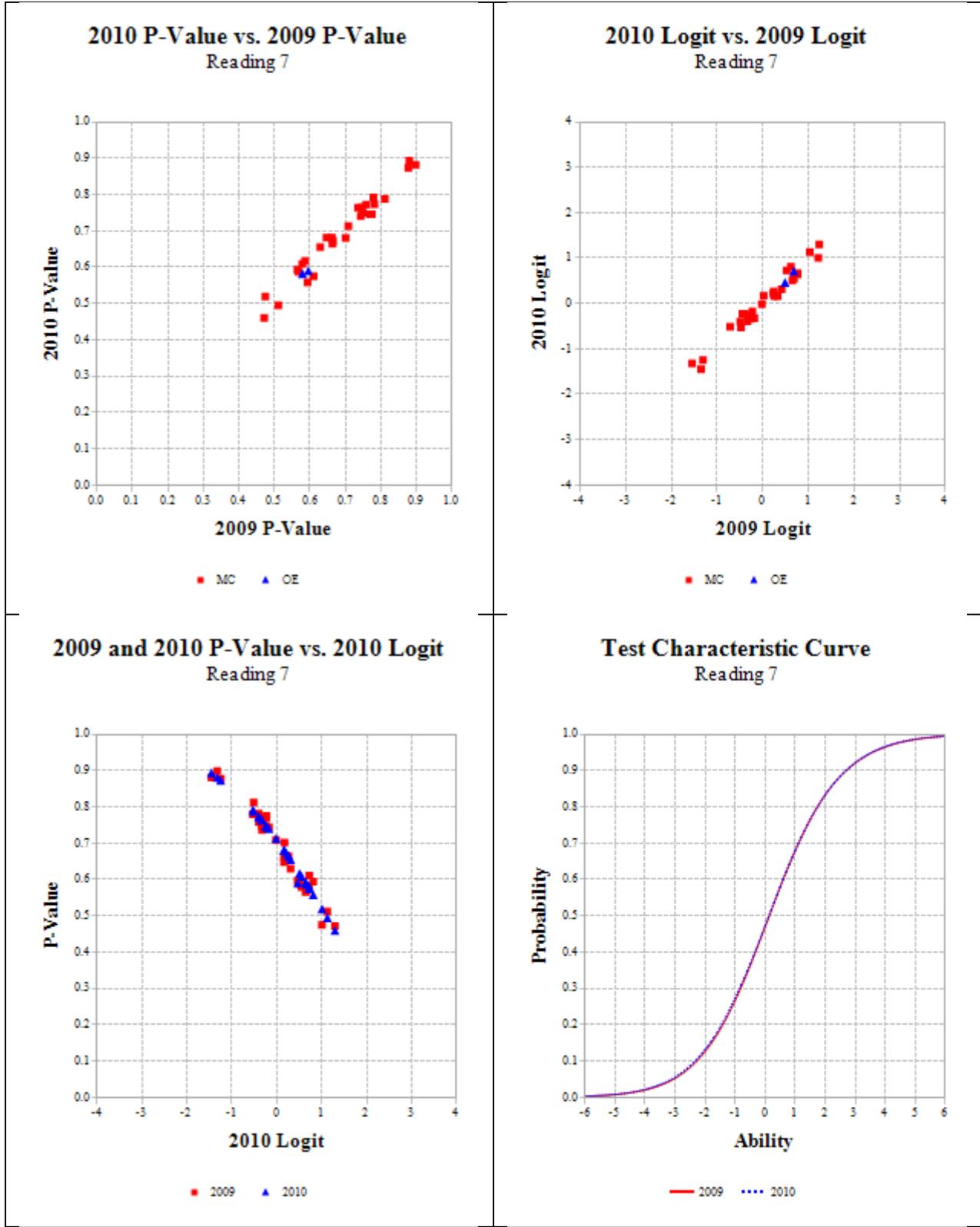


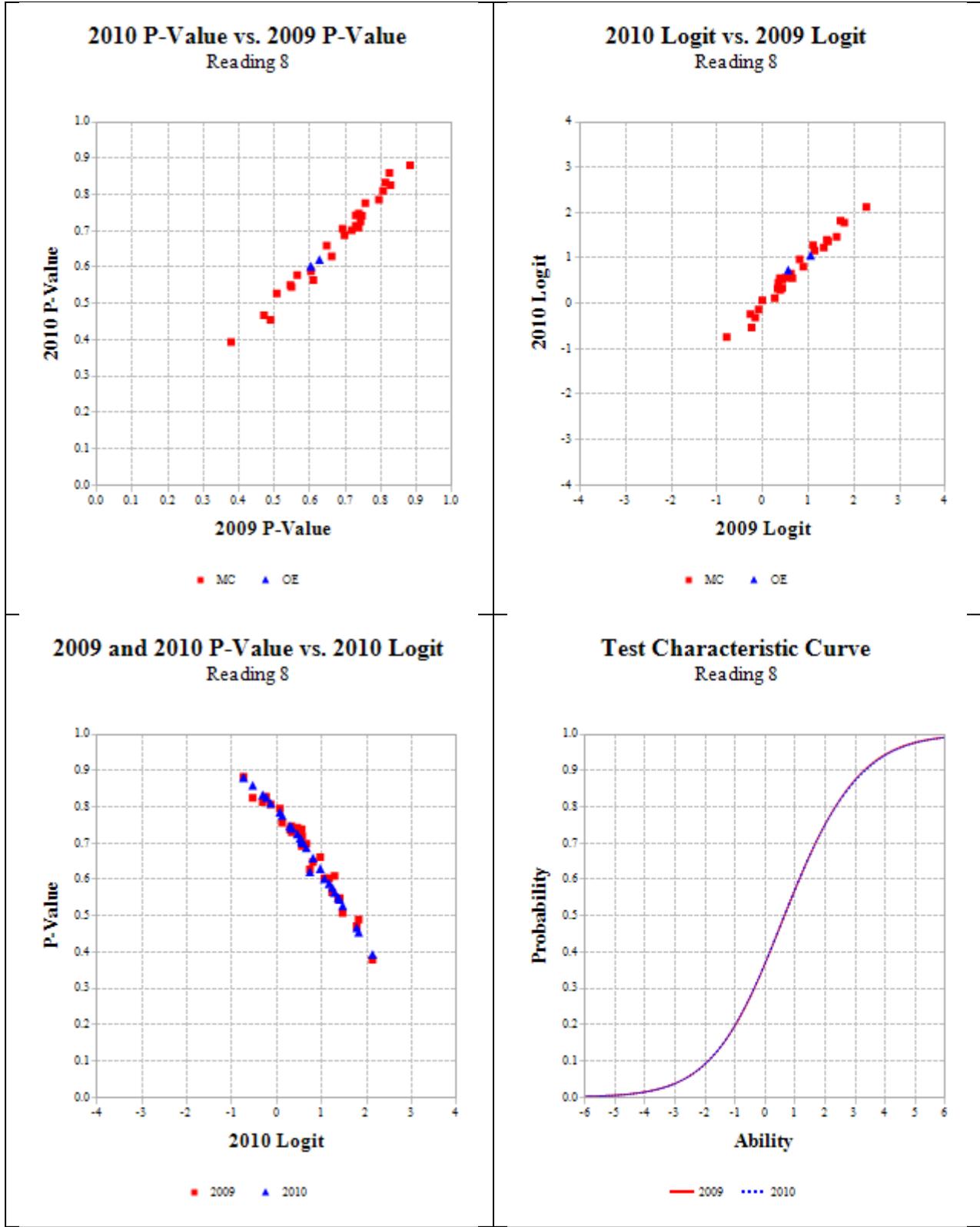


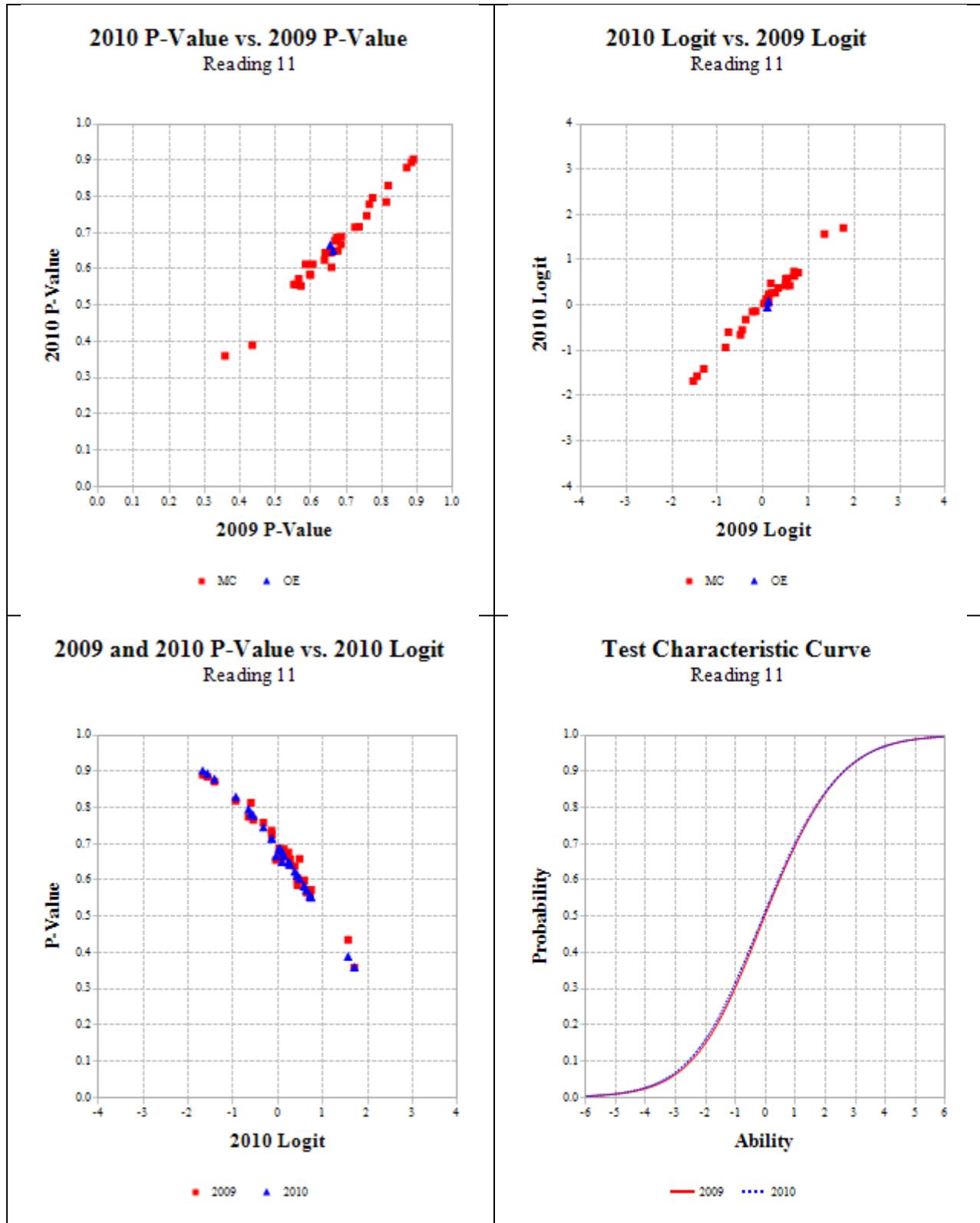


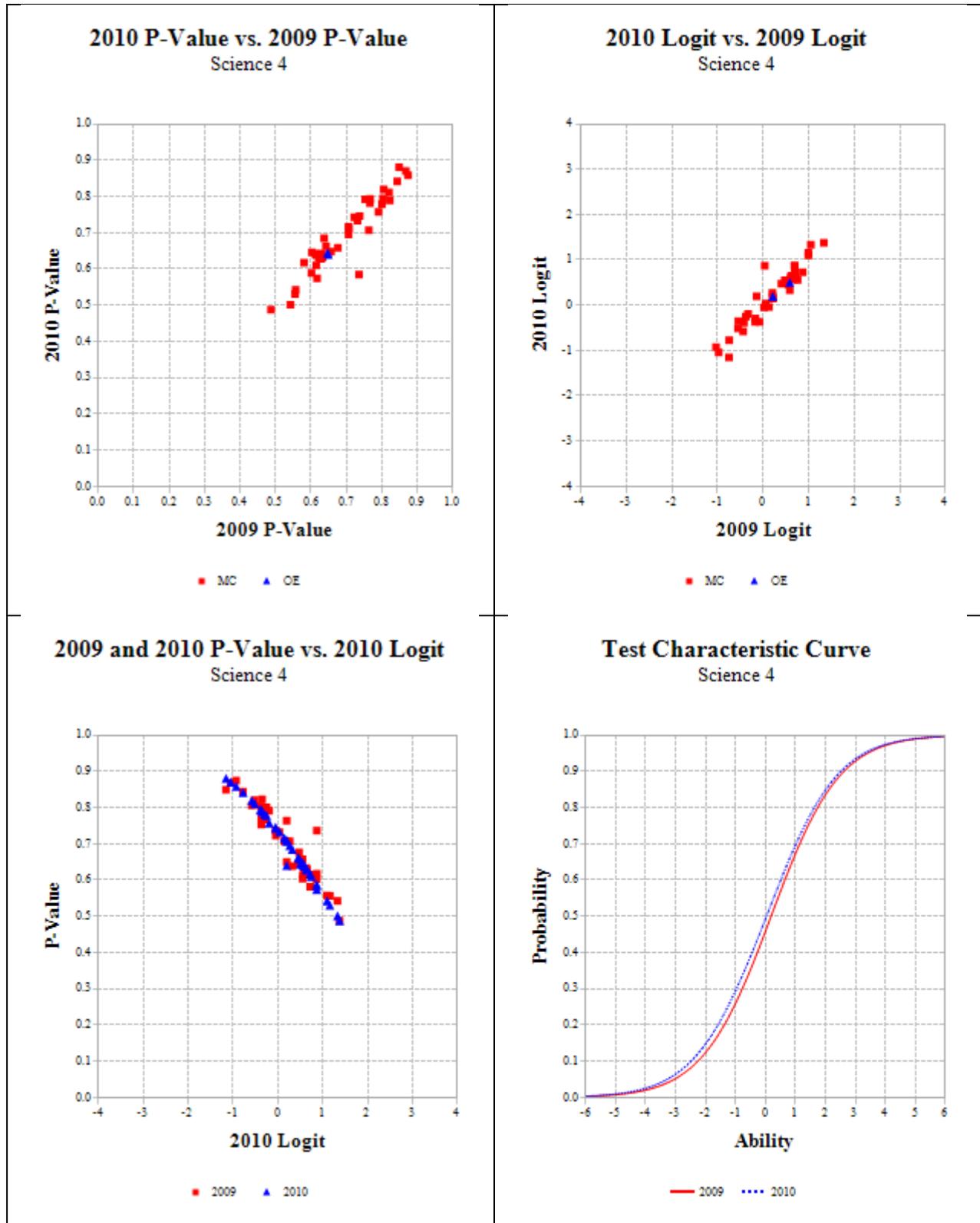


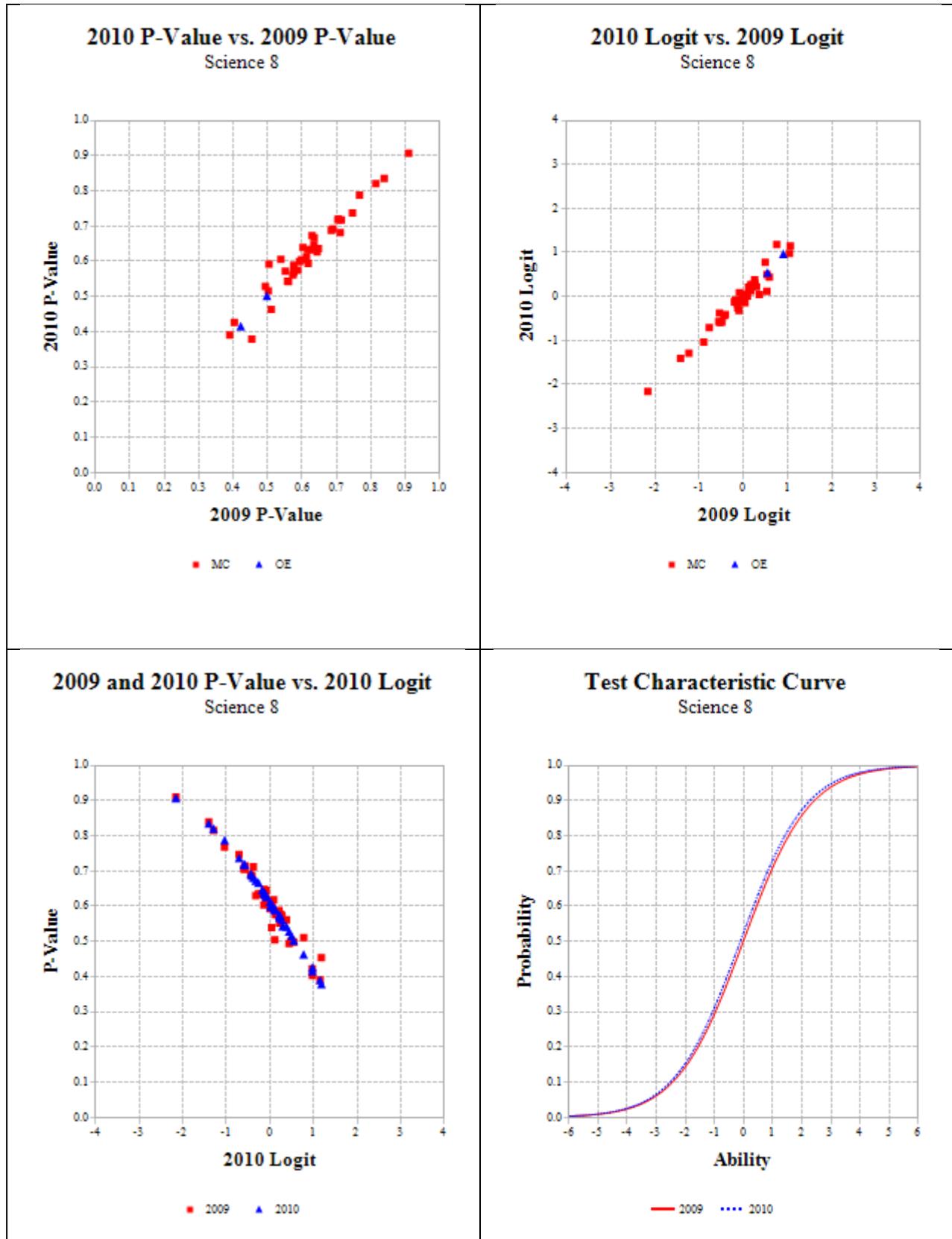


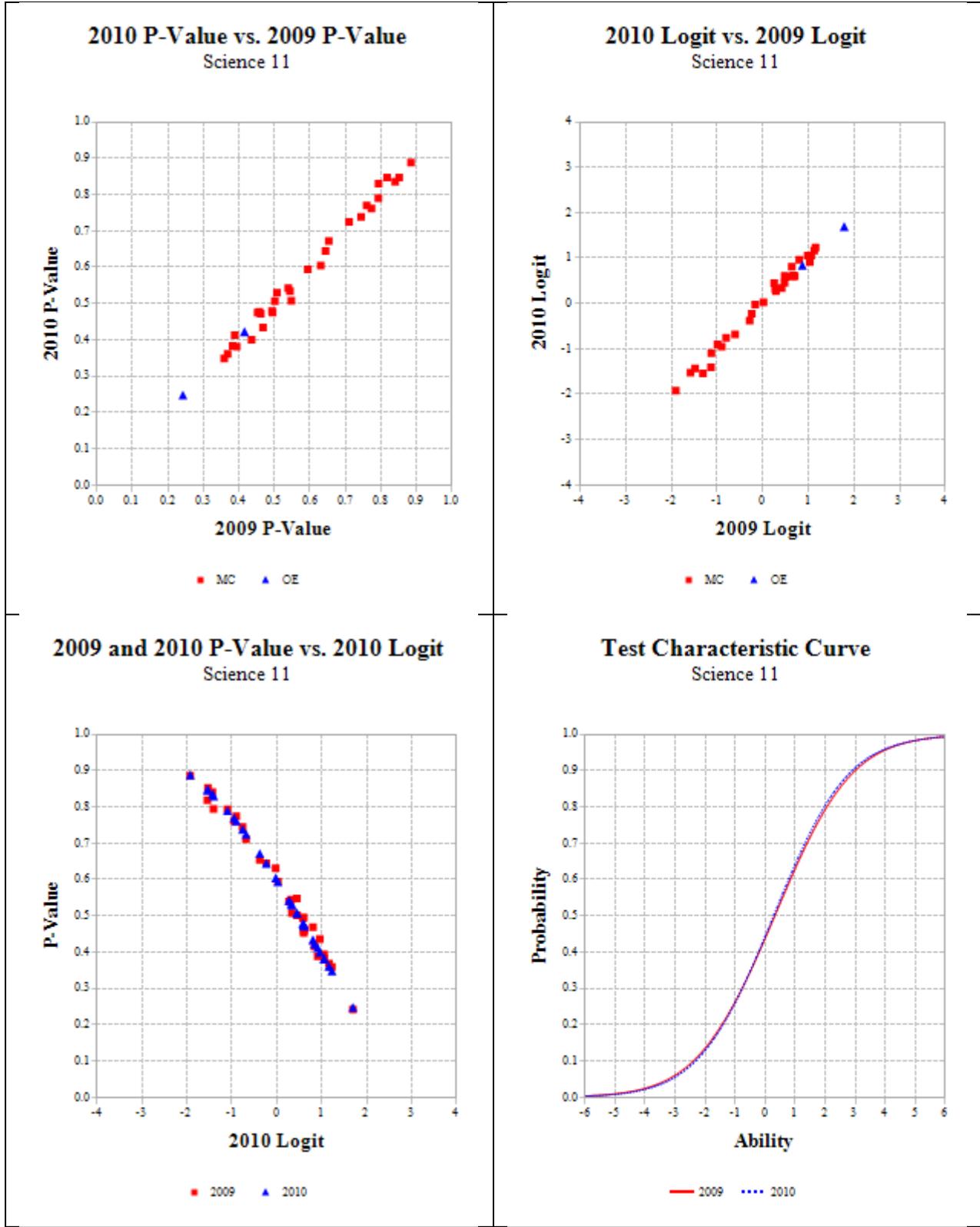












## WRITING

The writing exams were composed of six forms at each grade. Each form contained 12 core operational revising and editing (R&E) MC items and 8 field test R&E MC items (the MC items were associated with stimulus-based writing samples). Each test form also included two core operational writing prompts (WP). In addition, one WP item was included in the FT section. As with other PSSA programs, student scores were based solely on the core operational MC and core operational WP items. Table 15–4 summarizes the 2010 PSSA writing equating design.

Raw-to-scaled score tables for the writing tests were derived somewhat differently from the other subject areas. Essentially, all operational items were treated as core linking items and there were no EB items.<sup>24</sup> However, the actual linking procedure is essentially the same as described at the beginning of this chapter (i.e., prompt scores get a rater effect adjustment; prompt scores are weighted accordingly when computing the mean shift; and the mean shift is applied to all item parameter estimates before scoring tables are derived in a fully anchored WINSTEPS run).

**Table 15–4. 2010 Writing Test Design**

Grade	Core			FT		Total # (MC/WP)	Total # Core Points	Forms
	Unique Core MC	Core-to-Core Linking MC	Core Linking WP	MC	WP			
5	0	12	2	8	1	20/3	100	6
8	0	12	2	8	1	20/3	100	6
11	0	12	2	8	1	20/3	100	6

*Note:* Each WP is worth four points for conventions and four points for mode. However, the mode score is weighted by 10 to get the total possible points of 100.

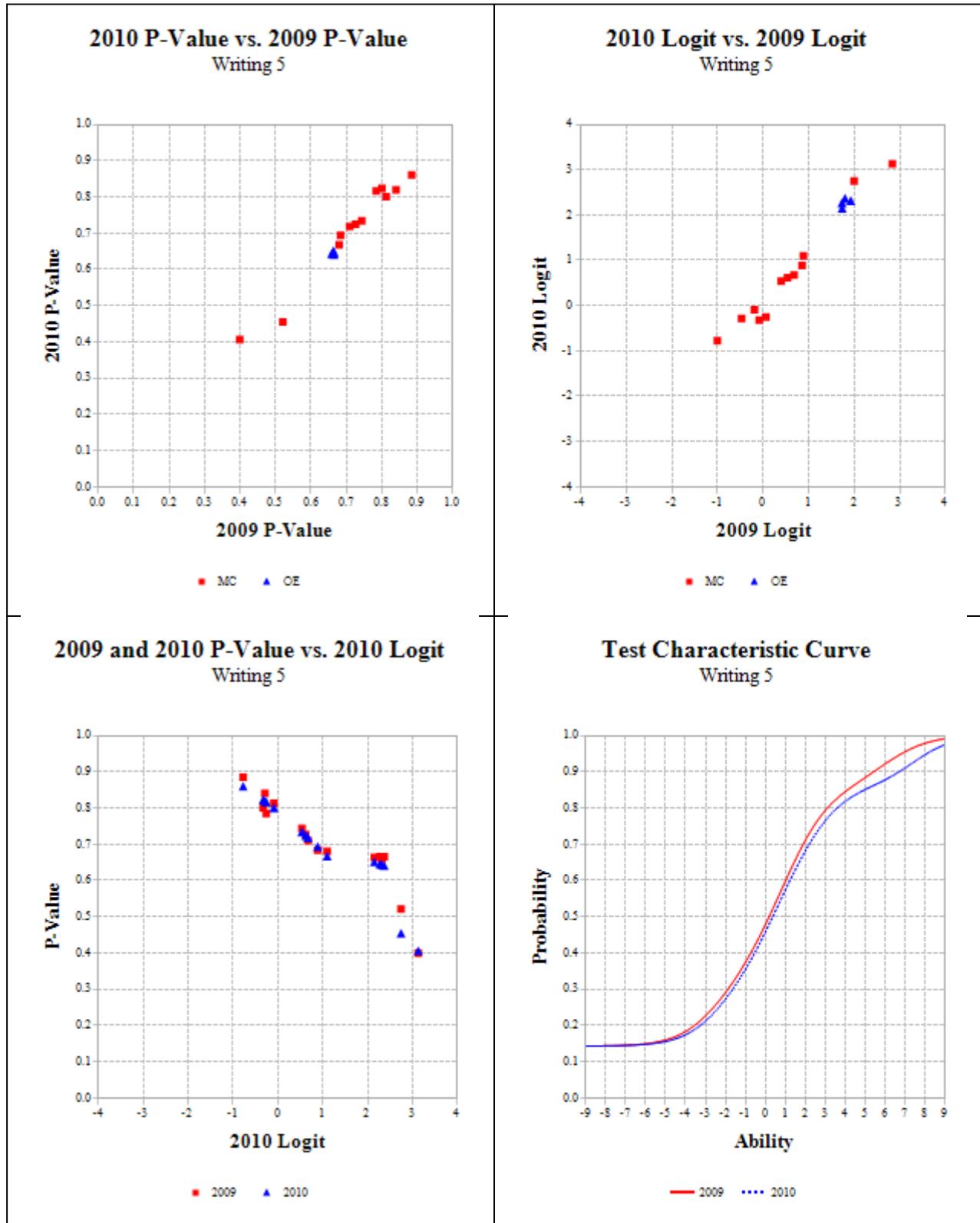
## Graphs

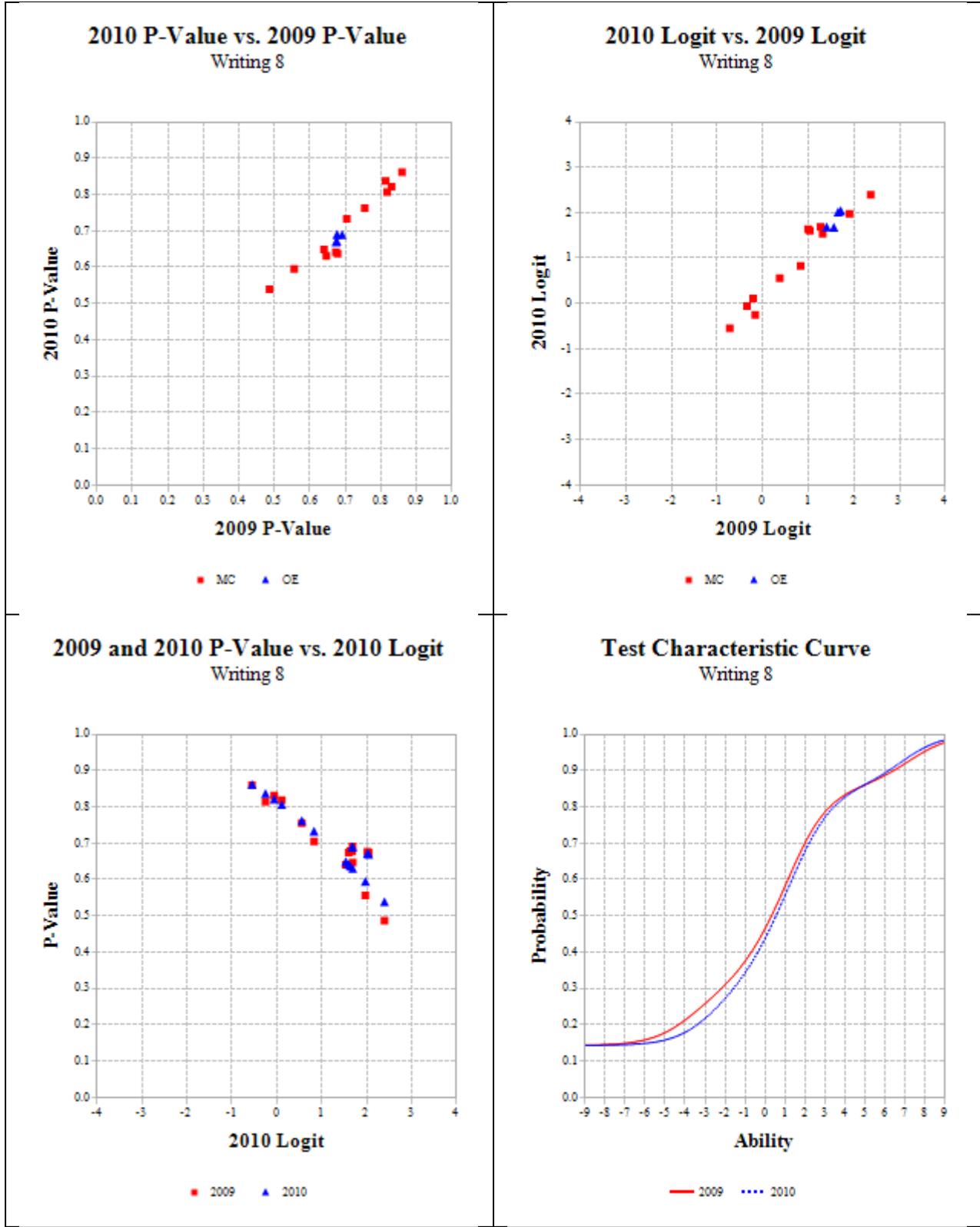
Graphs, similar to those presented for other subject areas, are provided for writing in Figure 15–2. The TCCs for writing are less parallel and more irregular than those for the other subjects. This is likely due to the weighting that was used to score the writing test. Recall that the raw scores on mode are weighted by 10 to get a total possible score of 100 points.

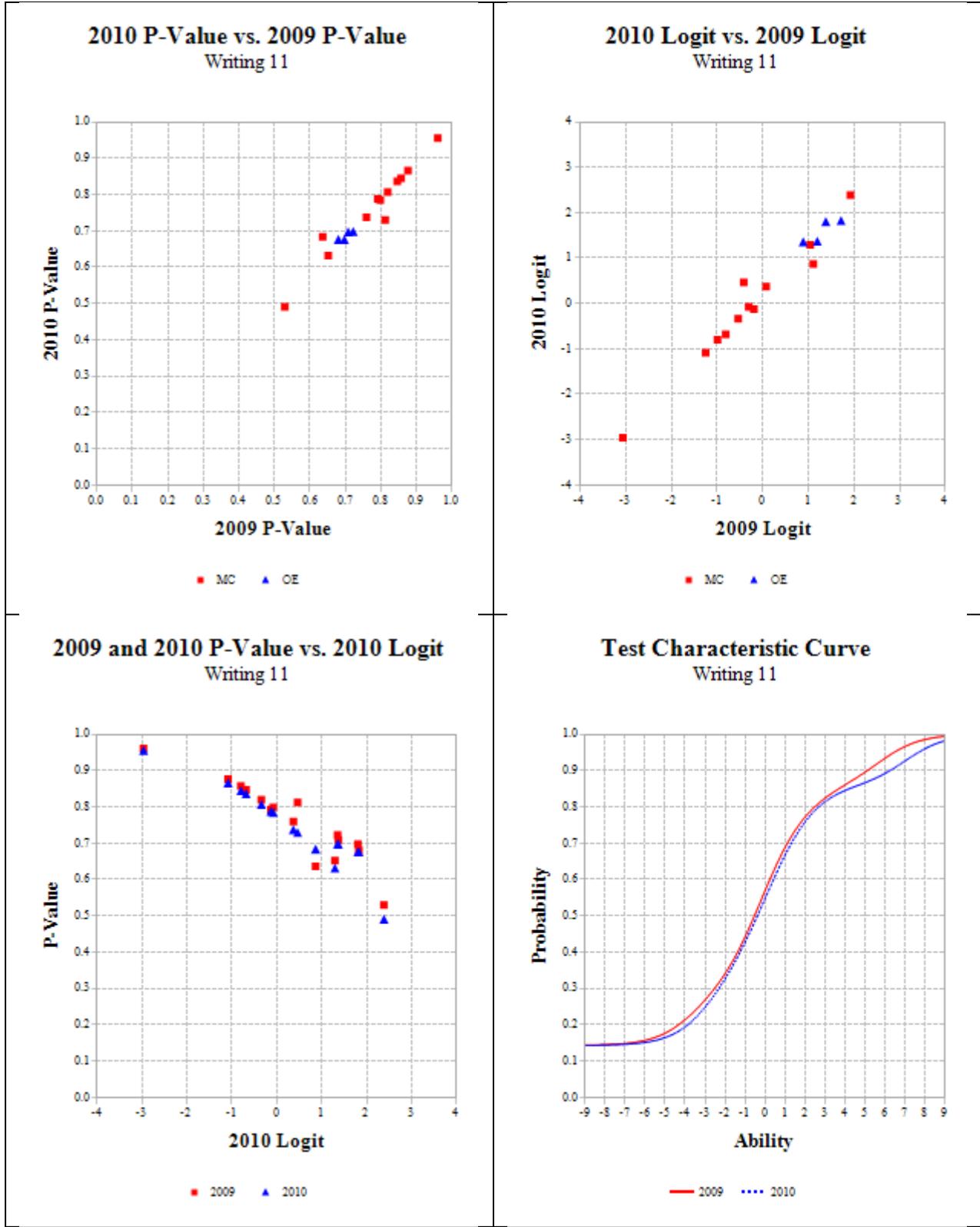
Overall, the plots suggest that writing results are less stable than the other content areas. The nature of the construct (with MC and weighted WP items contributing to the student scores) may have partial responsibility for this.

<sup>24</sup> In other subjects only a subset of operational items are treated as core linking items and there were EB linking items as well.

Figure 15–2. Item Stability Plots and Test Characteristic Curves for Writing









## Chapter Sixteen: Scores and Score Reports

This chapter provides information about the scores provided for the PSSA (e.g., scaled scores, performance levels, and strand scores), how they are presented on score reports, and appropriate and inappropriate uses of the scores.

### SCORING THE PSSA

PSSA items are composed of multiple-choice and open-ended items. Each correct response to an MC item receives a score of 1. Incorrect responses receive a score of zero. Scores on OE items range from zero to four, depending on the grade and subject area. Table 16–1 summarizes the types of items used on each subject-area test. More detailed information about the various item types is provided in Chapter Three.

**Table 16–1. Item Types Used by Subject Area**

Item Type	Subject			
	Mathematics	Reading	Science	Writing
Multiple-Choice (1 point)	■	■	■	■
Open-Ended (2 point)			■	
Open-Ended (3 point)		■		
Open-Ended (4 point)	■		■	
Prompt (4 point)				■

*Note.* Science uses 4-point OEs at Grade 11 only.

### DESCRIPTION OF TOTAL TEST SCORES

Different types of scores have been developed for PSSA reporting. Since the underlying properties of these scores are not necessarily the same, the particular scores used depend on the purposes for which the test has been given. The following types of scores are provided for reporting overall student's performance on each PSSA subject-area test:

- Raw scores
- Scaled scores
- Performance levels

#### *Raw Scores*

A raw score is the number of points a student earned over the operational MC and OE items. By itself, the raw score has very limited utility. One limitation is that it can only be interpreted with reference to the total number of items on a subject-area test (e.g., a raw score of 15 on a 20-item test is different than a raw score of 15 on a 30-item test). In addition, raw scores depend on the difficulty of test items across test forms (e.g., a raw score of 15 on a test with 20 easy items is different than a raw score of 15 on a test with 20 difficult items). Because the difficulty of the items on a test can change from year to year, raw scores should not be compared across tests or administrations.

### ***Scaled Scores***

Scaled scores are introduced in Chapter Fourteen, and additional information is provided there including historical information about the development of the PSSA scaled score system. In the simplest sense, a scaled score is a transformed number-correct score. The specifics of the transformation processes for the PSSA are also discussed in Chapter Fourteen. When all students take the same items, as with the operational items on the PSSA, the more points the student earns, the higher the associated scaled score will be.

The value of switching to the more abstract scaled score metric lies in the fact that it produces more general, interpretable, and equitable results. As noted above, a raw score of 30 is meaningless unless the maximum raw score is known. The difficulty of the test items was also mentioned as an additional challenge with interpreting raw scores. Number-correct scores are transformed to scaled scores to remove the effects of test length and item difficulty. (Strictly speaking, transformation of number-correct scores to percent-correct scores would also remove the effect of test length, but it would do nothing to adjust for the difficulty of the items.)

Another advantage of scaled scores is that they lend themselves to interpretations at what is referred to as an interval level, while raw scores do not. Interval-level scales allow an interpretation of a scaled score difference of 5 points to be the same whether the scores are 1295 vs. 1300 or 1445 vs. 1450. Raw score differences, in this context, cannot be interpreted in this manner and are thus neither generalizable nor equitable.

When test scores are properly linked across years, a scaled score of 1300—or any other value for a particular grade and content area test, such as Grade 4 reading—should have the same absolute meaning in the current year as it had in previous years. For example, a school with a scaled score above 1300 in Grade 4 reading in 2010 performed better than the average school in the base year in Grade 4 reading.

More importantly, an increase in the scaled score for Grade 4 reading from last year to the current year means that student performance improved;<sup>25</sup> it does not say anything about whether this year's test is easier or harder than last year's test. To make these interpretations requires no information about the length or the difficulty of the test in either year, although these variables are essential for the process of deriving the scaled scores.

There is considerable auxiliary information presented in this report that might aid the reader in further contextualizing PSSA scaled scores. The reader is specifically referred to the following information:

- Chapter Fourteen provides information on the development of the PSSA scaled score system, including historical information, transformation formulas, rounding rules, and general scale characteristics (e.g., minimum values).
- Chapter Seventeen provides total test score statistics. In particular, Table 17–2 lists the scaled score means and standard deviations for this year's test results.

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<sup>25</sup> This example is not an endorsement of conducting a trend analysis with only two years of results. Further, small differences may not be statistically or practically significant.

### Performance Levels

PSSA results are also reported using four Performance Levels: Below Basic, Basic, Proficient, and Advanced. The cut scores on the scaled score metric (i.e., the lowest possible scaled score to enter the Basic, Proficient, and Advanced levels) were presented earlier in this report. However, the information is repeated below (Table 16–2) for convenience.

**Table 16–2. PSSA Scaled Score Cuts  
for Each Performance Level by Grade and Subject Area**

Subject	Grade	Min	Scaled Score Cuts <sup>1</sup>			Max <sup>2</sup>
			BB/B	B/P	P/A	
Mathematics	3	750	1044	1180	1370	1816
	4	700	1156	1246	1445	2446
	5	700	1158	1312	1483	2432
	6	700	1174	1298	1476	2447
	7	700	1183	1298	1472	2475
	8	700	1171	1284	1446	2314
	11	700	1167	1304	1509	2377
Reading	3	1000	1168	1235	1442	1966
	4	700	1112	1255	1469	2294
	5	700	1137	1275	1497	2357
	6	700	1121	1278	1456	2293
	7	700	1131	1279	1470	2373
	8	700	1146	1280	1473	2635
	11	700	1112	1257	1492	2520
Science	4	1050	1150	1275	1483	2254
	8	925	1150	1275	1464	2258
	11	1050	1150	1275	1347	1862
Writing	5	700	745	1236	1909	2249
	8	700	914	1236	1748	2245
	11	700	952	1236	1806	2382

Notes. <sup>1</sup> BB = Below Basic; B = Basic; P = Proficient; and A = Advanced.

<sup>2</sup> Scaled Score Maximum Values are unique for the current year's test.

Performance levels descriptors (PLDs) are another way to attach meaning to the scaled score metric. PLDs associate precise quantitative ranges of scaled scores with verbal, qualitative descriptions of student status. While much less precise, the qualitative description of the levels is one way for parents and teachers to interpret the student scores. They are also useful in assessing the status of the school. The Pennsylvania General Performance Level Descriptors, as developed by PDE and teacher panels, are given below. These are also included on student score reports.

- **Advanced:** The Advanced Level reflects superior academic performance. Advanced work indicates an in-depth understanding and exemplary display of the skills included in the Pennsylvania Academic Content Standards.
- **Proficient:** The Proficient Level reflects satisfactory academic performance. Proficient work indicates a solid understanding and adequate display of the skills included in the Pennsylvania Academic Content Standards.
- **Basic:** The Basic Level reflects marginal academic performance. Basic work indicates a partial understanding and limited display of the skills included in the Pennsylvania Academic Content Standards. This work is approaching satisfactory performance, but has not yet reached it. There is a need for additional instructional opportunities and/or increased student academic commitment to achieve the Proficient Level.
- **Below Basic:** The Below Basic Level reflects inadequate academic performance. Below Basic work indicates little understanding and minimal display of the skills included in the Pennsylvania Academic Content Standards. There is a major need for additional instructional opportunities and/or increased student academic commitment to achieve the Proficient Level.

## **DESCRIPTION OF REPORTING CATEGORY SCORES**

The following types of scores are provided for PSSA reporting category scores:

- Reporting Category Scores (Strand Scores)
- Strength Profile

### ***Reporting Category Scores (Strand Scores)***

A reporting category score describes performance of a student, school, or district on a particular reporting category (content standard defined in the test). For the PSSA, reporting category scores are raw scores, indicating the points a student or a school/district earned for that reporting category. (Attributes of raw scores are described earlier in this chapter.)

Reporting category scores cannot be compared across years because they are not statistically linked nor are they interval scores. Also, it is not advisable to compare reporting category raw scores even within the same form because some reporting categories may contain items that are easier or more difficult than other reporting categories (the strength profile, discussed below, mitigates this problem to some degree). A greater concern is the low reliability of many of these scores, especially for strand scores based on a small number of possible points. Chapter Eighteen provides more information about strand-score reliability.

When compared to other results from the same year, reporting category scores can be somewhat helpful in identifying a group's strengths and weaknesses as measured by the test. For example, it can be informative to compare average reporting category scores of a school against that of another reference group (e.g., the state average). Hence, reporting category scores can suggest group strengths and weaknesses relative to another reference group. (Challenges pertaining to interpreting results for individual students are discussed below.)

### ***Strength Profile***

The strength profile provides another indication of a student's performance within each of the reporting categories. This profile can be used to identify areas in which a student needs to improve and areas in which a student has performed more successfully. Unlike reporting category scores that are reported as raw scores, strength profile scores categorize students into one of three levels: Low, Medium, and High. These categories take into account the difficulty of the items and are based on the same scaling techniques used to derive the PSSA scaled scores. (Details regarding the creation of the strength profile are provided in Chapter Fourteen. These scaled scores are not printed on score reports. They only exist to determine whether performance in the reporting categories was Low, Medium, or High.) A Low score on the strength profile indicates performance that is below Proficient on the overall PSSA scale. A Medium score on the strength profile indicates performance that is comparable to the Proficient level on the PSSA. A High strength profile indicates performance that is comparable to the Advanced level.

## **APPROPRIATE SCORE USES**

### ***Individual Students***

Scaled scores on the PSSA indicate a student's achievement over the PSSA Assessment Anchors and Eligible Content. Scaled scores are primarily used to determine student performance level classifications (i.e., a criterion-referenced inference). Scaled scores that are based on IRT models are typically assumed to be of the interval type; so comparisons may be made on differences in scaled scores. If this assumption holds, then it would be safe to infer for Grade 4 reading that the ability difference between 1110 and 1120 represents the same ability difference that separates 1250 and 1260. Scaled scores can also be used to compare the performance of an individual student to the performance of a similar demographic or subgroup at a school or district. Test score standard errors (discussed in Chapter Eighteen) should be considered.

### ***Groups of Students***

Test results can be used to evaluate performance over time. Mean scaled scores can be compared across administrations within the same grade and subject area to indicate whether student performance is improving across years. Generally, such trend analyses benefit from using mean results from as many test administration years as possible. Different cohorts of students are used (i.e., the same student or students are not tracked across grade levels). All scores can be analyzed within the same subject and grade for any single administration to determine which demographic or program group had, for example, the highest average performance or the highest percent of students at or above the Proficient standard.

Reporting category scores can help evaluate academic areas for relative strengths or weaknesses. These category scores provide information to identify areas where further diagnosis is warranted. Generalizations from test results may be made to the specific content domain represented by the academic standards measured in the PSSA. However, all instruction and program evaluations

should include as much information from other sources as possible to provide a more complete picture of performance.

## **CAUTIONS FOR SCORE USES**

### ***Extreme Error for Extreme Scores***

Student scores toward the minimum or maximum ends of the score range will have very large standard errors of measurement and, therefore, such scores should be viewed very cautiously. The maximum scaled score only provides a very rough estimate of a student's ability. For instance, if the maximum score for the PSSA Grade 6 mathematics test were 2500<sup>26</sup> and a student achieves this score, it cannot be determined whether the student could have achieved an even higher scaled score. If the test were 10 items longer, a different estimate might have been obtained. Similarly, if the items in a new test were more difficult than the items on a previous administration, the maximum scaled score would likely be higher on the new test because it would take a greater level of achievement to answer the items correctly. In this manner, extreme scaled scores may vary from one administration to the next even if the number of test items does not change. The fluctuation of extreme scaled scores complicates the comparisons of students with scaled scores at the extreme ends of the score distribution. To minimize confusion and potential misinterpretation, the minimum scaled scores possible on the PSSA tests have been fixed (see Table 16–2) so they do not change between administrations. However, the maximum scaled score values have not been fixed. Therefore, caution must be taken when comparing scores at the maximum end of the scale.

### ***Each Test has a Unique Scale***

Scaling was conducted for each grade and subject area test separately. Therefore, PSSA scale scores should be interpreted only within each content area. PSSA scaled scores are not status indicators in the same sense as percentile ranks (or scales that are essentially transformations of percentile ranks) and, therefore, cannot be used to profile relative strengths and weaknesses across subject areas. As an example, student scaled scores of 1450 in Grade 4 reading and 1400 in Grade 4 mathematics does not necessarily imply that the student performed better in reading than in mathematics. Neither do the PSSA scaled scores represent a developmental or vertical scale. This means that no across-grade comparisons or growth statements for a student are appropriate. For example, a 1400 in Grade 4 reading and a 1400 in Grade 5 reading does not indicate a student had no achievement growth in reading from Grade 4 to Grade 5.

### ***Strength Profile Caveats***

The category labels of Low, Medium, and High were deliberately used instead of any of the PSSA performance level names—Below Basic, Basic, Proficient, and Advanced—to acknowledge that the PSSA cut scores were established on the basis of the total test score. Therefore, the domain categories should not be interpreted the same way as PSSA performance levels because they likely do not carry the same meaning.

While the strength profile might facilitate comparisons of a student's strengths and weaknesses across reporting categories in some cases, several factors merit caution. As noted earlier, many of the strand scores are very unreliable. The scaling underlying the strength profile does not mitigate this problem.

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<sup>26</sup> It is not, at least for this year

Additionally, the categories reflect more absolute comparisons. Relative comparisons are more difficult to make. As an example, if one scored High in both strand A and B, we know the student did very well in both strands compared to overall performance in the state (i.e., absolute status). However, we do not know whether the student's performance in strand A was better or worse relative to the performance in strand B (relative status).

Finally, some seemingly unusual results might occur that may be difficult for users to understand. As one example, it may be possible for a student to earn Medium in all reporting categories but have an Advanced performance level. This can happen because the strand scores are correlated, meaning the distributional properties of the total score depends not just on the variances of the strand scores, but the covariances among the strand scores as well. (An analogy would be when a school track team places first overall in a competition although they did not win a single event.)

### ***Using PSSA Results for Other Purposes***

Should PSSA results be used for placement decisions such as eligibility for gifted/talented programs or for other special programs or services? Frequently asked questions about the PSSA pertain to the maximum possible PSSA scaled scores for various subjects; or what PSSA score represents the 90th percentile. The motivation behind many of these questions may be associated with special program eligibility.

Other uses or inferences based on PSSA results may or may not be valid as the validity evidence and arguments provided in Chapter Nineteen may not necessarily support other score uses and interpretations. According to the AERA/APA /NCME *Standards* (1999) (i.e., Standard 1.4) if a test is used in a way that has not been validated, it is incumbent on the user to justify the new use, collecting new evidence if necessary. Finally, a universal caveat for any test's result is that it not be used for placement and educational planning alone. Instead, other information about the student (e.g., other test performance data) should be included.

## **REPORTS**

The following score reports are provided to students, parents, schools, and districts for the PSSA tests in mathematics, reading, science, and writing:

- Parent Letter
- Individual Student Report
- School Summary Report
- District Summary Report
- Interpretive Guide

### ***Parent Letter***

Parent letters were delivered to Pennsylvania districts on June 10, 2010. This score report provides parents and students their first glimpse of performance on the spring 2010 PSSA tests. This report provides results at the student level. A sample of the report is provided in Figure 16–1.

Figure 16–1. Parent Memo

Dear Family:

This letter is intended to provide you with information about your student's performance on the 2010 Pennsylvania System of School Assessment (PSSA). Use the information in this letter to discuss your student's performance with your student's teachers. A strong partnership between families and teachers is critical for your student's success.

For more information about the PSSA, please visit the Pennsylvania Department of Education Web site at [www.education.state.pa.us](http://www.education.state.pa.us) (Type "PSSA Resource Materials" in the search box) or contact your student's school.

Sincerely,  
Thomas E. Gluck  
Acting Secretary of Education



Student Name:	
PA Student ID:	
School:	
District:	
Test Date:	
Grade:	

MATHEMATICS				
How did [student] perform OVERALL?				
Performance Level: Proficient			PSSA Score: 1407	
Below Basic	Basic	Proficient	Advanced	
700	1171	1284	1446	2314
Your student's score is indicated by the ↑. If your student were to test again, his or her score would likely remain in the following range: 1358–1456.				
How did [student] perform by REPORTING CATEGORY?				
Reporting Categories	Student's Points	Total Points Possible		
Numbers and Operations	10	15		
Measurement	8	10		
Geometry	10	14		
Algebraic Concepts	12	19		
Data Analysis and Probability	9	14		

WRITING				
How did [student] perform OVERALL?				
Performance Level: Proficient			PSSA Score: 1449	
Below Basic	Basic	Proficient	Advanced	
700	914	1236	1748	2245
Your student's score is indicated by the ↑. If your student were to test again, his or her score would likely remain in the following range: 1401–1497.				
How did [student] perform by REPORTING CATEGORY?				
Reporting Categories	Student's Points	Total Points Possible		
Composition	60	80		
Informational	30	40		
Persuasive	30	40		
Revising and Editing	14	20		
Informational	3	4		
Persuasive	3	4		
Multiple Choice	8	12		

READING				
How did [student] perform OVERALL?				
Performance Level: Proficient			PSSA Score: 1375	
Below Basic	Basic	Proficient	Advanced	
700	1146	1280	1473	2635
Your student's score is indicated by the ↑. If your student were to test again, his or her score would likely remain in the following range: 1301–1449.				
How did [student] perform by REPORTING CATEGORY?				
Reporting Categories	Student's Points	Total Points Possible		
Comprehension and Reading Skills	13	22		
Interpretation and Analysis of Fictional and Nonfictional Text	18	30		

SCIENCE				
How did [student] perform OVERALL?				
Performance Level: Proficient			PSSA Score: 1332	
Below Basic	Basic	Proficient	Advanced	
925	1150	1275	1464	2258
Your student's score is indicated by the ↑. If your student were to test again, his or her score would likely remain in the following range: 1280–1384.				
How did [student] perform by REPORTING CATEGORY?				
Reporting Categories	Student's Points	Total Points Possible		
The Nature of Science	23	34		
Biological Sciences	5	11		
Physical Sciences	7	12		
Earth and Space Sciences	11	11		

Note that the performance level line graphs are not drawn to scale because some performance levels have more scaled score points than others. Additionally, the graphs do not display the actual percentage of students in each performance level.

***Individual Student Report***

A student report is provided for all students who took the PSSA. This report was delivered to Pennsylvania school districts on September 1, 2010. Districts are responsible for sending them home to individual students. This report is a four-page color document that provides the types of scores explained earlier in this chapter. Screen shots of the four pages from a sample individual student report are provided in Figures 16–2 through 16–5.

Figure 16–2. Page 1 of the Individual Student Report



# PENNSYLVANIA

## Student Report

**Dear Family:**

This report is designed to provide you with specific information about your student’s strengths and needs as measured by the 2010 Grade 8 Pennsylvania System of School Assessment (PSSA). I encourage you to use the information in this report to discuss with your student’s teacher(s) ways to enhance your student’s education. A strong partnership between families and teachers is critical for every child’s success. Working together, we can help all children succeed in school.

For more information about the PSSA, please visit the Pennsylvania Department of Education Web site at [www.education.state.pa.us](http://www.education.state.pa.us) (Type “PSSA Resource Materials” in the search box) or contact your student’s school.

Sincerely,



Thomas E. Gluck  
Acting Secretary of Education

**Student Name:** .....

**PA Student ID:** \*\*\*\*\* .....

**School:** .....

**District:** .....

**Test Date:** Spring 2010

**Grade:** 8

**Student’s PSSA Results by Subject**

Subject	Goal Range			
	Below Basic	Basic	Proficient	Advanced
Mathematics			✓	
Reading			✓	
Science			✓	
Writing			✓	

**Table of Contents**

Page 1 ..... General Overview

Page 2 ..... Math, Reading, and Science Detailed Results

Page 3 ..... Writing Detailed Results

Page 4 ..... Helping Your Student Achieve Success

An Interpretation Guide for this report is available at [www.education.state.pa.us](http://www.education.state.pa.us) (Type “student report guide” in the search box).

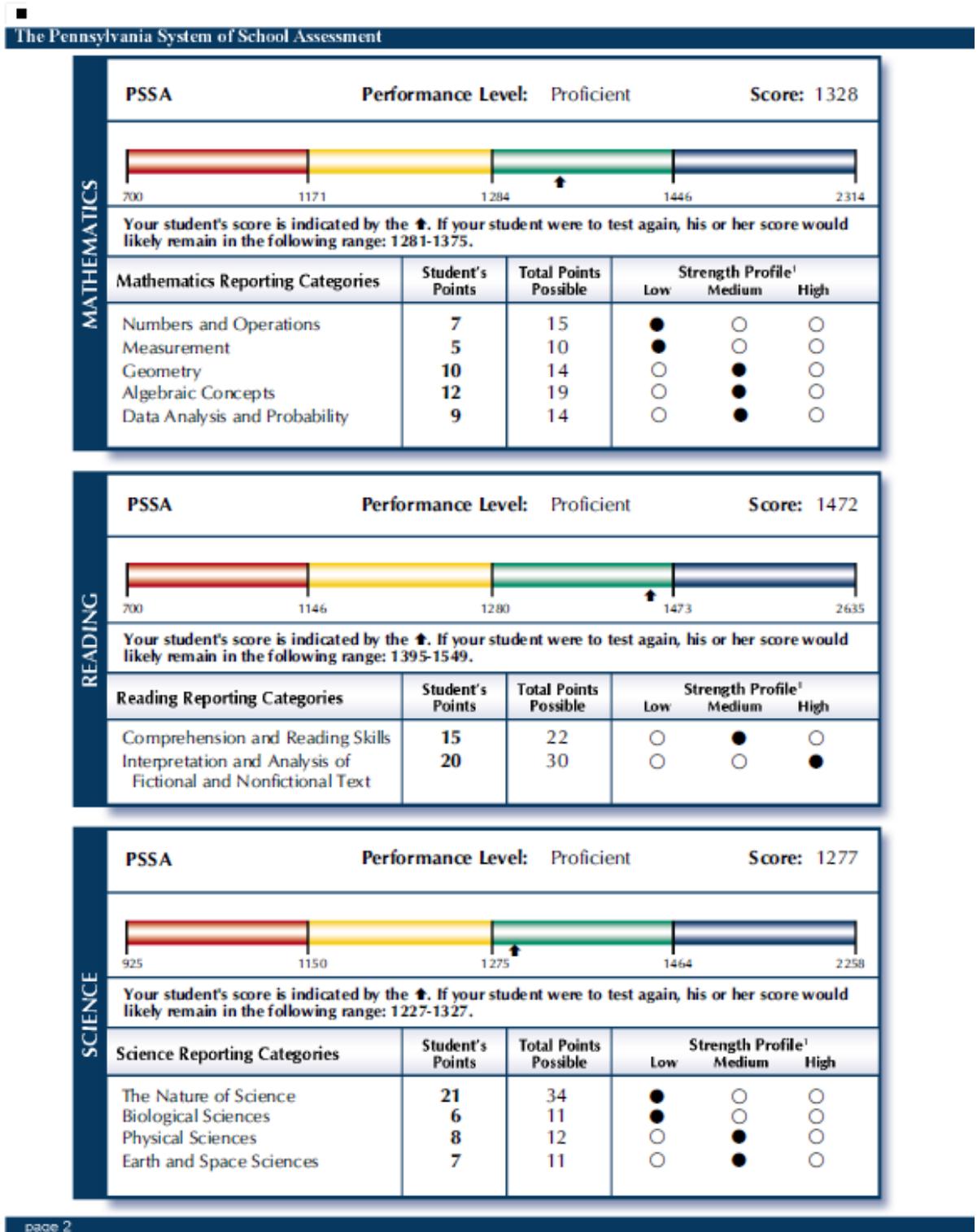


**pennsylvania**  
DEPARTMENT OF EDUCATION

The Pennsylvania System of School Assessment
page 1

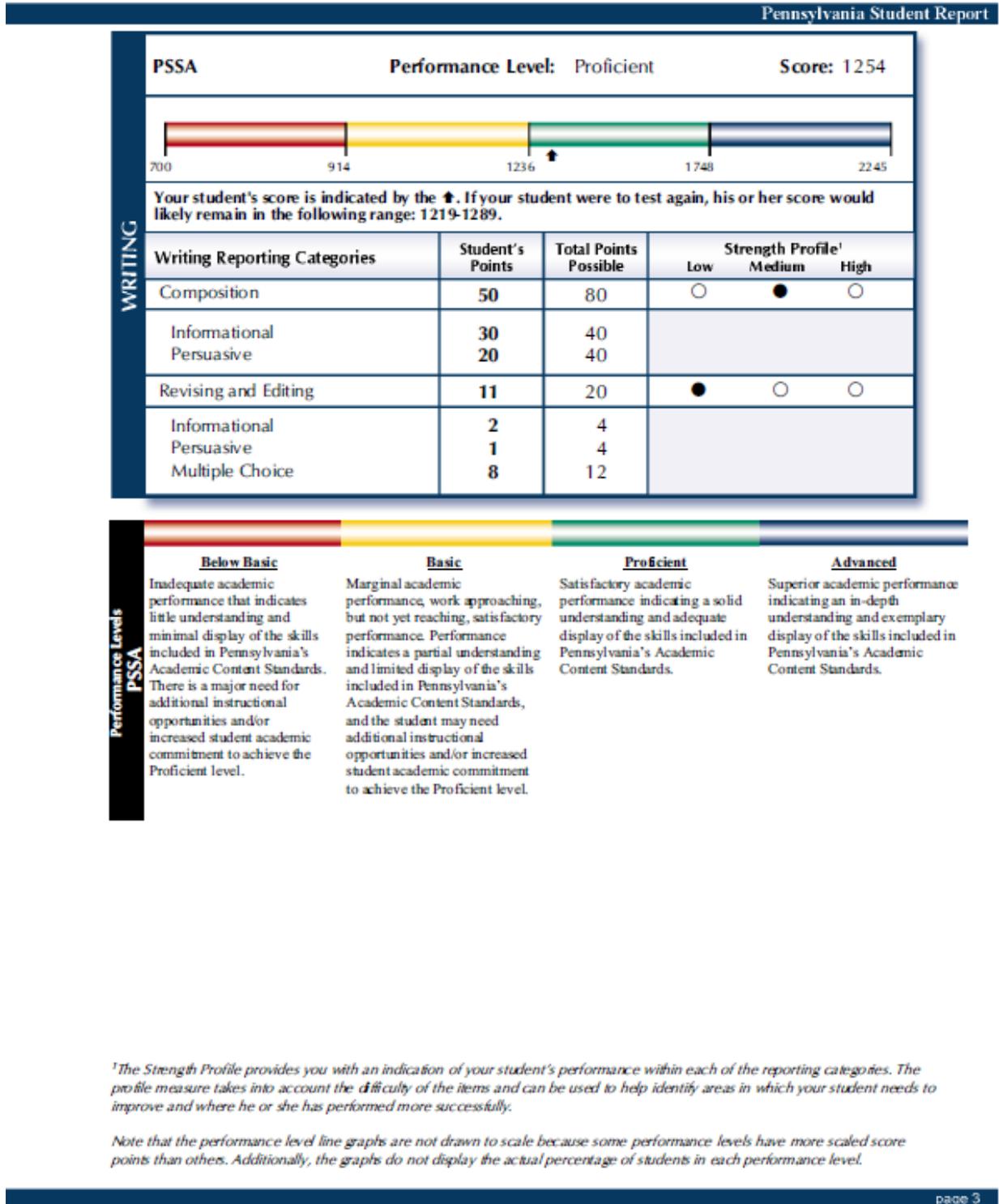
[www.education.state.pa.us](http://www.education.state.pa.us)

Figure 16–3. Page 2 of the Individual Student Report



Test Date: Spring 2010

Figure 16–4. Page 3 of the Individual Student Report



Test Date: Spring 2010

Figure 16–5. Page 4 of the Individual Student Report



## How can you help your student achieve success?

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**Make sure your student reads as much as possible.**  
 Reading at home helps children do better at school. Find books and special programs for families at your regional or neighborhood library. Go to [www.statelibrary.state.pa.us](http://www.statelibrary.state.pa.us) to learn about Pennsylvania's POWER Library Initiative or to find a library near you.

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**Remember to make connections!**  
 Success in school involves more than just reading and mathematics. Children can master these other skills by engaging in enriching activities outside the classroom. Practicing music, for example, can build skills that will be valuable throughout school and life. Remember that taking trips to a museum, a show or a concert is a positive way to strengthen your student's overall education.

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**What should your student be able to know and do?**  
 Every school year you can learn about what your student should be able to know and do in each specific content area. You can follow the grade level expectation for each content area and see samples of the type of work students should be producing. Follow this link to find this information: <http://pdesas.org/>

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**Education pays...**  
 Education pays in higher earnings and lower unemployment rates.

Unemployment rate in 2008

2.0	Doctoral degree
1.7	Professional degree
2.4	Master's degree
2.8	Bachelor's degree
3.7	Associate degree
5.1	Some college, no degree
5.7	High school graduate
9.0	Less than a high school diploma

Median weekly earnings in 2008

\$1,561	Doctoral degree
1,531	Professional degree
1,233	Master's degree
1,012	Bachelor's degree
757	Associate degree
699	Some college, no degree
618	High school graduate
453	Less than a high school diploma

Source: Bureau of Labor Statistics, Current Population Survey

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**Early career planning**  
 Free printed materials and career exploration CDs from Pennsylvania Higher Education Assistance Agency (PHEAA) are available by visiting: [www.educationplanner.org](http://www.educationplanner.org)

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**Resources for parents and students**  
[www.CollegeBoard.com/PAPlanforHighSchool](http://www.CollegeBoard.com/PAPlanforHighSchool)



***School and District Summary Reports***

Summary reports are provided at the school and district level. These reports contain summary information about the percentage of students in each of the four performance levels. Raw scores are also provided by assessment anchor to allow schools or districts to identify strengths or weaknesses at the content strand level.

***Interpretative Guide***

An interpretative guide is provided to help parents and other PSSA stakeholders better understand test result information presented in the individual student report. The interpretative guide can be found on the PDE website.

## Chapter Seventeen: Operational Test Statistics

This chapter presents various summary statistics for the PSSA total test scores based on the final data file described in Chapter Nine. Related information covered elsewhere in this report includes the item-level statistics that were presented in Chapters Eleven (classical item statistics) and Twelve (Rasch item statistics). These chapters provide additional consideration as item difficulty distributions can affect total score distributions.

### PERFORMANCE LEVEL STATISTICS

Table 17–1 presents performance level percentages by grade and content. Appendix M provides performance level percentages for prior years.

**Table 17–1. Performance Level Percentages for 2010 PSSA**

Subject	Grade	Percentage in Each Performance Level			
		Below Basic	Basic	Proficient	Advanced
Mathematics	3	4.2	11.3	41.1	43.4
Reading		12.9	11.9	47.9	27.3
Mathematics	4	7.0	8.1	30.9	54.0
Reading		12.8	14.3	36.3	36.6
Science		7.7	10.8	35.5	45.9
Mathematics	5	8.8	16.8	26.8	47.6
Reading		17.2	18.7	41.2	22.9
Writing		1.8	36.5	59.8	2.0
Mathematics	6	9.4	12.6	24.7	53.3
Reading		14.8	16.4	30.7	38.1
Mathematics	7	11.7	10.3	23.6	54.3
Reading		11.2	15.3	31.6	41.9
Mathematics	8	12.0	12.8	24.1	51.1
Reading		8.7	9.4	28.6	53.3
Science		25.5	17.3	33.7	23.5
Writing		3.2	21.6	61.7	13.5
Mathematics	11	24.8	15.6	27.6	32.0
Reading		18.0	14.8	33.2	34.0
Science		19.0	41.2	25.0	14.8
Writing		2.2	17.1	67.7	13.0

## SCALED SCORES

### *Summary Statistics*

Table 17–2 provides the scaled score means and standard deviations. See the section Every Test has a Unique Scale in Chapter Sixteen for some caveats regarding interpretation of scale scores.

**Table 17–2. Means and Standard Deviations for the 2010 PSSA Scaled Scores**

Grade	Mathematics		Reading		Science		Writing	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
3	1341.0	164.7	1350.2	158.6				
4	1469.6	222.4	1379.6	222.9	1456.8	200.4		
5	1477.1	236.3	1328.9	217.6			1322.1	265.5
6	1493.4	245.0	1378.4	233.7				
7	1500.0	254.7	1413.9	219.2				
8	1450.7	236.9	1491.3	245.3	1309.0	210.1	1400.9	271.9
11	1372.2	276.0	1363.2	280.4	1242.6	96.7	1483.7	282.3

### *Scaled Score Distributions*

Scaled scores are based on a linear transformation of the Rasch ability estimates. Distributions of the Rasch abilities are provided at the end of Chapter Twelve.

## RAW SCORES

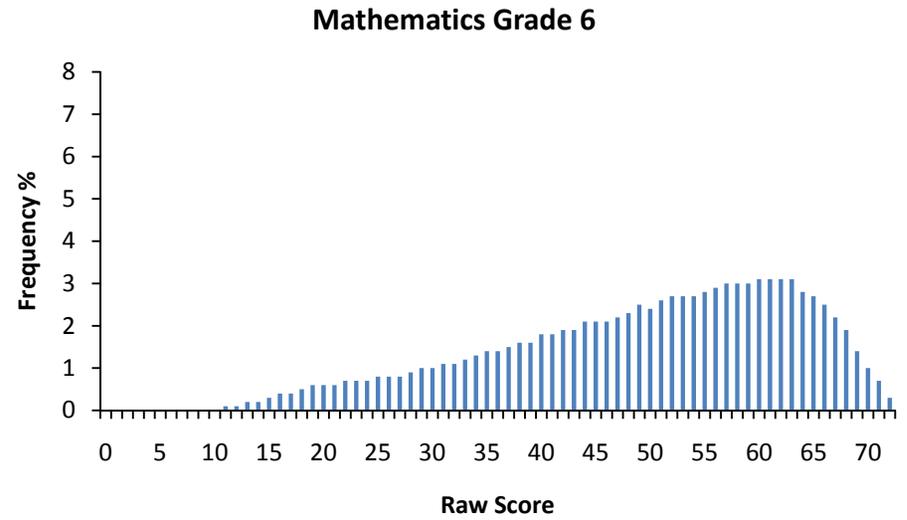
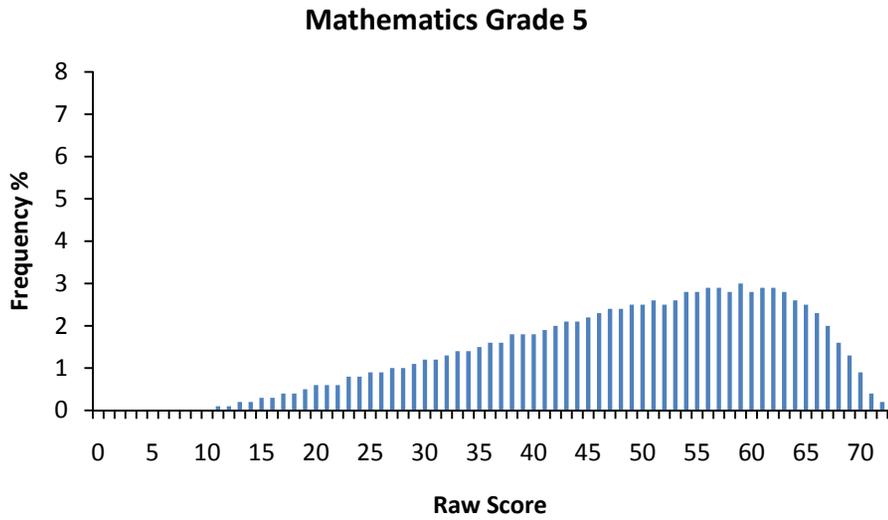
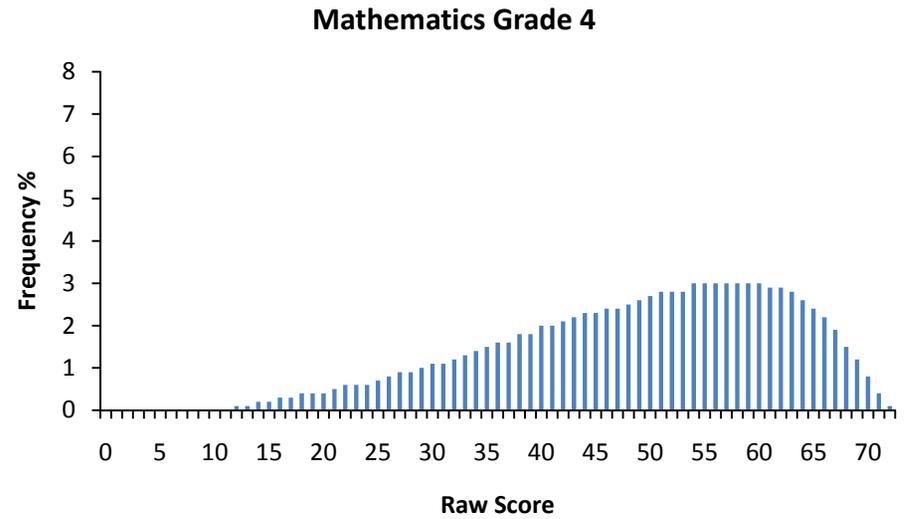
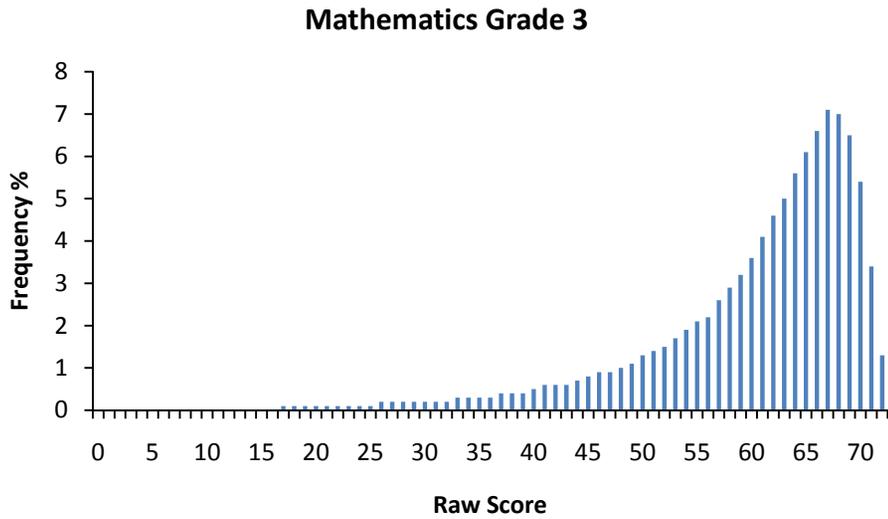
### *Summary Statistics*

Appendix K provides summary statistics for the operational raw scores. The statistics reported include the: number of points possible (Pts.), number of items (Len.), number of students tested (N), mean number of score points received (Mean), standard deviation of test scores (SD), reliability (r), traditional standard error of measurement (SEM), and item types (Items) used to determine each score. These statistics are based on the total test using both multiple-choice (MC) and open-ended (OE) items for the operational sections of each form. (For information disaggregated by item type, Chapter Eleven provides breakout statistics for MC and OE items.)

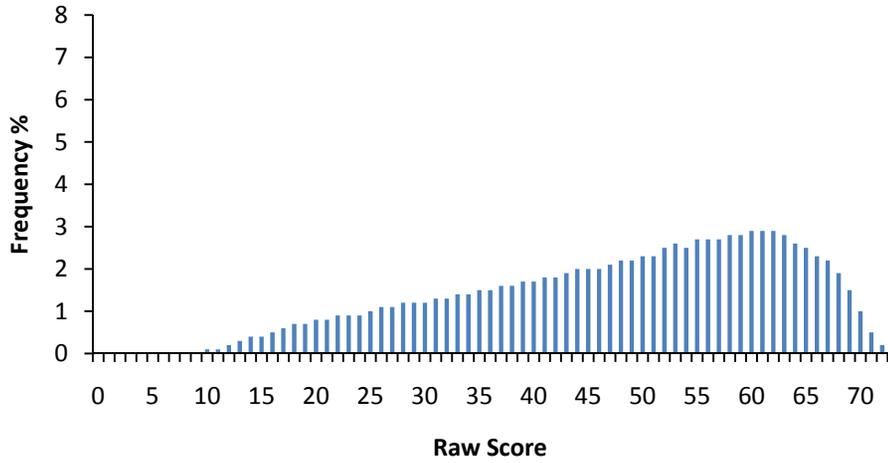
### *Score Distributions*

Raw score relative-frequency (rf) distributions are provide in Figure 17–1. Most distributions are negatively skewed and unimodal. Grade 11 science is more symmetric than other distributions. Writing has one major mode and several minor modes (arising because of the differential weighting given to the writing prompt scores).

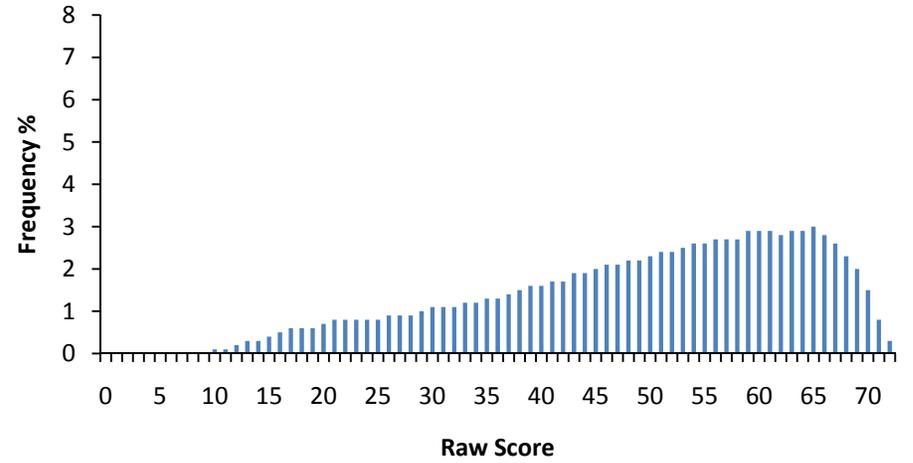
Figure 17–1. 2010 PSSA Raw Score Distributions



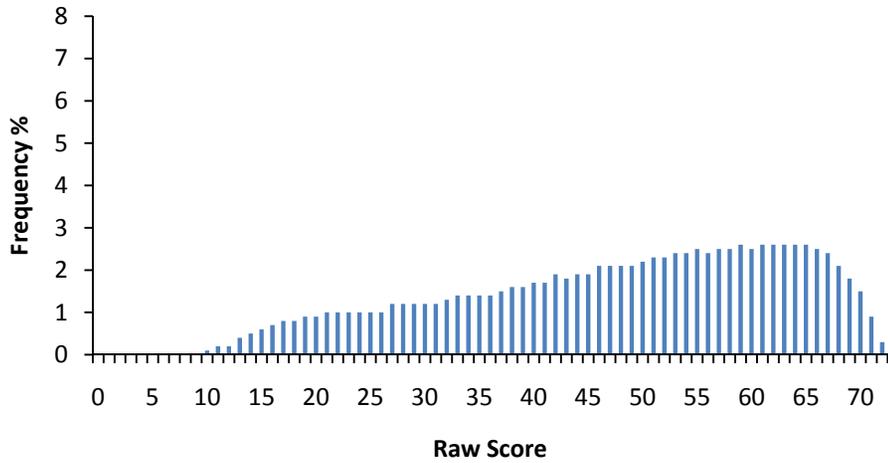
**Mathematics Grade 7**



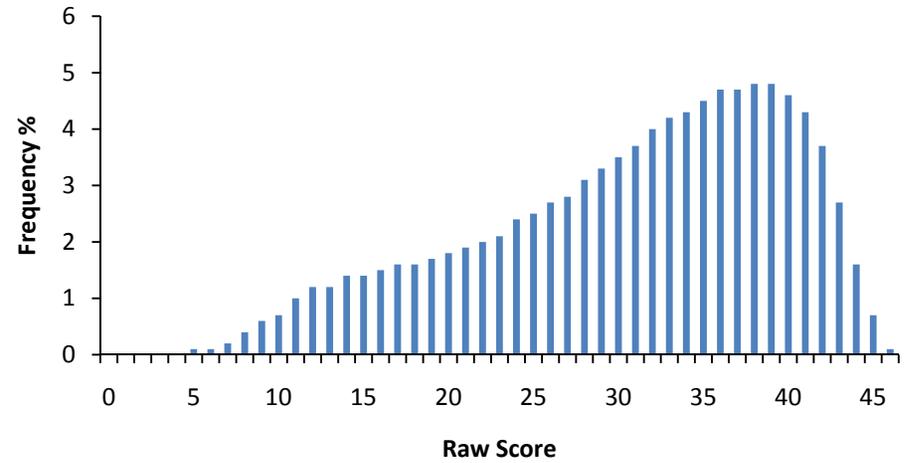
**Mathematics Grade 8**



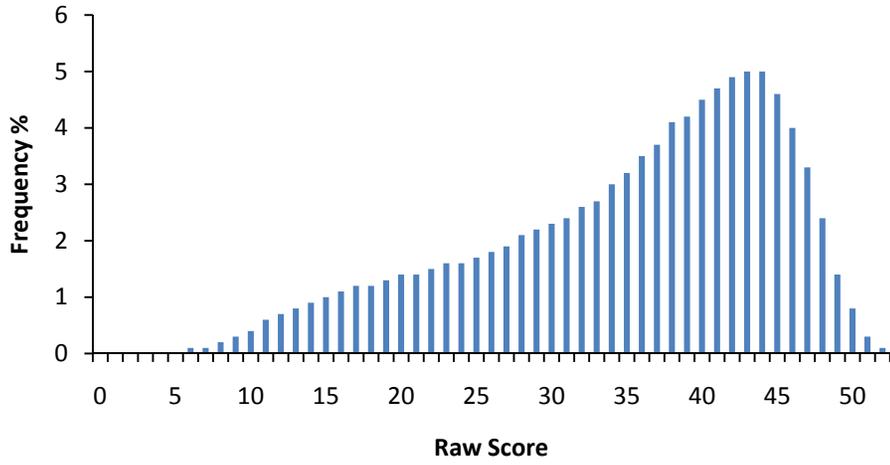
**Mathematics Grade 11**



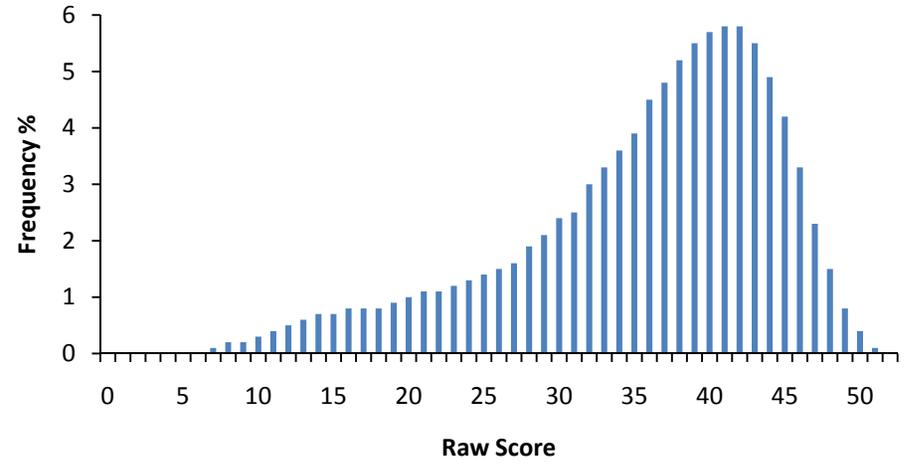
**Reading Grade 3**



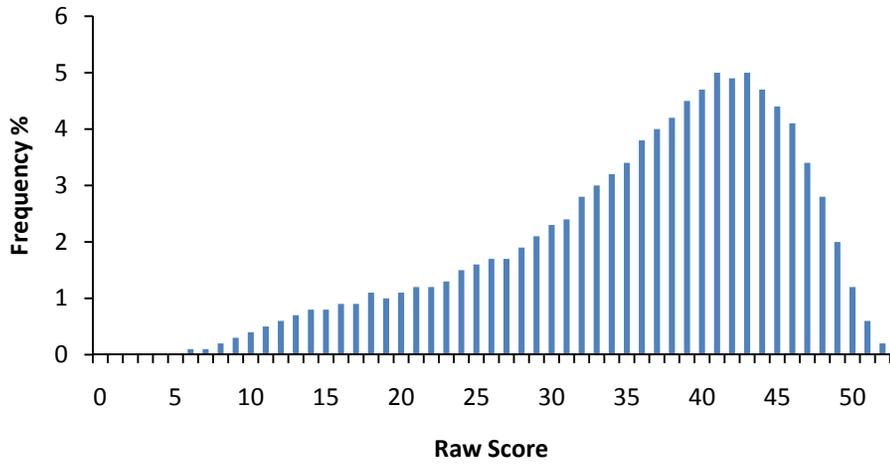
Reading Grade 4



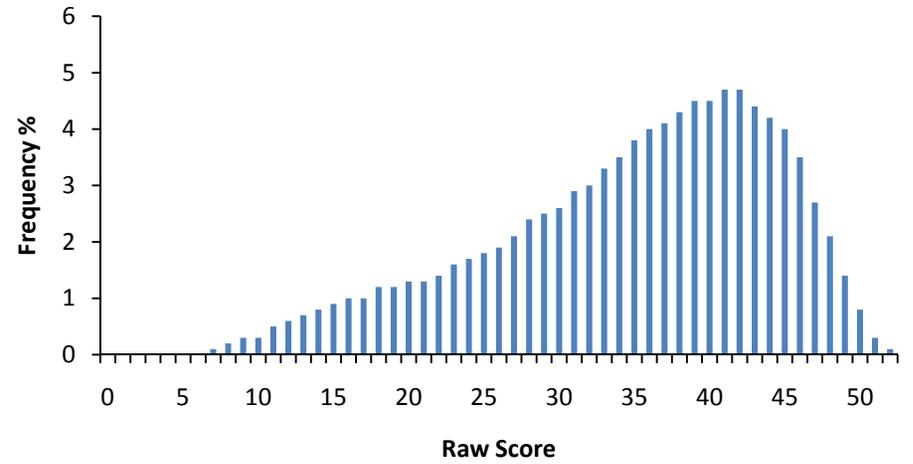
Reading Grade 5



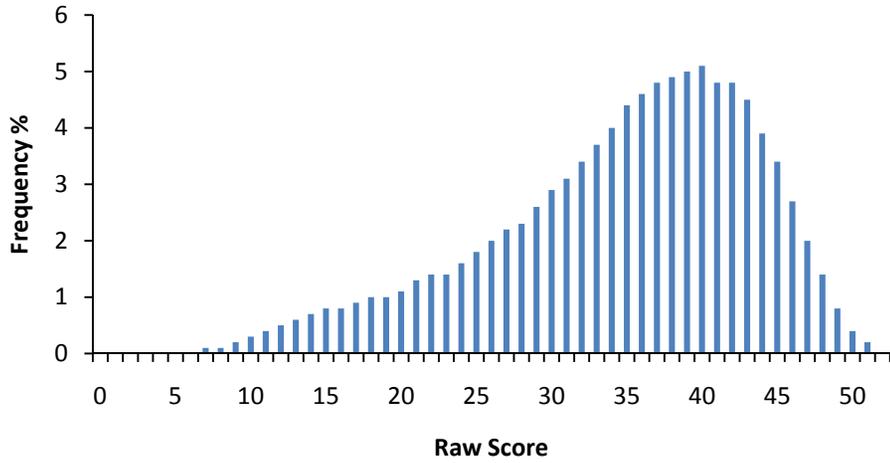
Reading Grade 6



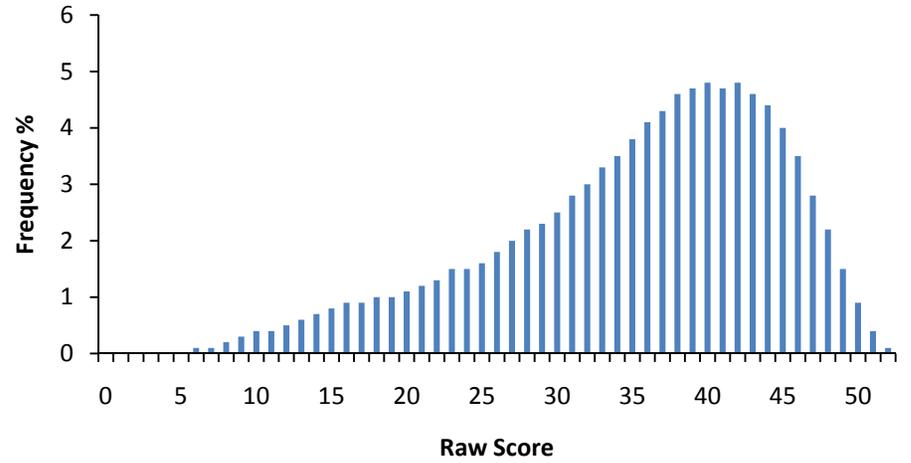
Reading Grade 7



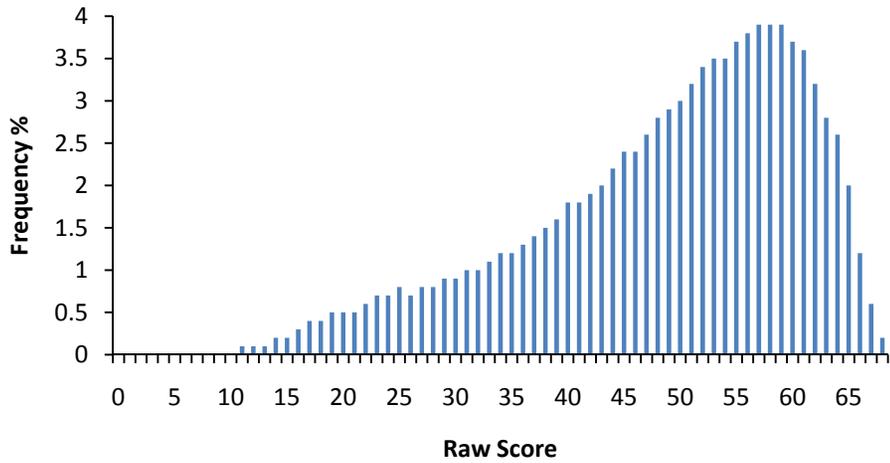
**Reading Grade 8**



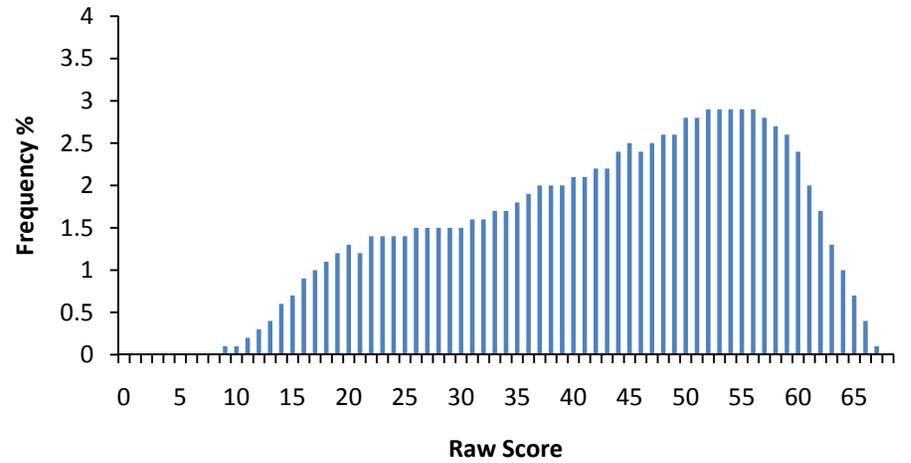
**Reading Grade 11**



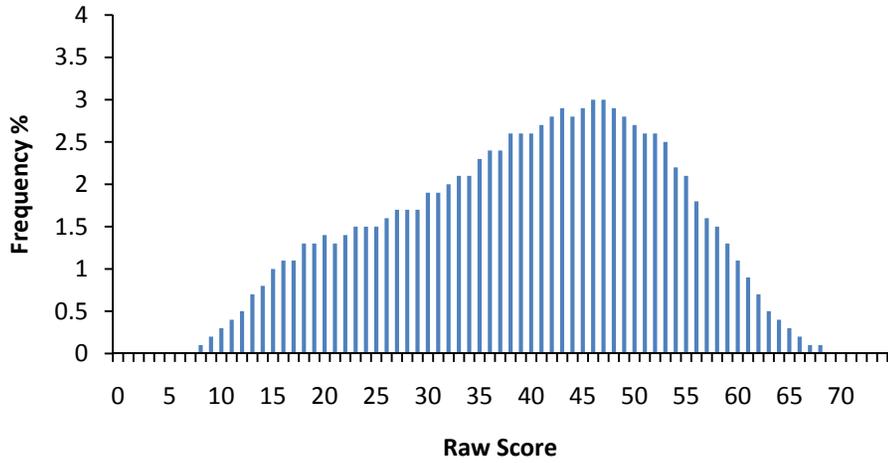
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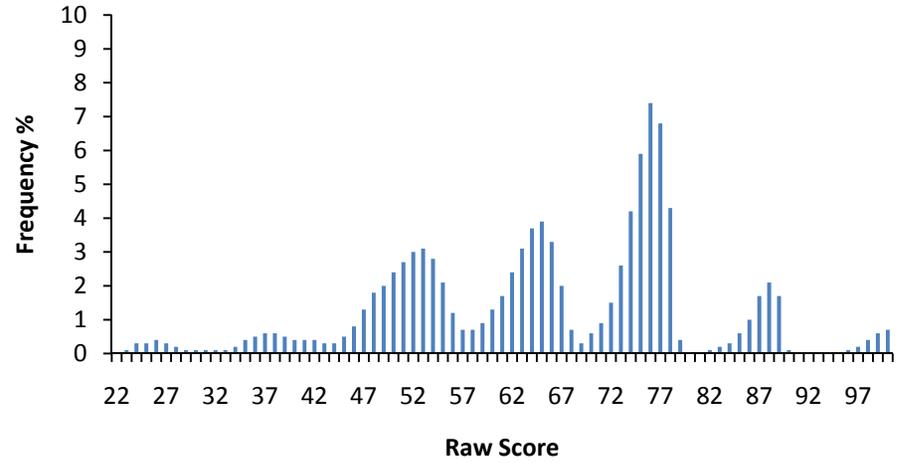
**Science Grade 8**



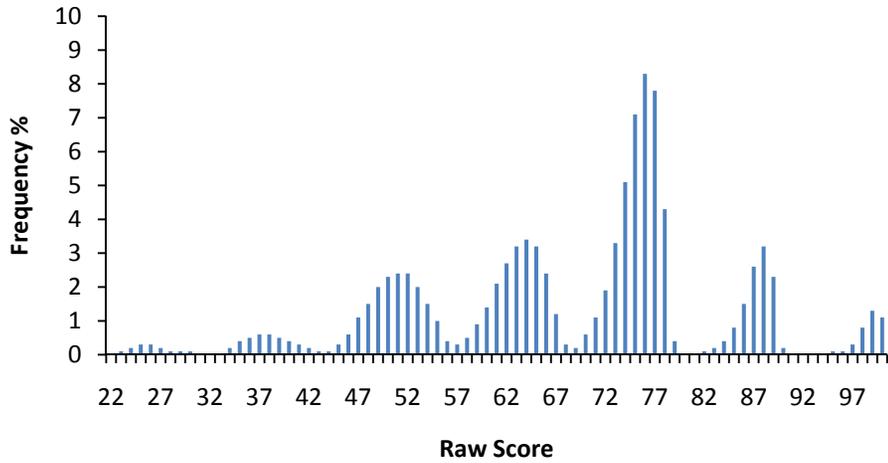
Science Grade 11



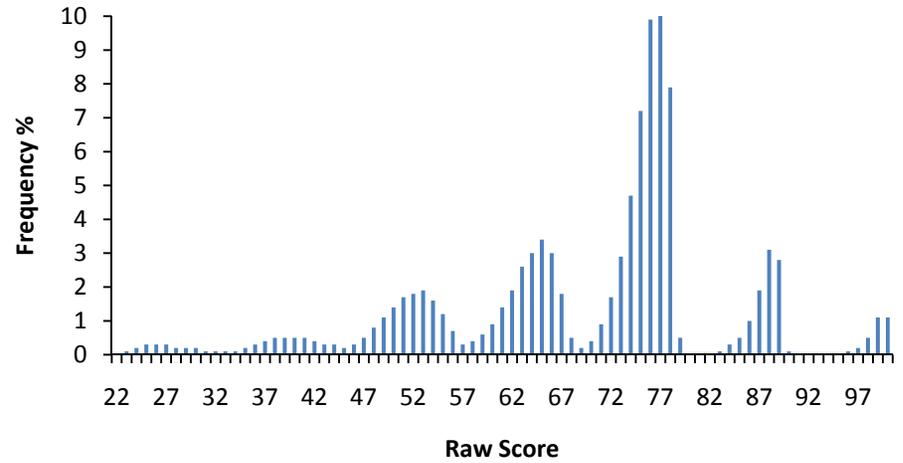
Writing Grade 5



Writing Grade 8



Writing Grade 11





## **Chapter Eighteen: Reliability**

This chapter<sup>27</sup> addresses the reliability of PSSA test scores. According to the *Standards for Educational and Psychological Testing* (AERA, APA, & NCME, 1999), reliability refers to:

the degree to which test scores for a group of test takers are consistent over repeated applications of a measurement procedure and hence are inferred to be dependable and repeatable for an individual test taker; the degree to which scores are free of errors of measurement for a given group (p. 25).

Frisbie (2005) highlighted several elements of this definition. First, reliability is a property of test scores, not a test itself. Many may appreciate this distinction, but in casual usage, individuals frequently make reference to a reliable test. While reliability concerns test scores (and not the test specifically), it is important to appreciate the fact that test scores can be affected by characteristics of the instrument. For example, all other things being equal, tests with more items/points tend to be more reliable than tests with fewer items/points. Second, reliability coefficients are group specific. Reliabilities tend to be higher in populations that are more heterogeneous and lower in populations that are more homogeneous. Consequently, both test length and population heterogeneity should be considered when evaluating reliability.

There are other reliability considerations that may be less evident from the *Standard's* definition, yet are still important for test users to understand. While freedom from measurement error is highlighted in the definition above, reliability is specifically concerned with random sources of error. Indeed, the degree of inconsistency due to random error sources is what determines reliability: less consistency is associated with lower reliability and more consistency is associated with higher reliability. Of course, systematic error sources also exist. These can artificially increase reliability and decrease validity. (Validity is further discussed in Chapter Nineteen.)

Another noteworthy issue is that multiple sources of error exist (e.g., the day of testing, the items used, the raters who score the items). However, most widely-used reliability indices only reflect a single type of error. Consequently, it is important for test users to understand what specific type of error is being considered in a reliability study, and equally, if not more important, what types are not.

Understanding the distinction between relative error and absolute error is also important as many reliability indices only reflect relative error. Relative error is of interest whenever the relative ordering of individuals respective to their test performance is of interest. Understanding examinee rank-order stability is important; however, such stability might be well achieved even when the specific score values are considerably different. When specific score values are considered important (e.g., if cuts cores are used), then absolute error too. Generally, there is more error variance when considering the absolute scores of examinees, which, in turn, suggests lower reliability.

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<sup>27</sup> Please note that some of the material in this chapter is technical in nature.

As the above suggests, reliability is a complex, non-unitary notion that cannot be adequately represented by a single number. There are several reliability indices available, and these may not provide the same results (Frisbie, 2005). The remainder of this chapter covers the following:

- Reliability coefficients and their interpretation
- Unconditional and conditional standard errors of measurement (SEMs and CSEMs)
- Decision consistency
- Rater agreement

### RELIABILITY INDICES

As shown below, the reliability coefficient expresses the consistency of test scores as the ratio of true score variance to total score variance. The total variance contains two components: 1) the variance in true scores, and 2) the variance due to the imperfections in the measurement process. Put differently, total variance equals true score variance plus error variance.<sup>28</sup>

$$\rho_X^2 = \frac{\sigma_T^2}{\sigma_X^2} = \frac{\sigma_T^2}{\sigma_T^2 + \sigma_E^2}$$

Reliability coefficients indicate the degree to which differences in test scores reflect true differences in the attribute being tested rather than random fluctuations. Total test score variance (i.e., individual differences) is partly due to real differences in the attribute (true variance) and partly due to random error in the measurement process (error variance).

Reliability coefficients range from 0.0 to 1.0. If all test score variances were true, the index would equal 1.0. The index will be 0.0 if none of the test score variances were true. Such scores would be pure random noise (i.e., all measurement error). If the index achieved a value of 1.0, scores would be perfectly consistent (i.e., contain no measurement error). Although values of 1.0 are never achieved in practice, it is clear that larger coefficients are more desirable because they indicate that test scores are less influenced by random error. (How big is big enough and how small is too small are issues considered in a later section.)

As noted in the introduction, there are several different indices that can be used to estimate this ratio. One approach is referred to as internal consistency, which is derived from analyzing the performance consistency of individuals over the items within a test. As discussed below, these internal consistency indices do not take into account other sources of error, for example, variations due to random errors associated with the linking process, day-to-day variations (student health, testing environment, etc.), and rater inconsistency.

### COEFFICIENT ALPHA

Although a number of reliability indices exist, perhaps the most frequently reported one for achievement tests is Coefficient Alpha. Consequently, this index is the one reported for the PSSA. Alpha indicates the internal consistency over the responses to a set of items measuring an underlying trait, in this case, academic achievement in subject areas such as mathematics, reading, and science. (The approach taken for writing is slightly different and is described later in this chapter.)

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<sup>28</sup> A covariance term is not required as true scores and error are assumed to be uncorrelated in classical test theory.

Alpha is an internal consistency index. It can be conceptualized as the extent to which an exchangeable set of items from the same domain would result in a similar rank ordering of students. Note that relative error is reflected in this index. Variation in student performance from one sample of items to the next should be of particular concern for any achievement test user. Consider two hypothetical vocabulary tests intended for the same group of students. Each test contains different sets of unique words that are believed to be randomly equivalent, perhaps like the ones shown below:

**Table 18–1. Two Hypothetical Vocabulary Tests**

Test One	Test Two
Abase	Abate
Boon	Bilk
Capricious	Circuitous
Deface	Debase
....	....
Zealous	Zenith

If a representative group of students could take both of these tests, and the correlation between the scores obtained, then that result would represent the parallel forms reliability of the test scores. However, such data-collection designs are impractical in large-scale settings and experimental confounds like fatigue and practice effects are likely to affect the results. Internal-consistency reliability indices arose in part to provide reliability measures using the data from just a single test administration. So, if students only took Test One and the Coefficient Alpha index for those test scores were high, then this would suggest that Test Two would provide a very similar rank ordering of the students if they had taken it instead. If Coefficient Alpha were low, dissimilar rank orderings would likely be observed—again, relative-error variance is reflected in Alpha. (It should also be noted that Coefficient Alpha is algebraically identical to a *Person × Item* design under Generalizability Theory when relative error variance is assumed.)

**Formula**

Consider the following data matrix representing the scores of persons (rows) on items (columns):

**Table 18–2. Person × Item Score ( $X_{pi}$ ) Infinite (Population-Universe) Matrix**

Person	Item			
	1	2	... <i>I</i>	... <i>k</i>
1	$Y_{11}$	$Y_{12}$	... $Y_{1i}$	... $X_{1k}$
2	$Y_{21}$	$Y_{22}$	... $Y_{2i}$	... $X_{2k}$
.....				
.....				
<i>P</i>	$Y_{p1}$	$Y_{p2}$	... $Y_{pi}$	... $X_{pk}$
.....				
.....				
<i>N</i>	$Y_{N1}$	$Y_{N2}$	... $Y_{Ni}$	... $X_{Nk}$

Note. Adapted from Cronbach and Shavelson (2004).

Then, a general computational formula for Alpha is as follows:

$$\alpha = \frac{N}{N-1} \left( 1 - \frac{\sum_{i=1}^N \sigma_{Y_i}^2}{\sigma_X^2} \right),$$

where  $N$  is the number of parts (items or testlets),  $\sigma_X^2$  is the variance of the observed total test scores, and  $\sigma_{Y_i}^2$  is the variance of part  $i$ .

## FURTHER INTERPRETATIONS

### *Rules of Thumb*

What reliability value is considered high enough? What values are considered too low? Although frequently asked for, any rules of thumb for interpreting the magnitude of reliability indices are mostly arbitrary. Another approach is to research the reliabilities from similar testing instruments to see what values are commonly observed. For the PSSA, comparisons to tests of similar lengths that were administered to similar student populations from other large-scale assessment programs would be relevant. For many other state assessments programs, reliabilities in the low 0.90s are usually the highest ever observed and reliabilities in the high 0.80s are very common.

The lower a given reliability coefficient, the greater the potential for over-interpretation of the associated results. As suggested above, there is no firm guideline regarding how low is too low. However, as an informative point of reference, a reliability coefficient of 0.50 would suggest that there is as much error variance as true-score variance in the scores.

### *Is Alpha a Lower Limit to Reliability?*

According to Brennan (1998), “the conventional wisdom that Coefficient Alpha is a lower limit to reliability is based largely on a misunderstanding.” In reflecting on the 50th anniversary of his seminal 1951 article, Cronbach—in Cronbach and Shavelson (2004)—expressed similar misgivings about this conventional wisdom:

one could argue that alpha was almost an unbiased estimate of the desired reliability....the almost in the preceding sentence refers to a small mathematical detail that causes the alpha coefficient to run a trifle lower than the desired value. This detail is of no consequence and does not support the statement made frequently in textbooks or in articles that alpha is a lower value to the reliability coefficient. That statement is justified by reasoning that starts with the definition of the desired coefficient as the expected consistency among measurements that had a higher degree of parallelism than the random parallel concept implied.

The assumptions for three common parallelism models are presented in Table 18–3. Alpha’s assumptions come from the Essentially-Tau Equivalent model, which does not require equal means or equal variances across test parts. Based on this, Brennan (1998) asserts that the lower-limit issue, as conceptualized by many, provides an answer to a question that is of minimal importance. Reframed differently, the goal of selecting a reliability coefficient is not to find the one that provides the highest coefficient, but the one that most accurately reflects the test data under study.

It is important to note that there are factors encountered in practice that may legitimately make Coefficient Alpha an underestimate of reliability. However, there are also factors that might make Coefficient Alpha an overestimate of reliability. Both possibilities are discussed further below and generally arise when the Essentially-Tau Equivalent assumptions are strained.

**Table 18–3. Summary of Expectations/Observable Relationships for Different Parallelism Models**

Relationship	Degree of Measurement Parallelism*		
	Classically Parallel	Essentially-Tau Equivalent	Congeneric
Content Similarity	Yes	Yes	Yes
Equal Means across Parts	Yes	No	No
Equal Variances across Parts	Yes	No	No
Equal Covariances across Parts	Yes	Yes	No
Equal Covariances with Other Variables	Yes	Yes	No

\*Other models exist, but are not considered here due to their limited application in practice.

***Biases That Might Make Alpha an Underestimate of Reliability***

There are factors that might negatively bias Coefficient Alpha, making the apparent reliability lower than it may actually be. Two situations frequently encountered in practice that might cause this include tests that are composed of mixed item types (e.g., MC and OE items) and tests that include a planned stratification of the test items according to topics or subdomains.

Although both situations strictly violate the assumptions on which Coefficient Alpha is derived (i.e., the tests are not based on equal part lengths in the former case and are not randomly parallel in the latter case), neither necessarily guarantees that the reliability will be markedly lower. In the latter case, reliability will be underestimated only when strand items are homogeneous enough for the average covariance within strata to exceed the average covariance between strata. Although both are potential influences for the PSSAs, most of the total test score reliabilities reported in Appendix K are all close to or above 0.90, indicating highly consistent test scores for these instruments. Writing is an exception discussed further below.

***Biases That Might Make Alpha an Overestimate of Reliability***

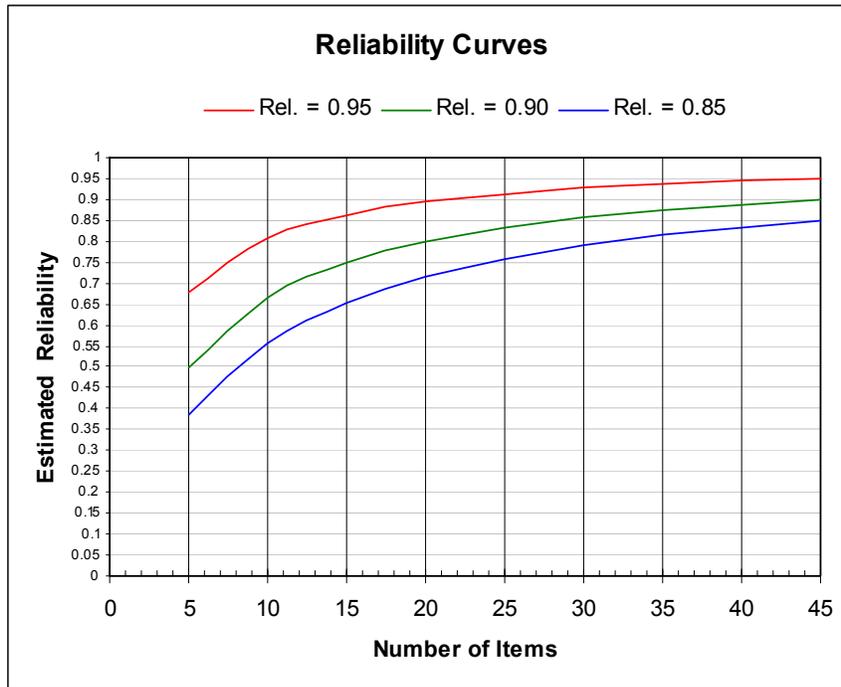
As emphasized in earlier sections, Coefficient Alpha only takes into account measurement error that arises from the selection of items used on a particular test form. There are other sources of random inaccuracy. One is due to the occasion of testing. Other various random conditions that might affect students on any particular testing occasions include illness, fatigue, and anxiety. Also, when a test includes OE items, as the PSSA does, another source that can cause random fluctuation is from the OE item scorers. In a sense, Alpha may be positively biased because it does not take into account these other important sources of random error. Really, any internal consistency reliability index might understate the overall problem of measurement error because such sources or random error are ignored by them.

Another positive bias can occur when items are associated (clustered) with a common stimulus. Item bundles and testlets are other frequently used terms for this situation. One concrete example is when multiple reading comprehension items are associated with a common passage selection. Again, such a situation does not guarantee that the reliability estimate will be markedly affected, but the potential exists.

**Strand Scores**

As noted in the introduction, reliabilities tend to go up in value with an increase in test length and go down in value with a decrease in test length. Figure 18–1 illustrates this relationship for a hypothetical 45-point test with three total score reliabilities: 0.95, 0.90, and 0.85. As an example, the curve for reliability equal to 0.90 suggests that a 10-item strand would be expected to have a score reliability of just over 0.65. The use of the Spearman-Brown prophecy formula assumes all items are exchangeable, which in practice, they may not be. While such a chart may not perfectly model actual strand correlations, the intent is only to illustrate the substantial impact that limited numbers of strand items can have on strand-score reliability. One should not be surprised that strand scores with more points tend to show higher reliability coefficients and those with fewer points tend to show lower reliability coefficients. Further, what is most important for PSSA users to note is that some strand score reliabilities may be too low to warrant interpretation at the individual student level.

**Figure 18–1. Example of the Relationship between Test Length and Reliability**



Note. Tabled values derived using the Spearman-Brown formula.

### **Individual-Level versus Group-Level Scores**

The results presented in this chapter pertain to the reliability of individual scores. Group results (e.g., state and district levels) are also provided on PSSA score reports, but the reliability of those scores are not specifically calculated here. However, as a general rule, it should be noted that the reliabilities of group mean scores are almost always higher (sometimes substantially) than the corresponding reliabilities for individual scores. This is especially important to remember for strand scores because those scores can be quite reliable at the group level, even though their individual reliabilities may be too low. Because the reliability of group mean scores (e.g., school or district means) tends to be higher than that of individual scores, the interpretation of strand scores at these aggregate levels is likely very reasonable in most instances. Even though the reliability for means scores based on only a few items might be adequate, the validity of those same scores might be suspect because use of only few items may not adequately cover the construct of interest. Validity is further discussed in Chapter Nineteen.

### **RELIABILITY OF WRITING SCORES**

An extension of Coefficient Alpha that was derived to specifically fit stratified parallel tests (sometimes called stratified alpha; Cronbach, Schonemann, & McKie, 1965) was used to compute the PSSA writing score reliabilities. This approach is often used when it is believed that Alpha may be yielding a lower coefficient than it should for the reasons noted above. Although originally developed for content-stratified tests, Qualls (1995) demonstrated its utility for mixed-format tests as well when the stratification is based on item type. It may be computed as:

$${}_{strata} \rho_{xx'} = 1 - \frac{\sum \sigma^2_{x_h} (1 - \alpha \rho_{x_h x_{h'}})}{\sigma^2_x}$$

where  $h$  indexes the individual strata.

It should be noted that the reliability of writing assessments (and many other performance-based tests) tend to be lower than reliabilities for other tests. Part of the reason for this is that there tends to be large student-by-task interactions on such assessments. For writing, this means individual student performance fluctuates significantly across different writing prompts, a student may score high on one prompt but much lower on another. In principle, adding more prompts can improve reliability to a more acceptable level. However, this is challenging in practice because of costs, testing time, and student fatigue. In sum, the large student-by-task interaction combined with the limited number of tasks often results in a relatively low reliability for writing assessments.

### **STANDARD ERROR OF MEASUREMENT (SEM)**

The reliability coefficient is a unit-free indicator that reflects the degree to which scores are free of measurement error. It always ranges between 0.0 and 1.0 regardless of the test's scale. Reliability coefficients best reflect the extent to which measurement inconsistencies may be present or absent in a group. However, they are not that useful for helping users interpret test scores. The standard error of measurement (SEM) is another indicator of test score precision that is better suited for determining the effect of measurement inconsistencies for the scores obtained by individual examinees. This is particularly so for Conditional SEMs (CSEM) discussed further below.

### ***Traditional Standard Error of Measurement***

A precise, theoretical interpretation of the SEM is somewhat unwieldy. A beginning point for understanding the concept is as follows. If everyone being tested had the same true score,<sup>29</sup> there would still be some variation in observed scores due to imperfections in the measurement process, such as random differences in attention during instruction or concentration during testing and the sampling of test items. The standard error is defined as the standard deviation<sup>30</sup> of the distribution of observed scores for students with identical true scores. Because the SEM is an index of the random variability in test scores in actual score units, it represents very important information for test score users.

The SEM formula is provided below:

$$SEM = SD\sqrt{1 - reliability}$$

It indicates the value of the SEM depends on both the reliability coefficient and the standard deviation of test scores. If the reliability were equal to 0.00 (the lowest possible value) the SEM would be equal to the standard deviation of the test scores. If test reliability were equal to 1.00 (the highest possible value) the SEM would be 0.0. In other words, a perfectly reliable test has no measurement error (Harvill, 1991). Additionally, the value of the SEM takes the group variation (i.e., score standard deviation) into account. Consider that an SEM of 3 on a 10-point test would be very different than an SEM of 3 on a 100-point test.

### ***Traditional Standard Error of Measurement Confidence Intervals***

The SEM is an index of the random variability in test scores in actual score units, which is why it has such great utility for test score users. SEMs allow statements regarding the precision of individual tests scores. SEMs help place ‘reasonable limits’ (Gulliksen, 1950) around observed scores through construction of an approximate score band. Often referred to as confidence intervals, these bands are constructed by taking the observed scores,  $X$ , and adding and subtracting a multiplicative factor of the SEM. As an example, students with a given true score will have observed scores that fall between +/-1 SEM about two-thirds of the time.<sup>31</sup> For +/-2 SEM confidence intervals, this increases to about 95 percent.

### ***Further Interpretations***

#### **ONE STANDARD ERROR OF MEASUREMENT FOR ALL TEST SCORES**

The SEM approach described above only provides a single numerical estimate for constructing the confidence intervals for examinees regardless of their score level. In reality however, such confidence intervals vary according to a student’s score. Consequently, care should be taken using the SEM for students with extreme scores. (In the next sections, an alternate approach is described that conditions the SEM on a student’s score estimate.)

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<sup>29</sup> True score is the score the person would receive if the measurement process were perfect.

<sup>30</sup> The standard deviation of a distribution is a measure of the dispersion of the observations. For the normal distribution, about 16 percent of the observations are more than one standard deviation above the mean.

<sup>31</sup> Some prefer the following interpretation: if a student were tested an infinite number of times, the +/-1 SEM confidence intervals constructed for each score would capture the student’s true score 68 percent of the time.

## **GROUP SPECIFIC**

As noted in the introduction, reliabilities are group specific. The same is true for SEMs because both score reliabilities and score standard deviations vary across groups.

## **RAW SCORE METRIC**

The SEM approach is calculated using raw scores, and as such, the resulting confidence interval bands are on the raw score metric. Error bands on the scaled score metric are considered in the next section.

## **TYPE OF ERROR REFLECTED**

The interpretation of the SEM should be driven by the type of score reliability that underpins it. So, the PSSA SEMs involve the same source of error relevant to internal consistency indices. As noted earlier, a precise technical explanation of the SEM (and resulting confidence intervals) can be unwieldy. Because of this, score users are often provided less complex interpretations.

One simpler description sometimes used is that a confidence interval represents the possible score range that one would observe if a student could be tested twice with the same instrument. Taking the same test on a different day implies the only source of random error being considered is related to the occasion of testing, such as a student might be sleepier one day than another, or may be sick, or did not get a good breakfast. There is a reliability index that captures this source of random error, and it is referred to as the test-retest reliability coefficient. This is not the type of reliability computed for the PSSAs. When internal consistency reliability estimates are used, such an explanation blurs the fact that random error based on the occasion of testing is not considered.

When SEMs are derived from internal consistency reliability estimates, a better approach is to describe the confidence interval as providing reasonable bounds for the range of scores that a student might receive if he or she took an equivalent version of the test; that is, the student took a test that covered exactly the same content but included a different set of items (if an infinite number of tests with equivalent content were taken, the student's true score will lie within the constructed confidence intervals 68 percent of the time). As an example, if the PSSA score was 1750 and the SEM band was 1700 to 1800, then a student would be likely to receive a score somewhere between 1700 and 1800 if a different version of the test had been taken.

## **RESULTS AND OBSERVATIONS**

Coefficient Alpha results and associated (traditional) SEMs for various PSSA scores are documented in Appendix K. Values were derived using the PSSA final data file (see Chapter Nine). The results are organized by subject area and grade. Each table also breaks out the various reporting strands and groups of interest (i.e., the total student population, gender and ethnic groups, English language learners (ELL), students with individualized education plan (IEP), and the economically disadvantaged (ED)). The statistics reported include number of points possible (Pts.), number of items (Len.), number of students tested (N), mean number of score points received (Mean), standard deviation of test scores (SD), reliability (r), traditional standard error of measurement (SEM), and item types (Items) used to determine each score.

Note that these tables report the standard deviations of observed scores. Assuming normally distributed scores, one would expect about two-thirds of the observations to be within one standard deviation of the mean. An estimate of the standard deviation of the true scores can be computed as:

$$\hat{\sigma}_T = \sqrt{\hat{\sigma}_x^2 - \hat{\sigma}_x^2(1 - \hat{\rho}_{xx})}$$

The results are historically consistent with past PSSA reliability results. The overall test score reliability values are excellent, with many in the low 0.90s, for mathematics, reading, and science. Writing reliabilities were lower, as they have been historically. (Possible reasons for this were discussed earlier.) It was also noted that reliabilities tend to go up in value with an increase in test length and population heterogeneity and go down in value with a decrease in test length and more homogeneous populations. Across the grades and subjects tabled in Appendix K, reliabilities for the sub-strands tended to follow these same trends. That is, strands with more items tended to show higher reliability coefficients. Also, groups exhibiting more variability in test scores tended to have higher reliability coefficients. Perhaps the most significant result pertains to an earlier caution (i.e., that some strand score reliabilities may be too low to warrant interpretation at the individual student level). Once again, there is no firm guideline regarding how low is too low. The lower a given reliability coefficient, the greater the potential for over-interpretation. As a point of reference, a reliability coefficient of 0.50 would suggest that there is as much error variance as true-score variance in the scores. It should be noted that the reliability of group mean scores (e.g., school or district means) tends to be higher than that of individual scores, suggesting interpretation of strand scores at these aggregate levels is likely reasonable.

### **RASCH CONDITIONAL STANDARD ERROR OF MEASUREMENT**

The CSEM also indicates the degree of measurement error but does so in scaled-score units and varies as a function of a student's actual scaled score. Therefore, the CSEM may be especially useful in characterizing measurement precision in the neighborhood of a score level used for decision-making—such as cut scores for identifying students who meet a performance standard.

Technically, when a Rasch model is applied, the CSEM at any given point on the ability continuum is defined as the reciprocal of the square root of the test information function derived from the Rasch scaling model:

$$CSEM(\hat{\theta}) = \frac{1}{\sqrt{I(\hat{\theta})}}$$

where,  $CSEM(\hat{\theta})$  is the conditional standard error of measurement and  $I(\hat{\theta})$  is the test information function. Test information depends on the sum of the corresponding information functions for the test items. Item information depends on each item's difficulty and conditional item score variance. The formula above utilizes the Rasch ability ( $\theta$ ) metric. The conditional standard error on the scaled score (SS) metric is determined by simply multiplying the  $CSEM(\hat{\theta})$  by the slope (multiplicative constant,  $m$ ) of the linear transformation equation used to convert the Rasch ability estimates to scaled scores:

$$CSEM(SS) = CSEM(\hat{\theta}) * m$$

Chapter Fourteen provides the linear transformation formulas for each PSSA test.

### ***Rasch Conditional Standard Error of Measurement Confidence Intervals***

CSEMs also allow statements regarding the precision of individual tests scores. And like SEMs, they help place reasonable limits around observed scaled scores through construction of an approximate score band. The confidence intervals are constructed by adding and subtracting a multiplicative factor of the CSEM and may be interpreted as described in the earlier section.

#### ***Further Interpretations***

##### **DIFFERENT CONDITIONAL STANDARD ERROR OF MEASUREMENT FOR DIFFERENT TEST SCORES**

The CSEM approach provides different numerical estimates for constructing the confidence intervals for examinees depending on their specific score level. The magnitude of the CSEM values is U-shaped with larger CSEM values associated with lower and higher scores.

##### **GROUP SPECIFIC**

Assuming reasonable model-data fit—as explored in Chapter Twelve—the Rasch based CSEMs (conditioned on score level) should not vary across groups.

##### **SCALED SCORE METRIC**

The CSEM and associated confidence interval bands are on the scaled score metric.

##### **TYPE OF ERROR REFLECTED**

The SEMs documented on the PSSA score reports are the Rasch-based conditional standard errors of measurement described above. These are provided by the WINSTEPS scaling program described in Chapter Twelve. As noted earlier, these CSEMs are based on the concept of statistical information. For the purpose of providing a simpler explanation of SEMs to test score users, the earlier description of SEMs framed using the idea of internal consistency reliability was provided in the PSSA score report interpretive documents.<sup>32</sup> Score report content is considered in greater detail in Chapter Sixteen.

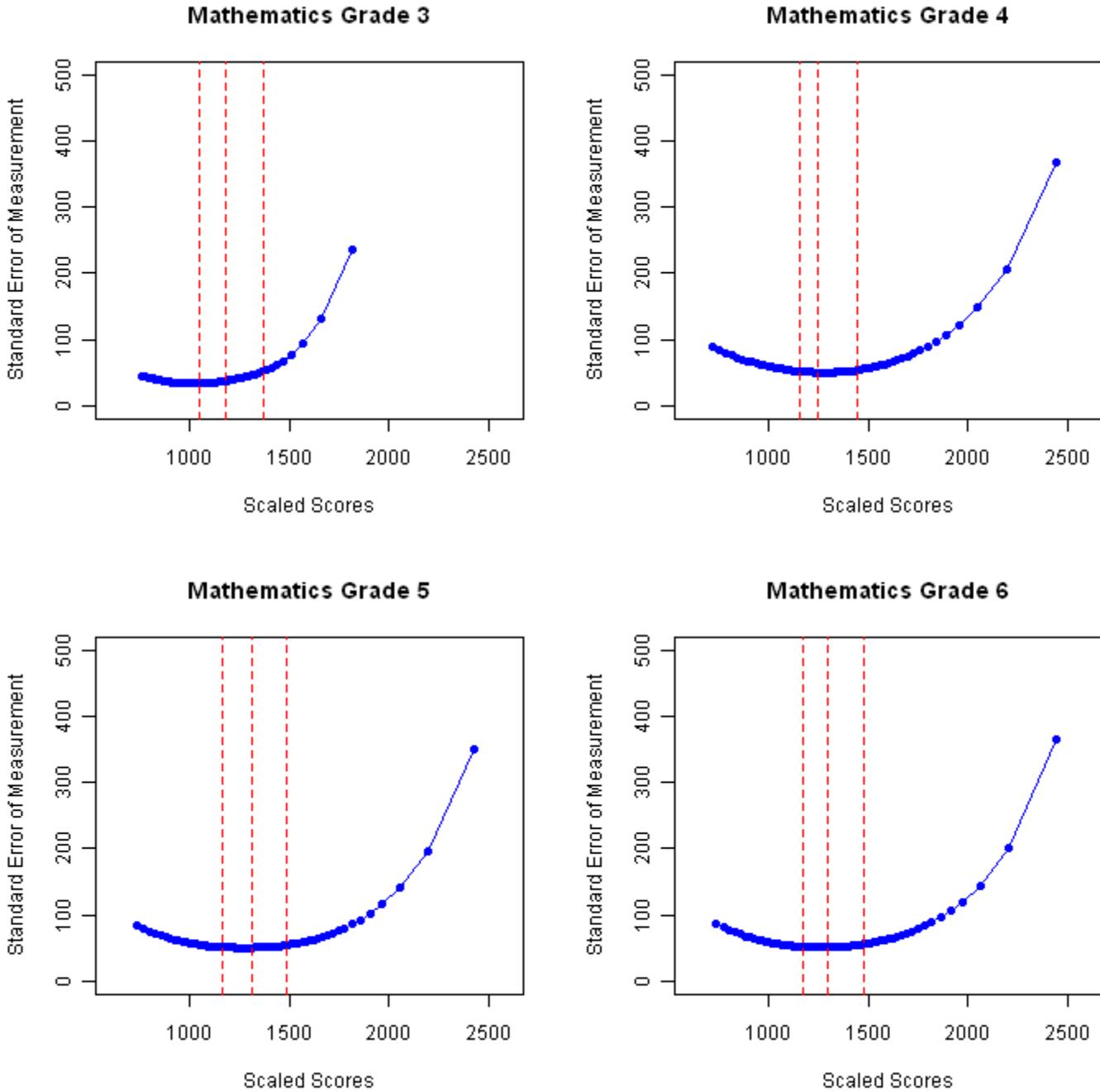
### **RESULTS AND OBSERVATIONS**

Figure 18–2 shows the Rasch CSEMs associated with each scaled score level. (This information is also provided in tabular form in Appendix N.) Values were derived using the calibration data file described in Chapter Nine. The values are fairly consistent across a noticeably large range of the scaled scores, as demonstrated by the relatively flat bottoms of most plots. The values increase at both extremes (i.e., at smaller and larger scaled scores) giving these figures their typical U-shaped pattern. (Only the SEMs for scores greater than the lowest observable scaled scores [LOSS] are shown in the figures; consequently, the complete U-shape does not appear in most plots.) The three red-dashed lines represent the Basic, Proficient, and Advanced scaled score cuts, respectively, moving from lower to higher scaled score values. SEM values at the cut score lines were generally associated with smaller SEM values, indicating more precise measurement occurs at these cuts. The plots for writing are somewhat irregular in shape, which is likely due to the differential weighting that occurs for portions of these tests.

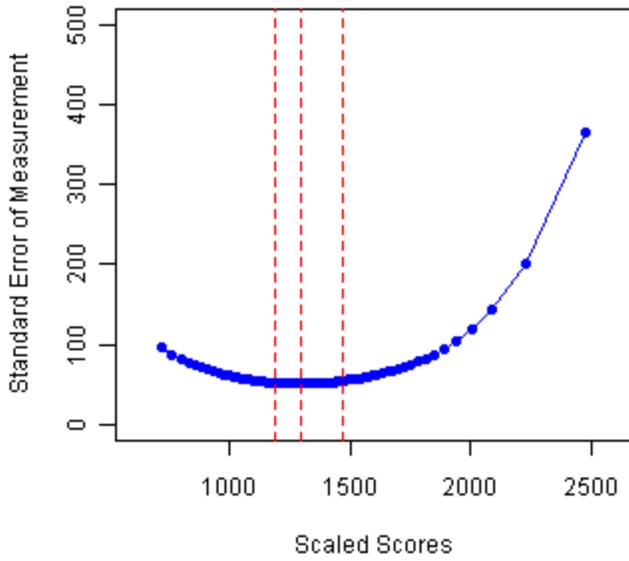
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<sup>32</sup> Because IRT CSEMs are based on statistical information, it is questionable whether they account for error variance due to items. However, it seems difficult to construct a simple explanation of IRT CSEMs for the general public.

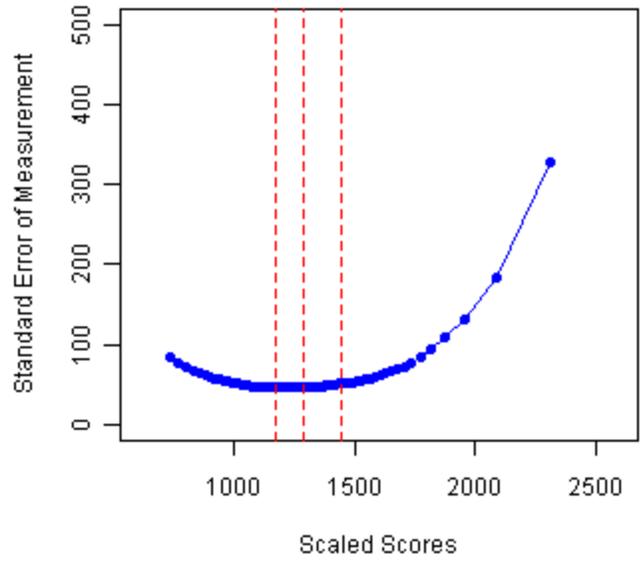
Figure 18–2. Conditional Standard Error Plots for Each Grade and Subject



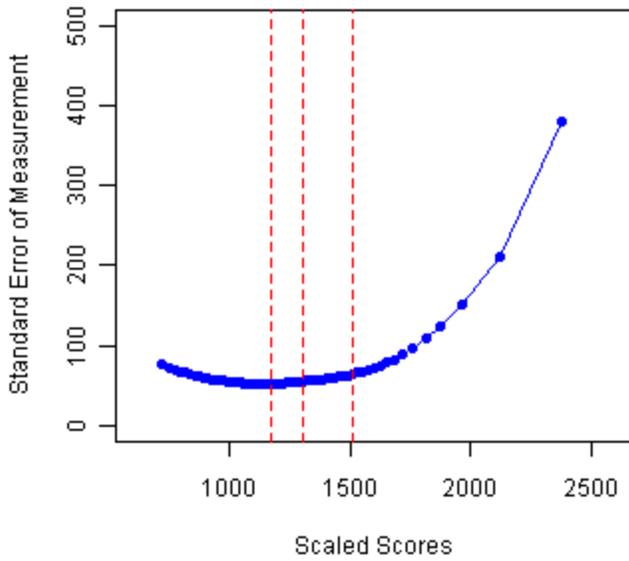
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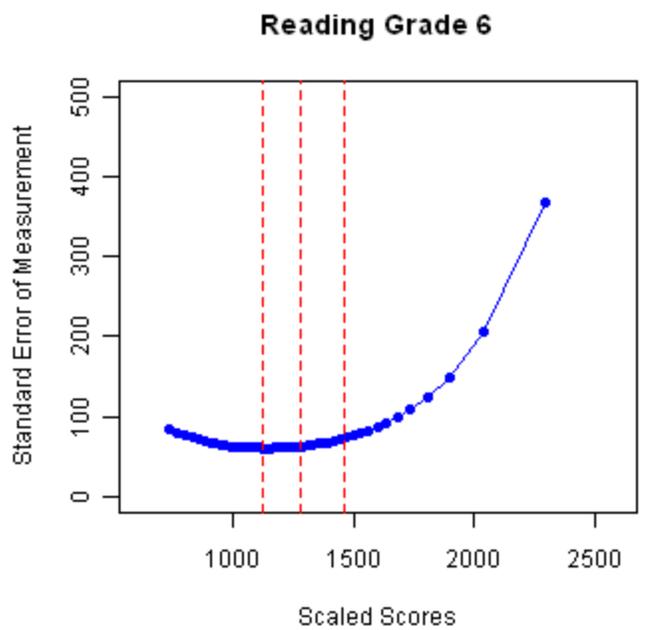
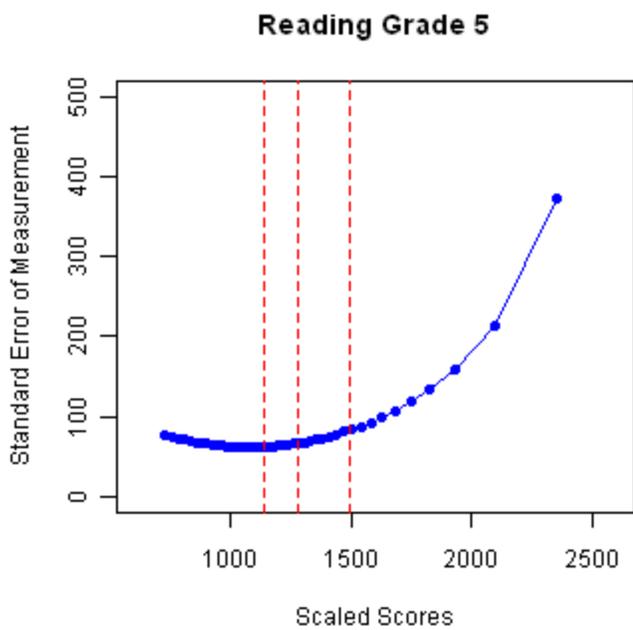
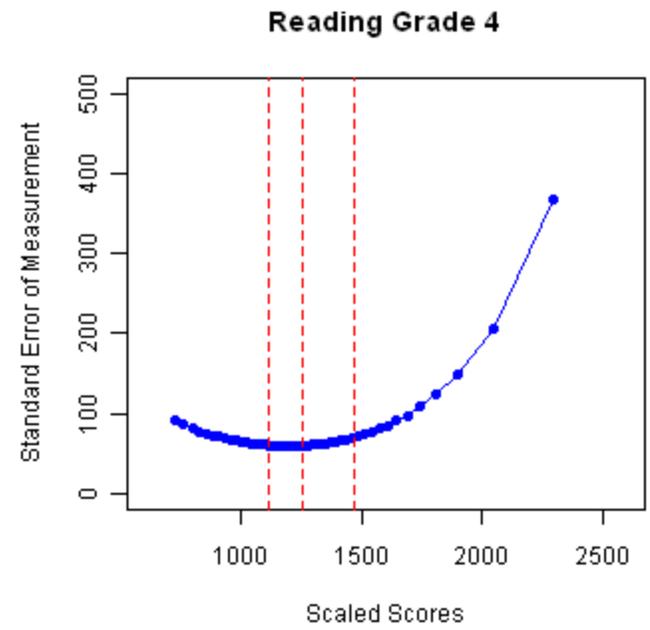
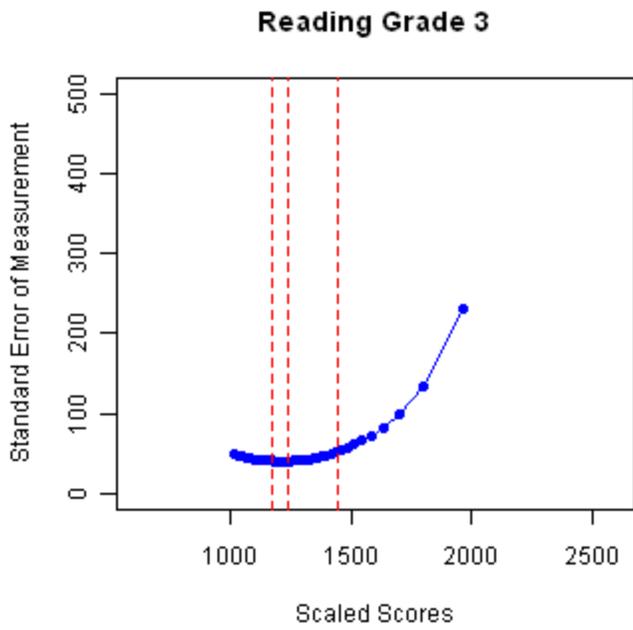


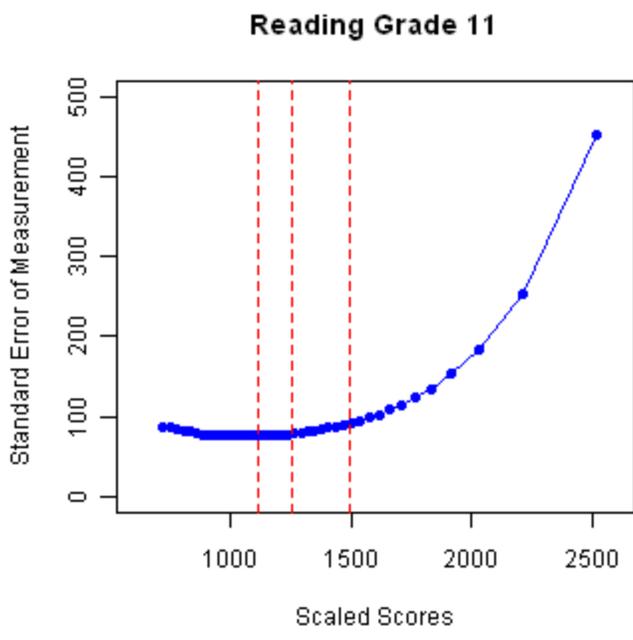
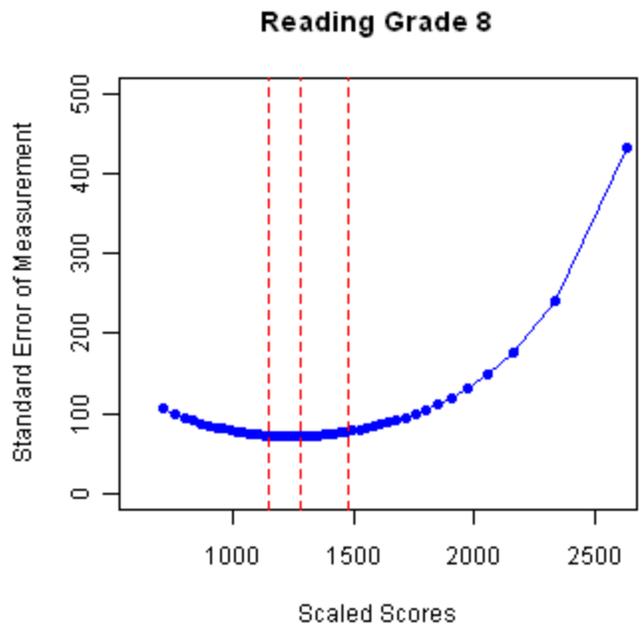
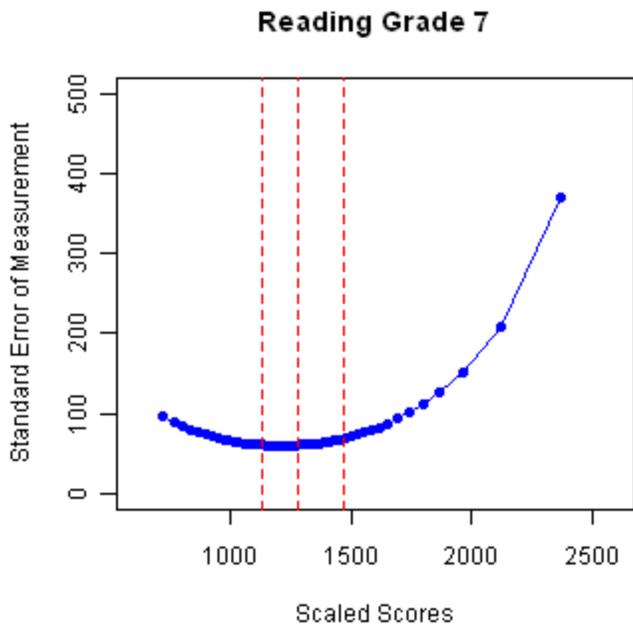
**Mathematics Grade 8**



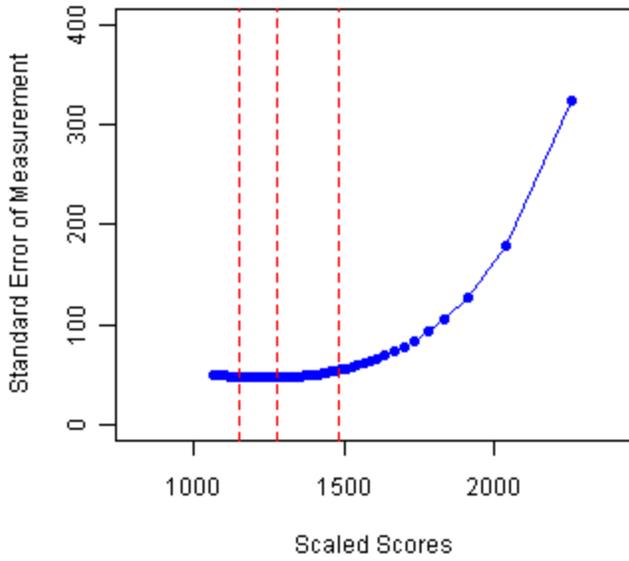
**Mathematics Grade 11**



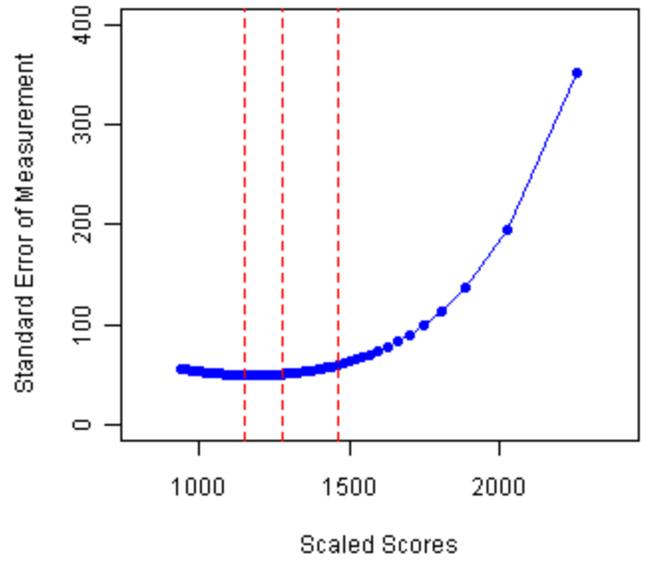




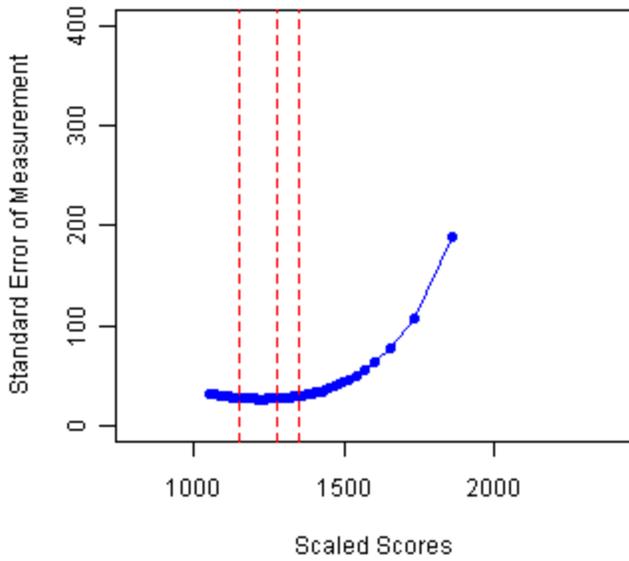
**Science Grade 4**



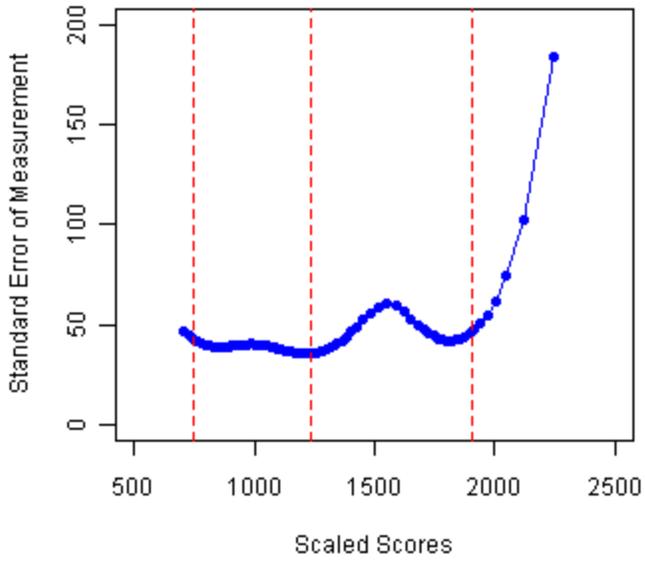
**Science Grade 8**



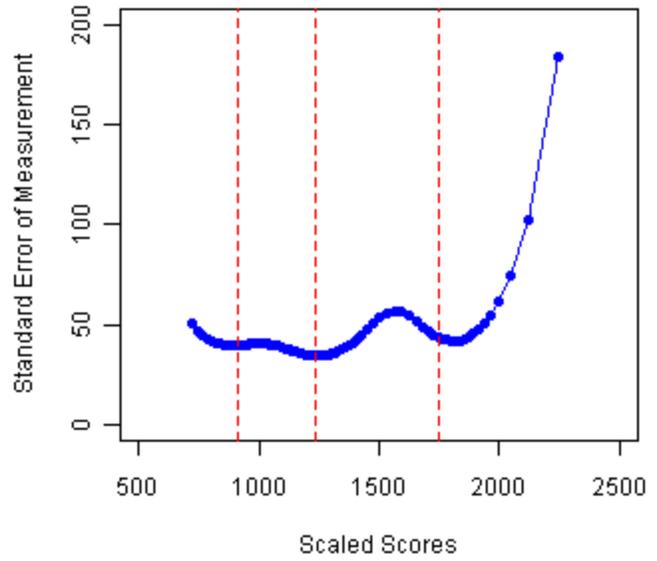
**Science Grade 11**



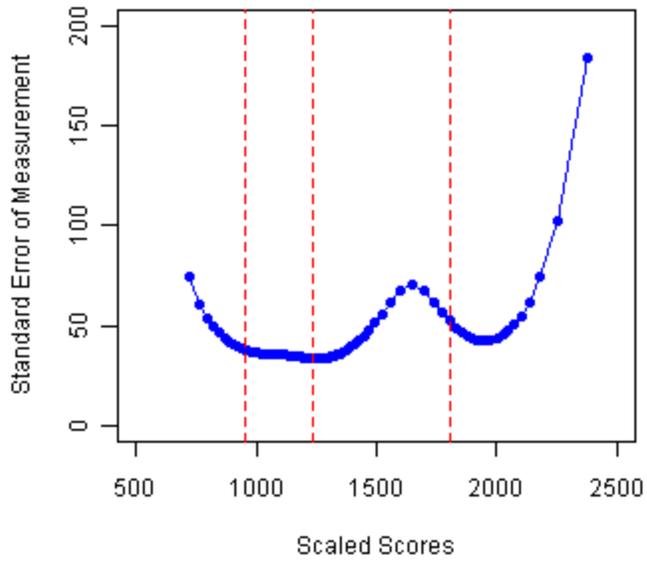
**Writing Grade 5**



**Writing Grade 8**



**Writing Grade 11**



**DECISION CONSISTENCY**

Classification consistency refers to the degree with which the achievement level for each student can be replicated upon retesting using an equivalent form (Huynh, 1976). In a standards-based testing program there should be great interest in knowing how accurately students are classified into performance categories. In contrast to Coefficient Alpha that is concerned with the relative rank-ordering of students, it is the absolute values of student scores that are important in decision consistency.

Decision consistency answers the question: What is the agreement between the classifications based on two non-overlapping, equally difficult forms of the test. If two parallel forms of the test were given to the same students, the consistency of the measure would be reflected by the extent that the classification decisions made from the first set of test scores matched the decisions based on the second set of test scores. Consider Tables 18–4 and 18–5 below:

**Table 18–4. Pseudo-Decision Table for Two Hypothetical Categories**

		TEST ONE		
		LEVEL I	LEVEL II	MARGINAL
TEST TWO	LEVEL I	$\varphi_{11}$	$\varphi_{12}$	$\varphi_{1\bullet}$
	LEVEL II	$\varphi_{21}$	$\varphi_{22}$	$\varphi_{2\bullet}$
	MARGINAL	$\varphi_{\bullet 1}$	$\varphi_{\bullet 2}$	1

**Table 18–5. Pseudo-Decision Table for Four Hypothetical Categories**

		TEST ONE				
		LEVEL I	LEVEL II	LEVEL III	LEVEL IV	MARGINAL
TEST TWO	LEVEL I	$\varphi_{11}$	$\varphi_{12}$	$\varphi_{13}$	$\varphi_{14}$	$\varphi_{1\bullet}$
	LEVEL II	$\varphi_{21}$	$\varphi_{22}$	$\varphi_{23}$	$\varphi_{24}$	$\varphi_{2\bullet}$
	LEVEL III	$\varphi_{31}$	$\varphi_{32}$	$\varphi_{33}$	$\varphi_{34}$	$\varphi_{3\bullet}$
	LEVEL IV	$\varphi_{41}$	$\varphi_{42}$	$\varphi_{43}$	$\varphi_{44}$	$\varphi_{4\bullet}$
	MARGINAL	$\varphi_{\bullet 1}$	$\varphi_{\bullet 2}$	$\varphi_{\bullet 3}$	$\varphi_{\bullet 4}$	1

If a student is classified as being in one category based on Test One’s score, how probable would it be that the student would be reclassified as being in the same category if he or she took Test Two (a non-overlapping, equally difficult form of the test)?

The proportions of correct decisions,  $\varphi$ , for two and four categories are computed by the following two formulas, respectively:

$$\varphi = \varphi_{11} + \varphi_{22}$$

$$\varphi = \varphi_{11} + \varphi_{22} + \varphi_{33} + \varphi_{44}$$

It is the sum of the diagonal entries—that is, the proportion of students classified by the two forms into exactly the same achievement level—that would signify the overall consistency.

Since it is not feasible to repeat PSSA testing in order to estimate the proportion of students who would be reclassified in the same performance levels, a statistical model needs to be imposed on the data to project the consistency of classifications solely using data from the available administration (Hambleton & Novick, 1973). Although a number of procedures are available, two well-known methods were developed by Hanson and Brennan (1990) and Livingston and Lewis (1995) utilizing specific True Score Models. These approaches are fairly complex and the cited sources contain details regarding the statistical models used to calculate decision consistency from the single PSSA administration.

### ***Further Interpretations***

Several factors might affect decision consistency. One important factor is the reliability of the scores. All other things being equal, more reliable test scores tend to result in more similar reclassifications. Another factor is the location of the cut score in the score distribution. More consistent classifications are observed when the cut scores are located away from the mass of the score distribution. For example, when scores are close to being normally distributed, the mass is concentrated in the middle of the distribution, and, thus, classifications tend to become more consistent when cut scores go up from 70 percent to 80 percent to 90 percent, or, alternatively, go down from 30 percent to 20 percent to 10 percent. The number of performance levels is also a consideration. Consistency indices for four performance levels should be lower than those based on two categories. This is not surprising since classification using four levels would allow more opportunity to change achievement levels. Hence, there would be more classification errors with four achievement levels, resulting in lower consistency indices. Lastly, some research has found that results from the Hanson and Brennan (1990) method on a dichotomized version of a complex assessment yields similar results to the Livingston and Lewis (1995) method (Stearns & Smith, 2007).

## **RESULTS AND OBSERVATIONS**

The results for the overall consistency across all four performance levels as well as for the dichotomies created by the three cut scores are presented in Table 18–6. The tabled values, derived using the program *BB-Class* (Brennan, 2004), show that consistency values across the two methods are generally very similar. The Hanson and Brennan values are slightly higher (by about 0.01) in most cases. However, writing shows slightly larger differences across the two methods.

Across all subject areas, the overall decision consistency ranged from the low 0.60s to the mid 0.80s. The overall consistency in reading was slightly lower than the other subject areas on average. It should be noted that consistency indices for the four performance levels should be lower than those based on two categories (discussed above).

Dichotomous decisions using the Basic cuts generally have the highest consistency values and exceeded 0.90 in all cases. The next highest values, on average, are associated with the Proficient and Advanced cuts, respectively, for mathematics and reading. In writing, the latter two are reversed, while in science the results are about even.

**Table 18–6. Decision Consistency Results**

	<b>Grade</b>	<b>Method</b>	<b>Overall</b>	<b>BBas/Bas</b>	<b>Bas/Prof</b>	<b>Prof/Adv</b>
<b>Mathematics</b>	<b>3</b>	HB	0.74	0.98	0.94	0.82
		LL	0.71	0.98	0.94	0.80
	<b>4</b>	HB	0.78	0.96	0.93	0.88
		LL	0.78	0.96	0.93	0.88
	<b>5</b>	HB	0.76	0.95	0.91	0.89
		LL	0.76	0.95	0.91	0.89
	<b>6</b>	HB	0.77	0.95	0.92	0.89
		LL	0.77	0.95	0.92	0.89
	<b>7</b>	HB	0.79	0.95	0.93	0.90
		LL	0.79	0.95	0.93	0.90
	<b>8</b>	HB	0.78	0.95	0.92	0.90
		LL	0.78	0.95	0.92	0.90
	<b>11</b>	HB	0.75	0.92	0.91	0.91
		LL	0.74	0.92	0.91	0.90
<b>Reading</b>	<b>3</b>	HB	0.73	0.94	0.91	0.87
		LL	0.72	0.94	0.91	0.86
	<b>4</b>	HB	0.71	0.94	0.91	0.86
		LL	0.70	0.94	0.91	0.85
	<b>5</b>	HB	0.63	0.93	0.88	0.82
		LL	0.62	0.93	0.88	0.81
	<b>6</b>	HB	0.69	0.93	0.90	0.86
		LL	0.69	0.93	0.89	0.85
	<b>7</b>	HB	0.71	0.94	0.90	0.86
		LL	0.70	0.94	0.90	0.85
	<b>8</b>	HB	0.74	0.95	0.92	0.86
		LL	0.73	0.95	0.91	0.85
	<b>11</b>	HB	0.68	0.92	0.89	0.86
		LL	0.67	0.92	0.88	0.85
<b>Science</b>	<b>4</b>	HB	0.78	0.96	0.93	0.88
		LL	0.78	0.96	0.93	0.88
	<b>8</b>	HB	0.73	0.92	0.90	0.90
		LL	0.73	0.92	0.90	0.90
	<b>11</b>	HB	0.71	0.92	0.88	0.91
		LL	0.71	0.92	0.88	0.90

	Grade	Method	Overall	BBas/Bas	Bas/Prof	Prof/Adv
<b>Writing</b>	<b>5</b>	HB	0.84	0.99	0.87	0.98
		LL	0.77	0.98	0.80	0.98
	<b>8</b>	HB	0.80	0.98	0.90	0.92
		LL	0.70	0.97	0.84	0.89
	<b>11</b>	HB	0.79	0.99	0.92	0.89
		LL	0.70	0.98	0.88	0.84

*Note.* Results derived using PSSA final data file (see Chapter Nine).

## RATER AGREEMENT

Because open-ended items are included on the PSSAs, another source of random error is related to the scorers of those items. Frisbie (2005) noted that “test score reliability differs from scorer reliability” and that “the need for one kind of estimate cannot be satisfied by the other.” Additionally, the data most easily obtainable that captures this information comes from the “10 percent read behinds” collected during the scoring process (see Chapter Eight for a description). Partly because of the way that this data is obtained and reported (i.e., it is not a ratio of true score variance over observed score variance), the term rater agreement is used here, not rater reliability or inter-rater reliability as these terms are somewhat misleading as explained above.

### *Further Interpretations*

For the PSSAs, both within-year and across-year rater consistency are available. As noted earlier, the linking process adjusts for across-year changes (see Chapter Sixteen). As part of the data collected for that process, additional across-year rater consistency data is available for consideration.

## RESULTS AND OBSERVATIONS

Within-year rater agreement information is provided in Chapter Eight. This information is reformatted in Tables 18–7 through 18–10 for PSSA mathematics, reading, science, and writing OE items, respectively. In addition, the percentages awarded to each score point are also presented in these tables. As seen from these tables, the inter-rater agreement percentages range from 82 percent to 95 percent for mathematics, 74 percent to 90 percent for reading, 79 percent to 96 percent for science, and 77 percent to 83 percent for writing. Mathematics had validity ranging from 84 percent to 99 percent; reading had validity ranging from 75 percent to 96 percent; and science had validity ranging from 83 percent to 98 percent. (Validity is discussed further in Chapter Eighteen.) The ranges above are similar to prior results for the PSSA.

Across-year data are presented in Tables 18–11 through 18–13 for mathematics, reading, and science. Note that for these subjects, data are only available for the designated OE core anchor items. The number of responses (N), the old score and new score means, and the Pearson correlations are tabled. Mathematics correlations range from the high 0.80s to high 0.90s. Reading correlations range from the low 0.60s to low 0.80s. Science correlations range from the high 0.60s to mid 0.80s. Correlations for the writing prompt scores are reported in Table 18–14 and range from the high 0.60s to mid 0.70s. The correlation ranges above are similar to prior results for the PSSAs.

**Table 18–7. Inter-Rater Agreement and Percentage Awarded for Each Score Point for OE Items—Mathematics**

Grade	Item	Inter-Rater Agreement %		Validity	Percentage Awarded for Each Score Point %					
		Exact	Adjacent		0	1	2	3	4	B/NS
3	1	93	7	98	8	24	19	26	23	0
	2	95	5	97	2	7	15	28	47	1
	3	87	13	97	9	20	25	25	21	0
4	1	91	9	99	8	14	23	23	31	2
	2	93	7	91	10	12	20	44	11	3
	3	92	8	88	8	18	14	35	22	2
5	1	82	18	92	14	22	24	22	16	2
	2	84	16	89	11	36	20	22	8	3
	3	92	8	98	6	24	27	29	12	2
6	1	95	5	99	8	13	19	27	30	3
	2	85	15	84	12	32	17	20	15	4
	3	85	15	87	10	39	31	11	6	3
7	1	86	14	94	23	34	21	12	7	3
	2	84	15	88	16	10	22	28	18	5
	3	83	16	89	4	31	30	19	13	3
8	1	89	11	95	18	36	10	25	8	3
	2	85	15	94	11	34	24	13	13	5
	3	85	15	92	4	12	38	26	17	3
11	1	89	11	96	28	24	15	13	15	5
	2	88	12	94	9	11	34	20	19	7
	3	87	13	91	15	37	13	17	7	10

Note. B = blank; NS = non-scoreable

**Table 18–8. Inter-Rater Agreement and Percentage Awarded for Each Score Point for OE Items—Reading**

Grade	Item	Inter-Rater Agreement %		Validity	Percentage Awarded for Each Score Point %				
		Exact	Adjacent		0	1	2	3	B/NS
3	1	74	26	77	9	46	36	8	1
	2	75	24	87	6	45	41	7	1
4	1	82	17	88	9	21	35	34	1
	2	83	16	79	15	23	31	25	6
	3	84	16	81	3	36	46	14	1
	4	86	14	90	17	38	29	15	1
5	1	82	18	81	5	43	38	13	2
	2	85	15	84	5	43	37	14	1
	3	90	10	88	15	23	50	11	1
	4	84	16	84	5	36	53	6	1
6	1	77	22	75	5	15	54	22	4
	2	78	21	83	10	20	48	21	1
	3	78	22	77	6	40	30	23	1
	4	78	22	78	7	37	37	17	1
7	1	79	21	75	3	27	58	11	2
	2	78	22	80	6	26	51	17	1
	3	75	25	80	11	32	37	20	1
	4	76	24	85	16	22	30	30	1
8	1	78	22	86	3	26	52	19	1
	2	77	23	86	9	34	41	15	1
	3	81	19	95	2	23	56	18	1
	4	81	19	96	6	22	54	16	2
11	1	86	14	76	3	16	56	23	2
	2	76	23	80	5	42	35	14	5
	3	78	22	81	4	18	50	25	3
	4	76	24	78	3	18	53	23	3

Note. B = blank; NS = non-scoreable.

**Table 18–9. Inter-Rater Agreement and Percentage Awarded for Each Score Point for OE Items—Science**

Grade	Item	Inter-Rater Agreement %		Validity	Percentage Awarded for Each Score Point %			
		Exact	Adjacent		0	1	2	B/NS
4	1	93	7	96	16	26	58	1
	2	94	6	98	2	26	70	1
	3	91	9	96	27	34	36	3
	4	87	13	95	15	40	44	1
	5	91	9	98	6	58	34	1
8	1	89	11	94	50	31	16	2
	2	90	10	98	39	35	24	3
	3	87	13	90	16	40	38	5
	4	86	14	92	39	35	22	3
	5	88	12	95	23	51	24	2
11	1	87	13	83	50	29	10	11
	2a	95	5	95	72	10	5	12
	2b	84	16	90	24	40	24	12
	3a	83	17	85	57	24	7	12
	3b	84	16	85	46	33	9	12
	4	85	15	91	22	36	34	8
	5	83	17	88	30	40	21	9
	6	82	18	85	39	33	18	10
	7a	79	21	88	32	33	25	10
	7b	96	4	88	79	10	0	10
	8	90	10	93	43	33	15	9
9	86	14	92	40	37	12	11	

*Note.* B = blank; NS = non-scoreable. For more information regarding validity, see the section on Handscoring Validity Process in Chapter Eight.

**Table 18–10. Inter-Rater Agreement and Percentage Awarded for Each Score Point for OE Items—Writing**

Grade	Promp	Inter-Rater Agreement %		Percentage Awarded for Each Score Point %				NT/NS
		Exact	Adjacent	1	2	3	4	
5	1 (Com)	82	18	5	37	51	7	1
	1 (R&E)	79	21	6	38	49	7	1
	2 (Com)	81	19	5	39	49	6	1
	2 (R&E)	78	22	6	39	49	6	1
8	1 (Com)	79	21	3	27	58	10	1
	1 (R&E)	77	23	4	28	57	10	1
	2 (Com)	79	21	5	33	52	9	1
	2 (R&E)	77	23	5	32	52	10	1
11	1 (Com)	82	18	6	26	58	7	3
	1 (R&E)	80	20	6	26	57	8	3
	2 (Com)	83	17	4	22	63	9	3
	2 (R&E)	82	18	4	22	62	9	3

Note. NT = not taken; NS = non-scoreable.

**Table 18–11. Mathematics Mean Scores and Correlations**

Grade	Item ID	N	2009 Mean	2010 Mean	Corr.
3	1	997	2.86	2.79	0.96
	2	1000	2.42	2.43	0.93
4	1	1000	2.46	2.43	0.94
	2	1000	2.43	2.50	0.93
5	1	1000	1.99	2.04	0.89
	2	1000	1.81	1.87	0.90
6	1	995	2.47	2.46	0.98
	2	990	1.85	1.85	0.93
7	1	1000	1.45	1.37	0.91
	2	999	1.89	1.93	0.87
8	1	999	1.64	1.64	0.95
	2	1000	2.25	2.23	0.92
11	1	999	2.15	2.15	0.94
	2	993	1.49	1.44	0.92

**Table 18–12. Reading Mean Scores and Correlations**

<b>Grade</b>	<b>Item ID</b>	<b>N</b>	<b>2009 Mean</b>	<b>2010 Mean</b>	<b>Corr.</b>
<b>3</b>	1	998	1.46	1.47	0.62
<b>4</b>	1	998	1.68	1.66	0.78
	2	1000	1.39	1.36	0.82
<b>5</b>	1	999	1.57	1.55	0.74
	2	1000	1.58	1.59	0.61
<b>6</b>	1	998	1.74	1.78	0.77
	2	997	1.62	1.71	0.72
<b>7</b>	1	989	1.70	1.71	0.66
	2	995	1.74	1.63	0.81
<b>8</b>	1	997	1.73	1.70	0.72
	2	998	1.75	1.74	0.73
<b>11</b>	1	990	1.87	1.94	0.74
	2	991	1.91	1.88	0.74

**Table 18–13. Science Mean Scores and Correlations**

<b>Grade</b>	<b>Item ID</b>	<b>N</b>	<b>2009 Mean</b>	<b>2010 Mean</b>	<b>Corr.</b>
<b>4</b>	1	994	1.30	1.26	0.70
	2	996	1.26	1.27	0.79
<b>8</b>	1	993	0.84	0.84	0.85
	2	998	1.00	1.01	0.73
<b>11</b>	1	996	0.50	0.56	0.69
	2	991	0.83	0.78	0.69

**Table 18–14. Writing Mean Scores and Correlations**

<b>Grade</b>	<b>Item ID</b>	<b>N</b>	<b>2009 Mean</b>	<b>2010 Mean</b>	<b>Corr.</b>
<b>5</b>	1-A	1000	2.65	2.54	0.75
	1-B	1000	2.66	2.50	0.72
	2-A	997	2.64	2.50	0.72
<b>8</b>	2-B	997	2.67	2.48	0.69
	1-A	999	2.70	2.59	0.73
	1-B	999	2.76	2.58	0.67
	2-A	998	2.70	2.60	0.74
	2-B	998	2.70	2.60	0.72
<b>11</b>	1-A	994	2.73	2.65	0.75
	1-B	994	2.80	2.67	0.73
	2-A	996	2.84	2.78	0.74
	2-B	996	2.90	2.79	0.70



## **Chapter Nineteen: Validity**

As defined in the *Standards for Educational and Psychological Testing* (AERA, APA, & NCME, 1999), validity refers to “the degree to which evidence and theory support the interpretation of test scores entailed by proposed uses of tests” (p. 9). The *Standards* provides a framework for describing the sources of evidence that should be considered when evaluating validity. These sources include evidence based on 1) test content, 2) response processes, 3) the internal structure of the test, 4) the relationships between test scores and other variables, and 5) the consequences of testing. In addition, when IRT models are used to analyze assessment data, validity considerations related to those processes should also be explored.

The validity process involves the collection of a variety of evidence to support the proposed test score interpretations and uses. The entire technical report describes the technical aspects of the PSSA tests in support of their score interpretations and uses. Each of the previous chapters contributes important evidence components that pertain to score validation: test development, test administration, test scoring, item analysis, Rasch calibration, scaling, linking, score reporting, and reliability. This chapter is used to summarize and synthesize the evidence based on the *Standards*’ framework. The purposes and intended uses of PSSA test scores are reviewed first and then each type of validity evidence is addressed in turn.

### **PURPOSES AND INTENDED USES OF THE PSSA**

The *Standards* emphasize that validity pertains to how test scores are used. To help contextualize the evidence that will be presented below, the purposes of the PSSA will be reviewed first. As stated in the Chapter One, the three main purposes of the PSSA include the following:

1. Measuring how well students acquire the knowledge and skills described in the *Pennsylvania Assessment Anchor Content Standards* (Assessment Anchors) as defined by the Eligible Content for Mathematics, Reading, and Science and the Academic Content Standards for Writing.
2. Providing information on school and district accountability.
3. Improving curricular and instructional practices in order to help students reach proficiency in the Academic Standards.

### **EVIDENCE BASED ON TEST CONTENT**

Test content validity evidence for the PSSA rests greatly on establishing a link between each piece of the assessment (i.e., the items) and what the students should know and be able to do as required by the Assessment Anchors, Eligible Content, and/or the Academic Content Standards. The PSSA tests are intended to measure students’ knowledge and skills described in the Assessment Anchors as defined by the Eligible Content for Mathematics, Reading, and Science and the Academic Content Standards for Writing. Thus the evidence supporting the alignment among the PSSA tasks, the Assessment Anchors as defined by the Eligible Content, and the Academic Content Standards should be provided.

Lane (1999) suggests taking the following steps to support the content validity of the PSSA:

- Evaluate the degree to which the PSSA test specifications represent and align with the knowledge and skills described in the Assessment Anchors as defined by the Eligible Content for Mathematics, Reading, and Science and the Academic Content Standards for Writing in terms of both content and cognitive processes.
- Evaluate the alignment between the PSSA items and test specifications to ensure representativeness.
- Evaluate the extent to which the curriculum aligns with the Assessment Anchors. If some contents are not included in the curriculum, then low scores on PSSA should not be interpreted as meaning that instruction was ineffective.
- Conduct content reviews of the PSSA items using a panel of content experts to see whether they measure the intended construct or are the sources of construct-irrelevant variance.
- Conduct fairness reviews of the items to avoid issues related to a specific subpopulation.
- Evaluate procedures for administration and scoring such as the appropriateness of instructions to examinees, time limit for the assessment, and training of raters.
- Submit operational tests to third-party, independent reviews (i.e., Achieve.org).

Chapters Two through Eight of this report present a considerable amount of evidence related to test content. As described in these chapters, all the PSSA items were developed and aligned with the PSSA Assessment Anchors and Eligible Content for Mathematics, Reading, and Science and the Academic Content Standards for Writing following well-established procedures. After the items were developed, they underwent multiple rounds of content and bias reviews. After they were field tested, they were reviewed with respect to their statistical properties. Items selected for the operational assessment had to pass content, psychometric, and PDE reviews. Tests were administered according to standardized procedures with allowable accommodations.

Some efforts made to ensure content validity are summarized below:

- DRC used Webb's (1999) Depth of Knowledge (DOK) model to ensure the PSSA items aligned with the Assessment Anchors as defined by the Eligible Content and the Academic Content Standards in terms of both content and cognitive levels.
- DRC established detailed test and item/passage development specifications and ensured the items were sufficient in number and adequately distributed across content and levels of cognitive complexity and difficulty.
- DRC and WestEd selected qualified item writers and provided training to help ensure they wrote high-quality items.
- Each newly-developed item was first reviewed by content specialists and editors at DRC and/or WestEd to make sure that all items measured the intended Assessment Anchors, as defined by the Eligible Content for Mathematics, Reading, and Science and the Academic Content Standards for Writing. Appropriateness for the intended grade was also considered, as well as depth of knowledge, graphics, grammar/punctuation, language demand, and distractor reasonableness.

- Before field testing, the test items were submitted to content committees (composed of Pennsylvania educators) for review using, but not limited to, the following categories:
  - Overall quality and clarity
  - Anchor, eligible content, and/or standard alignment
  - Grade-level appropriateness
  - Difficulty level
  - Depth of knowledge
  - Appropriate sources of challenge (e.g., unintended content and skills)
  - Correct answer
  - Quality of distractors
  - Graphics
  - Appropriate language demand
  - Freedom from bias
- The items were also submitted to a Bias, Fairness, and Sensitivity Committee for review. This committee reviewed items for issues related to diversity, gender, and other pertinent factors.
- Items passing all the prior hurdles were tried out in a field test event. Several statistical analyses were conducted on the field test data including classical item analyses, distractor analyses, and differential item functioning (DIF). Items were once again carefully reviewed by DRC staff and a committee of Pennsylvania teachers with respect to their statistical characteristics. DIF was used to detect test items that might bias test scores for particular groups. Empirical investigation of DIF strengthens the validity evidence related to score interpretations for students in particular groups by eliminating potential sources of construct-irrelevant variance as such, DIF results might be better considered as internal structure validity evidence.
- The PSSA tests were administered according to standardized procedures with allowable accommodations. Students were given ample time to complete the tests (i.e., there were no speededness issues).
- As shown in Chapter Eight, the raters for open-ended (OE) items were carefully recruited and well trained. Their scoring was monitored throughout the scoring session to ensure that an acceptable level of scoring accuracy was maintained.

### **EVIDENCE BASED ON RESPONSE PROCESSES**

Response-process evidence is used to examine the extent to which the cognitive skills and processes employed by students match that identified in the test developer's defined construct domains for all students and for each subgroup. Think-aloud procedures or cognitive labs can be used to collect this type of evidence. In addition, when an assessment includes OE items, an examination of the extent to which the raters interpret and apply the scoring criteria accurately when assigning scores to students' responses on OE items also provides validity of the response-processes evidence.

For the PSSA science tests, DRC conducted a science cognitive lab study to gather relative information about the thinking processes students used to solve science scenario items. The use of the cognitive lab helped ensure that the intended response processes were employed by students. (No cognitive lab studies have been conducted for the PSSA mathematics, reading, or writing assessments because these assessments do not have scenarios.)

For all the PSSA tests, well-organized scorer training and subsequent monitoring of rating accuracy helped ensure that raters strictly followed the scoring criteria and that no rubric-unrelated features significantly affected their scoring.

## **EVIDENCE BASED ON INTERNAL STRUCTURE**

As described in the *Standards* (1999), internal-structure evidence refers to the degree to which the relationships between test items and test components conform to the construct on which the proposed test interpretations are based. For each PSSA test, one total test score as well as strand scores are reported (see Chapter Sixteen for more information about PSSA scores). Several dimensionality studies were conducted in order to provide internal-structure evidence relating to the use of both types of scores.

### ***Item-Test Correlations***

Item-test correlations are reviewed in Chapter Eleven. All values are positive and of acceptable magnitude.

### ***Item Response Theory Dimensionality***

Last year, IRT dimensionality analyses were conducted for the 2009 PSSA mathematics, reading, and science tests using WINSTEPS's principle components analyses on response residuals. Results showed that the PSSA tests were essentially unidimensional, providing evidence supporting the validity of using the total scores to estimate student's overall ability in each subject area. See the 2009 PSSA Technical Report (DRC, 2009) for details. Since this year's tests were developed based on the same test specifications, it is reasonable to assume that they have the same dimensionality structure. Hence, no additional analyses were conducted this year.

### ***Strand Correlations***

Correlations and disattenuated correlations between strand scores within each subject area are presented below. Values were derived from the PSSA final data file (see Chapter Nine). This data can also provide information on score dimensionality that is part of internal-structure evidence. As noted in Chapter Three, the PSSA mathematics tests have five domains (denoted by M.A, M.B, M.C, M.D, and M.E), the PSSA reading tests have two domains (denoted by R.A and R.B), the PSSA science tests have four domains (denoted by S.A, S.B, S.C, and S.D), and the PSSA writing tests include two domains (denoted by W.A and W.B).

For each grade, Pearson's correlation coefficients between these domains are reported in Tables 19–1a through 19–1g. The inter-correlations between the strands within the content areas are positive and generally range from moderate to high in value.

**Table 19–1a. Correlations between Mathematics and Reading Strands for Grade 3 (2010)**

	<b>M.A</b>	<b>M.B</b>	<b>M.C</b>	<b>M.D</b>	<b>M.E</b>	<b>R.A</b>	<b>R.B</b>
<b>M.A</b>							
<b>M.B</b>	<i>0.69</i>						
<b>M.C</b>	<i>0.61</i>	<i>0.50</i>					
<b>M.D</b>	<i>0.75</i>	<i>0.58</i>	<i>0.52</i>				
<b>M.E</b>	<i>0.65</i>	<i>0.51</i>	<i>0.48</i>	<i>0.55</i>			
<b>R.A</b>	0.68	0.55	0.52	0.62	0.49		
<b>R.B</b>	0.65	0.53	0.50	0.60	0.46	<i>0.81</i>	

Note. Within-subject correlations are in italics.

**Table 19–1b. Correlations between Mathematics, Reading, and Science Strands for Grade 4 (2010)**

	<b>M.A</b>	<b>M.B</b>	<b>M.C</b>	<b>M.D</b>	<b>M.E</b>	<b>R.A</b>	<b>R.B</b>	<b>S.A</b>	<b>S.B</b>	<b>S.C</b>	<b>S.D</b>
<b>M.A</b>											
<b>M.B</b>	<i>0.74</i>										
<b>M.C</b>	<i>0.63</i>	<i>0.57</i>									
<b>M.D</b>	<i>0.68</i>	<i>0.57</i>	<i>0.51</i>								
<b>M.E</b>	<i>0.68</i>	<i>0.60</i>	<i>0.54</i>	<i>0.56</i>							
<b>R.A</b>	0.70	0.61	0.59	0.57	0.61						
<b>R.B</b>	0.66	0.58	0.56	0.56	0.57	<i>0.80</i>					
<b>S.A</b>	0.69	0.62	0.58	0.55	0.62	0.78	0.71				
<b>S.B</b>	0.61	0.54	0.52	0.49	0.54	0.69	0.63	<i>0.79</i>			
<b>S.C</b>	0.62	0.56	0.53	0.49	0.54	0.69	0.63	<i>0.79</i>	<i>0.71</i>		
<b>S.D</b>	0.57	0.53	0.49	0.43	0.48	0.60	0.55	<i>0.70</i>	<i>0.63</i>	<i>0.64</i>	

**Table 19–1c. Correlations between Mathematics, Reading, and Writing Strands for Grade 5 (2010)**

	<b>M.A</b>	<b>M.B</b>	<b>M.C</b>	<b>M.D</b>	<b>M.E</b>	<b>R.A</b>	<b>R.B</b>	<b>W.A</b>	<b>W.B</b>
<b>M.A</b>									
<b>M.B</b>	<i>0.75</i>								
<b>M.C</b>	<i>0.69</i>	<i>0.61</i>							
<b>M.D</b>	<i>0.75</i>	<i>0.63</i>	<i>0.59</i>						
<b>M.E</b>	<i>0.68</i>	<i>0.55</i>	<i>0.58</i>	<i>0.59</i>					
<b>R.A</b>	0.68	0.58	0.60	0.61	0.57				
<b>R.B</b>	0.68	0.57	0.60	0.60	0.60	<i>0.80</i>			
<b>W.A</b>	0.46	0.40	0.40	0.39	0.39	0.52	0.55		
<b>W.B</b>	0.66	0.56	0.58	0.59	0.56	0.73	0.74	<i>0.70</i>	

**Table 19–1d. Correlations between Mathematics and Reading Strands for Grade 6 (2010)**

	<b>M.A</b>	<b>M.B</b>	<b>M.C</b>	<b>M.D</b>	<b>M.E</b>	<b>R.A</b>	<b>R.B</b>
<b>M.A</b>							
<b>M.B</b>	0.70						
<b>M.C</b>	0.71	0.67					
<b>M.D</b>	0.76	0.66	0.67				
<b>M.E</b>	0.75	0.67	0.70	0.71			
<b>R.A</b>	0.68	0.61	0.64	0.68	0.68		
<b>R.B</b>	0.68	0.58	0.64	0.67	0.68	0.82	

**Table 19–1e. Correlations between Mathematics and Reading Strands for Grade 7 (2010)**

	<b>M.A</b>	<b>M.B</b>	<b>M.C</b>	<b>M.D</b>	<b>M.E</b>	<b>R.A</b>	<b>R.B</b>
<b>M.A</b>							
<b>M.B</b>	0.76						
<b>M.C</b>	0.70	0.69					
<b>M.D</b>	0.79	0.78	0.72				
<b>M.E</b>	0.75	0.73	0.69	0.77			
<b>R.A</b>	0.65	0.66	0.62	0.72	0.68		
<b>R.B</b>	0.63	0.64	0.60	0.69	0.66	0.83	

**Table 19–1f. Correlations between Mathematics, Reading, Science, and Writing Strands for Grade 8 (2010)**

	<b>M.A</b>	<b>M.B</b>	<b>M.C</b>	<b>M.D</b>	<b>M.E</b>	<b>R.A</b>	<b>R.B</b>	<b>S.A</b>	<b>S.B</b>	<b>S.C</b>	<b>S.D</b>	<b>W.A</b>	<b>W.B</b>
<b>M.A</b>													
<b>M.B</b>	0.73												
<b>M.C</b>	0.72	0.73											
<b>M.D</b>	0.78	0.75	0.77										
<b>M.E</b>	0.74	0.71	0.72	0.76									
<b>R.A</b>	0.66	0.64	0.62	0.68	0.68								
<b>R.B</b>	0.67	0.65	0.64	0.69	0.68	0.81							
<b>S.A</b>	0.71	0.67	0.67	0.72	0.71	0.74	0.75						
<b>S.B</b>	0.61	0.58	0.58	0.61	0.61	0.64	0.66	0.77					
<b>S.C</b>	0.60	0.56	0.57	0.60	0.59	0.61	0.62	0.76	0.66				
<b>S.D</b>	0.61	0.58	0.58	0.60	0.61	0.65	0.67	0.79	0.71	0.67			
<b>W.A</b>	0.52	0.50	0.50	0.54	0.52	0.62	0.64	0.57	0.50	0.48	0.52		
<b>W.B</b>	0.64	0.61	0.62	0.66	0.65	0.74	0.75	0.72	0.63	0.60	0.64	0.76	

**Table 19–1g. Correlations between Mathematics, Reading, Science, and Writing Strands for Grade 11 (2010)**

	M.A	M.B	M.C	M.D	M.E	R.A	R.B	S.A	S.B	S.C	S.D	W.A	W.B
<b>M.A</b>													
<b>M.B</b>	0.68												
<b>M.C</b>	0.69	0.72											
<b>M.D</b>	0.76	0.76	0.77										
<b>M.E</b>	0.71	0.72	0.72	0.80									
<b>R.A</b>	0.62	0.62	0.62	0.68	0.64								
<b>R.B</b>	0.63	0.63	0.62	0.71	0.66	0.81							
<b>S.A</b>	0.66	0.66	0.66	0.72	0.70	0.75	0.76						
<b>S.B</b>	0.53	0.54	0.53	0.58	0.56	0.62	0.62	0.72					
<b>S.C</b>	0.57	0.57	0.58	0.62	0.60	0.62	0.62	0.74	0.63				
<b>S.D</b>	0.53	0.55	0.55	0.58	0.56	0.63	0.62	0.75	0.64	0.65			
<b>W.A</b>	0.44	0.43	0.43	0.52	0.46	0.53	0.61	0.54	0.41	0.43	0.41		
<b>W.B</b>	0.57	0.57	0.57	0.65	0.59	0.69	0.73	0.70	0.54	0.55	0.55	0.74	

The correlations in Tables 19–1a through 19–1g are based on the observed strand scores. These observed-score correlations are weakened by existing measurement error contained within each strand. As a result, disattenuating the observed correlations can provide an estimate of the relationships between strands if there were no measurement error. (An important caveat is provided further below.) The disattenuated correlation coefficients ( $R_{xy}$ ) can be computed by using the formula (Spearman 1904, 1910) below:

$$R_{xy} = \frac{r_{xy}}{\sqrt{r_{xx}r_{yy}}}$$

where  $r_{xy}$  is the observed correlation, and  $r_{xx}$  and  $r_{yy}$  are the reliabilities for Strand X and Strand Y. Disattenuated correlations very near 1.00 might suggest that the same or very similar constructs are being measured. Values somewhat less than 1.00 might suggest that different strands are measuring slightly different aspects of the same construct. Values markedly less than 1.00 might suggest the strands reflect different constructs.

Tables 19–2a through 19–2g show the corresponding disattenuated correlations for the 2010 PSSA tests for each grade. Given that none of these strands has perfect reliabilities (see Chapter Eighteen), the disattenuated strand correlations are higher than their observed score counterparts.

Some within-subject correlations are very high (e.g., above 0.95), suggesting that the within-subject strands might be measuring essentially the same construct. This, in turn, suggests that some strand scores might not provide unique information about the strengths or weakness of students.

On the other hand, some within-subject strand correlations are somewhat lower than 1.00. For such strands, partial evidence is provided regarding the multidimensional structure of some tests and further supporting the validity of those specific strand scores.

On a fairly consistent basis, the correlations between the strands within each subject area were higher than the correlations between strands across different subject areas. In general, within-subject strand correlations are mostly larger than 0.90, while across-subject strand correlations range from 0.70 to 0.90. As a specific example, Grade 3 correlations for the M.A, M.B, M.C, M.D, and M.E strands range from 0.90 to 1.10 and the correlations between R.A and R.B was 0.99. In contrast, the correlations between the two reading strands with the five mathematics strands only range from 0.65 to 0.93. Such a pattern is expected since the two subject-area tests were designed to measure different constructs. Similar patterns are also observed at other grade levels.

**Table 19–2a. Disattenuated Strand Correlations for Mathematics and Reading: Grade 3 (2010)**

	<b>M.A</b>	<b>M.B</b>	<b>M.C</b>	<b>M.D</b>	<b>M.E</b>	<b>R.A</b>	<b>R.B</b>
<b>M.A</b>	-						
<b>M.B</b>	<i>0.96</i>	-					
<b>M.C</b>	<i>0.93</i>	<i>0.90</i>	-				
<b>M.D</b>	<i>1.10</i>	<i>1.01</i>	<i>1.00</i>	-			
<b>M.E</b>	<i>0.88</i>	<i>0.81</i>	<i>0.85</i>	<i>0.93</i>	-		
<b>R.A</b>	0.78	0.75	0.79	0.89	0.65	-	
<b>R.B</b>	0.80	0.76	0.80	0.93	0.65	<i>0.99</i>	-

*Note.* Within-subject values are in italics.

**Table 19–2b. Disattenuated Strand Correlations for Mathematics, Reading, and Science: Grade 4 (2010)**

	<b>M.A</b>	<b>M.B</b>	<b>M.C</b>	<b>M.D</b>	<b>M.E</b>	<b>R.A</b>	<b>R.B</b>	<b>S.A</b>	<b>S.B</b>	<b>S.C</b>	<b>S.D</b>
<b>M.A</b>	-										
<b>M.B</b>	<i>0.99</i>	-									
<b>M.C</b>	<i>0.88</i>	<i>0.90</i>	-								
<b>M.D</b>	<i>1.06</i>	<i>1.02</i>	<i>0.94</i>	-							
<b>M.E</b>	<i>0.91</i>	<i>0.92</i>	<i>0.86</i>	<i>0.98</i>	-						
<b>R.A</b>	0.80	0.81	0.80	0.88	0.80	-					
<b>R.B</b>	0.83	0.84	0.84	0.93	0.82	<i>1.00</i>	-				
<b>S.A</b>	0.80	0.82	0.80	0.85	0.82	0.90	0.89	-			
<b>S.B</b>	0.78	0.80	0.80	0.84	0.80	0.89	0.88	<i>1.02</i>	-		
<b>S.C</b>	0.79	0.82	0.81	0.83	0.79	0.87	0.87	<i>1.00</i>	<i>1.01</i>	-	
<b>S.D</b>	0.76	0.81	0.78	0.77	0.72	0.79	0.79	<i>0.93</i>	<i>0.94</i>	<i>0.93</i>	-

**Table 19–2c. Disattenuated Strand Correlations for Mathematics, Reading, and Writing: Grade 5 (2010)**

	M.A	M.B	M.C	M.D	M.E	R.A	R.B	W.A	W.B
<b>M.A</b>	-								
<b>M.B</b>	1.00	-							
<b>M.C</b>	1.00	1.04	-						
<b>M.D</b>	0.97	0.96	0.99	-					
<b>M.E</b>	0.85	0.81	0.92	0.85	-				
<b>R.A</b>	0.80	0.80	0.89	0.82	0.73	-			
<b>R.B</b>	0.81	0.80	0.91	0.83	0.78	0.98	-		
<b>W.A</b>	0.58	0.59	0.65	0.57	0.54	0.68	0.72	-	
<b>W.B</b>	0.79	0.79	0.87	0.80	0.72	0.89	0.92	0.92	-

**Table 19–2d. Disattenuated Strand Correlations for Mathematics and Reading: Grade 6 (2010)**

	M.A	M.B	M.C	M.D	M.E	R.A	R.B
<b>M.A</b>	-						
<b>M.B</b>	0.92	-					
<b>M.C</b>	0.95	0.95	-				
<b>M.D</b>	0.97	0.91	0.93	-			
<b>M.E</b>	1.01	0.96	1.01	1.00	-		
<b>R.A</b>	0.81	0.78	0.84	0.85	0.89	-	
<b>R.B</b>	0.84	0.77	0.85	0.87	0.92	0.99	-

**Table 19–2e. Disattenuated Strand Correlations for Mathematics and Reading: Grade 7 (2010)**

	M.A	M.B	M.C	M.D	M.E	R.A	R.B
<b>M.A</b>	-						
<b>M.B</b>	0.97	-					
<b>M.C</b>	0.95	0.95	-				
<b>M.D</b>	0.99	0.98	0.97	-			
<b>M.E</b>	1.00	0.98	0.98	1.01	-		
<b>R.A</b>	0.81	0.83	0.83	0.88	0.88	-	
<b>R.B</b>	0.79	0.81	0.81	0.86	0.86	1.02	-

**Table 19–2f. Disattenuated Strand Correlations  
for Mathematics, Reading, Science, and Writing: Grade 8 (2010)**

	M.A	M.B	M.C	M.D	M.E	R.A	R.B	S.A	S.B	S.C	S.D	W.A	W.B
<b>M.A</b>	-												
<b>M.B</b>	0.96	-											
<b>M.C</b>	0.95	0.95	-										
<b>M.D</b>	1.00	0.95	0.97	-									
<b>M.E</b>	1.00	0.95	0.96	0.97	-								
<b>R.A</b>	0.86	0.81	0.80	0.83	0.88	-							
<b>R.B</b>	0.87	0.82	0.82	0.85	0.88	1.01	-						
<b>S.A</b>	0.87	0.82	0.82	0.84	0.87	0.87	0.89	-					
<b>S.B</b>	0.85	0.79	0.80	0.81	0.85	0.86	0.89	0.99	-				
<b>S.C</b>	0.85	0.79	0.80	0.82	0.85	0.84	0.86	1.00	0.98	-			
<b>S.D</b>	0.84	0.79	0.79	0.79	0.84	0.87	0.89	0.99	1.01	0.99	-		
<b>W.A</b>	0.70	0.67	0.67	0.70	0.71	0.81	0.85	0.72	0.71	0.69	0.72	-	
<b>W.B</b>	0.83	0.78	0.79	0.82	0.85	0.92	0.94	0.86	0.85	0.83	0.85	1.01	-

**Table 19–2g. Disattenuated Strand Correlations  
for Mathematics, Reading, Science, and Writing: Grade 11 (2010)**

	M.A	M.B	M.C	M.D	M.E	R.A	R.B	S.A	S.B	S.C	S.D	W.A	W.B
<b>M.A</b>	-												
<b>M.B</b>	1.02	-											
<b>M.C</b>	1.01	0.98	-										
<b>M.D</b>	1.02	0.96	0.96	-									
<b>M.E</b>	1.07	1.01	1.00	1.02	-								
<b>R.A</b>	0.87	0.82	0.80	0.81	0.86	-							
<b>R.B</b>	0.86	0.81	0.78	0.83	0.87	0.98	-						
<b>S.A</b>	0.90	0.84	0.83	0.83	0.90	0.89	0.89	-					
<b>S.B</b>	0.85	0.81	0.78	0.78	0.86	0.88	0.87	0.99	-				
<b>S.C</b>	0.91	0.85	0.84	0.84	0.92	0.87	0.85	1.01	1.01	-			
<b>S.D</b>	0.83	0.79	0.77	0.75	0.83	0.86	0.83	0.98	1.00	1.00	-		
<b>W.A</b>	0.64	0.60	0.58	0.65	0.65	0.68	0.78	0.69	0.62	0.63	0.59	-	
<b>W.B</b>	0.81	0.75	0.74	0.78	0.79	0.86	0.89	0.84	0.77	0.79	0.76	0.97	-

It should be noted that some caution is needed in interpreting the disattenuated results because the reliabilities used to calculate the disattenuated correlations are subject to both upward and downward biases. (These are discussed in some detail in Chapter Eighteen.) Consequently, some of the values tabled above may be higher or lower than they should be, depending on which bias prevails for any given pair of strand scores. When the reliabilities are lower than they should be, the disattenuated correlations will be inflated (and in some instances can appear larger than the theoretical correlation maximum value of 1.00).

**Exploratory Factor Analysis**

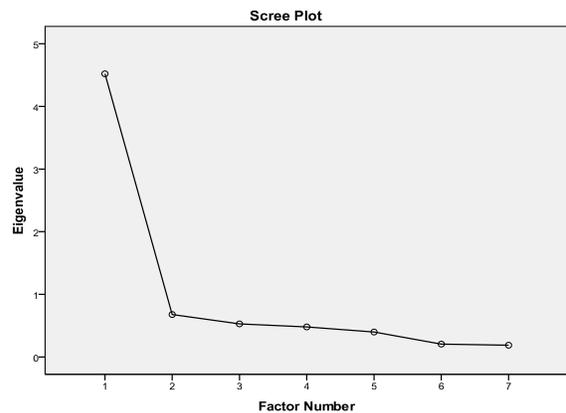
In order to further explore the internal structure of the PSSA tests, an exploratory factor analysis (EFA) of the strand scores across all the PSSA subject areas was conducted. The PSSA final data file (see Chapter Nine) was used to create the observed correlation matrices shown in Tables 19–1a through 19–1g, which in turn were used in the EFAs. In SPSS, Principle Axis Factor extraction was utilized with an oblique rotation (Promax) of the initial factor solution to improve interpretability. Oblique rotations allow for correlated factors which seemed more appropriate for the PSSA tests because of a priori expectations that academic achievement across subject areas should be correlated.

Table 19–3 presents the eigenvalues and the explained variance for the extracted factors for the Grade 3 PSSA tests. The Scree Plot graphing the eigenvalues against the factor number is shown in Figure 19–1. The first factor accounted for over 64 percent of the total variance, while the second factor explained about 10 percent of the total variance. Only the first factor had an eigenvalue greater than 1.0, typically suggesting a one-factor solution using the Kaiser criterion. However, the one-factor solution resulted in many large fitted residual values in the reproduced correlation matrix (i.e., 6 of 21 residuals were greater than 0.05 with one as large as 0.16). Based on this finding and the prior belief that there should be two distinct factors at Grade 3 (one for mathematics and another for reading), a two-factor solution was further explored.

**Table 19–3. Eigenvalues and Explained Variance for Grade 3**

Factor	Eigenvalue	%
1	4.521	64.590
2	0.678	9.682
3	0.529	7.553
4	0.480	6.852
5	0.399	5.699
6	0.206	2.946
7	0.188	2.679

**Figure 19–1. Scree Plot for Grade 3**



The Pattern loadings resulting from the two-factor solution are presented in Table 19–4a. The Pattern loadings have simple structure which show that the five mathematics domains clearly loaded on the first factor while the two reading domains clearly loaded on the second factor. The respective factor loadings are quite high. The factor correlation matrix shows that the correlation between the two latent factors is 0.755, which is very close to the observed correlation between mathematics and reading (0.73 as seen Table 19–5) but just lower than the disattenuated correlation.

**Table 19–4a. Pattern Matrix and Factor Correlation for Grade 3**

Domain	Factor	
	1	2
<b>Mathematics</b>		
M.A	0.901	0.041
M.B	0.679	0.074
M.C	0.570	0.124
M.D	0.668	0.160
M.E	0.732	-0.039
<b>Reading</b>		
R.A	0.072	0.851
R.B	0.013	0.885
Correlation (F1, F2) = 0.755		

Other grades have similar results. The eigenvalue scree plots consistently indict a one-factor solution. This possibly resulted because of the high correlations between the PSSA subjects. (The eigenvalues and explained variances are not shown for the other grades due to space considerations.) The pattern matrices and the factor correlations are reported in Table 19–4b through 19–4g for the remaining six grades, respectively. The Pattern loadings clearly suggested that the PSSA tests measured different but correlated constructs.

**Table 19–4b. Pattern Matrix and Factor Correlations for Grade 4**

Domain	Factor		
	1	2	3
<b>Mathematics</b>			
M.A	.893	.035	-.004
M.B	.756	.122	-.063
M.C	.509	.144	.100
M.D	.684	-.068	.131
M.E	.617	.102	.070
<b>Reading</b>			
R.A	.073	.183	.707
R.B	.112	.050	.743
<b>Science</b>			
S.A	.039	.822	.101
S.B	.006	.775	.074
S.C	.037	.791	.033
S.D	.114	.725	-.072
Correlation (F1, F2) = 0.760		Correlation (F1, F3) = 0.765	
Correlation (F2, F3) = 0.796			

**Table 19–4c. Pattern Matrix and Factor Correlations for Grade 5**

Domain	Factor		
	1	2	3
<b>Mathematics</b>			
M.A	.958	.015	-.039
M.B	.813	.040	-.060
M.C	.632	.014	.144
M.D	.747	-.013	.074
M.E	.589	.000	.176
<b>Reading</b>			
R.A	.116	.044	.753
R.B	.055	.065	.811
<b>Writing</b>			
W.A	-.037	.839	-.050
W.B	.105	.721	.155
Correlation (F1, F2) = 0.673		Correlation (F1, F3) = 0.783	
Correlation (F2, F3) = 0.781			

**Table 19–4d. Pattern Matrix and Factor Correlation for Grade 6**

Domain	Factor	
	1	2
<b>Mathematics</b>		
M.A	.823	.075
M.B	.812	-.013
M.C	.734	.101
M.D	.696	.172
M.E	.713	.164
<b>Reading</b>		
R.A	.130	.786
R.B	.020	.906
Correlation (F1, F2) = 0.794		

**Table 19–4e. Pattern Matrix and Factor Correlation for Grade 7**

Domain	Factor	
	1	2
<b>Mathematics</b>		
M.A	.890	-.012
M.B	.816	.058
M.C	.740	.076
M.D	.789	.141
M.E	.742	.140
<b>Reading</b>		
R.A	.076	.860
R.B	.047	.864
Correlation (F1, F2) = 0.777		

**Table 19–4f. Pattern Matrix and Factor Correlations for Grade 8**

Domain	Factor			
	1	2	3	4
<b>Mathematics</b>				
M.A	.768	.103	.009	.007
M.B	.805	.022	-.004	.032
M.C	.857	.042	.040	-.084
M.D	.866	.002	.033	.011
M.E	.696	.086	.003	.103
<b>Reading</b>				
R.A	.063	.063	.087	.734
R.B	.092	.127	.159	.581
<b>Science</b>				
S.A	.118	.811	.001	.038
S.B	.046	.767	.012	.020
S.C	.097	.755	.013	-.052
S.D	-.011	.816	.040	.013
<b>Writing</b>				
W.A	.003	-.027	.862	-.013
W.B	.069	.114	.766	.023
Correlation (F1, F2) = 0.785		Correlation (F1, F3) = 0.708		
Correlation (F1, F4) = 0.774				
Correlation (F2, F3) = 0.726		Correlation (F2, F4) = 0.793		
Correlation (F3, F4) = 0.789				

**Table19–4g. Pattern Matrix and Factor Correlations for Grade 11**

Domain	Factor			
	1	2	3	4
<b>Mathematics</b>				
M.A	.760	.039	.002	.037
M.B	.797	.058	-.026	.014
M.C	.831	.056	-.021	-.022
M.D	.879	-.027	.079	.011
M.E	.806	.072	.002	-.002
<b>Reading</b>				
R.A	.055	.136	-.028	.768
R.B	.085	.093	.164	.627
<b>Science</b>				
S.A	.106	.736	.098	.043
S.B	.025	.732	-.021	.058
S.C	.151	.730	.011	-.070
S.D	-.006	.836	-.025	.004
<b>Writing</b>				
W.A	-.024	-.034	.940	-.077
W.B	.059	.074	.734	.087
Correlation (F1, F2) = 0.777		Correlation (F1, F3) = 0.671		
Correlation (F1, F4) = 0.763				
Correlation (F2, F3) = 0.673		Correlation (F2, F4) = 0.798		
Correlation (F3, F4) = 0.765				

Taken as a whole, all the internal structure evidence presented above generally indicates that related elements of each of the PSSA tests correlate in the intended manner. Different PSSA subject area tests seem to measure different constructs. Additionally, the strands within each subject area have stronger relationships than the across subject strands. This further supports using a total score to report student performance in the different subject areas.

The strand scores present more of a mixed message. Since the strands in each subject area were designed to measure distinct components of the subject area, it is reasonable to expect that the inter-subject strand correlations should be positive and strong, but ideally, not extremely high. However, the disattenuated correlations imply that some strands are essentially measuring the same constructs. Consequently, there may be less support for providing results for some strand scores beyond the total score. While there is content rationale underlying the creation of the strand scores, the empirical correlations illustrate that caution is required when using the strand scores as a way to identify individual student's strengths and weaknesses. Certainly, instructional programs should not be based on strand score information alone, but only in conjunction with other sources of evidence available (e.g., teacher observations, other exam performance).

### **EVIDENCE BASED ON RELATIONSHIPS WITH OTHER VARIABLES**

As described in the *Standards* (1999), “Evidence based on relationships with other variables addresses questions about the degree to which relationships are consistent with the construct underlying the proposed interpretations” (p. 13). This category of evidence refers to external structure evidence and is classified as three types of evidence—convergent, discriminant, and criterion-related evidence. Convergent evidence is provided by relationships between students' performance on different assessments intended to measure a similar construct. Discriminant evidence is provided by relationships between students' performance on different tests intended to measure different constructs. Criterion-related evidence, either predictive or concurrent, is provided by relationships between students' test scores and their performance on a criterion measure (Cronbach, 1971; Messick, 1989).

External evidence for the PSSA tests has been examined by HumRRO in a series of independent studies using 2001–2003 PSSA data (Koger, Thacker & Dickinson, 2004; Sinclair & Thacker, 2005; Thacker, Dickinson, & Koger, 2004). In their studies, the correlations of PSSA scores with a variety of measures including SAT, CTB, and other commonly administrated assessments were investigated to provide the convergent and discriminant evidence. The criterion-related evidence was evaluated by the relationships between PSSA and criterion variables such as grade point average (GPA), course grades, university proficiency exams, and students' GPA in their first college course.

The results from their studies provided strong external evidence in support of PSSA as a valid measure of student achievement. Same-subject correlations were highest for mathematics, typically ranging from about 0.70 to about 0.90. For reading, correlations were also quite high, although slightly weaker than for mathematics and ranging from about 0.60 to about 0.80 (Thacker, Dickinson, & Koger, 2004). For example, the correlations between PSSA and SAT were high ( $r = 0.78$  for reading and  $r = 0.87$  for mathematics in 2003). They also found that PSSA scores positively correlated with students' course grades and GPAs, although not as highly as with SATs ( $r = 0.46$  to  $r = 0.55$ ) (Koger, Thacker & Dickinson, 2004). Regarding the predictive evidence, they found that the university proficiency tests were moderately to highly correlated with the PSSA. Students' course GPAs in their first college English and Mathematics classes generally showed positive relationships with both the PSSA and the university

proficiency exams, but these correlations were not as strong as the correlations between the PSSA and the proficiency exams (Sinclair & Thacker, 2005). Moreover, the different assessments measuring the same subject were found to be more highly related with each other than with the assessments measuring different subjects, providing some discriminant evidence. All these results suggest that PSSA subject-area tests measure the intended constructs.

In addition, Thacker and his colleagues also examined the relationship between the PSSA and some irrelevant characteristics to determine if the PSSA exhibited any differential impact based on gender, ethnicity, English proficiency, or socioeconomic status. None of these characteristics appeared to influence the PSSA scores more than would be expected based on observed differences for SAT scores and other comparison tests. In other words, PSSA items are not injecting any unexpected gender, racial/ethnic, socioeconomic status, or limited English proficiency bias.

For the 2010 PSSA dataset, the correlations between students' test scores on different PSSA tests including mathematics, reading, science, and writing are shown in Table 19–5 in order to provide some discriminant validity evidence. In this table, both the observed and disattenuated correlations are reported.

**Table 19–5. Correlations among Students' Performance on All PSSA Tests**

	<b>Mathematics/ Reading</b>	<b>Mathematics/ Science</b>	<b>Mathematics/ Writing</b>	<b>Reading/ Science</b>	<b>Reading/ Writing</b>	<b>Science/ Writing</b>
<b>G3</b>	0.73 (0.80)	-	-	-	-	-
<b>G4</b>	0.77 (0.84)	0.76 (0.82)	-	0.81 (0.88)	-	-
<b>G5</b>	0.76 (0.83)	-	0.56 (0.65)	-	0.64 (0.76)	-
<b>G6</b>	0.79 (0.86)	-	-	-	-	-
<b>G7</b>	0.77 (0.84)	-	-	-	-	-
<b>G8</b>	0.78 (0.86)	0.79 (0.85)	0.64 (0.73)	0.80 (0.88)	0.72 (0.85)	0.65 (0.75)
<b>G11</b>	0.77 (0.83)	0.79 (0.84)	0.58 (0.67)	0.80 (0.88)	0.67 (0.78)	0.60 (0.69)

*Note.* Numbers in the parenthesis are disattenuated correlations. The PSSA final data file was used for these calculations (see Chapter Nine). Case-wise elimination of missing data was used.

Each PSSA assessment measures a different construct, so the correlations between them were not expected to be extremely high. The values in this table are consistent with this expectation. As can be seen, the correlations between the PSSA tests range from 0.56 to 0.81. The correlations between the mathematics, reading, and science were relatively higher (around 0.79), while the correlations between writing and other subjects were relatively lower (most around 0.60). In addition, the correlations are very stable across different grade levels. For example, the correlation between mathematics and reading tests was around 0.77 for all grades. (Factor correlations between the latent variables are presented in Tables 19–4a through 19–4g.)

**EVIDENCE BASED ON CONSEQUENCES OF TESTING**

Based on the *Standards* (1999), evidence of the consequences of implementing an assessment program is an additional source of validity information. Both positive and negative (intended and unintended) consequences of score-based inferences must be investigated to fully evaluate the pool of validity evidence.

Lane and Stone (2002) summarized the general intended consequences for state assessments and accountability programs as follows:

- Student, teacher, and administrator motivation and effort.
- Curriculum and instruction practices (including content and strategies).
- Improved learning for all students.
- Content and format of classroom assessments.
- Professional development support.
- Use and nature of test preparation activities.
- Student, teacher, administrator, and public awareness and beliefs about the assessment, criteria for judging performance, and the use of assessment results.

Evidence for the intended improvement of student learning can be seen by looking at the increasing percentage of students who are Proficient or Advanced across years. The following tables provide the percentages of students who were Proficient or Advanced by grade, year, and subject. Values were derived from the PSSA final data file (see Chapter Nine).

**Table 19–6a. Percentage of Students Scoring in the Proficient or Advanced Category: Mathematics**

<b>Grade</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
<b>3</b>	-	-	78.5	80.5	81.7	84.5
<b>4</b>	-	77.3	78.0	79.5	81.8	84.8
<b>5</b>	69.0	66.9	71.0	73.2	73.5	74.4
<b>6</b>	-	68.0	69.6	72.3	75.7	78.0
<b>7</b>	-	66.4	67.2	70.6	75.3	78.0
<b>8</b>	62.9	62.2	67.9	70.3	71.2	75.1
<b>11</b>	50.8	51.9	53.7	55.9	55.7	59.6

**Table 19–6b. Percentage of Students Scoring  
in the Proficient or Advanced Category: Reading**

Grade	2005	2006	2007	2008	2009	2010
3	-	-	72.8	76.9	77.0	75.2
4	-	68.1	70.1	70.1	72.6	72.9
5	64.2	60.6	59.9	61.5	64.5	64.1
6	-	65.9	63.5	66.9	67.6	68.7
7	-	68.0	66.8	70.0	71.4	73.5
8	64.0	70.6	75.0	78.2	80.5	81.9
11	65.0	65.2	65.4	64.7	65.3	67.2

**Table 19–6c. Percentage of Students Scoring  
in the Proficient or Advanced Category: Science**

Grade	2005	2006	2007	2008	2009	2010
4	-	-	-	81.5	83.4	81.5
8	-	-	-	52.7	54.8	57.2
11	-	-	-	35.6	39.7	39.8

**Table 19–6d. Percentage of Students Scoring  
in the Proficient or Advanced Category: Writing**

Grade	2005	2006	2007	2008	2009	2010
5	-	54.1	57.3	57.3	58.1	61.7
8	-	66.0	71.7	69.1	71.2	75.1
11	-	85.7	87.8	85.8	82.8	80.7

As indicated above, students in Pennsylvania continue to improve on the PSSA. Generally, each year more students score Proficient or higher on the PSSA tests than did students during the previous year. Such a trend is evidence of one intended consequence of the PSSA testing program.

Similar results were also reported by the Center for Education Policy (CEP), a leading national educational research organization. The CEP report (reference), which examined mathematics and reading performance, found that Pennsylvania was the only state to:

- Reduce the percentage of students performing at the lowest achievement ranking.
- Increase the percentage of students who are at least on grade level.
- Increase the percentage of students who are at the highest achievement level.

In addition, Pennsylvania is one of only eight states with a moderate to large increase in the percentage of students performing on grade level in reading and mathematics at the elementary and middle and high school levels. For more information on the CEP report, visit [www.cep-dc.org](http://www.cep-dc.org).

Lane and Stone (2002) also summarized the possible unintended outcomes:

- Narrowing of curriculum and instruction to focus only the specific standards assessed and ignoring the broader construct reflected in the specified standards.
- The use of test preparation materials that are closely linked to the assessment without making changes to instruction.
- The use of unethical test preparation materials or administration procedures.
- Differential performance gains for subgroups of students.
- Inappropriate or unfair uses of test scores, such as questionable practices in reassignment of teachers or principals.
- For some students, decreased confidence and motivation to learn and to perform well on the assessment because of past experiences with assessments.

As noted above, one important piece of consequential evidence pertains to the use of assessment results. As shown in Chapter Sixteen, there are several different types of scores and score reports used for the PSSA. The extent to which various groups of users (e.g., students, teachers, and parents) interpret these scores and reports appropriately affects the validity of subsequent uses of these results. Chapter Sixteen of this technical report is intended to provide accurate and clear test score and report information with the hope that this will help users avoid unintended uses and interpretations of the PSSA results. Nevertheless, evidence pertaining to other consequences of the PSSA needs continued research.

### **EVIDENCE RELATED TO THE USE OF THE RASCH MODEL**

Since the Rasch model is the basis of all calibration, scaling, and linking analyses associated with the PSSA, the validity of the inferences from these results depends on the degree to which the assumptions of the model are met as well as the fit between the model and test data. As discussed at length in Chapter Twelve, the underlying assumptions of Rasch models were essentially met for all the PSSA data, indicating the appropriateness of using the Rasch models to analyze the PSSA data.

In addition, the Rasch model was also used to link different operational PSSA tests across years. The accuracy of the linking also affects the accuracy of student scores and the validity of score uses. As described in Chapter Fifteen, DRC Psychometric Services staffers follow linking procedures previously vetted by the Pennsylvania National TAC. Moreover, DRC internal and the third-party (HumRRO) checks ensured the accuracy of the linking results.

## **VALIDITY EVIDENCE SUMMARY**

Validity evidence related to test content was reviewed earlier in this chapter. On the whole, the early chapters of this technical report show that a strong link can be established between each PSSA item and its associated eligible content. Details regarding how the PSSA operational assessments were assembled to reflect the state content standards and detailed information regarding educator reviews (including content, bias, and sensitivity reviews) are presented in Chapter Three.

Strand score intercorrelations are also presented in this chapter. In general, within-subject-area strands (e.g., mathematics) correlate more highly with themselves than they do with other subject-area strands (e.g., reading). Consequently, this provides some favorable evidence regarding the internal and external relationships between the tests' components.

PDE's commitment to validity is also evidenced by the fact that the Pennsylvania State Board of Education commissioned an independent study of an earlier version of the PSSA. That study, conducted by HumRRO, included an extensive evaluation of the items (Thacker & Dickinson, 2004) and statistical relationships of the PSSA, including convergent and discriminant validity (Thacker, Dickinson & Koger, 2004).

Validity of score inferences is bolstered when test scores are consistent. Here, the reliabilities of the total test scores (presented in Chapter Eighteen) are very good, with many being in the low 0.90s.

Additionally, reported in Chapter Five, differential item functioning with respect to gender and ethnicity helps address construct-irrelevant variance, which represents an important threat to the validity of inferences made from achievement test scores. As noted in that chapter, field test items are screened and reviewed for DIF. Only items approved by teacher committees are eligible for operational use.

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Appendix A:  
Assessment Anchor Explanations



PENNSYLVANIA DEPARTMENT OF EDUCATION  
**About the Mathematics Assessment Anchors**

**Introduction**

This is a brief introduction to the Mathematics Assessment Anchors. For more information on the Assessment Anchors and how they were developed, please read the *General Introduction* provided on the website and the *Frequently Asked Questions*.

**How the Assessment Anchors Connect to the Standards**

The PA Academic Standards for Mathematics are:

- 2.1 Numbers, Number Systems and Number Relationships
- 2.2 Computation and Estimation
- 2.3 Measurement and Estimation
- 2.4 Mathematical Reasoning and Connections
- 2.5 Mathematical Problem Solving and Communication
- 2.6 Statistics and Data Analysis
- 2.7 Probability and Predictions
- 2.8 Algebra and Functions
- 2.9 Geometry
- 2.10 Trigonometry
- 2.11 Concepts of Calculus

All of the Mathematics Standards categories are still included on the PSSA but the Assessment Anchors tighten the focus of what is assessed. The Assessment Anchors also clarify what is expected from grade level to grade level. There is a clear vertical alignment in the Assessment Anchors that did not exist in the standards. Teachers will be able to see how concepts build on one another from year to year. In addition, the Assessment Anchors have fewer Reporting Categories to help create more valid scores (there are more items per reporting category). Rather than report student results in all 11 standards, the reports will be organized into five major categories.

**How the Assessment Anchors are Organized**

These categories are similar to the five NCTM (National Council of Teachers of Mathematics) Standards and the five NAEP (National Assessment of Educational Progress) Reporting Categories. Each PA Standard Category was examined and then placed in the appropriate Reporting Category. Some of the specific Standards Statements cut across different Reporting Categories (e.g., 2.11- Concepts of Calculus, which occurs in different categories rather than being a separate category). The following is a general summary of where the bulk of the PA Mathematics Standards can be found in the Reporting Categories:

## Appendix A: Assessment Anchor Explanations

<b>Reporting Category</b>	<b>Standard</b>
A. Numbers & Operations	2.1 (Numbers) & 2.2 (Computation)
B. Measurement	2.3 (Measurement)
C. Geometry	2.9 (Geometry) & 2.10 (Trigonometry)
D. Algebraic Concepts	2.8 (Algebra)
E. Data Analysis & Probability	2.6 (Statistics & Data) & 2.7 (Probability)

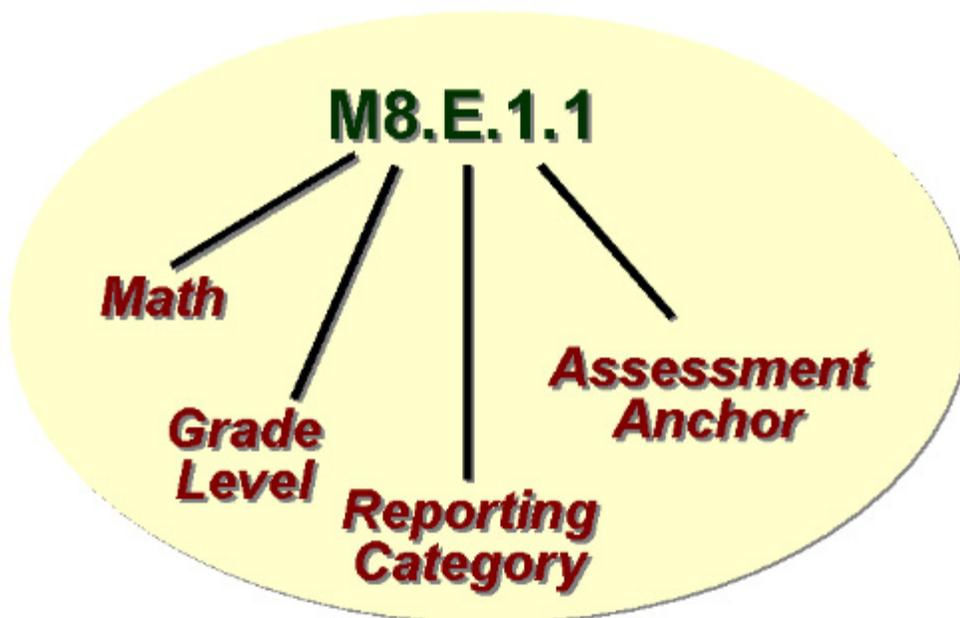
### **Important Patterns**

The PA Mathematics Standards 2.4 (Reasoning) and 2.5 (Problem Solving) are not listed in the chart above. These two standards are not included because the above Reporting Categories focus on content (not process) and both Reasoning and Problem Solving are processes. However, knowing how to perform these processes is a very important part of the PSSA. Most of the multiple-choice items and all of the open-ended items will require students to know how to reason and solve problems, in addition to being knowledgeable about the content area being assessed. Even though Problem Solving is not one of the five content Reporting Categories, the PSSA will still show a separate score for the open-ended items on the school report, reflecting students' problem solving performance.

### How to Read the Assessment Anchors

The Mathematics Assessment Anchors begin with an “M” to distinguish them from the Reading Assessment Anchors “R”. The number after the “M” in the label is the grade level (e.g., M8 would be Mathematics at eighth grade). The second letter in the labeling system is the Reporting Category (A through E). The same reporting categories continue across all Grade levels, 3 through 8 and 11. The final number in the label is the actual Assessment Anchor. (e.g., 1.1, 1.2, 1.3, etc.) Essentially, you read the Assessment Anchors like an outline, with the Assessment Anchor shaded across the top of the page and more specific details underneath.

For example, M8.E.1.1 is a Mathematics Assessment Anchor (M stands for Math) at 8th Grade (8). The E indicates that this Anchor is in the Data Analysis and Probability Reporting Category and the 1.1 means that it is the first Assessment Anchor in the Data Analysis and Probability Reporting Category (1.1). (*See below*)



NOTE: Below each specific descriptor of the Assessment Anchor is a reference in italics. This reference relates to the Pennsylvania Academic Standards and helps you cross-walk the Anchors to the Standards.

### **Eligible Content and Sample Items**

Two other important features\* appear in this document:

*Eligible Content.* The column on the right-hand side of the page underneath each Assessment Anchor is the Eligible Content. This is often known as the “assessment limits” and helps teachers identify how the anchor will be assessed. Not all of the Eligible Content is assessed on the PSSA, but it shows the range of knowledge drawn upon to design the test.

*Sample Items.* The sample items appear on the bottom half of the page. These are examples of how the Assessment Anchor might appear on the PSSA. Some of the pages may not have any sample items because we only created three per Assessment Anchor. We will be continually adding to the sample items. For other sample items teachers should consult the released items on the state website.

\*NOTE: These features are found in the Assessment Anchors document for each grade, which are located on the PDE website: [www.education.state.pa.us](http://www.education.state.pa.us) from the left-hand column, select “Programs”, “Programs O-R”, “Pennsylvania System of School Assessment (PSSA)”, and then “Assessment Anchors”.

## **PENNSYLVANIA DEPARTMENT OF EDUCATION**

### **Overview of Mathematics Assessment Anchors**

\*Note that on this overview document, the grade level does not appear because these anchors occur at all Grade levels 3 through 8 and 11.

#### **MA. Numbers and Operations**

MA.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.

MA.2 Understand the meanings of operations, use operations and understand how they relate to each other.

MA.3 Compute accurately and fluently and make reasonable estimates.

#### **MB. Measurement**

MB.1 Demonstrate an understanding of measurable attributes of objects and figures, and the units, systems and processes of measurement (not assessed at Grade 11).

MB.2 Apply appropriate techniques, tools and formulas to determine measurements.

#### **MC. Geometry**

MC.1 Analyze characteristics and properties of two- and three- dimensional geometric shapes and demonstrate understanding of geometric relationships.

MC.2 Identify and/or apply concepts of transformations or symmetry (not assessed at Grades 6, 7 or 11).

MC.3 Locate points or describe relationships using the coordinate plane (not assessed at Grade 3).

#### **MD. Algebraic Concepts**

MD.1 Demonstrate an understanding of patterns, relations and functions.

MD.2 Represent and/or analyze mathematical situations using numbers, symbols, words, tables and/or graphs.

MD.3 Analyze change in various contexts (not assessed at Grades 3, 4 or 8).

MD.4 Describe or use models to represent quantitative relationships (not assessed at Grade 3, 4, 5, 6 or 7).

**ME. Data Analysis and Probability**

ME.1 Formulate or answer questions that can be addressed with data and/or organize, display, interpret or analyze data.

ME.2 Select and/or use appropriate statistical methods to analyze data (not assessed at Grade 3).

ME.3 Understand and/or apply basic concepts of probability or outcomes.

ME.4 Develop and/or evaluate inferences and predictions or draw conclusions based on data or data displays (not assessed at Grades 3, 4, 5 or 6).

**PENNSYLVANIA DEPARTMENT OF EDUCATION**  
**About the Reading Assessment Anchors**

**Introduction**

This is a brief introduction to the Reading Assessment Anchors. For more information on the Assessment Anchors and how they were developed, please read the *General Introduction* provided on the website and the *Frequently Asked Questions*.

**How the Assessment Anchors Connect to the Standards**

The PA Academic Standards for Reading, Writing, Speaking and Listening are:

- 1.1 Learning to Read Independently
- 1.2 Reading Critically in All Content Areas
- 1.3 Reading, Analyzing and Interpreting Literature
- 1.4 Types of Writing
- 1.5 Quality of Writing
- 1.6 Speaking and Listening
- 1.7 Characteristics and Function of the English Language
- 1.8 Research

In the past, the Reading PSSA assessed standards 1.1, 1.2, 1.3, 1.7 and 1.8 in Grades 5, 8 and 11. The Writing PSSA assessed standards 1.4 and 1.5. Speaking and Listening have always been assessed through local assessments. *Because of the shift to create a clearer and more focused test using the Assessment Anchors, the 2005 PSSA will only assess the first three reading standards.* Learning to read independently and critically, and the ability to analyze and interpret are at the heart of what students must be able to do to be good readers in today's society. Standards 1.7 and 1.8 are not specific to reading and for the most part these standards are better assessed at the district level.

## How the Assessment Anchors Are Organized

Instead of having five reporting categories, the Assessment Anchors will have two:

Reporting Category	Standard
A. Comprehension and Reading Skills	1.1 (Learning to Read Independently) and 1.2 (Reading Critically in All Content Areas)
B. Interpretation and Analysis of Fiction and Nonfiction Text	1.1 (Learning to Read Independently) and 1.2 (Reading Critically in All Content Areas) and 1.3 Reading, Analyzing and Interpreting Literature)

### Important Patterns

There are additional patterns within each Reporting Category. Each Reporting Category includes some basic elements that are consistent across all of the grade levels.

#### *A. Comprehension and Reading Skills*

Comprehension and Reading Skills have two basic elements:

- A.1 Fiction
- A.2 Nonfiction

#### *B. Interpretation and Analysis of Fiction and Nonfiction Text*

Interpretation and Analysis of Fiction and Nonfiction Text has three basic elements:

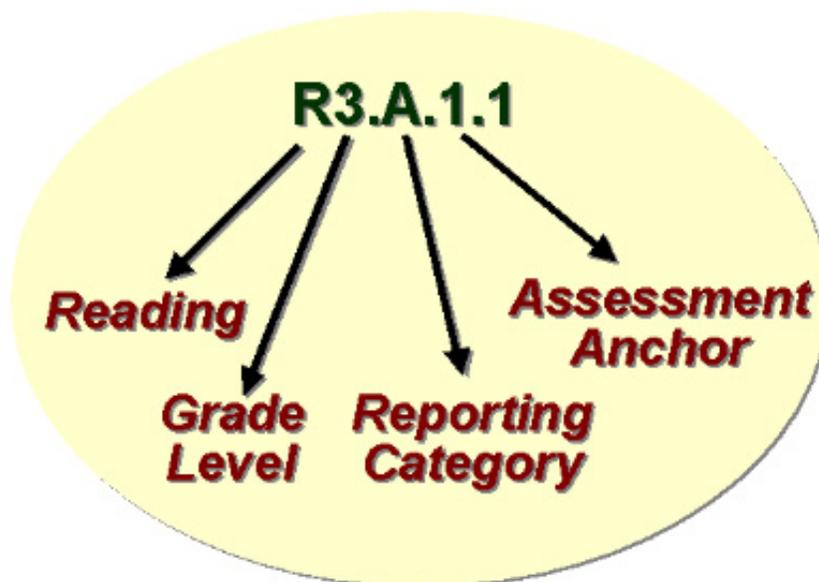
- B.1 Components within text **or** components within and across texts
- B.2 Literary Devices
- B.3 Concepts and Organization of Nonfiction Text

**The Anchors generally target the same comprehension skills from Grades 3 through 8 and 11, although the depth of knowledge required to comprehend the text grows in complexity over the years. In addition, the expectation is that the level of texts themselves will grow in complexity.**

### How to Read the Assessment Anchors

The Reading Assessment Anchors begin with “R” to distinguish them from the Mathematics Assessment Anchors, which begin with “M”. The number after the “R” in the label is the grade level (e.g., R3 would be Reading at third grade). The second letter in the labeling system is the Reporting Category (A or B). The same reporting categories continue across all Grades 3 through 8 and 11. The final number in the label is the actual Assessment Anchor (e.g., 1.1, 1.2, 1.3, etc.). Essentially, you read the Assessment Anchors like an outline, with the Assessment Anchor shaded across the top of the page and more specific details underneath.

For example, R3.A.1.1 is a Reading Assessment Anchor (R stands for Reading) at 3<sup>rd</sup> grade (3). The A indicates that this Anchor is in the Comprehension and Reading Skills Reporting Category and the 1.1 means that it is the first Assessment Anchor in that Reporting Category. (*See below*)



NOTE: Below each specific descriptor of the Assessment Anchor is a reference in italics. This reference relates to the Pennsylvania Academic Standards and helps you crosswalk the Anchors to the Standards.

**Eligible Content and Sample Items**

Two other important features\* appear in this document:

*Eligible Content.* The column on the right-hand side of the page underneath each Assessment Anchor is the Eligible Content. This is often known as the “assessment limits” and helps teachers identify how deeply they need to cover an Anchor and/or the range of the content they should teach to best prepare their students for the PSSA. Not all of the Eligible Content is assessed on the PSSA, but it shows the range of knowledge drawn upon to design the test.

*Sample Items.* For sample items please see the Item Bank currently on the web page and the Item Samplers, soon to be on the web page and distributed to districts via CD.

\*NOTE: These features are found in the Assessment Anchors document for each grade, which are located on the PDE website: [www.education.state.pa.us](http://www.education.state.pa.us) from the left-hand column, select “Programs”, “Programs O-R”, “Pennsylvania System of School Assessment (PSSA)”, and then “Assessment Anchors”.

PENNSYLVANIA DEPARTMENT OF EDUCATION  
**Overview of Reading Assessment Anchors**

**GRADE 3**

**R3.A. Comprehension and Reading Skills**

- R3.A.1 Understand Fiction Appropriate to Grade level
- R3.A.2 Understand Nonfiction Appropriate to Grade Level

**R3.B. Interpretation and Analysis of Fictional and Nonfictional Text**

- R3.B.1 Understand Components Within and Between Texts
- R3.B.2 Understand Literary Devices in Fictional and Nonfictional Text
- R3.B.3 Understand Concepts and Organization of Nonfictional Text

**GRADE 4**

**R4.A. Comprehension and Reading Skills**

- R4A.1 Understand Fiction Appropriate to Grade level
- R4A.2 Understand Nonfiction Appropriate to Grade Level

**R4.B. Interpretation and Analysis of Fictional and Nonfictional Text**

- R4.B.1 Understand Components Within and Between Texts
- R4.B.2 Understand Literary Devices in Fictional and Nonfictional Text
- R4.B.3 Understand Concepts and Organization of Nonfictional Text

**GRADE 5**

**R5.A. Comprehension and Reading Skills**

- R5.A.1 Understand Fiction Appropriate to Grade level
- R5.A.2 Understand Nonfiction Appropriate to Grade Level

**R5.B. Interpretation and Analysis of Fictional and Nonfictional Text**

- R5.B.1 Understand Components Within and Between Texts
- R5.B.2 Understand Literary Devices in Fictional and Nonfictional Text
- R5.B.3 Understand Concepts and Organization of Nonfictional Text

**GRADE 6**

**R6.A. Comprehension and Reading Skills**

- R6.A.1 Understand Fiction Appropriate to Grade level
- R6.A.2 Understand Nonfiction Appropriate to Grade Level

**R6.B. Interpretation and Analysis of Fictional and Nonfictional Text**

- R6.B.1 Understand Components Within and Between Texts
- R6.B.2 Understand Literary Devices in Fictional and Nonfictional Text
- R6.B.3 Understand Concepts and Organization of Nonfictional Text

## **GRADE 7**

### **R7.A. Comprehension and Reading Skills**

- R7.A.1 Understand Fiction Appropriate to Grade level
- R7.A.2 Understand Nonfiction Appropriate to Grade Level

### **R7.B. Interpretation and Analysis of Fictional and Nonfictional Text**

- R7.B.1 Understand Components Within and Between Texts
- R7.B.2 Understand Literary Devices in Fictional and Nonfictional Text
- R7.B.3 Understand Concepts and Organization of Nonfictional Text

## **GRADE 8**

### **R8.A. Comprehension and Reading Skills**

- R8.A.1 Understand Fiction Appropriate to Grade level
- R8.A.2 Understand Nonfiction Appropriate to Grade Level

### **R8.B. Interpretation and Analysis of Fictional and Nonfictional Text**

- R8.B.1 Understand Components Within and Between Texts
- R8.B.2 Understand Literary Devices in Fictional and Nonfictional Text
- R8.B.3 Understand Concepts and Organization of Nonfictional Text

## **GRADE 11**

### **R11.A. Comprehension and Reading Skills**

- R11.A.1 Understand Fiction Appropriate to Grade level
- R11.A.2 Understand Nonfiction Appropriate to Grade Level

### **R11.B. Interpretation and Analysis of Fictional and Nonfictional Text**

- R11.B.1 Understand Components Within and Between Texts
- R11.B.2 Understand Literary Devices in Fictional and Nonfictional Text
- R11.B.3 Understand Concepts and Organization of Nonfictional Text

# **Pennsylvania Science**

## **About the Science Assessment Anchors**

### **Introduction**

The Pennsylvania Science Assessment is based on the Academic Standards adopted by the State Board of Education in January of 2002. The standards are comprised of two documents: Science and Technology Standards and Environment and Ecology Standards. These documents contain seventeen important categories that describe what students need to know. The purpose of the Assessment Anchors is to articulate essential and assessable elements, and to provide clarity for instruction and for the focus of the state assessment in grades 4, 8, and 11.

### **How the Assessment Anchors Connect to the Standards**

The Pennsylvania Academic Standards for Science are:

- |   |   |
|---|---|
| <b>3.1</b> Unifying Themes                          | <b>4.1</b> Watersheds and Wetlands                    |
| <b>3.2</b> Inquiry and Design                       | <b>4.2</b> Renewable and Nonrenewable Resources       |
| <b>3.3</b> Biological Sciences                      | <b>4.3</b> Environmental Health                       |
| <b>3.4</b> Physical Science, Chemistry, and Physics | <b>4.4</b> Agriculture and Society                    |
| <b>3.5</b> Earth Sciences                           | <b>4.5</b> Integrated Pest Management                 |
| <b>3.6</b> Technology Education                     | <b>4.6</b> Ecosystems and their Interactions          |
| <b>3.7</b> Technological Devises                    | <b>4.7</b> Threatened, Endangered and Extinct Species |
| <b>3.8</b> Science, Technology and Human Endeavors  | <b>4.8</b> Humans and the Environment                 |
|   | <b>4.9</b> Environmental Laws and Regulations         |

All of the Science Standards categories are included in the Assessment Anchors, but the anchors tighten the focus of what is assessed. The Assessment Anchors clarify what is expected from grade span to grade span (K-4, 5-7, and 8-10). In addition, the Assessment Anchors have fewer Reporting Categories to help create more reliable scores (meaning that there are more items per reporting category making interpretations about what students actually know more reliable). Rather than reporting student results in all 17 standards, the reports will be organized into four reporting categories.

### **How the Assessment Anchors are Organized**

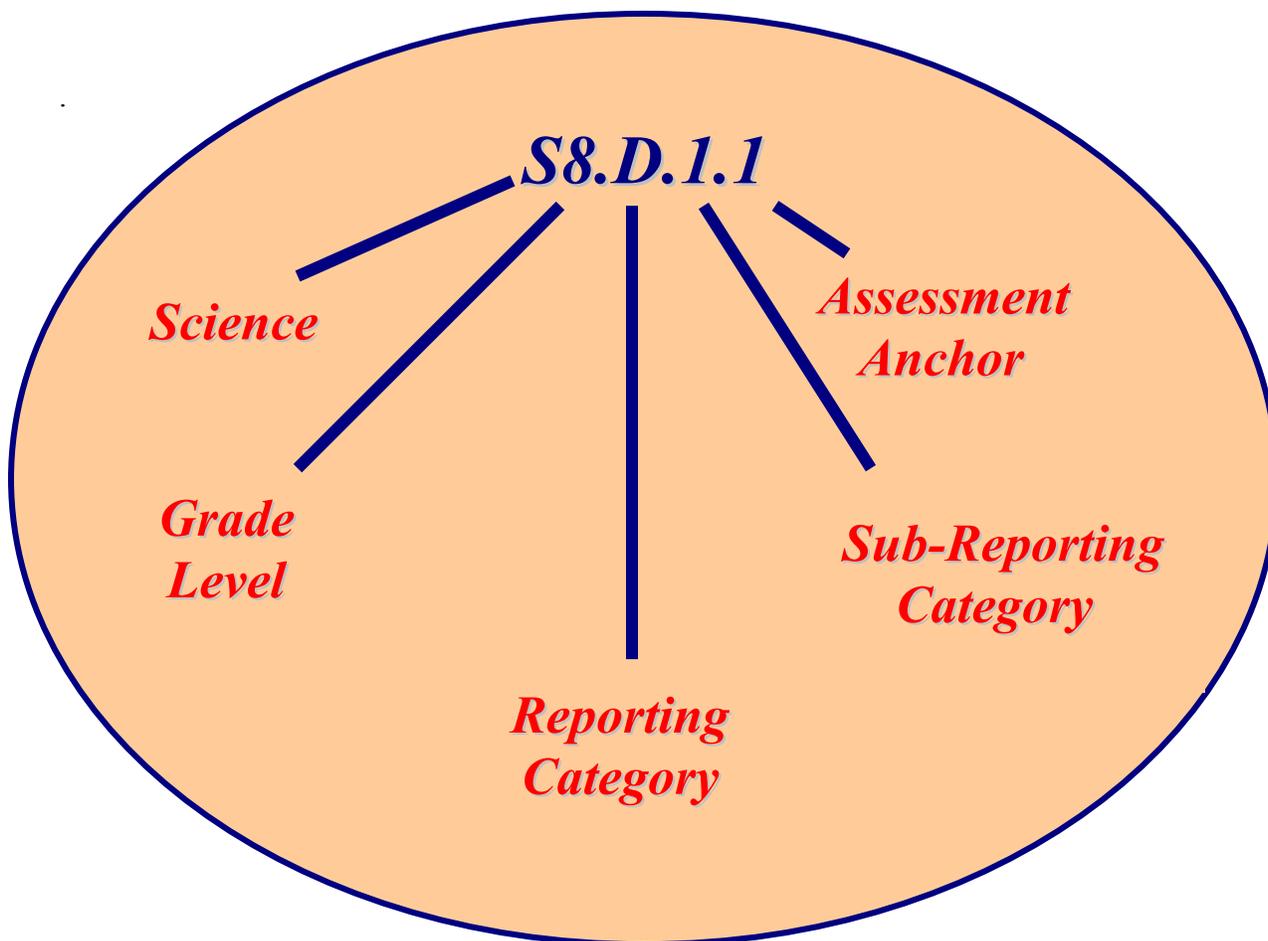
The four reporting categories are similar to those used by the National Assessment of Educational Progress (NEAP) and The Third International Mathematics and Science Study (TIMSS). The four categories for the assessment anchors are included in these major assessments, but are organized differently. Below are the four student reporting categories for the assessment anchors for the Pennsylvania System of School Assessment (PSSA) in Science and the related standards.

Appendix A: Assessment Anchor Explanations

<b>Reporting Categories</b>	<b>Connections to the Standards</b>
<b>A. The Nature of Science</b>	<p>3.1 Unifying Themes of Science            3.2 Inquiry and Design            3.6 Technology Education            3.7 Technological Devices            3.8 Science, Technology, and Human Endeavors            4.4 Agriculture and Society            4.6 Ecosystems and their Interactions            4.7 Threatened, Endangered, and Extinct Species            4.8 Humans and the Environment</p>
<b>B. Biological Sciences</b>	<p>3.1 Unifying Themes of Science            3.3 Biological Sciences            4.2 Renewable and Nonrenewable Resources            4.3 Environmental Health            4.6 Ecosystems and Their Interactions            4.7 Threatened, Endangered, and Extinct Species</p>
<b>C. Physical Sciences</b>	<p>3.2 Inquiry and Design            3.4 Physical Science, Chemistry, and Physics            3.6 Earth Sciences</p>
<b>D. Earth and Space Sciences</b>	<p>3.2 Inquiry and Design            3.4 Physical Science, Chemistry, and Physics            3.5 Earth Sciences            3.7 Technological Devices            4.1 Watersheds and Wetlands            4.2 Renewable and Nonrenewable Resources            4.8 Humans and the Environment</p>

### How to Read the Assessment Anchors

All of the Science Assessment Anchors begin with an “S” to indicate science. The number after the “S” in the label is the grade level (e.g., S8 would be Science at eighth grade). The second letter in the labeling system is the Reporting Category (A through D) followed by the sub-reporting category number. The same reporting categories continue across all Grade levels, 4, 8, and 11. The final number in the label is the actual Assessment Anchor number (e.g., 1.1, 1.2, 1.3, etc.). Essentially, you read the Assessment Anchors like an outline, with the Assessment Anchor shaded across the top of the page and more specific details underneath. (*See example below.*)



For example, **S8.D.1.1** is the code for the first science (S) assessment anchor for Grade 8 in the reporting category of (D) Earth and Space Sciences, and the sub-category of Earth Features and Processes That Change Earth and Its Resources.

## **Other Important Features\* that Appear in the Assessment Anchors**

### Eligible Content

The column on the right-hand side of the page underneath each Assessment Anchor is the Eligible Content. This is often known as the “assessment limit” and helps teachers identify how the anchor will be assessed. Not all of the Eligible Content is assessed on the PSSA each year, but it shows the range of knowledge drawn upon to design the test.

### The use of “e.g.” and “i.e.”

Some assessment anchors contain additional information in parentheses. If there is a list inside with an “e.g.,” preceding it, that means the examples included are meant to be just that, examples. This is not an exhaustive list for assessment purposes. However, if the list is preceded by an “i.e.,” the list is to be considered limited to those specific examples, and those items are the only items that are “fair game” for assessment.

### The use of “and” and “or”

All of the concepts and skills identified at a given grade level are “fair game” for large-scale assessment purposes. However, conjunctions used throughout this document have specific meaning. The use of the conjunction “or” means that a student can be assessed on all or just some of the elements in a given year. The use of “and” between elements means that the *intent* is to assess each element of the assessment anchor every year. In some situations, “or” is used when students have choices about how they will provide supporting evidence for their responses.

### Sample Items

The sample items appear on the bottom half of the page. These are examples of how the Assessment Anchor might appear on the PSSA. Some of the pages may not have any sample items because the development committee only created three examples per Assessment Anchor. We will be continually adding to the sample items as time goes on. For other sample items, teachers should consult the item sampler on the state website.

\*NOTE: These features are found in the Assessment Anchors document for each grade, which are located on the PDE website: [www.education.state.pa.us](http://www.education.state.pa.us) from the left-hand column, select “Programs”, “Programs O-R”, “Pennsylvania System of School Assessment (PSSA)”, and then “Assessment Anchors”.

## Overview of Science Assessment Anchors

*\*Note that on this overview document, the grade level does not appear in the reporting categories because these occur at all grade levels (4, 8, and 11). However, Grade 4 is used as an example for the Anchors and Benchmark References.*

<b>S.A The Nature of Science</b>	
<b>S.A.1. Reasoning and Analysis</b>	
<b>S4.A.1.1</b> Identify and explain the pros and cons of applying scientific, environmental, or technological knowledge to possible solutions to problems.	(3.2.4.A) (3.2.4.C) (3.8.4.C)
<b>S4.A.1.2</b> Recognize and describe change in natural or human-made systems and the possible effects of those changes.	(3.1.4.C) (3.1.4.E) (4.7.4.B) (4.8.4.A) (4.8.4.C)
<b>S.A.2. Processes, Procedures, and Tools of Scientific Investigations</b>	
<b>S4.A.2.1.</b> Apply skills necessary to conduct an experiment or design a solution to solve a problem.	(3.2.4.C)
<b>S4.A.2.2</b> Identify appropriate instruments for a specific task and describe the information the instrument can provide.	(3.7.4.A) (3.7.4.B)
<b>S.A.3. Systems, Models, and Patterns</b>	
<b>S4.A.3.1</b> Identify systems and describe relationships among parts of a familiar system (e.g., digestive system, simple machines, water cycle).	(3.1.4.A) (3.6.4.A) (3.6.4.B) (3.6.4.C) (4.4.4.C) (4.6.4.A) (4.6.4.B)
<b>S4.A.3.2</b> Use models to illustrate simple concepts and compare the models to what they represent.	(3.1.4.B) (4.3.4.C)
<b>S4.A.3.3</b> Identify and make observations about patterns that regularly occur and reoccur in nature.	(3.1.4.C) (3.2.4.B)

<b>S.B Biological Sciences</b>	
<b>S.B.1. Structure and Function of Organisms</b>	
<b>S4.B.1.1</b> Identify and describe similarities and differences between living things and their life processes.	(3.3.4.A) (3.3.4.B) (4.3.4.A) (4.3.4.C) (4.6.4.A)
<b>S.B.2. Continuity of Life</b>	
<b>S4.B.2.1</b> Identify and explain how adaptations help organisms to survive.	(4.7.4.B)
<b>S4.B.2.2</b> Identify that characteristics are inherited and, thus, offspring closely resemble their parents.	(3.3.4.C) (4.7.4.A) (4.7.4.C)
<b>S.B.3. Ecological Behavior and Systems</b>	
<b>S4.B.3.1</b> Identify and describe living and nonliving things in the environment or their interaction.	(4.6.4.A)
<b>S4.B.3.2</b> Describe, explain, and predict change in natural or human-made systems and the possible effects of those changes on the environment.	(4.2.4.C) (4.3.4.C) (4.6.4.C) (3.1.4.E)
<b>S4.B.3.3</b> Identify or describe human reliance on the environment at the individual or the community level.	(3.8.4.C) (4.3.4.B) (4.4.4.B) (4.5.4.C)

<b>S.C Physical Sciences</b>	
<b>S.C.1. Structure, Properties and Interactions of Matter and Energy</b>	
S4.C.1.1 Describe observable physical properties of matter.	(3.2.4.B) (3.4.4.A)
<b>S.C.2 Forms, Sources, Conversions, and Transfer of Energy</b>	
S4.C.2.1 Recognize basic energy types and sources, or describe how energy can be changed from one form to another.	(3.4.4.B) (3.4.4.C)
<b>S.C.3 Principles of Force and Motion</b>	
S4.C.3.1 Identify and describe different types of force and motion, or the effect of the interaction between force and motion.	(3.2.4.B) (3.4.4.C) (3.6.4.C)

<b>S.D Earth and Space Sciences</b>	
<b>S.D.1 Earth Features and Processes that Change Earth and Its Resources</b>	
S4.D.1.1 Describe basic landforms in Pennsylvania.	(3.5.4.A)
S4.D.1.2 Identify the types and uses of Earth’s resources.	(3.5.4.B) (3.5.4.D) (4.2.4.B) (4.8.4.D)
S4.D.1.3 Describe Earth’s different sources of water or describe changes in the form of water.	(3.5.4.D) (4.1.4.A) (4.1.4.D) (4.1.4.E)
<b>S.D.2 Weather, Climate, and Atmospheric Processes</b>	
S4.D.2.1 Identify basic weather conditions and how they are measured.	(3.5.4.C) (3.7.4.B) (3.2.4.B)
<b>S.D.3 Composition and Structure of the Universe</b>	
S4.D.3.1 Describe Earth’s relationship to the sun and the moon.	(3.4.4.D)

Appendix B:  
PSSA General Scoring Guidelines



**PENNSYLVANIA DEPARTMENT OF EDUCATION**

**PSSA**

**General Description of Mathematics Scoring Guidelines**

**4 – The response demonstrates a *thorough* understanding of the mathematical concepts and procedures required by the task.**

The response provides correct answer(s) with clear and complete mathematical procedures shown and a correct explanation, as required by the task. Response may contain a minor “blemish” (e.g., missing \$) or omission in work or explanation that does not detract from demonstrating a *thorough* understanding.

**3 – The response demonstrates a *general* understanding of the mathematical concepts and procedures required by the task.**

The response and explanation (as required by the task) are mostly complete and correct. The response may have minor errors or omissions that do not detract from demonstrating a *general* understanding.

**2 – The response demonstrates a *partial* understanding of the mathematical concepts and procedures required by the task.**

The response is somewhat correct with *partial* understanding of the required mathematical concepts and/or procedures demonstrated and/or explained. The response may contain some work that is incomplete or unclear.

**1 – The response demonstrates a *minimal* understanding of the mathematical concepts and procedures required by the task.**

**0 – The response has no correct answer and *insufficient* evidence to demonstrate any understanding of the mathematical concepts and procedures required by the task for that grade level.**

Response may show only information copied from the question.

Special Categories within zero reported separately:

BLK (blank) ...Blank, entirely erased, or written refusal to respond

OT .....Off task

IL.....Illegible

LOE.....Response in a language other than English

*The Scoring Guideline documents are available on the PDE website.*

**PENNSYLVANIA DEPARTMENT OF EDUCATION  
PSSA**

**General Scoring Guidelines for Open-Ended Reading Items**

**3 Points**

- The response provides a complete answer to the task (e.g., a statement that offers a correct answer as well as text-based support).
- The response provides specific, appropriate and accurate details (e.g., naming, describing, explaining, or comparing) or examples.

**2 Points**

- The response provides a partial answer to the task (e.g., indicates some awareness of the task and at least one text-based detail).
- The response attempts to provide sufficient, appropriate details (e.g., naming, describing, explaining, or comparing) or examples; may contain minor inaccuracies.

**1 Point**

- The response provides an incomplete answer to the task (e.g., indicating either a misunderstanding of the task or no text-based details).
- The response provides insufficient or inappropriate details or examples that have a major effect on accuracy.
- The response consists entirely of relevant copied text.

**0 Points**

- The response provides insufficient material for scoring.
- The response is inaccurate in all aspects.

**Categories within zero reported separately:**

- **BLK (blank) = no response or written refusal to respond or too brief to determine response.**
- **OT = off task/topic.**
- **LOE = response in a language other than English.**
- **IL = illegible.**

***DESCRIPTION OF SCIENCE SCORING GUIDELINES FOR 2-POINT OPEN-ENDED ITEMS:***

**General Description of Science Scoring Guidelines:**

- 2 – The response demonstrates a *thorough* understanding of the scientific content, concepts, and procedures required by the task/s.**

The response provides a clear, complete, and correct response as required by the task/s. Response may contain a minor blemish (e.g., misspelled words) or omission in work or explanation that does not detract from demonstrating a thorough understanding.

- 1 – The response demonstrates a *partial* understanding of the scientific content, concepts, and procedures required by the task/s.**

The response is somewhat correct with partial understanding of the required scientific content, concepts, and/or procedures demonstrated and/or explained. The response may contain some work that is incomplete or unclear.

- 0 – The response provides *insufficient* evidence to demonstrate any understanding of the scientific content, concepts, and procedures as required by the task/s for that grade level.**

Response may show only information copied or rephrased from the question or insufficient correct information to receive a score of 1.

*Special Categories within zero reported separately:*

BLK – Blank, entirely erased or written refusal to respond

OT – Off Task

IL – Illegible

LOE – Response in a language other than English

**DESCRIPTION OF SCIENCE SCORING GUIDELINES FOR 4-POINT OPEN-ENDED ITEMS:**

**General Description of Science Scoring Guidelines:**

- 4 – The response demonstrates a *thorough* understanding of the scientific content, concepts, and procedures required by the task/s.**

The response provides a clear, complete, and correct response as required by the task/s. Response may contain a minor blemish (e.g., misspelled words) or omission in work or explanation that does not detract from demonstrating a thorough understanding.

- 3 – The response demonstrates a *general* understanding of the scientific content, concepts, and procedures required by the task/s.**

The responses, as required by the task, are mostly complete and correct. The response may have minor errors or omissions that do not detract from demonstrating a general understanding.

- 2 – The response demonstrates a *partial* understanding of the scientific content, concepts, and procedures required by the task/s.**

The response is somewhat correct with partial understanding of the required scientific content, concepts, and/or procedures demonstrated and/or explained. The response may contain some work that is incomplete or unclear.

- 1 – The response demonstrates a *minimal* understanding of the scientific content, concepts, and procedures as required by the task/s.**

- 0 – The response provides *insufficient* evidence to demonstrate any understanding of the scientific content, concepts, and procedures as required by the task/s for that grade level.**

Response may show only information copied or rephrased from the question or insufficient correct information to receive a score of 1.

Special Categories within zero reported separately:

BLK – Blank, entirely erased or written refusal to respond

OT – Off Task

IL – Illegible

LOE – Response in a language other than English

## PSSA CONVENTIONS SCORING GUIDELINE FOR WRITING

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- 4** ■ Thorough control of sentence formation.
- Few errors, if any, are present in grammar, usage, spelling, and punctuation, but the errors that are present do not interfere with meaning.
- 

- 3** ■ Adequate control of sentence formation.
- Some errors may be present in grammar, usage, spelling, and punctuation, but few, if any, of the errors that are present may interfere with meaning.
- 

- 2** ■ Limited and/or inconsistent control of sentence formation. Some sentences may be awkward or fragmented
- Many errors may be present in grammar, usage, spelling, and punctuation, and some of those errors may interfere with meaning.
- 

- 1** ■ Minimal control of sentence formation. Many sentences are awkward and fragmented.
- Many errors may be present in grammar, usage, spelling, and punctuation, and many of those errors may interfere with meaning.

## PSSA INFORMATIONAL SCORING GUIDELINE FOR WRITING

---

4

**FOCUS** ■ *Sharp, distinct controlling point made about a single topic with evident awareness of task and audience.*

**CONTENT DEVELOPMENT** ■ *Substantial, relevant, and illustrative content that demonstrates a clear understanding of the purpose. Thorough elaboration with effectively presented information consistently supported with well-chosen details.*

**ORGANIZATION** ■ *Effective organizational strategies and structures, such as logical order and transitions, which develop a controlling idea.*

**STYLE** ■ *Precise control of language, stylistic techniques, and sentence structures that creates a consistent and effective tone.*

---

3

**FOCUS** ■ *Clear controlling point made about a single topic with general awareness of task and audience.*

**CONTENT DEVELOPMENT** ■ *Adequate, specific, and/or illustrative content that demonstrates an understanding of the purpose. Sufficient elaboration with clearly presented information supported with well-chosen details.*

**ORGANIZATION** ■ *Organizational strategies and structures, such as logical order and transitions, which develop a controlling idea.*

**STYLE** ■ *Appropriate control of language, stylistic techniques, and sentence structures that creates a consistent tone.*

---

2

**FOCUS** ■ *Vague evidence of a controlling point made about a single topic with an inconsistent awareness of task and audience.*

**CONTENT DEVELOPMENT** ■ *Inadequate, vague content that demonstrates a weak understanding of the purpose. Underdeveloped and/or repetitive elaboration with inconsistently supported information. May be an extended list.*

**ORGANIZATION** ■ *Inconsistent organizational strategies and structures, such as logical order and transitions, which ineffectively develop a controlling idea.*

**STYLE** ■ *Limited control of language and sentence structures that creates interference with tone.*

---

1

**FOCUS** ■ *Little or no evidence of a controlling point made about a single topic with a minimal awareness of task and audience.*

**CONTENT DEVELOPMENT** ■ *Minimal evidence of content that demonstrates a lack of understanding of the purpose. Superficial, undeveloped writing with little or no support. May be a bare list.*

**ORGANIZATION** ■ *Little or no evidence of organizational strategies and structures, such as logical order and transitions, which inadequately develop a controlling idea.*

**STYLE** ■ *Minimal control of language and sentence structures that creates an inconsistent tone.*

---

## PSSA NARRATIVE SCORING GUIDELINE FOR WRITING

---

4

- FOCUS ■ Sharp, distinct controlling point or theme with evident awareness of the narrative.
  - CONTENT DEVELOPMENT ■ Strong story line with illustrative details that addresses a complex idea or examines a complex experience. Thoroughly elaborated narrative sequence that employs narrative elements as appropriate.
  - ORGANIZATION ■ Skillful narrative pattern with clear and consistent sequencing of events, employing a beginning, a middle, and an end. Minor interruptions to the sequence may occur.
  - STYLE ■ Precise control of language, literary devices, and sentence structures that creates a consistent and effective point of view and tone.
- 

3

- FOCUS ■ Clear controlling point or theme with general awareness of the narrative.
  - CONTENT DEVELOPMENT ■ Story line with details that addresses an idea or examines an experience. Sufficiently elaborated narrative sequence that employs narrative elements as appropriate.
  - ORGANIZATION ■ Narrative pattern with generally consistent sequencing of events, employing a beginning, a middle, and an end. Interruptions to the sequence may occur.
  - STYLE ■ Appropriate control of language, literary devices, and sentence structures that creates a consistent point of view and tone.
- 

2

- FOCUS ■ Vague evidence of a controlling point or theme with inconsistent awareness of the narrative.
  - CONTENT DEVELOPMENT ■ Inconsistent story line that inadequately addresses an idea or examines an experience. Insufficiently elaborated narrative sequence that may employ narrative elements.
  - ORGANIZATION ■ Narrative pattern with generally inconsistent sequencing of events that may employ a beginning, a middle, and an end. Interruptions to the sequence may interfere with meaning.
  - STYLE ■ Limited control of language and sentence structures that creates interference with point of view and tone.
- 

1

- FOCUS ■ Little or no evidence of a controlling point or theme with minimal awareness of the narrative.
  - CONTENT DEVELOPMENT ■ Insufficient story line that minimally addresses an idea or examines an experience. Unelaborated narrative that may employ narrative elements.
  - ORGANIZATION ■ Narrative pattern with little or no sequencing of events. Interruptions to the sequence interfere with meaning.
  - STYLE ■ Minimal control of language and sentence structures that creates an inconsistent point of view and tone.
-

## PSSA PERSUASIVE SCORING GUIDELINE FOR WRITING

4

- FOCUS** ■ Sharp, distinct controlling point presented as a position and made convincing through a clear, thoughtful, and substantiated argument with evident awareness of task and audience.
- CONTENT DEVELOPMENT** ■ Substantial, relevant, and illustrative content that demonstrates a clear understanding of the purpose. Thoroughly elaborated argument that includes a clear position consistently supported with precise and relevant evidence. Rhetorical (persuasive) strategies are evident.
- ORGANIZATION** ■ Effective organizational strategies and structures, such as logical order and transitions, to develop a position supported with a purposeful presentation of content.
- STYLE** ■ Precise control of language, stylistic techniques, and sentence structures that creates a consistent and effective tone.

3

- FOCUS** ■ Clear controlling point presented as a position and made convincing through a credible and substantiated argument with general awareness of task and audience.
- CONTENT DEVELOPMENT** ■ Adequate, specific and/or illustrative content that demonstrates an understanding of the purpose. Sufficiently elaborated argument that includes a clear position supported with some relevant evidence. Rhetorical (persuasive) strategies may be evident.
- ORGANIZATION** ■ Organizational strategies and structures, such as logical order and transitions, to develop a position supported with sufficient presentation of content.
- STYLE** ■ Appropriate control of language, stylistic techniques, and sentence structures that creates a consistent tone.

2

- FOCUS** ■ Vague evidence of a controlling point presented as a position that may lack a credible and/or substantiated argument with an inconsistent awareness of task and audience.
- CONTENT DEVELOPMENT** ■ Inadequate, vague content that demonstrates a weak understanding of the purpose. Insufficiently elaborated argument that includes an underdeveloped position supported with little evidence.
- ORGANIZATION** ■ Inconsistent organizational strategies and structures, such as logical order and transitions, to develop a position with inadequate presentation of content.
- STYLE** ■ Limited control of language and sentence structures that creates interference with tone.

1

- FOCUS** ■ Little or no evidence of a controlling point presented as a position that lacks a credible and/or substantiated argument with minimal awareness of task and audience.
- CONTENT DEVELOPMENT** ■ Minimal evidence of content that demonstrates a lack of understanding of the purpose. Unelaborated argument that includes an undeveloped position supported with minimal or no evidence.
- ORGANIZATION** ■ Little or no evidence of organizational strategies and structures, such as logical order and transitions, to develop a position with insufficient presentation of content.
- STYLE** ■ Minimal control of language and sentence structures that creates an inconsistent tone.

Appendix C:  
2010 PSSA Tally Sheets



Appendix C: 2010 PSSA Tally Sheets

Grade 03

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
	1			Understand relationships and representations of numbers and number systems		4				4	4			1				1	1	
	1	1	1	Match word to number	1		1		2		2	1		1				2	2	
	1	1	2	Differentiate between even & odd	1				1		1	1						1	1	
	1	1	3	Compare two whole numbers	2				2		2	2						2	2	
	1	1	4	Order a set of whole numbers	2		1		3		3	2		1				3	3	
	1	1	5	Match symbolic representation	2				2		2	2						2	2	
	1	2	1	Write fraction that corresponds to drawing	2				2		2	2						2	2	
	1	2	2	Draw representation of a fraction	2				2		2	2						2	2	
	1	3	1	Count a collection of bills & coins	2				2		2	2						2	2	
	1	3	2	Compare total values of combinations of coins	1		1		2		2	1		1				2	2	
	1	3	3	Make change up to \$5.00	1				1		1	1						1	1	
Total For Assessment Anchor A.1					16	4	3		19	4	23	16	1	3				19	1	20
A: Numbers and Operations	2			Understand meanings, uses and relations of operations																
	2	1	1	Represent multiplication as repeated addition	1		1		2		2	1		1				2	2	
	2	1	2	Demonstrate inverse relationships	2		1		3		3	2		1				3	3	
	2	1	3	Identify correct operation(s)	2				2		2	2						2	2	
	Total For Assessment Anchor A.2					5		2		7		7	5		2				7	7
	Understand meanings, uses of operations and how they relate to each other					5		2		7		7	5		2				7	7
	3			Compute accurately/fluently and make reasonable estimates																
	3	1	1	Solve single- & double-digit addition & subtraction problems	1		1		2		2	1		1				2	2	
	3	1	2	Solve multiplication problems	2		1		3		3	2		1				3	3	
	3	1	3	Solve triple digit addition & subtraction problems	2				2		2	2						2	2	
3	2	1	Estimate sums and differences	1		1		2		2	1		1				2	2		
Total For Assessment Anchor A.3					6		3		9		9	6		3				9	9	
Compute accurately and fluently and make reasonable estimates					6		3		9		9	6		3				9	9	
Total For Reporting Category A					27	4	8		35	4	39	27	1	8				35	1	36

Appendix C: 2010 PSSA Tally Sheets

Grade 03

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
											Core		EB							
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
B: Measurement	1			Understand measurable attributes and units, systems, processes of measurement																
	1	1	1	Tell/show analog time to the minute	2		1		3		3		2		1		3		3	
	1	1	2	Find elapsed time	1				1		1		1				1		1	
	1	1	3	Identify times as AM or PM	2				2		2		2				2		2	
	1	2	1	Select appropriate unit for measurement	1				1		1		1				1		1	
	1	2	2	Compare and/or order objects by length, area, or weight	1		1		2		2		1		1		2		2	
	Total For Assessment Anchor B.1 Understand measurable attributes and units, systems, processes of measurement					7		2		9		9		7		2		9		9
	2			Apply techniques, tools & formulas to determine measurements																
	2	1	1	Use a ruler to nearest 1/2 inch	3		1		4		4		3		1		4		4	
	2	2	1	Match object with measurement																
	Total For Assessment Anchor B.2 Apply appropriate techniques, tools and formulas to determine measurements					3		1		4		4		3		1		4		4
	Total For Reporting Category B					10		3		13		13		10		3		13		13

Appendix C: 2010 PSSA Tally Sheets

Grade 03

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
C: Geometry	1			Analyze characteristics & properties of 2-D & 3-D shapes																
	1	1	1	Name/identify/describe 2-D shapes	2		1		3		3		2		1		3		3	
	1	1	2	Name/identify 3-D shapes	2		1		3		3		2		1		3		3	
	Total For Assessment Anchor C.1 Analyze characteristics and properties of two- and three-dimensional geometric shapes					4		2		6		6		4		2		6		6
	2			Identify and/or apply concepts of transformations or symmetry		4				4	4			1					1	1
	2	1	1	Identify/draw line of symmetry	1				1		1		1					1		1
	2	1	2	Identify symmetrical 2-D shapes	2				2		2		2					2		2
	Total For Assessment Anchor C.2 Identify and/or apply concepts of transformations or symmetry					3	4			3	4	7		3	1			3	1	4
	Total For Reporting Category C					7	4	2		9	4	13		7	1	2		9	1	10

Appendix C: 2010 PSSA Tally Sheets

Grade 03

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items								
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)				
											Core		EB						
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total	
D: Algebraic Concepts	1			Understand patterns, relations and functions															
	1	1	1	Extend or find a missing element in a pattern	1		1		2		2		1		1		2		2
	1	1	2	Identify/describe rule for a pattern	2		1		3		3		2		1		3		3
	Total For Assessment Anchor D.1 Understand patterns, relations and functions				3		2		5		5		3		2		5		5
	2			Represent/analyze mathematical situations		4				4	4			1				1	1
	2	1	1	Create or match a story	1				1		1		1				1		1
	2	1	2	Match number sentence to story	1				1		1		1				1		1
	2	2	1	Find a missing number	1				1		1		1				1		1
	2	2	2	Identify the missing symbol	1				1		1		1				1		1
	Total For Assessment Anchor D.2 Represent/analyze mathematical situations using numbers, symbols, words, tables and/or graphs				4	4			4	4	8		4	1			4	1	5
Total For Reporting Category D				7	4	2		9	4	13		7	1	2		9	1	10	

Appendix C: 2010 PSSA Tally Sheets

Grade 03

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items								
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)				
											Core		EB						
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total	
<b>E: Data Analysis and Probability</b>	1			Formulate/answer questions; organize, display, interpret or analyze data															
	1	1	1	Analyze data shown on tables, charts, or bar graphs	2		1		3		3		2		1		3		3
	1	1	2	Describe, interpret and/or answer questions based on data	3		1		4		4		3		1		4		4
	1	2	1	Graph data	2		1		3		3		2		1		3		3
	1	2	2	Translate information from one type of display to another	2				2		2		2				2		2
	Total For Assessment Anchor E.1 Formulate or answer questions about data and/or organize, display, interpret or analyze data					9		3		12		12		9		3		12	
Total For Reporting Category E					9		3		12		12		9		3		12		12

Appendix C: 2010 PSSA Tally Sheets

Grade 04

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points									Items						
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
A: Numbers and Operations	1			Understand relationships and representations of numbers and number systems																
	1	1	1	Match drawing to fraction, decimal, mixed number	2				2		2		2					2		2
	1	1	2	Create a drawing or set to represent a fraction	2				2		2		2					2		2
	1	1	3	Match standard form to word form (decimals)	1		1		2		2		1		1			2		2
	1	1	4	Write in expanded, standard or word form (whole numbers)	3				3		3		3					3		3
	1	2	1	Locate/identify fractions or decimals on number line	2				2		2		2					2		2
	1	2	2	Compare/order whole numbers			1		1		1				1			1		1
	1	3	1	Find/identify/list factors	4				4		4		4					4		4
	1	3	2	Find/identify/list multiples	2				2		2		2					2		2
	Total For Assessment Anchor A.1 Understand relationships among and representations of numbers and number systems					16		2		18		18		16		2		18		18
	2			Understand meanings, uses and relations of operations		4				4	4			1					1	1
	2	1	1	Solve problems involving all operations (whole numbers)	2		1		3		3		2		1			3		3
	2	1	2	Solve problems with decimals	3		1		4		4		3		1			4		4
	Total For Assessment Anchor A.2 Understand meanings, uses of operations and how they relate to each other					5	4	2		7	4	11		5	1	2		7	1	8
	3			Compute accurately/fluently and make reasonable estimates																
	3	1	1	Round whole numbers	2		2		4		4		2		2			4		4
	3	1	2	Round to nearest dollar	1		2		3		3		1		2			3		3
	3	1	3	Estimate answers with whole numbers	2				2		2		2					2		2
	3	2	1	Solve addition/subtraction problems involving decimals	1				1		1		1					1		1
	3	2	2	Solve addition/subtraction problems involving fractions	1				1		1		1					1		1
Total For Assessment Anchor A.3 Compute accurately and fluently and make reasonable estimates					7		4		11		11		7		4		11		11	
Total For Reporting Category A					28	4	8		36	4	40		28	1	8		36	1	37	

Appendix C: 2010 PSSA Tally Sheets

Grade 04

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points									Items					
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)			
												Core		EB					
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total	
B: Measurement	1			Understand measurable attributes and units, systems, processes of measurement															
	1	1	1	Match analog time to digital time			1		1		1			1			1		1
	1	1	2	Identify time	2				2		2	2					2		2
	1	1	3	Calculate elapsed time	1		1		2		2	1		1			2		2
	1	1	4	Determine beginning or ending time	2				2		2	2					2		2
	Total For Assessment Anchor B.1 Understand measurable attributes and units, systems, processes of measurement					5		2		7		7	5		2		7		7
	2			Apply techniques, tools & formulas to determine measurements		4				4	4		1					1	1
	2	1	1	Use/read ruler to nearest 1/4 inch	2				2		2	2					2		2
	2	2	1	Make reasonable estimates of measurement															
	Total For Assessment Anchor B.2 Apply appropriate techniques, tools and formulas to determine measurements					2	4			2	4	6	2	1			2	1	3
Total For Reporting Category B					7	4	2		9	4	13	7	1	2		9	1	10	

Appendix C: 2010 PSSA Tally Sheets

Grade 04

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points									Items												
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)										
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total								
C: Geometry	1			Analyze characteristics & properties of 2-D & 3-D shapes																						
	1	1	1	Identify/classify/compare 2-D figures	2		1		3		3		2		1		3		3							
	1	1	2	Classify 3-D figures, identify characteristics	1				1		1		1				1		1							
	1	2	1	Identify points/lines/segments/rays	2				2		2		2				2		2							
	1	2	2	Identify parallel/perpendicular lines	1				1		1		1				1		1							
	Total For Assessment Anchor C.1 Analyze characteristics and properties of two- and three-dimensional geometric shapes					6		1		7		7		6		1		7		7						
	2			Identify and/or apply concepts of transformations and symmetry																						
	2	1	1	Identify/draw figures having one, two, or no lines of symmetry	3		1		4		4		3		1		4		4							
	Total For Assessment Anchor C.2 Identify and/or apply concepts of transformations and symmetry					3		1		4		4		3		1		4		4						
	3			Locate points/describe relationships using the coordinate plane																						
	3	1	1	Match or plot ordered pair	1		1		2		2		1		1		2		2							
	Total For Assessment Anchor C.3 Locate points or describe relationships using the coordinate plane					1		1		2		2		1		1		2		2						
	Total For Reporting Category C					10		3		13		13		10		3		13		13						

Appendix C: 2010 PSSA Tally Sheets

Grade 04

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items										
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)						
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total			
D: Algebraic Concepts	1			Understand patterns, relations and functions		4				4	4			1				1	1		
	1	1	1	Extend or find a missing element in a numerical or geometric pattern	1				1		1	1						1	1		
	1	1	2	Identify/describe rule for numerical or geometric pattern	1				1		1	1						1	1		
	1	1	3	Create or replicate numerical or geometric pattern																	
	1	2	1	Determine missing elements in function table given the rule	1				1		1	1						1	1		
	1	2	2	Determine rule given a table	1				1		1	1						1	1		
	Total For Assessment Anchor D.1 Understand patterns, relations and functions					4	4			4	4	8	4	1				4	1	5	
	2			Represent/analyze mathematical situations																	
	2	1	1	Correlate story with expression or equation	1		1		2		2	1		1				2	2		
	2	2	1	Solve for missing number in equation																	
	2	2	2	Identify the missing symbol	1		1		2		2	1		1				2	2		
	Total For Assessment Anchor D.2 Represent/analyze mathematical situations using numbers, symbols, words, tables and/or graphs					2		2		4		4	2		2			4		4	
	Total For Reporting Category D					6	4	2		8	4	12	6	1	2				8	1	9

Appendix C: 2010 PSSA Tally Sheets

Grade 04

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points									Items						
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)				
												Core		EB						
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
<b>E: Data Analysis and Probability</b>	1			Formulate questions; organize, display, interpret or analyze data																
	1	1	1	Describe/interpret/answer questions based on data shown	4		1		5		5		4		1		5		5	
	1	2	1	Graph data or complete a graph	1		1		2		2		1		1		2		2	
	1	2	2	Translate data from one type of display to another	2				2		2		2				2		2	
	Total For Assessment Anchor E.1 Formulate or answer questions about data and/or organize, display, interpret or analyze data					7		2		9		9		7		2		9		9
	3			Understand and apply basic concepts of probability																
	3	1	1	Make a prediction based on data or chance	2		1		3		3		2		1		3		3	
	Total For Assessment Anchor E.3 Understand and apply basic concepts of probability					2		1		3		3		2		1		3		3
	Total For Reporting Category E					9		3		12		12		9		3		12		12

Appendix C: 2010 PSSA Tally Sheets

Grade 05

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points							Items								
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)				
									MC		OE	MC		OE		MC		OE		
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
	1			Understand relationships and representations of numbers and number systems																
	1	1	1	Use expanded notation	2		1		3		3		2		1		3		3	
	1	2	1	Read/write decimals	2				2		2		2				2		2	
	1	2	2	Identify number with place value	1		1		2		2		1		1		2		2	
	1	3	1	Compare whole numbers																
	1	3	2	Compare and/or order decimals	1		1		2		2		1		1		2		2	
	1	3	3	Compare proper fractions	3				3		3		3				3		3	
	1	4	1	Identify negative numbers on number line	1		1		2		2		1		1		2		2	
	1	4	2	Identify negative numbers on thermometer	1				1		1		1				1		1	
	1	5	1	Model fractions/mixed numbers	2				2		2		2				2		2	
	1	6	1	Name/identify prime and composite numbers	2		1		3		3		2		1		3		3	
	1	6	2	List/identify factors, multiples	1				1		1		1				1		1	
<b>Total For Assessment Anchor A.1</b>																				
Understand relationships among and representations of numbers and number systems					16		5		21		21		16		5		21		21	
<b>A: Numbers and Operations</b>	2			Understand meanings, uses and relations of operations		4			4	4			1				1	1		
	2	1	1	Solve problems involving all operations (whole numbers & decimals)	3		1		4		4		3		1		4		4	
	2	1	2	Solve problems involving addition/subtraction (fractions)	1				1		1		1				1		1	
	2	1	3	Choose correct operation	2		1		3		3		2		1		3		3	
	<b>Total For Assessment Anchor A.2</b>																			
	Understand meanings, uses of operations and how they relate to each other					6	4	2		8	4	12		6	1	2		8	1	9
	3			Compute accurately/fluently and make reasonable estimates																
	3	1	1	Round whole numbers & decimals	3		1		4		4		3		1		4		4	
	3	1	2	Estimate to solve	2				2		2		2				2		2	
	3	2	1	Compute without calculator	1				1		1		1				1		1	
<b>Total For Assessment Anchor A.3</b>																				
Compute accurately and fluently and make reasonable estimates					6		1		7		7		6		1		7		7	
<b>Total For Reporting Category A</b>					28	4	8		36	4	40		28	1	8		36	1	37	

Appendix C: 2010 PSSA Tally Sheets

Grade 05

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items										
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)						
											Core		EB								
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total			
B: Measurement	1			Understand measurable attributes and units, systems, processes of measurement		4				4	4			1					1	1	
	1	1	1	Select appropriate unit	1				1		1			1					1		1
	1	2	1	Convert measurements	1				1		1			1					1		1
	1	2	2	Add/subtract measurements																	
	1	3	1	Estimate polygon perimeter/area																	
	1	3	2	Estimate area of irregular figure	1				1		1			1					1		1
	Total For Assessment Anchor B.1 Understand measurable attributes and units, systems, processes of measurement					3	4			3	4	7		3	1				3	1	4
	2			Apply techniques, tools & formulas to determine measurements																	
	2	1	1	Use a ruler to nearest 1/8 in. or cm	1		1		2		2			1		1			2		2
	2	2	1	Find perimeter of square or rectangle or labeled figure	1				1		1			1					1		1
	2	2	2	Find area of square or rectangle	1				1		1			1					1		1
	2	2	3	Solve measurement problems	1		1		2		2			1		1			2		2
	Total For Assessment Anchor B.2 Apply appropriate techniques, tools and formulas to determine measurements					4		2		6		6		4		2			6		6
	Total For Reporting Category B					7	4	2		9	4	13		7	1	2			9	1	10

Appendix C: 2010 PSSA Tally Sheets

Grade 05

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items										
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)						
											Core		EB								
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total			
C: Geometry	1			Analyze characteristics & properties of 2-D & 3-D shapes		4				4	4			1					1	1	
	1	1	1	Identify/classify/compare 3-D figures	1				1		1		1						1		1
	1	1	2	Identify/classify/compare quadrilaterals	1				1		1		1						1		1
	1	2	1	Identify/draw/label points, lines, segments, rays, planes	1				1		1		1						1		1
	Total For Assessment Anchor C.1 Analyze characteristics and properties of two- and three-dimensional geometric shapes					3	4			3	4	7	3	1					3	1	4
	2			Identify and/or apply concepts of transformations or symmetry																	
	2	1	1	Draw or identify translation, reflection, rotation	1		1		2		2		1		1				2		2
	2	1	2	Draw/identify lines of symmetry	2		1		3		3		2		1				3		3
	Total For Assessment Anchor C.2 Identify and/or apply concepts of transformations or symmetry					3		2		5		5	3		2				5		5
	Total For Reporting Category C					6	4	2		8	4	12	6	1	2				8	1	9

Appendix C: 2010 PSSA Tally Sheets

Grade 05

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items								
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)				
											Core		EB						
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total	
D: Algebraic Concepts	1			Understand patterns, relations and functions															
	1	1	1	Extend or find a missing element in a numerical or geometric pattern	1		1		2		2		1		1		2	2	
	1	1	2	Create numerical or geometric pattern	2				2		2		2				2	2	
	1	2	1	Form/illustrate pattern rule	2				2		2		2				2	2	
	Total For Assessment Anchor D.1 Understand patterns, relations and functions					5		1		6		6		5		1		6	6
	2			Represent/analyze mathematical situations															
	2	1	1	Solve for missing number	1				1		1		1				1	1	
	2	1	2	Match number sentence to story	4		2		6		6		4		2		6	6	
	Total For Assessment Anchor D.2 Represent/analyze mathematical situations using numbers, symbols, words, tables and/or graphs					5		2		7		7		5		2		7	7
	Total For Reporting Category D					10		3		13		13		10		3		13	13

Appendix C: 2010 PSSA Tally Sheets

Grade 05

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items								
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)				
											Core		EB						
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total	
E: Data Analysis and Probability	1			Formulate/answer questions; organize, display, interpret or analyze data															
	1	1	1	Interpret/display data			1		1			1			1			1	
	Total For Assessment Anchor E.1																		
	Formulate or answer questions about data and/or organize, display, interpret or analyze data						1		1			1			1			1	
	2			Select and/or use appropriate statistical methods to analyze data															
	2	1	1	Determine the mean, median, range	4				4		4				4			4	
	2	1	2	Identify the mode in set of data	2				2		2				2			2	
	Total For Assessment Anchor E.2																		
	Select and/or use appropriate statistical methods to analyze data						6		6		6				6			6	
	3			Understand/apply basic concepts of probability or outcomes															
	3	1	1	Predict/determine likelihood of outcomes	1		1		2		2		1		1		2		2
	3	1	2	Determine probability of outcome	2		1		3		3		2		1		3		3
	Total For Assessment Anchor E.3																		
	Understand and/or apply basic concepts of probability or outcomes						3		2		5		3		2		5		5
	Total For Reporting Category E						9		3		12		9		3		12		12

Appendix C: 2010 PSSA Tally Sheets

Grade 06

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	Core		EB		MC	OE	Total		
												MC	OE	MC	OE					
A: Numbers and Operations	1			Understand relationships and representations of numbers and number systems																
	1	1	1	Represent percents as fractions and/or decimals	1				1		1				1			1		
	1	1	2	Convert between fractions and decimals/differentiate between terminating & repeating decimals	2		1		3		3		2		1			3	3	
	1	1	3	Represent number in exponential form	1				1		1		1					1	1	
	1	1	4	Represent mixed number as an improper fraction	2				2		2		2					2	2	
	1	2	1	Compare/order rational numbers except integers	2		1		3		3		2		1			3	3	
	1	3	1	Find GCF of two numbers	1		1		2		2		1		1			2	2	
	1	3	2	Find LCM of two numbers	2				2		2		2					2	2	
	1	3	3	Use divisibility rules for 2, 3, 5 & 10 to solve problems																
	1	4	1	Model percents	2		1		3		3		2		1			3	3	
	Total For Assessment Anchor A.1 Understand relationships among and representations of numbers and number systems					13		4		17		17		13		4		17	17	
	2			Understand meanings, uses and relations of operations		4				4	4		1					1	1	
	2	1	1	Complete equations by using properties: associative, commutative, distributive, Identity	2		1		3		3		2		1			3	3	
	Total For Assessment Anchor A.2 Select /use operations to solve problems					2	4	1		3	4	7	2	1	1			3	1	4
	3			Compute accurately/fluently and make reasonable estimates																
	3	1	1	Estimate to solve	2				2		2		2					2	2	
	3	2	1	Solve problems involving operations	1				1		1		1					1	1	
	Total For Assessment Anchor A.3 Compute accurately and fluently and make reasonable estimates					3				3		3		3				3	3	
	Total For Reporting Category A					18	4	5		23	4	27		18	1	5		23	1	24

Appendix C: 2010 PSSA Tally Sheets

Grade 06

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points							Items							
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)			
									Core		EB								
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total	
B: Measurement	1			Understand measurable attributes and units, systems, processes of measurement															
	1	1	1	Determine/compare elapsed time	3		1		4		4		3		1		4		4
	Total For Assessment Anchor B.1 Understand measurable attributes and units, systems, processes of measurement				3		1		4		4		3		1		4		4
	2			Apply techniques, tools & formulas to determine measurements															
	2	1	1	Use ruler to nearest 1/16 in. or mm	1		1		2		2		1		1		2		2
	2	1	2	Choose precise measurement															
	2	1	3	Measure angles using protractor	2		1		3		3		2		1		3		3
	2	2	1	Find perimeter of any polygon	2				2		2		2				2		2
	2	3	1	Define/label/identify angles	1				1		1		1				1		1
	Total For Assessment Anchor B.2 Apply appropriate techniques, tools and formulas to determine measurements				6		2		8		8		6		2		8		8
Total For Reporting Category B				9		3		12		12		9		3		12		12	

Appendix C: 2010 PSSA Tally Sheets

Grade 06

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
C: Geometry	1			Analyze characteristics & properties of 2-D & 3-D shapes		4				4	4			1				1	1	
	1	1	1	Identify, classify, and compare types of polygons	1				1		1	1						1	1	
	1	1	2	Identify properties of all types of triangles	1		1		2		2	1		1				2	2	
	1	1	3	Solve radius/diameter problems	1				1		1	1						1	1	
	1	1	4	Identify/use polygon/circle degrees	1				1		1	1						1	1	
	1	2	1	Identify/describe/label parallel, perpendicular, and intersecting lines	2				2		2	2						2	2	
	1	2	2	Identify points, planes, lines, line segments, rays, angles, and vertices	1		1		2		2	1		1				2	2	
	Total For Assessment Anchor C.1 Analyze characteristics and properties of two- and three-dimensional geometric shapes					7	4	2		9	4	13	7	1	2			9	1	10
	3			Locate points/describe relationships using the coordinate plane																
	3	1	1	Plot points in Quadrant I & on axes	3		1		4		4	3		1				4	4	
Total For Assessment Anchor C.3 Locate points or describe relationships using the coordinate plane					3		1		4		4	3		1			4		4	
Total For Reporting Category C					10	4	3		13	4	17	10	1	3			13	1	14	

Appendix C: 2010 PSSA Tally Sheets

Grade 06

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items								
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total	
D: Algebraic Concepts	1			Understand patterns, relations and functions															
	1	1	1	Create/extend/complete pattern	1		1		2		2		1		1		2	2	
	1	2	1	Determine or illustrate pattern rule	4		1		5		5		4		1		5	5	
	Total For Assessment Anchor D.1 Understand patterns, relations and functions					5		2		7		7		5		2		7	7
	2			Represent/analyze mathematical situations															
	2	1	1	Identify inverse operation to solve one step equation	3				3		3		3				3	3	
	2	1	2	Solve one-step equation	2		1		3		3		2		1		3	3	
	2	2	1	Match one variable, one-step equation/expression to situation	3		1		4		4		3		1		4	4	
	Total For Assessment Anchor D.2 Represent/analyze mathematical situations using numbers, symbols, words, tables and/or graphs					8		2		10		10		8		2		10	10
	Total For Reporting Category D					13		4		17		17		13		4		17	17

Appendix C: 2010 PSSA Tally Sheets

Grade 06

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
E: Data Analysis and Probability	1			Formulate/answer questions; organize, display, interpret or analyze data		4				4	4			1				1	1	
	1	1	1	Analyze data	1				1		1	1						1	1	
	1	1	2	Choose appropriate data representation	1				1		1	1						1	1	
	1	1	3	Display data in graphs, etc.	1		1		2		2	1		1				2	2	
	Total For Assessment Anchor E.1 Formulate or answer questions about data and/or organize, display, interpret or analyze data				3	4	1		4	4	8	3	1	1				4	1	5
	2			Select/use appropriate statistical methods to analyze data																
	2	1	1	Determine/calculate mean, median, mode, range	2		1		3		3	2		1				3	3	
	Total For Assessment Anchor E.2 Select and/or use appropriate statistical methods to analyze data				2		1		3		3	2		1				3		3
	3			Understand/apply basic concepts of probability or outcomes																
	3	1	1	Define/find probability	3		1		4		4	3		1				4	4	
	3	1	2	Determine/show combinations	2				2		2	2						2	2	
	Total For Assessment Anchor E.3 Understand and/or apply basic concepts of probability or outcomes				5		1		6		6	5		1				6		6
	Total For Reporting Category E				10	4	3		13	4	17	10	1	3				13	1	14

Appendix C: 2010 PSSA Tally Sheets

Grade 07

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points								Items						
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)				Number of Items				Total Number of Items (Core & EB)		
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total	
	1			Understand relationships and representations of numbers and number systems															
	1	1	1	Convert between fractions, decimals, percents	2		1		3		3		2		1		3		3
	1	2	1	Compare/order rational numbers	2		1		3		3		2		1		3		3
	1	2	2	Locate and identify rational numbers on a number line															
<b>Total For Assessment Anchor A.1</b>					<b>4</b>		<b>2</b>		<b>6</b>		<b>6</b>		<b>4</b>		<b>2</b>		<b>6</b>		<b>6</b>
	2			Understand meanings, uses and relations of operations															
	2	1	1	Use order of operations	1		1		2		2		1		1		2		2
	2	2	1	Write ratios to compare quantities	1		1		2		2		1		1		2		2
	2	2	2	Solve for a variable in proportions	1				1		1		1				1		1
	2	2	3	Use proportions to test equivalency	1				1		1		1				1		1
	2	2	4	Calculate/apply unit rates or unit prices	1				1		1		1				1		1
	2	2	5	Select and use ratios/proportions to solve problems	2				2		2		2				2		2
	2	2	6	Use proportions to find missing lengths in similar figures	1				1		1		1				1		1
<b>Total For Assessment Anchor A.2</b>					<b>8</b>		<b>2</b>		<b>10</b>		<b>10</b>		<b>8</b>		<b>2</b>		<b>10</b>		<b>10</b>
	3			Compute accurately/fluently and make reasonable estimates															
	3	1	1	Estimate answers involving operations with whole numbers, decimals, fractions and mixed numbers	2				2		2		2				2		2
	3	2	1	Solve problems involving operations with whole numbers, decimals, fractions and mixed numbers	1				1		1		1				1		1
	3	2	2	Solve problems involving addition/subtraction of integers															
<b>Total For Assessment Anchor A.3</b>					<b>3</b>				<b>3</b>		<b>3</b>		<b>3</b>				<b>3</b>		<b>3</b>
<b>Total For Reporting Category A</b>					<b>15</b>		<b>4</b>		<b>19</b>		<b>19</b>		<b>15</b>		<b>4</b>		<b>19</b>		<b>19</b>

Appendix C: 2010 PSSA Tally Sheets

Grade 07

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items								
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)				
											Core		EB						
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total	
B: Measurement	1			Understand measurable attributes and units, systems, processes of measurement															
	1	1	1	Add/subtract/convert measurements	2		1		3		3		2		1		3		3
	Total For Assessment Anchor B.1																		
	Understand measurable attributes and units, systems, processes of measurement				2		1		3		3		2		1		3		3
	2			Apply techniques, tools & formulas to determine measurements															
	2	1	1	Find perimeter and/or area of compound figures	1				1		1		1				1		1
	2	1	2	Find circumference/area of circles	1				1		1		1				1		1
	2	1	3	Find area of triangles, parallelograms, trapezoids	2		1		3		3		2		1		3		3
	2	2	1	Interpret and apply scale drawings	3				3		3		3				3		3
	2	2	2	Determine appropriate scale for reduction and enlargement	1		1		2		2		1		1		2		2
Total For Assessment Anchor B.2																			
Apply appropriate techniques, tools and formulas to determine measurements				8		2		10		10		8		2		10		10	
Total For Reporting Category B					10		3		13		13		10		3		13		13

Appendix C: 2010 PSSA Tally Sheets

Grade 07

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items										
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)						
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total			
C: Geometry	1			Analyze characteristics & properties of 2-D & 3-D shapes		4				4	4			1					1	1	
	1	1	1	Identify diameter, radius, chord, circumference in circles	1				1		1			1					1	1	
	1	1	2	Solve problems using radius/diameter relationship	1		1		2		2			1		1			2	2	
	1	1	3	Identify parallel, perpendicular, and skew lines in a 3-dimensional figure	1				1		1			1					1	1	
	1	2	1	Identify similar/congruent polygons	1				1		1			1					1	1	
	1	2	2	Identify corresponding sides/angles	1		1		2		2			1		1			2	2	
	Total For Assessment Anchor C.1 Analyze characteristics and properties of two- and three-dimensional geometric shapes					5	4	2		7	4	11		5	1	2			7	1	8
	3			Locate points/describe relationships using the coordinate plane																	
	3	1	1	Plot/identify ordered pairs	3		1		4		4			3		1			4	4	
	3	1	2	Identify Quadrants I, II, III, IV, x- and y- axes, and the origin on the coordinate plane	2				2		2			2					2	2	
	Total For Assessment Anchor C.3 Locate points or describe relationships using the coordinate plane					5		1		6		6		5		1			6		6
	Total For Reporting Category C					10	4	3		13	4	17		10	1	3			13	1	14

Appendix C: 2010 PSSA Tally Sheets

Grade 07

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
											Core		EB							
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
D: Algebraic Concepts	1			Understand patterns, relations and functions																
	1	1	1	Describe/extend/complete pattern	4		1		5		5		4		1		5		5	
	Total For Assessment Anchor D.1 Understand patterns, relations and functions					4		1		5		5		4		1		5		5
	2			Represent/analyze mathematical situations		4			4	4					1				1	1
	2	1	1	Solve one-step equations	2		1		3		3		2		1		3		3	
	2	1	2	Use substitution of variables to simplify expression	2		1		3		3		2		1		3		3	
	2	2	1	Identify mathematical models	1		1		2		2		1		1		2		2	
	Total For Assessment Anchor D.2 Represent/analyze mathematical situations using numbers, symbols, words, tables and/or graphs					5	4	3		8	4	12		5	1	3		8	1	9
	3			Analyze change in various contexts																
	3	1	1	Solve problems w/ constant rate of change	3		1		4		4		3		1		4		4	
	3	1	2	Describe or use a rate of change shown on a graph	3				3		3		3				3		3	
	Total For Assessment Anchor D.3 Analyze change in various contexts					6		1		7		7		6		1		7		7
	Total For Reporting Category D					15	4	5		20	4	24		15	1	5		20	1	21

Appendix C: 2010 PSSA Tally Sheets

Grade 07

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points							Items								
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)				
												Core		EB						
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
E: Data Analysis and Probability	1			Formulate/answer questions; organize, display, interpret or analyze data																
	1	1	1	Analyze data	2		1		3		3		2		1		3		3	
	Total For Assessment Anchor E.1 Formulate or answer questions about data and/or organize, display, interpret or analyze data					2		1		3		3		2		1		3		3
	2			Select and/or use appropriate statistical methods to analyze data																
	2	1	1	Identify/calculate mean, median, mode, range for a set of data	2		1		3		3		2		1		3		3	
	2	1	2	Choose appropriate measure of central tendency for a situation	1				1		1		1				1		1	
	Total For Assessment Anchor E.2 Select and/or use appropriate statistical methods to analyze data					3		1		4		4		3		1		4		4
	3			Understand/apply basic concepts of probability or outcomes		4			4	4			1					1	1	
	3	1	1	Find theoretical probability of event	1				1	1			1				1		1	
	3	1	2	Find theoretical probability of event not occurring	1		1		2	2			1		1		2		2	
	3	1	3	Find experimental probability	1				1	1			1				1		1	
	Total For Assessment Anchor E.3 Understand and/or apply basic concepts of probability or outcomes					3	4	1		4	4	8		3	1	1		4	1	5
	4			Develop/evaluate inferences and predictions based on data displays																
	4	1	1	Predict/draw conclusions from displays or probability	2				2	2			2				2		2	
	Total For Assessment Anchor E.4 Develop/evaluate inferences and predictions based on data displays					2				2		2		2				2		2
	Total For Reporting Category E					10	4	3		13	4	17		10	1	3		13	1	14

Appendix C: 2010 PSSA Tally Sheets

Grade 08

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points							Items							
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)			
												Core		EB					
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total	
A: Numbers and Operations	1			Understand relationships and representations of numbers and number systems															
	1	1	1	Use scientific notation or exponential forms	2				2		2				2			2	2
	1	1	2	Find the square/cube/square root															
	Total For Assessment Anchor A.1 Understand relationships among and representations of numbers and number systems					2				2		2			2			2	2
	2			Understand meanings, uses and relations of operations		4				4	4		1					1	1
	2	1	1	Use order of operations to simplify															
	2	2	1	Use ratios, proportions, percents to solve problems	2		1		3		3		2		1		3		3
	2	2	2	Represent or solve rate problems	1		1		2		2		1		1		2		2
	Total For Assessment Anchor A.2 Understand meanings, uses of operations and how they relate to each other					3	4	2		5	4	9	3	1	2		5	1	6
	3			Compute accurately/fluently and make reasonable estimates															
	3	1	1	Explain when to round up or down	1		1		2		2		1		1		2		2
	3	1	2	Explain when to estimate	1				1		1		1				1		1
	3	2	1	Estimate percent problems	2				2		2		2				2		2
	3	3	1	Compute with/without calculator	2				2		2		2				2		2
	Total For Assessment Anchor A.3 Compute accurately and fluently and make reasonable estimates					6		1		7		7	6		1		7		7
	Total For Reporting Category A					11	4	3		14	4	18	11	1	3		14	1	15

Appendix C: 2010 PSSA Tally Sheets

Grade 08

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items								
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)				
											Core		EB						
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total	
B: Measurement	1			Understand measurable attributes and units, systems, processes of measurement															
	1	1	1	Convert metric measurements			1		1		1			1		1		1	
	1	1	2	Convert customary measurements	2				2		2			2		2		2	
	1	1	3	Convert time	1				1		1			1		1		1	
	1	1	4	Convert temperature	1				1		1			1		1		1	
	Total For Assessment Anchor B.1 Understand measurable attributes and units, systems, processes of measurement					4		1		5		5		4		1		5	5
	2			Apply techniques, tools & formulas to determine measurements															
	2	1	1	Determine total degrees of interior angles	1		1		2		2		1		1		2		2
	2	1	2	Determine the measurement of 1 interior angle of a polygon	1				1		1				1		1		1
	2	1	3	Determine the number of sides of a polygon given total degrees of interior angles															
	2	2	1	Calculate surface area of cubes and rectangular prisms	2				2		2			2			2		2
	2	2	2	Calculate volume of cubes and rectangular prisms	1				1		1			1			1		1
	2	2	3	Determine appropriate type of measurement for a given situation	1		1		2		2		1		1		2		2
	Total For Assessment Anchor B.2 Apply appropriate techniques, tools and formulas to determine measurements					6		2		8		8		6		2		8	8
	Total For Reporting Category B					10		3		13		13		10		3		13	13

Appendix C: 2010 PSSA Tally Sheets

Grade 08

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
											Core		EB							
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
C: Geometry	1			Analyze characteristics & properties of 2-D & 3-D shapes																
	1	1	1	Match the 3-dimensional figure w/ its net	1		1		2		2		1		1		2	2		
	1	1	2	Define, identify, and use properties of angles formed by intersecting lines	2		1		3		3		2		1		3	3		
	1	1	3	Define, identify, and use properties of angles formed when parallel lines are cut by a transversal	1				1		1		1				1	1		
	1	2	1	Use the Pythagorean Theorem	3				3		3		3				3	3		
	Total For Assessment Anchor C.1 Analyze characteristics and properties of two- and three-dimensional geometric shapes					7		2		9		9		7		2		9	9	
	3			Locate points/describe relationships using the coordinate plane		4			4	4		1						1	1	
	3	1	1	Plot/locate/identify ordered pairs	3		1		4		4		3		1		4		4	
	Total For Assessment Anchor C.3 Locate points or describe relationships using the coordinate plane					3	4	1		4	4	8		3	1	1		4	1	5
	Total For Reporting Category C					10	4	3		13	4	17		10	1	3		13	1	14

Appendix C: 2010 PSSA Tally Sheets

Grade 08

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items										
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)						
											Core		EB								
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total			
D: Algebraic Concepts	1			Understand patterns, relations and functions		4				4	4			1					1	1	
	1	1	1	Continue numeric/algebraic pattern	1				1		1			1					1	1	
	1	1	2	Find missing element in pattern	1		1		2		2			1		1			2	2	
	1	1	3	Write/state rule of function	1				1		1			1					1	1	
	Total For Assessment Anchor D.1 Understand patterns, relations and functions					3	4	1		4	4	8		3	1	1			4	1	5
	2			Represent/analyze mathematical situations																	
	2	1	1	Solve equations/inequalities	2				2		2			2					2		2
	2	1	2	Use substitution to check solution			1		1		1			1					1		1
	2	1	3	Simplify/substitute for expression	1				1		1			1					1		1
	2	2	1	Match written situation to expression, equation, or inequality	1		1		2		2			1		1			2		2
	2	2	2	Write/solve equation for a situation	2				2		2			2					2		2
	Total For Assessment Anchor D.2 Represent/analyze mathematical situations using numbers, symbols, words, tables and/or graphs					6		2		8		8		6		2			8		8
	4			Describe/use models to represent quantitative relationships																	
	4	1	1	Graph linear function from x/y table	2		1		3		3			2		1			3		3
	4	1	2	Match linear graph to x/y table	2				2		2			2					2		2
	4	1	3	Match linear equation to x/y table	2		1		3		3			2		1			3		3
	Total For Assessment Anchor D.4 Describe/use models to represent quantitative relationships					6		2		8		8		6		2			8		8
	Total For Reporting Category D					15	4	5		20	4	24		15	1	5			20	1	21

Appendix C: 2010 PSSA Tally Sheets

Grade 08

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points							Items							
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)			
											Core		EB						
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total	
E: Data Analysis and Probability	1			Formulate/answer questions; organize, display, interpret or analyze data															
	1	1	1	Choose correct data representation	3				3		3				3			3	
	1	1	2	Display and/or interpret data	2				2		2				2			2	
	1	1	3	Interpret stem-and-leaf, box-and-whisker plots	2		1		3		3		1		3			3	
	Total For Assessment Anchor E.1 Formulate or answer questions about data and/or organize, display, interpret or analyze data					7		1		8		8		1		8		8	
	3			Understand/apply basic concepts of probability or outcomes															
	3	1	1	Find probability	2		1		3		3		1		3			3	
	3	2	1	Calculate show number of permutations/combinations	1				1		1				1			1	
	Total For Assessment Anchor E.3 Understand and/or apply basic concepts of probability or outcomes					3		1		4		4		1		4		4	
	4			Develop/evaluate inferences & predictions based on data															
	4	1	1	Fit line to scatter plot; describe correlation	1				1		1				1			1	
	4	1	2	Make predictions based on data	3		1		4		4		1		4			4	
	Total For Assessment Anchor E.4 Develop/evaluate inferences & predictions or draw conclusions based on data or data displays					4		1		5		5		1		5		5	
	Total For Reporting Category E					14		3		17		17		3		17		17	

Appendix C: 2010 PSSA Tally Sheets

Grade 11

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items										
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)						
											Core		EB								
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total			
A: Numbers and Operations	1			Understand relationships and representations of numbers and number systems		4				4	4			1				1	1		
	1	1	1	Find square root of an integer																	
	1	1	2	Use scientific notation	1				1		1							1	1		
	1	1	3	Simplify square roots																	
	1	2	1	Find/use GCF (monomial)																	
	1	3	1	Identify irrational numbers on a number line	1		1		2		2			1		1		2	2		
	1	3	2	Compare and/or order real numbers																	
	Total For Assessment Anchor A.1																				
	Understand relationships among and representations of numbers and number systems					2	4	1		3	4	7			2	1	1		3	1	4
	2			Understand meanings, uses and relations of operations																	
	2	1	1	Solve problems using operations with rational numbers	1				1		1								1	1	
	2	1	2	Solve problems using direct and inverse proportions																	
	2	1	3	Identify/use proportional relationships																	
	2	2	1	Simplify expressions with exponents/roots/absolute value	1				1		1				1				1	1	
	2	2	2	Simplify expressions involving operations of powers																	
	Total For Assessment Anchor A.2																				
	Understand meanings, uses of operations and how they relate to each other					2				2		2			2				2	2	
	3			Compute accurately/fluently and make reasonable estimates																	
	3	1	1	Use order of operations to simplify	1				1		1				1				1	1	
	3	2	1	Use estimation to solve problems	2				2		2				2				2	2	
Total For Assessment Anchor A.3																					
Compute accurately and fluently and make reasonable estimates					3				3		3			3				3	3		
Total For Reporting Category A					7	4	1		8	4	12			7	1	1		8	1	9	

Appendix C: 2010 PSSA Tally Sheets

Grade 11

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points									Items					
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)			
					MC	OE	MC	OE	MC	OE	Total	Core		EB		Total			
												MC	OE	MC	OE	MC	OE	MC	OE
B: Measurement	2			Apply techniques, tools & formulas to determine measurements															
	2	1	1	Measure and/or compare angles	1				1		1	1				1		1	1
	2	2	1	Calculate surface area of prisms, cylinders, cones, pyramids, and/or spheres	2		1		3		3	2		1		3		3	3
	2	2	2	Calculate volume of prisms, cylinders, cones, pyramids, and/or spheres	1				1		1	1				1		1	1
	2	2	3	Estimate area, perimeter, or circumference of irregular figure	2				2		2	2				2		2	2
	2	2	4	Find missing length measurement	2				2		2	2				2		2	2
	2	3	1	Describe effect of linear dimension change	1		1		2		2	1		1		2		2	2
	Total For Assessment Anchor B.2 Apply appropriate techniques, tools and formulas to determine measurements					9		2		11		11	9		2		11		11
Total For Reporting Category B					9		2		11		11	9		2		11		11	

Appendix C: 2010 PSSA Tally Sheets

Grade 11

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items							
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)			
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total
C: Geometry	1			Analyze characteristics & properties of 2-D & 3-D shapes														
	1	1	1	Recognize/use properties of circles	1				1		1				1		1	
	1	1	2	Recognize or use properties of arcs, angles, semicircles	2				2		2				2		2	
	1	2	1	Identify/use triangle properties	1				1		1				1		1	
	1	2	2	Recognize/use quadrilateral properties														
	1	2	3	Identify and/or use properties of isosceles and equilateral triangles	2				2		2				2		2	
	1	3	1	Recognize/use properties of congruent & similar polygons/solids	1				1		1				1		1	
	1	4	1	Use the Pythagorean Theorem	2		2		4		4		2		2		4	
	Total For Assessment Anchor C.1 Analyze characteristics and properties of two- and three-dimensional geometric shapes					9		2		11		11		9		2		11
	3			Locate points/describe relationships using the coordinate plane														
	3	1	1	Find distance and/or midpoint	1		2		3		3		1		2		3	3
	3	1	2	Relate slope to perpendicularity and/or parallelism	1				1		1		1				1	1
	Total For Assessment Anchor C.3 Locate points or describe relationships using the coordinate plane					2		2		4		4		2		2		4
	Total For Reporting Category C					11		4		15		15		11		4		15

Appendix C: 2010 PSSA Tally Sheets

Grade 11

Math

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
	1			Understand patterns, relations and functions																
	1	1	1	Analyze data for pattern; represent pattern algebraically/graphically	2		1		3		3		2		1		3		3	
	1	1	2	Determine if relation is a function	1				1		1		1				1		1	
	1	1	3	Identify domain, range, and inverse of a relation	2				2		2		2				2		2	
Total For Assessment Anchor D.1 Understand patterns, relations and functions					5		1		6		6		5		1		6		6	
D: Algebraic Concepts	2			Represent/analyze mathematical situations		4				4	4			1				1	1	
	2	1	1	Solve compound inequalities and/or graph solution sets on number line	1				1		1		1				1		1	
	2	1	2	Identify or graph linear inequalities on coordinate plane	1				1		1		1				1		1	
	2	1	3	Write and/or solve linear equation	1		1		2		2		1		1		2		2	
	2	1	4	Solve systems of equations	1		1		2		2		1		1		2		2	
	2	1	5	Solve quadratic equations using factoring	1		1		2		2		1		1		2		2	
	2	2	1	Add/subtract/multiply polynomials	3				3		3		3				3		3	
	2	2	2	Factor algebraic expressions	2		1		3		3		2		1		3		3	
	2	2	3	Simplify algebraic fractions																
	Total For Assessment Anchor D.2 Represent/analyze mathematical situations using numbers, symbols, words, tables and/or graphs					10	4	4		14	4	18		10	1	4		14	1	15
	3			Analyze change in various contexts																
	3	1	1	Identify/describe rates of change	1				1		1		1				1		1	
	3	1	2	Determine relations in variable changes	1				1		1		1				1		1	
	3	2	1	Apply formula for slope of line	2				2		2		2				2		2	
	3	2	2	Write/identify linear equation	1				1		1		1				1		1	
3	2	3	Compute slope and/or y-intercept	2		1		3		3		2		1		3		3		
Total For Assessment Anchor D.3 Analyze change in various contexts					7		1		8		8		7		1		8		8	
4			Describe/use models to represent quantitative relationships																	
4	1	1	Match graph to table/equation	3		1		4		4		3		1		4		4		
Total For Assessment Anchor D.4 Describe or use models to represent quantitative relationships					3		1		4		4		3		1		4		4	
Total For Reporting Category D					25	4	7		32	4	36		25	1	7		32	1	33	



Appendix C: 2010 PSSA Tally Sheets

Grade 03

Reading

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points							Items								
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)				
					MC	OE	MC	OE	MC	OE	Total	Core		EB		Total				
												MC	OE	MC	OE	MC	OE	MC	OE	
A: Comprehension and Reading Skills	1	1	1	Identify meaning of multiple-meaning words	1				1		1		1			1		1		
	1	1	2	Identify synonym/antonym	1		1		2		2		1		1		2		2	
	1	2	1	Identify meaning of word with an affix/how meaning changes																
	1	2	2	Define words from context clues			1		1		1		1			1		1		
	1	3	1	Make inferences/draw conclusions	4		1		5		5		4		1		5		5	
	1	4	1	Identify main ideas/relevant details	3		1		4		4		3		1		4		4	
	1	5	1	Summarize key details and events of a text as a whole	1				1		1		1				1		1	
	1	6	1	Identify author's purpose for writing text	2		1		3		3		2		1		3		3	
	Total For Assessment Anchor A.1 Understand fiction appropriate to grade level.					12		5		17		17		12		5		17		17
	2	1	1	Identify meaning of multiple-meaning words																
	2	1	2	Identify meaning of content-specific words																
	2	2	1	Identify meaning of word with an affix/how meaning changes																
	2	2	2	Define words from context clues	2		1		3		3		2		1		3		3	
	2	3	1	Make inferences/draw conclusions	2		1		3		3		2		1		3		3	
	2	4	1	Identify main ideas/relevant details	12		2		14		14		12		2		14		14	
	2	5	1	Summarize major points/processes/events of a text as a whole			1		1		1				1		1		1	
	2	6	1	Identify author's purpose for writing text	1		1		2		2		1		1		2		2	
	Total For Assessment Anchor A.2 Understand nonfiction appropriate to grade level.					17		6		23		23		17		6		23		23
	Total For Reporting Category A					29		11		40		40		29		11		40		40

Appendix C: 2010 PSSA Tally Sheets

Grade 03

Reading

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items							
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)			
					MC	OE	MC	OE	MC	OE	Total	Core		EB		Total		
												MC	OE	MC	OE	MC	OE	MC
B: Interpretation and Analysis of Fictional and Nonfictional Text	1	1	1	Identify in fiction and literary nonfiction character (narrator/speaker/subject of a biography), setting, plot	6	3	4		10	3	13	6	1	4		10	1	11
	1	2	1	Connections between texts	1	3			1	3	4	1	1			1	1	2
	Total For Assessment Anchor B.1 Understand components within and between texts.				7	6	4		11	6	17	7	2	4		11	2	13
	2	1	1	Identify examples of personification														
	Total For Assessment Anchor B.2 Understand literary devices in fictional and nonfictional text.																	
	3	1	1	Identify fact/opinion	2		1		3		3	2		1		3		3
	3	2	1	Identify exaggeration (bias)														
	3	3	1	Identify text organization (sequence, question/answer, comparison/contrast, cause/effect, problem/solution)														
	3	3	2	Use headings to locate information or identify content that fits into a specific section	1				1		1	1				1		1
	3	3	3	Interpret and make connections between graphics/charts/texts														
	3	3	4	Sequence of steps in a list of directions	1				1		1	1				1		1
	Total For Assessment Anchor B.3 Understand concepts and organization of nonfictional text.				4		1		5		5	4		1		5		5
	Total For Reporting Category B				11	6	5		16	6	22	11	2	5		16	2	18

Appendix C: 2010 PSSA Tally Sheets

Grade 04

Reading

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points									Items					
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)			
					MC	OE	MC	OE	MC	OE	Total	Core		EB		MC	OE	Total	
												MC	OE	MC	OE				
A: Comprehension and Reading Skills	1	1	1	Identify meaning of multiple-meaning words															
	1	1	2	Identify synonym/antonym	2				2		2	2					2		2
	1	2	1	Identify meaning of word with an affix/how meaning changes	1				1		1	1					1		1
	1	2	2	Define words from context clues	1		1		2		2	1		1			2		2
	1	3	1	Make inferences/draw conclusions	5		2		7		7	5		2			7		7
	1	4	1	Identify main ideas/relevant details			1		1		1			1			1		1
	1	5	1	Summarize key details and events of a text as a whole	1	3			1	3	4	1	1				1	1	2
	1	6	1	Identify author's purpose for writing text	2				2		2	2					2		2
	Total For Assessment Anchor A.1 Understand fiction appropriate to grade level.					12	3	4		16	3	19	12	1	4		16	1	17
		2	1	1	Identify meaning of multiple-meaning words			1		1		1			1		1		1
		2	1	2	Identify meaning of content-specific words														
		2	2	1	Identify meaning of word with an affix/how meaning changes	1				1		1	1				1		1
		2	2	2	Define words from context clues			1		1		1			1		1		1
		2	3	1	Make inferences/draw conclusions	3		1		4		4	3		1		4		4
		2	4	1	Identify main ideas/relevant details	7	3	3		10	3	13	7	1	3		10	1	11
		2	5	1	Summarize major points/processes/events of a text as a whole	1				1		1	1				1		1
		2	6	1	Identify author's purpose for writing text	2		1		3		3	2		1		3		3
	Total For Assessment Anchor A.2 Understand nonfiction appropriate to grade level.					14	3	7		21	3	24	14	1	7		21	1	22
Total For Reporting Category A					26	6	11		37	6	43	26	2	11		37	2	39	

Appendix C: 2010 PSSA Tally Sheets

Grade 04

Reading

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items							
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)			
					MC	OE	MC	OE	MC	OE	Total	Core		EB		MC	OE	Total
												MC	OE	MC	OE			
<b>B: Interpretation and Analysis of Fictional and Nonfictional Text</b>	1	1	1	Identify in fiction and literary nonfiction character (narrator/speaker/subject of a biography), setting, plot	4	3	1		5	3	8	4	1	1		5	1	6
	1	2	1	Connections between texts	1	3			1	3	4	1	1			1	1	2
	Total For Assessment Anchor B.1 Understand components within and between texts.				5	6	1		6	6	12	5	2	1		6	2	8
	2	1	1	Identify examples of personification	1				1		1	1				1		1
	2	1	2	Identify examples of similes	1		1		2		2	1		1		2		2
	2	1	3	Identify examples of alliteration	1				1		1	1				1		1
	Total For Assessment Anchor B.2 Understand literary devices in fictional and nonfictional text.				3		1		4		4	3		1		4		4
	3	1	1	Identify fact/opinion	1		1		2		2	1		1		2		2
	3	2	1	Identify exaggeration (bias)														
	3	3	1	Identify text organization (sequence, question/answer, comparison/contrast, cause/effect, problem/solution)	1		1		2		2	1		1		2		2
	3	3	2	Use headings to locate information or identify content that fits into a specific section	2				2		2	2				2		2
	3	3	3	Interpret and make connections between graphics/charts/texts	1				1		1	1				1		1
	3	3	4	Sequence of steps in a list of directions	1		1		2		2	1		1		2		2
	Total For Assessment Anchor B.3 Understand concepts and organization of nonfictional text.				6		3		9		9	6		3		9		9
	Total For Reporting Category B				14	6	5		19	6	25	14	2	5		19	2	21

Appendix C: 2010 PSSA Tally Sheets

Grade 05

Reading

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items		Total Number of Items (Core & EB)							
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
A: Comprehension and Reading Skills	1	1	1	Identify meaning of multiple-meaning words																
	1	1	2	Identify synonym/antonym	2				2		2			2				2		2
	1	2	1	Identify meaning of word with an affix/how meaning changes	2				2		2			2				2		2
	1	2	2	Define words from context clues																
	1	3	1	Make inferences/draw conclusions	4		2		6		6		4		2		6		6	
	1	3	2	Cite evidence from text to support generalizations																
	1	4	1	Identify and/or interpret main ideas/relevant details	7		3		10		10		7		3		10		10	
	1	5	1	Summarize key details and events of a text as a whole																
	1	6	1	Identify author's purpose for writing text	1				1		1		1				1		1	
	1	6	2	Identify text that supports the author's intended purpose																
	Total For Assessment Anchor A.1 Understand fiction appropriate to grade level.					16		5		21		21		16		5		21		21
	2	1	1	Identify meaning of multiple-meaning words																
	2	1	2	Identify meaning of content-specific words	2				2		2		2				2		2	
	2	2	1	Identify meaning of word with an affix/how meaning changes	1		1		2		2		1		1		2		2	
	2	2	2	Define words from context clues			1		1		1				1		1		1	
	2	3	1	Make inferences/draw conclusions	4	6			4	6	10		4	2			4	2	6	
	2	3	2	Cite evidence from text to support generalizations	1				1		1		1				1		1	
	2	4	1	Identify and/or interpret main ideas/relevant details	1		3		4		4		1		3		4		4	
	2	5	1	Summarize major points/processes/events of a text as a whole																
	2	6	1	Identify author's purpose for writing text																
2	6	2	Identify text that supports the author's intended purpose			1		1		1				1		1		1		
Total For Assessment Anchor A.2 Understand nonfiction appropriate to grade level.					9	6	6		15	6	21		9	2	6		15	2	17	
Total For Reporting Category A					25	6	11		36	6	42		25	2	11		36	2	38	

Appendix C: 2010 PSSA Tally Sheets

Grade 05

Reading

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points									Items					
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items (Core)		Number of Items (EB)		Total Number of Items (Core & EB)			
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total	
<b>B: Interpretation and Analysis of Fictional and Nonfictional Text</b>	1	1	1	Identify in fiction and literary nonfiction character (narrator/ speaker/subject of a biography), setting, plot, theme	4	3	3		7	3	10	4	1	3		7	1	8	
	1	2	1	Connections between texts	1	3	2		3	3	6	1	1	2		3	1	4	
	<b>Total For Assessment Anchor B.1</b>																		
	Understand components within and between texts.				5	6	5		10	6	16	5	2	5		10	2	12	
	2	1	1	Identify examples of personification															
	2	1	2	Identify examples of similes	2				2		2	2				2		2	
	2	1	3	Identify/interpret examples of alliteration	2				2		2	2				2		2	
	2	1	4	Identify/interpret examples of metaphors															
	2	2	1	Identify point of view of the narrator as first or third person	1				1		1	1				1		1	
	2	2	2	Describe the effectiveness of the point of view used by the author															
	<b>Total For Assessment Anchor B.2</b>																		
	Understand literary devices in fictional and nonfictional text.				5				5		5	5				5		5	
	3	1	1	Identify fact/opinion	1				1		1	1				1		1	
	3	2	1	Identify exaggeration (bias)															
	3	3	1	Identify text organization (sequence, question/answer, comparison/contrast, cause/effect, problem/solution)															
	3	3	2	Use headings to locate information or identify content that fits into a specific section	1				1		1	1				1		1	
	3	3	3	Interpret and make connections between graphics/charts/texts	1				1		1	1				1		1	
	3	3	4	Sequence of steps in a list of directions	2				2		2	2				2		2	
	<b>Total For Assessment Anchor B.3</b>																		
	Understand concepts and organization of nonfictional text.				5				5		5	5				5		5	
<b>Total For Reporting Category B</b>					15	6	5		20	6	26	15	2	5		20	2	22	

Appendix C: 2010 PSSA Tally Sheets

Grade 06

Reading

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points							Items								
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)				
									Core		EB		Core		EB					
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
A: Comprehension and Reading Skills	1	1	1	Apply meaning of multiple-meaning words in text	1		1		2		2		1		1		2		2	
	1	1	2	Identify synonym/antonym	1				1		1		1				1		1	
	1	2	1	Identify meaning of word with an affix/how meaning changes	1				1		1		1				1		1	
	1	2	2	Define words from context clues	1				1		1		1				1		1	
	1	3	1	Make inferences/draw conclusions	3		2		5		5		3		2		5		5	
	1	3	2	Cite evidence from text to support generalizations																
	1	4	1	Identify and/or interpret main ideas/relevant details	4		2		6		6		4		2		6		6	
	1	5	1	Summarize key details and events of a text as a whole	1		1		2		2		1		1		2		2	
	1	6	1	Identify author's purpose for writing text			1		1		1				1		1		1	
	1	6	2	Identify text that supports the author's intended purpose																
	Total For Assessment Anchor A.1 Understand fiction appropriate to grade level.					12		7		19		19		12		7		19		19
	2	1	1	Apply meaning of multiple-meaning words in text	1				1		1		1				1		1	
	2	1	2	Identify meaning of content-specific words																
	2	2	1	Identify meaning of word with an affix/how meaning changes																
	2	2	2	Define words from context clues																
	2	3	1	Make inferences/draw conclusions	5		2		7		7		5		2		7		7	
	2	3	2	Cite evidence from text to support generalizations	2	3			2	3	5		2	1			2	1	3	
	2	4	1	Identify and/or interpret main ideas/relevant details	6		1		7		7		6		1		7		7	
	2	5	1	Summarize major points/processes/events of a text as a whole	1				1		1		1				1		1	
	2	6	1	Identify author's purpose for writing text																
2	6	2	Identify text that supports the author's intended purpose																	
Total For Assessment Anchor A.2 Understand nonfiction appropriate to grade level.					15	3	3		18	3	21		15	1	3		18	1	19	
Total For Reporting Category A					27	3	10		37	3	40		27	1	10		37	1	38	

Appendix C: 2010 PSSA Tally Sheets

Grade 06

Reading

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items								
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)				
					MC	OE	MC	OE	MC	OE	Total	Core		EB		Total			
												MC	OE	MC	OE	MC	OE	MC	OE
<b>B: Interpretation and Analysis of Fictional and Nonfictional Text</b>	1	1	1	Identify in fiction and literary nonfiction character (narrator/ speaker/subject of a biography), setting, plot, theme	3	6	3		6	6	12	3	2	3		6	2	8	
	1	2	1	Connections between texts	3	3			3	3	6	3	1			3	1	4	
	<b>Total For Assessment Anchor B.1</b>																		
	Understand components within and between texts.				6	9	3		9	9	18	6	3	3		9	3	12	
	2	1	1	Identify examples of personification															
	2	1	2	Identify examples of similes	2		1		3		3	2		1		3		3	
	2	1	3	Identify/interpret examples of alliteration	1				1		1	1				1		1	
	2	1	4	Identify/interpret examples of metaphors			1		1		1			1		1		1	
	2	2	1	Identify point of view of the narrator as first or third person															
	2	2	2	Describe the effectiveness of the point of view used by the author	1				1		1	1				1		1	
	<b>Total For Assessment Anchor B.2</b>																		
	Understand literary devices in fictional and nonfictional text.				4		2		6		6	4		2		6		6	
	3	1	1	Identify fact/opinion	1		1		2		2	1		1		2		2	
	3	2	1	Identify exaggeration (bias)	1				1		1	1				1		1	
	3	3	1	Identify text organization (sequence, question/answer, comparison/contrast, cause/effect, problem/solution)															
	3	3	2	Use headings to locate information or identify content that fits into a specific section	1				1		1	1				1		1	
	3	3	3	Interpret and make connections between graphics/charts/texts															
	3	3	4	Sequence of steps in a list of directions															
	<b>Total For Assessment Anchor B.3</b>																		
	Understand concepts and organization of nonfictional text.				3		1		4		4	3		1		4		4	
<b>Total For Reporting Category B</b>					13	9	6		19	9	28	13	3	6		19	3	22	

Appendix C: 2010 PSSA Tally Sheets

Grade 07

Reading

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items											
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)							
					MC	OE	MC	OE	MC	OE	Total	Core		EB		Total						
												MC	OE	MC	OE	MC	OE	MC	OE			
A: Comprehension and Reading Skills	1	1	1	Apply meaning of multiple-meaning words in text																		
	1	1	2	Identify synonym/antonym	1				1		1						1			1		
	1	2	1	Identify meaning of word with an affix/how meaning changes																		
	1	2	2	Define words from context clues	1				1		1						1			1		
	1	3	1	Make inferences/draw conclusions	5	3	2		7	3	10						7	1		8		
	1	3	2	Cite evidence from text to support generalizations																		
	1	4	1	Identify and/or interpret main ideas/relevant details	1		2		3		3					1		2		3		
	1	5	1	Summarize key details and events of a text as a whole																		
	1	6	1	Identify author's purpose for writing text	1		1		2		2					1		1		2		
	1	6	2	Identify text that supports the author's intended purpose																		
	Total For Assessment Anchor A.1 Understand fiction appropriate to grade level.					9	3	5		14	3	17				9	1	5		14	1	15
	A: Comprehension and Reading Skills	2	1	1	Apply meaning of multiple-meaning words in text																	
		2	1	2	Identify meaning of content-specific words																	
		2	2	1	Identify meaning of word with an affix/how meaning changes	1		1		2		2				1		1		2	2	
		2	2	2	Define words from context clues																	
		2	3	1	Make inferences/draw conclusions	6				6		6						6			6	
		2	3	2	Cite evidence from text to support generalizations																	
		2	4	1	Identify and/or interpret main ideas/relevant details	3		1		4		4					3		1		4	
		2	5	1	Summarize major points/processes/events of a text as a whole			3	1	1	3	4					1	1		1	1	2
		2	6	1	Identify author's purpose for writing text	1		1		2		2					1		1		2	
2		6	2	Identify text that supports the author's intended purpose																		
Total For Assessment Anchor A.2 Understand nonfiction appropriate to grade level.					11	3	4		15	3	18				11	1	4		15	1	16	
Total For Reporting Category A					20	6	9		29	6	35				20	2	9		29	2	31	

Appendix C: 2010 PSSA Tally Sheets

Grade 07

Reading

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
<b>B: Interpretation and Analysis of Fictional and Nonfictional Text</b>	1	1	1	Identify in fiction and literary nonfiction character (narrator/speaker/subject of a biography), setting, plot, theme	8		2		10		10		8		2		10		10	
	1	2	1	Connections between texts	2	6			2	6	8		2	2			2	2	4	
	<b>Total For Assessment Anchor B.1</b> Understand components within and between texts.				10	6	2		12	6	18		10	2	2		12	2	14	
	2	1	1	Interpret/analyze examples of personification, simile, alliteration, metaphor, hyperbole, and imagery	4		2		6		6		4		2		6		6	
	2	1	2	Identify author's purpose/effectiveness of figurative language	1		1		2		2		1		1		2		2	
	2	2	1	Identify point of view of the narrator as first or third person			2		2		2				2		2		2	
	2	2	2	Describe the effectiveness of the point of view used by the author	1				1		1		1				1		1	
	<b>Total For Assessment Anchor B.2</b> Understand literary devices in fictional and nonfictional text.				6		5		11		11		6		5		11		11	
	3	1	1	Use of facts and opinions to make a point/construct an argument	2				2		2		2				2		2	
	3	2	1	Identify bias/propaganda techniques	1				1		1		1				1		1	
	3	3	1	Analyze text organization (sequence, question/answer, comparison/contrast, cause/effect, problem/solution)																
	3	3	2	Identify content that fits into a specific section	1				1		1		1				1		1	
	3	3	3	Interpret and make connections between graphics/charts/texts																
	3	3	4	Sequence of steps in a list of directions																
	<b>Total For Assessment Anchor B.3</b> Understand concepts and organization of nonfictional text.				4				4		4		4				4		4	
	<b>Total For Reporting Category B</b>					20	6	7		27	6	33		20	2	7		27	2	29

Appendix C: 2010 PSSA Tally Sheets

Grade 08

Reading

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items								
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)				
					MC	OE	MC	OE	MC	OE	Total	Core		EB		Total			
												MC	OE	MC	OE	MC	OE	MC	OE
A: Comprehension and Reading Skills	1	1	1	Apply meaning of multiple-meaning words in text	1				1		1				1		1		
	1	1	2	Identify synonym/antonym															
	1	2	1	Identify meaning of word with an affix/how meaning changes			1		1		1				1		1		
	1	2	2	Define words from context clues	1				1		1				1		1		
	1	3	1	Make inferences/draw conclusions	1	3	3		4	3	7	1	1	3		4	1	5	
	1	3	2	Cite evidence from text to support generalizations															
	1	4	1	Identify and/or interpret main ideas/relevant details	3		1		4		4	3		1		4		4	
	1	5	1	Summarize key details and events of a text as a whole	1				1		1	1				1		1	
	1	6	1	Identify author's purpose for writing text	1				1		1	1				1		1	
	1	6	2	Identify text that supports the author's intended purpose															
	Total For Assessment Anchor A.1 Understand fiction appropriate to grade level.					8	3	5		13	3	16	8	1	5		13	1	14
		2	1	1	Apply meaning of multiple-meaning words in text	1				1		1	1			1		1	
		2	1	2	Identify meaning of content-specific words			1		1		1		1		1		1	
		2	2	1	Identify meaning of word with an affix/how meaning changes														
		2	2	2	Define words from context clues	1		1		2		2	1		1		2		2
		2	3	1	Make inferences/draw conclusions	3		1		4		4	3		1		4		4
		2	3	2	Cite evidence from text to support generalizations	1				1		1	1				1		1
		2	4	1	Identify and/or interpret main ideas/relevant details	4				4		4	4				4		4
		2	5	1	Summarize major points/processes/events of a text as a whole														
		2	6	1	Identify author's purpose for writing text			1		1		1			1		1		1
2		6	2	Identify text that supports the author's intended purpose	1				1		1	1				1		1	
Total For Assessment Anchor A.2 Understand nonfiction appropriate to grade level.					11		4		15		15	11		4		15		15	
Total For Reporting Category A					19	3	9		28	3	31	19	1	9		28	1	29	

Appendix C: 2010 PSSA Tally Sheets

Grade 08

Reading

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items								
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)				
					MC	OE	MC	OE	MC	OE	Total	Core		EB		Total			
												MC	OE	MC	OE	MC	OE	MC	OE
<b>B: Interpretation and Analysis of Fictional and Nonfictional Text</b>	1	1	1	Identify in fiction and literary nonfiction character (narrator/ speaker/subject of a biography), setting, plot, theme	4	3	1		5	3	8	4	1	1		5	1	6	
	1	2	1	Connections between texts	6	3			6	3	9	6	1			6	1	7	
	<b>Total For Assessment Anchor B.1</b>				<b>Understand components within and between texts.</b>	<b>10</b>	<b>6</b>	<b>1</b>		<b>11</b>	<b>6</b>	<b>17</b>	<b>10</b>	<b>2</b>	<b>1</b>		<b>11</b>	<b>2</b>	<b>13</b>
	2	1	1	Interpret/analyze examples of personification, simile, metaphor, hyperbole, and imagery	3		4		7		7	3		4		7		7	
	2	1	2	Identify author's purpose/effectiveness of figurative language	1		1		2		2	1		1		2		2	
	2	2	1	Identify point of view of the narrator as first or third person	1				1		1	1				1		1	
	2	2	2	Analyze the effectiveness of the point of view used by the author	1				1		1	1				1		1	
	<b>Total For Assessment Anchor B.2</b>				<b>Understand literary devices in fictional and nonfictional text.</b>	<b>6</b>		<b>5</b>		<b>11</b>		<b>11</b>	<b>6</b>		<b>5</b>		<b>11</b>		<b>11</b>
	3	1	1	Use of facts and opinions to make a point/construct an argument	1	3			1	3	4	1	1			1	1	2	
	3	2	1	Identify bias/propaganda techniques	1				1		1	1				1		1	
	3	3	1	Analyze text organization (sequence, question/answer, comparison/contrast, cause/effect, problem/solution)	1		1		2		2	1		1		2		2	
	3	3	2	Identify content that fits into a specific section															
	3	3	3	Interpret and make connections between graphics/charts/texts															
	3	3	4	Sequence of steps in a list of directions	2				2		2	2				2		2	
	<b>Total For Assessment Anchor B.3</b>				<b>Understand concepts and organization of nonfictional text.</b>	<b>5</b>	<b>3</b>	<b>1</b>		<b>6</b>	<b>3</b>	<b>9</b>	<b>5</b>	<b>1</b>	<b>1</b>		<b>6</b>	<b>1</b>	<b>7</b>
	<b>Total For Reporting Category B</b>					<b>21</b>	<b>9</b>	<b>7</b>		<b>28</b>	<b>9</b>	<b>37</b>	<b>21</b>	<b>3</b>	<b>7</b>		<b>28</b>	<b>3</b>	<b>31</b>

Appendix C: 2010 PSSA Tally Sheets

Grade 11

Reading

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items								
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)				
					MC	OE	MC	OE	MC	OE	Total	Core		EB		Total			
												MC	OE	MC	OE	MC	OE	MC	OE
A: Comprehension and Reading Skills	1	1	1	Apply meaning of multiple-meaning words in text	1				1		1				1		1		
	1	1	2	Identify synonym/antonym			1		1		1		1		1		1		
	1	2	1	Identify meaning of word with an affix/how meaning changes	1				1		1				1		1		
	1	2	2	Define words from context clues															
	1	3	1	Make inferences/draw conclusions	1		2		3		3		1		2		3	3	
	1	3	2	Cite evidence from text to support generalizations															
	1	4	1	Identify and/or interpret main ideas/relevant details	2		1		3		3		2		1		3	3	
	1	5	1	Summarize key details and events of a text as a whole															
	1	6	1	Identify author's purpose for writing text															
	1	6	2	Identify text that supports the author's intended purpose															
	Total For Assessment Anchor A.1 Understand fiction appropriate to grade level.					5		4		9		9		5		4		9	9
	2	1	1	Apply meaning of multiple-meaning words in text	2				2		2		2				2	2	
	2	1	2	Identify meaning of content-specific words			1		1		1				1		1	1	
	2	2	1	Identify meaning of word with an affix/how meaning changes															
	2	2	2	Define words from context clues	2				2		2		2				2	2	
	2	3	1	Make inferences/draw conclusions	6		2		8		8		6		2		8	8	
	2	3	2	Cite evidence from text to support generalizations															
	2	4	1	Identify and/or interpret main ideas/relevant details	4		2		6		6		4		2		6	6	
	2	5	1	Summarize major points/processes/events of a text as a whole															
	2	6	1	Identify author's purpose for writing text	1				1		1		1				1	1	
	2	6	2	Identify text that supports the author's intended purpose	1				1		1		1				1	1	
Total For Assessment Anchor A.2 Understand nonfiction appropriate to grade level.					16		5		21		21		16		5		21	21	
Total For Reporting Category A					21		9		30		30		21		9		30	30	

Appendix C: 2010 PSSA Tally Sheets

Grade 11

Reading

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items		Total Number of Items (Core & EB)							
					MC	OE	MC	OE	MC	OE	Total	Core	EB	MC	OE	MC	OE	Total		
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
<b>B: Interpretation and Analysis of Fictional and Nonfictional Text</b>	1	1	1	Identify in fiction and literary nonfiction character (narrator/speaker/subject of a biography), setting, plot, theme, tone, style, mood, symbolism	3	3	2		5	3	8		3	1	2		5	1	6	
	1	2	1	Connections between texts	3	6			3	6	9		3	2			3	2	5	
	Total For Assessment Anchor B.1 Understand components within and between texts.					6	9	2		8	9	17		6	3	2		8	3	11
	2	1	1	Analyze examples of personification, simile, metaphor, hyperbole, satire, imagery, foreshadowing, flashbacks, and irony	4		1		5		5		4		1		5		5	
	2	1	2	Identify author's purpose/effectiveness of figurative language	2	3	1		3	3	6		2	1	1		3	1	4	
	2	2	1	Identify point of view of the narrator as first or third person	1		1		2		2		1		1		2		2	
	2	2	2	Analyze the effectiveness of the point of view used by the author																
	Total For Assessment Anchor B.2 Understand literary devices in fictional and nonfictional text.					7	3	3		10	3	13		7	1	3		10	1	11
	3	1	1	Use of facts and opinions to make a point/construct an argument	1				1		1		1				1		1	
	3	2	1	Identify bias/propaganda techniques	2				2		2		2				2		2	
	3	2	2	Analyze the effectiveness of bias/propaganda techniques																
	3	3	1	Analyze the effect of text organization including use of headers																
	3	3	2	Analyze author's purpose for text organization and content	3		2		5		5		3		2		5		5	
	3	3	3	Analyze and make connections between graphics/charts/texts																
	3	3	4	Sequence of steps in a list of directions																
	Total For Assessment Anchor B.3 Understand concepts and organization of nonfictional text.					6		2		8		8		6		2		8		8
	Total For Reporting Category B					19	12	7		26	12	38		19	4	7		26	4	30

Appendix C: 2010 PSSA Tally Sheets

Grade 04

Science

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points									Items						
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
	1	1	1	Distinguish between a scientific fact and an opinion, providing clear explanations that connect observations and results (e.g., a scientific fact can be supported by making observations).	2					2		2	2					2		2
	1	1	2	Identify and describe examples of common technological changes past to present in the community (e.g., energy production, transportation, communications, agriculture, packaging materials) that have either positive or negative impacts on society or the environment.	1					1		1	1					1		1
	1	3	1	Observe and record change by using time and measurement.	3					3		3	3					3		3
	1	3	2	Describe relative size, distance, or motion.			1			1		1			1			1		1
	1	3	3	Observe and describe the change to objects caused by temperature change or light.	1					1		1	1					1		1
	1	3	4	Explain what happens to a living organism when its food supply, access to water, shelter, or space is changed (e.g., it might die, migrate, change behavior, eat something else).		2	2			2	2	4		1	2			2	1	3
	1	3	5	Provide examples, predict, or describe how everyday human activities (e.g., solid waste production, food production and consumption, transportation, water consumption, energy production and use) may change the environment.	2					2		2	2					2		2
<b>Total For Assessment Anchor A.1 Reasoning and Analysis</b>					<b>9</b>	<b>2</b>	<b>3</b>			<b>12</b>	<b>2</b>	<b>14</b>	<b>9</b>	<b>1</b>	<b>3</b>			<b>12</b>	<b>1</b>	<b>13</b>
	2	1	1	Generate questions about objects, organisms, or events that can be answered through scientific investigations.	1					1		1	1					1		1
	2	1	2	Design and describe an investigation (a fair test) to test one variable.	2					2		2	2					2		2

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A: Nature of Science	2	1	3	Observe a natural phenomenon (e.g., weather changes, length of daylight/night, movement of shadows, animal migrations, growth of plants), record observations, and then make a prediction based on those observations.														
	2	1	4	State a conclusion that is consistent with the information/data.	2			2	2	2				2				2
	2	2	1	Identify appropriate tools or instruments for specific tasks and describe the information they can provide (e.g., measuring: length - ruler, mass - balance scale, volume - beaker, temperature - thermometer; making observations: hand lens, binoculars, telescope).	2		2	4	4	2		2		4				4
	Total For Assessment Anchor A.2 Processes, Procedures, and Tools of Scientific Investigations				7		2	9	9	7		2		9				9
	3	1	1	Categorize systems as either natural or human-made (e.g., ballpoint pens, simple electrical circuits, plant anatomy, water cycle).	2		3	5	5	2		3		5				5
	3	1	2	Explain a relationship between the living and nonliving components in a system (e.g., food web, terrarium).	1	2		1	2	3	1	1		1	1			2
	3	1	3	Categorize the parts of an ecosystem as either living or nonliving and describe their roles in the system.	1		1	2	2	1		1		2				2
	3	1	4	Identify the parts of the food and fiber systems as they relate to agricultural products from the source to the consumer.	2		1	3	3	2		1		3				3
	3	2	1	Identify what different models represent (e.g., maps show physical features, directions, distances; globes represent Earth; drawings of watersheds depict terrain; dioramas show ecosystems; concept maps show relationships of ideas). Identify what different models represent	1			1	1	1				1				1
	3	2	2	Use models to make observations to explain how systems work (e.g., water cycle, Sun-Earth-Moon system).	1			1	1	1				1				1

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3	2	3	Use appropriate, simple modeling tools and techniques to describe or illustrate a system (e.g., two cans and string to model a communications system, terrarium to model an ecosystem).	1	2			1	2	3	1	1			1	1	2
3	3	1	Identify and describe observable patterns (e.g., growth patterns in plants, weather, water cycle).	2		2		4		4	2		2		4		4
3	3	2	Predict future conditions/events based on observable patterns (e.g., day/night, seasons, sunrise/sunset, lunar phases).	1				1		1	1				1		1
Total For Assessment Anchor A.3 Systems, Models, and Patterns				12	4	7		19	4	23	12	2	7		19	2	21
Total For Reporting Category A				28	6	12		40	6	46	28	3	12		40	3	43

Appendix C: 2010 PSSA Tally Sheets

Grade 04

Science

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points							Items							
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)			
											Core		EB						
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total	
	1	1	1	Identify life processes of living things (e.g., growth, digestion, respiration).															
	1	1	2	Compare similar functions of external characteristics of organisms (e.g., anatomical characteristics: appendages, type of covering, body segments).															
	1	1	3	Describe basic needs of plants and animals (e.g., air, water, food).	1		1		2		2		1		1		2		2
	1	1	4	Describe how different parts of a living thing work together to provide what the organism needs (e.g., parts of plants: roots, stems, leaves).			2				2	2		1				1	1
	1	1	5	Describe the life cycles of different organisms (e.g., moth, grasshopper, frog, seed-producing plant).	1				1		1		1				1		1
<b>Total For Assessment Anchor B.1 Structures and Functions of Organisms</b>					<b>2</b>	<b>2</b>	<b>1</b>		<b>3</b>	<b>2</b>	<b>5</b>		<b>2</b>	<b>1</b>	<b>1</b>		<b>3</b>	<b>1</b>	<b>4</b>
	2	1	1	Identify characteristics for plant and animal survival in different environments (e.g., wetland, tundra, desert, prairie, deep ocean, forest).	1				1		1		1				1		1
	2	1	2	Explain how specific adaptations can help a living organism survive (e.g., protective coloration, mimicry, leaf sizes and shapes, ability to catch or retain water).	1				1		1		1				1		1
	2	2	1	Identify physical characteristics (e.g., height, hair color, eye color, attached earlobes, ability to roll tongue) that appear in both parents and could be passed on to offspring	1				1		1		1				1		1
<b>Total For Assessment Anchor B.2 Continuity of Life</b>					<b>3</b>				<b>3</b>		<b>3</b>		<b>3</b>				<b>3</b>		<b>3</b>

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<b>B: Biological Sciences</b>	3	1	1	Describe the living and nonliving components of a local ecosystem (e.g., lentic and lotic systems, forest, cornfield, grasslands, city park, playground).	2		1		3	3	2		1		3		3	
	3	1	2	Describe interactions between living and nonliving components (e.g. plants – water, soil, sunlight, carbon dioxide, temperature; animals – food, water, shelter, oxygen, temperature) of a local ecosystem.	1		1		2	2	1		1		2		2	
	3	2	1	Describe what happens to a living thing when its habitat is changed.	1				1	1	1				1		1	
	3	2	2	Describe and predict how changes in the environment (e.g., fire, pollution, flood, building dams) can affect systems.														
	3	2	3	Explain and predict how changes in seasons affect plants, animals, or daily human life (e.g., food availability, shelter, mobility).														
	3	3	1	Identify everyday human activities (e.g., driving, washing, eating, manufacturing, farming) within a community that depend on the natural environment.	1		1		2	2	1		1		2		2	
	3	3	2	Describe the human dependence on the food and fiber systems from production to consumption (e.g., food, clothing, shelter, products).			1		1	1			1		1		1	
	3	3	3	Identify biological pests (e.g., fungi – molds, plants – foxtail, purple loosestrife, Eurasian water milfoil; animals – aphides, ticks, zebra mussels, starlings, mice) that compete with humans for resources.														
	3	3	4	Identify major land uses in the urban, suburban and rural communities (e.g., housing, commercial, recreation).														
	3	3	5	Describe the effects of pollution (e.g., litter) in the community.														
Total For Assessment Anchor B.3 Ecological Behavior and Systems					5		4		9	9	5		4		9		9	
Total For Reporting Category B					10	2	5		15	2	17	10	1	5		15	1	16

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Grade 04

Science

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points							Items										
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)						
					MC	OE	MC	OE	MC	OE	Total	Core		EB		Total						
												MC	OE	MC	OE	MC	OE	MC	OE			
C: Physical Sciences	1	1	1	Use physical properties [e.g., mass, shape, size, volume, color, texture, magnetism, state to describe matter.	2						2					2				2		
	1	1	2	Categorize/group objects using physical characteristics.	1						1					1				1		
	Total For Assessment Anchor C.1 Structures, Properties, and Interaction of Matter and Energy					3						3				3				3		
	2	1	1	Identify energy forms, energy transfer, and energy examples (e.g., light, heat, electrical).	1						1					1				1		
	2	1	2	Describe the flow of energy through an object or system (e.g., feeling radiant heat from a light bulb, eating food to get energy, using a battery to light a bulb or run a fan).																		
	2	1	3	Recognize or illustrate simple direct current series and parallel circuits composed of batteries, light bulbs (or other common loads), wire, and on/off switches.	1		1				2					1		1		2		
	2	1	4	Identify characteristics of sound (e.g., pitch, loudness, reflection).	2						2					2				2		
	Total For Assessment Anchor C.2 Forms, Sources, Conversions, and Transer of Energy					4		1			5					4		1		5		
	3	1	1	Describe changes in motion caused by forces (e.g., magnetic, pushes or pulls, gravity, friction).	1		1				2					1		1		2		
	3	1	2	Compare the relative movement of objects or describe types of motion that are evident (e.g., bouncing ball, moving in a straight line, back and forth, merry-go-round).	2		1				3					2		1		3		
	3	1	3	Describe the position of an object by locating it relative to another object or a stationary background (e.g., geographic direction, left, up).	1						1					1				1		
	Total For Assessment Anchor C.3 Principles of Motion and Force					4		2			6					4		2		6		
	Total For Reporting Category C					11		3			14					11		3		14		

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Grade 04

Science

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points							Items							
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)			
					MC	OE	MC	OE	MC	OE	Total	Core		EB		Total			
												MC	OE	MC	OE	MC	OE	MC	OE
D: Earth and Space Sciences	1	1	1	Describe how prominent Earth features in Pennsylvania (e.g., mountains, valleys, caves, sinkholes, lakes, rivers) were formed.	1				1		1		1				1		1
	1	1	2	Identify various Earth structures (e.g., mountains, watersheds, peninsulas, lakes, rivers, valleys) through the use of models.															
	1	1	3	Describe the composition of soil as weathered rock and decomposed organic remains.															
	1	2	1	Identify products and by-products of plants and animals for human use (e.g., food, clothing, building materials, paper products).	2		1		3		3		2		1		3		3
	1	2	2	Identify the types and uses of Earth materials for renewable, nonrenewable, and reusable products (e.g., human-made products: concrete, paper, plastics, fabrics).			1		1		1				1		1		1
	1	2	3	Recognize ways that humans benefit from the use of water resources (e.g., agriculture, energy, recreation).															
	1	3	1	Describe types of freshwater and saltwater bodies (e.g., lakes, rivers, wetlands, oceans).	1				1		1		1				1		1
	1	3	2	Explain how water goes through phase changes (i.e., evaporation, condensation, freezing, and melting).	2	1			1	2	3		1	1		1	1	2	
	1	3	3	Describe or compare lentic systems (i.e., ponds, lakes, and bays) and lotic systems (i.e., streams, creeks, and rivers).															
	1	3	4	Explain the role and relationship of a watershed or a wetland on water sources (e.g., water storage, groundwater recharge, water filtration, water source, water cycle).															
Total For Assessment Anchor D.1 Earth Features and Processes that Change Earth and its Resources					4	2	3		7	2	9	4	1	3		7	1	8	

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2	1	1	Identify basic cloud types (i.e., cirrus, cumulus, stratus, and cumulonimbus) and make connections to basic elements of weather (e.g., changes in temperature, precipitation).																
2	1	2	Identify weather patterns from data charts or graphs of the data (e.g., temperature, wind direction, wind speed, cloud types, precipitation).	1			1	1	1					1				1	
2	1	3	Identify appropriate instruments (i.e., thermometer, rain gauge, weather vane, anemometer, and barometer) to study weather and what they measure.																
Total For Assessment Anchor D.2 Weather, Climate, and Atmospheric Processes				1			1	1	1					1				1	
3	1	1	Describe motions of the Sun - Earth - Moon system.	2		1		3	3	2		1		3				3	
3	1	2	Explain how the motion of the Sun - Earth - Moon system relates to time (e.g., days, months, years).	2				2	2	2				2				2	
3	1	3	Describe the causes of seasonal change as they relate to the revolution of Earth and the tilt of Earth's axis.																
Total For Assessment Anchor D.3 Composition and Structure of the Universe				4		1		5	5	4		1		5				5	
Total For Reporting Category D				9	2	4		13	2	15	9	1	4		13	1		14	

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Grade 08

Science

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points							Items							
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)			
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total	
	1	1	1	Distinguish between a scientific theory and an opinion, explaining how a theory is supported with evidence, or how new data/information may change existing theories and practices	1				1		1		1				1		1
	1	1	2	Explain how certain questions can be answered through scientific inquiry and/or technological design.	1		1		2		2		1		1		2		2
	1	1	3	Use evidence, such as observations or experimental results, to support inferences about a relationship.															
	1	1	4	Develop descriptions, explanations, predictions, and models using evidence.	1				1		1		1				1		1
	1	2	1	Describe the positive and negative, intended and unintended, effects of specific scientific results or technological developments (e.g., air/space travel, genetic engineering, nuclear fission/fusion, artificial intelligence, lasers, organ transplants).	2		2		4		4		2		2		4		4
	1	2	2	Identify environmental issues and explain their potential long-term health effects (e.g., pollution, pest controls, vaccinations).															
	1	2	3	Describe fundamental scientific or technological concepts that could solve practical problems (e.g., Newton's laws of motion, Mendelian genetics).	1		1		2		2		1		1		2		2
	1	2	4	Explain society's standard of living in terms of technological advancements and how these advancements impact on agriculture (e.g., transportation, processing, production, storage).	1				1		1		1				1		1
	1	3	1	Use ratio to describe change (e.g., percents, parts per million, grams per cubic centimeter, mechanical advantage).	1				1		1		1				1		1

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A: Nature of Science	1	3	2	Use evidence, observations, or explanations to make inferences about change in systems over time (e.g., carrying capacity, succession, population dynamics, loss of mass in chemical reactions, indicator fossils in geologic time scale) and the variables affecting these changes.	2	1	3	3	2	1	3	3	
	1	3	3	Examine systems changing over time, identifying the possible variables causing this change, and drawing inferences about how these variables affect this change.	1		1	1	1		1	1	
	1	3	4	Given a scenario, explain how a dynamically changing environment provides for the sustainability of living systems.									
	Total For Assessment Anchor A.1 Reasoning and Analysis				11	5	16	16	11	5	16	16	
	2	1	1	Use evidence, observations, or a variety of scales (e.g., mass, distance, volume, temperature) to describe relationships.	2	1	3	3	2	1	3	3	
	2	1	2	Use space/time relationships, define concepts operationally, raise testable questions, or formulate hypotheses.									
	2	1	3	Design a controlled experiment by specifying how the independent variables will be manipulated, how the dependent variable will be measured, and which variables will be held constant.									
	2	1	4	Interpret data/observations; develop relationships among variables based on data/observations to design models as solutions.	1	1	2	2	1	1	2	2	
	2	1	5	Use evidence from investigations to clearly communicate and support conclusions.		1	1	1		1	1	1	
	2	1	6	Identify a design flaw in a simple technological system and devise possible working solutions.	3		3	3	3		3	3	
2	2	1	Describe the appropriate use of instruments and scales to accurately and safely measure time, mass, distance, volume, or temperature under a variety of conditions.	2	2	2	2	4	2	1	2	1	3

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2	2	2	Apply appropriate measurement systems (e.g., time, mass, distance, volume, temperature) to record and interpret observations under varying conditions.	2				2	2	2				2	2
2	2	3	Describe ways technology (e.g., microscope, telescope, micrometer, hydraulics, barometer) extends and enhances human abilities for specific purposes.	2		1		3	3	2		1		3	3
Total For Assessment Anchor A.2 Processes, Procedures, and Tools of Scientific Investigations				12	2	4		16	2	18	12	1	4	16	17
3	1	1	Describe a system (e.g., watershed, circulatory system, heating system, agricultural system) as a group of related parts with specific roles that work together to achieve an observed result.	1				1	1	1				1	1
3	1	2	Explain the concept of order in a system [e.g., (first to last: manufacturing steps, trophic levels); (simple to complex: cell, tissue, organ, organ system)].	1				1	1	1				1	1
3	1	3	Distinguish between system inputs, system processes, system outputs, and feedback (e.g., physical, ecological, biological, informational).	1				1	1	1				1	1
3	1	4	Distinguish between open loop (e.g., energy flow, food web) and closed loop (e.g., materials in the nitrogen and carbon cycles, closed-switch) systems.	1				1	1	1				1	1
3	1	5	Explain how components of natural and human-made systems play different roles in a working system.												
3	2	1	Describe how scientists use models to explore relationships in natural systems (e.g., an ecosystem, river system, the solar system).	1				1	1	1				1	1
3	2	2	Describe how engineers use models to develop new and improved technologies to solve problems.	1				1	1	1				1	1
3	2	3	Given a model showing simple cause- and-effect relationships in a natural system, predict results that can be used to test the assumptions in the model (e.g., photosynthesis, water cycle, diffusion, infiltration).	1				1	1	1				1	1

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3	3	1	Identify and describe patterns as repeated processes or recurring elements in human-made systems (e.g., trusses, hub-and-spoke system in communications and transportation systems, feedback controls in regulated systems).													
3	3	2	Describe repeating structure patterns in nature(e.g., veins in a leaf, tree rings, crystals, water waves) or periodic patterns (e.g., daily, monthly, annually).	2				2		2		2				2
Total For Assessment Anchor A.3 Systems, Models, and Patterns				9				9		9		9				9
Total For Reporting Category A				32	2	9		41	2	43	32	1	9		41	42

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Grade 08

Science

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points							Items							
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)			
					MC	OE	MC	OE	MC	OE	Total	Core		EB		Total			
												MC	OE	MC	OE	MC	OE	MC	OE
	1	1	1	Describe the structures of living things that help them function effectively in specific ways (e.g., adaptations, characteristics).			1		1			1			1				
	1	1	2	Compare similarities and differences in internal structures of organisms (e.g., invertebrate/vertebrate, vascular/nonvascular, single-celled/multi-celled) and external structures (e.g., appendages, body segments, type of covering, size, shape).	1				1			1					1		
	1	1	3	Apply knowledge of characteristic structures to identify or categorize organisms (i.e., plants, animals, fungi, bacteria, and protista).			1		1					1			1		
	1	1	4	Identify the levels of organization from cell to organism and describe how specific structures (parts), which underlie larger systems, enable the system to function as a whole.	2				2			2					2		
<b>Total For Assessment Anchor B.1 Structures and Functions of Organisms</b>					<b>3</b>		<b>2</b>		<b>5</b>			<b>5</b>			<b>3</b>		<b>2</b>		<b>5</b>
	2	1	1	Explain how inherited structures or behaviors help organisms survive and reproduce in different environments.	1				1			1					1		
	2	1	2	Explain how different adaptations in individuals of the same species may affect survivability or reproduction success.															
	2	1	3	Explain that mutations can alter a gene and are the original source of new variations.															
	2	1	4	Describe how selective breeding or biotechnology can change the genetic makeup of organisms.	1				1			1					1		
	2	1	5	Explain that adaptations are developed over long periods of time and are passed from one generation to another.															

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<b>B: Biological Sciences</b>	2	2	1	Identify and explain differences between inherited and acquired traits.			1		1		1		1		1		1	
	2	2	2	Recognize that the gene is the basic unit of inheritance, that there are dominant and recessive genes, and that traits are inherited.	1		2		3		3	1		2		3		3
	<b>Total For Assessment Anchor B.2 Continuity of Life</b>				<b>3</b>		<b>3</b>		<b>6</b>		<b>6</b>	<b>3</b>		<b>3</b>		<b>6</b>		<b>6</b>
	3	1	1	Explain the flow of energy through an ecosystem (e.g., food chains, food webs).														
	3	1	2	Identify major biomes and describe abiotic and biotic components (e.g., abiotic: different soil types, air, water sunlight; biotic: soil microbes, decomposers).			1		1		1			1		1		1
	3	1	3	Explain relationships among organisms (e.g., producers/consumers, predator/prey) in an ecosystem.		4	1		1	4	5		2	1		1	2	3
	3	2	1	Use evidence to explain factors that affect changes in populations (e.g., deforestation, disease, land use, natural disaster, invasive species).	1				1		1	1				1		1
	3	2	2	Use evidence to explain how diversity affects the ecological integrity of natural systems														
	3	2	3	Describe the response of organisms to environmental changes (e.g., changes in climate, hibernation, migration, coloration) and how those changes affect survival.														
	3	3	1	Explain how human activities may affect local, regional, and global environments.														
3	3	2	Explain how renewable and nonrenewable resources provide for human needs (i.e., energy, food, water, clothing, and shelter).															
3	3	3	Describe how waste management affects the environment (e.g., recycling, composting, landfills, incineration, sewage treatment).															

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3	3	4	Explain the long-term effects of using integrated pest management (e.g., herbicides, natural predators, biogenetics) on the environment.														
Total For Assessment Anchor B.3 Ecological Behavior and Systems				1	4	2		3	4	7	1	2	2		3	2	5
Total For Reporting Category B				7	4	7		14	4	18	7	2	7		14	2	16

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Grade 08

Science

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items								
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)				
					MC	OE	MC	OE	MC	OE	Total	Core		EB		Total			
												MC	OE	MC	OE	MC	OE	MC	OE
C: Physical Sciences	1	1	1	Explain the differences among elements, compounds, and mixtures.	1				1		1	1			1		1		
	1	1	2	Use characteristic physical or chemical properties to distinguish one substance from another (e.g., density, thermal expansion/contraction, freezing/melting points, streak test)	3		1		4		4	3		1		4		4	
	1	1	3	Identify and describe reactants and products of simple chemical reactions.															
	Total For Assessment Anchor C.1 Structures, Properties, and Interaction of Matter and Energy					4		1		5		5	4		1		5		5
	2	1	1	Distinguish among forms of energy (e.g., electrical, mechanical, chemical, light, sound, nuclear) and sources of energy (i.e., renewable and nonrenewable energy)															
	2	1	2	Explain how energy is transferred from one place to another through convection, conduction, or radiation.	1		2		3		3	1		2		3		3	
	2	1	3	Describe how one form of energy (e.g., electrical, mechanical, chemical, light, sound, nuclear) can be converted into a different form of energy.	1				1		1	1				1		1	
	2	2	1	Describe the Sun as the major source of energy that impacts the environment.															
	2	2	2	Compare the time span of renewability for fossil fuels and the time span of renewability for alternative fuels.	1				1		1	1				1		1	
	2	2	3	Describe the waste (i.e., kind and quantity) derived from the use of renewable and nonrenewable resources and their potential impact on the environment.															
Total For Assessment Anchor C.2 Forms, Sources, Conversions, and Transfer of Energy					3		2		5		5	3		2		5		5	
3	1	1	Describe forces acting on objects (e.g., friction, gravity, balanced versus unbalanced).	2				2		2	2				2		2		

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3	1	2	Distinguish between kinetic and potential energy.	2				2		2	2			2		2	
3	1	3	Explain that mechanical advantage helps to do work (physics) by either changing a force or changing the direction of the applied force (e.g., simple machines, hydraulic systems).	1		1		2		2	1		1		2		2
Total For Assessment Anchor C.3 Principles of Motion and Force				5		1		6		6	5		1		6		6
Total For Reporting Category C				12		4		16		16	12		4		16		16

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Grade 08

Science

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points								Items						
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)				Number of Items				Total Number of Items (Core & EB)		
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total	
	1	1	1	Explain the rock cycle as changes in the solid earth and rock types found in Pennsylvania (igneous – granite, basalt, pumice; sedimentary – limestone, sandstone, shale, coal; and metamorphic – slate, quartzite, marble, gneiss).															
	1	1	2	Describe natural processes that change Earth's surface (e.g., landslides, volcanic eruptions, earthquakes, mountain building, new land being formed, weathering, erosion, sedimentation, soil formation).															
	1	1	3	Identify soil types (i.e., humus, topsoil, subsoil, loam, loess, and parent material) and their characteristics (i.e., particle size, porosity, and permeability) found in different biomes and in Pennsylvania, and explain how they formed.	1				1		1		1				1		1
	1	1	4	Explain how fossils provide evidence about plants and animals that once lived throughout Pennsylvania's history (e.g., fossils provide evidence of different environments).	1		1		2		2		1		1		2		2
	1	2	1	Describe a product's transformation process from production to consumption (e.g., prospecting, propagating, growing, maintaining, adapting, treating, converting, distributing, disposing) and explain the process's potential impact on Earth's resources.	1				1		1		1				1		1
	1	2	2	Describe potential impacts of human-made processes (e.g., manufacturing, agriculture, transportation, mining) on Earth's resources, both nonliving (i.e., air, water, or earth materials) and living (i.e., plants and animals).	1				1		1		1				1		1

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D: Earth and Space Sciences	1	3	1	Describe the water cycle and the physical processes on which it depends (i.e., evaporation, condensation, precipitation, transpiration, runoff, infiltration, energy inputs, and phase changes).	1	1	2	2	1	1	2	2						
	1	3	2	Compare and contrast characteristics of freshwater and saltwater systems on the basis of their physical characteristics (i.e., composition, density, and electrical conductivity) and their use as natural resources.	2			2	2	1		1						
	1	3	3	Distinguish among different water systems (e.g., wetland systems, ocean systems, river systems, watersheds) and describe their relationships to each other as well as to landforms.	1			1	1	1		1						
	1	3	4	Identify the physical characteristics of a stream and how these characteristics determine the types of organisms found within the stream environment (e.g., biological diversity, water quality, flow rate, tributaries, surrounding watershed).	1	1		2	2	1	1	2	2					
	Total For Assessment Anchor D.1 Earth Features and Processes that Change Earth and its Resources				7	2	3		10	2	12	7	1	3		10	1	11
	2	1	1	Explain the impact of water systems on the local weather or the climate of a region (e.g., lake effect snow, land/ocean breezes).														
	2	1	2	Identify how global patterns of atmospheric movement influence regional weather and climate.														
	2	1	3	Identify how cloud types, wind directions, and barometric pressure changes are associated with weather patterns in different regions of the country.														
	Total For Assessment Anchor D.2 Weather, Climate, and Atmospheric Processes																	
	3	1	1	Describe patterns of Earth's movements (i.e., rotation and revolution) and the Moon's movements (i.e., phases, eclipses, and tides) in relation to the Sun.			1		1		1		1	1		1		

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3	1	2	Describe the role of gravity as the force that governs the movement of the solar system and universe.	2				2	2		1			1	1		
3	1	3	Compare and contrast characteristics of celestial bodies found in the solar system (e.g., moons, asteroids, comets, meteors, inner and outer planets).														
Total For Assessment Anchor D.3 Composition and Structure of the Universe				2	1		1	2	3		1	1		1	1	2	
Total For Reporting Category D				7	4	4		11	4	15	7	2	4		11	2	13

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Grade 11

Science

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points								Items						
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)				Number of Items				Total Number of Items (Core & EB)		
					MC	OE	MC	OE	MC	OE	Total	Core		EB		Total			
												MC	OE	MC	OE	MC	OE	MC	OE
	1	1	1	Compare and contrast scientific theories, scientific laws, and beliefs (e.g., the universal law of gravitation, how light travels, formation of moons, stages of ecological succession).															
	1	1	2	Analyze and explain the accuracy of scientific facts, principles, theories, and laws.	3	2			3	2	5	3	1			3	1	4	
	1	1	3	Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).	2	2			2	2	4	2	1			2	1	3	
	1	1	4	Explain how specific scientific knowledge or technological design concepts solve practical problems (e.g., momentum, Newton's universal law of gravitation, tectonics, conservation of mass and energy, cell theory, theory of evolution, atomic theory, theory of relativity, Pasteur's germ theory, relativity, heliocentric theory, ideal gas laws).	1				1		1	1				1		1	
	1	1	5	Analyze or compare the use of both direct and indirect observation as means to study the world and the universe (e.g., behavior of atoms, functions of cells, birth of stars).															
	1	2	1	Explain and apply scientific concepts to societal issues using case studies (e.g., spread of HIV, deforestation, environmental health, energy).															
	1	2	2	Use case studies (e.g., Wright brothers' flying machine, Tacoma Narrows Bridge, Henry Petroski's Design Paradigms) to propose possible solutions and analyze economic and environmental implications of solutions for real-world problems.			1		1		1			1		1		1	

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A: Nature of Science	1	3	1	Use appropriate quantitative data to describe or interpret change in systems (e.g., biological indices, electrical circuit data, automobile diagnostic systems data).	1	1	2	2	1	1	2	2				
	1	3	2	Describe or interpret dynamic changes to stable systems (e.g., chemical reactions, human body, food webs, tectonics, homeostasis).												
	1	3	3	Describe how changes in physical and biological indicators (e.g., soil, plants, animals) of water systems reflect changes in these systems (e.g. changes in bloodworm populations reflect changes in pollution levels in streams).												
	1	3	4	Compare the rate of use of natural resources and their impact on sustainability.												
	Total For Assessment Anchor A.1 Reasoning and Analysis				7	4	2	9	4	13	7	2	2	9	2	11
	2	1	1	Critique the elements of an experimental design (e.g., raising questions, formulating hypotheses, developing procedures, identifying variables, manipulating variables, interpreting data, and drawing conclusions) applicable to a specific experimental design.	1	4	1	2	4	6	1	2	1	2	2	4
	2	1	2	Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate, communicate results) applicable to a specific technological design.	1			1	1	1				1		1
	2	1	3	Use data to make inferences and predictions, or to draw conclusions, demonstrating understanding of experimental limits.	3	2		3	2	5	3	1		3	1	4
	2	1	4	Critique the results and conclusions of scientific inquiry for consistency and logic.												
	2	1	5	Communicate results of investigations using multiple representations.	1			1	1	1				1		1
2	2	1	Evaluate appropriate methods, instruments, and scale for precise quantitative and qualitative observations (e.g., to compare properties of materials, water quality).	1	2	3	4	2	6	1	1	3	4	1	5	

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2	2	2	Explain how technology (e.g., GPS, spectroscope, scanning electron microscope, pH meter, probe, interface, imaging technology, telescope) is used to extend human abilities and precision.	2	1	3	3	2	1	3	3				
Total For Assessment Anchor A.2 Processes, Procedures, and Tools of Scientific Investigations				9	8	5	14	8	22	9	4	5	14	4	18
3	1	1	Apply systems analysis, showing relationships (e.g., flowcharts, concept maps), input and output, and measurements to explain a system and its parts.												
3	1	2	Analyze and predict the effect of making a change in one part of a system on the system as a whole.	2		2	2	2				2		2	
3	1	3	Use appropriate quantitative data to describe or interpret a system (e.g., biological indices, electrical circuit data, automobile diagnostic systems data).												
3	1	4	Apply the universal systems model of inputs, processes, outputs, and feedback to a working system (e.g., heating, motor, food production) and identify the resources necessary for operation of the system.	1		1	1	1				1		1	
3	2	1	Compare the accuracy of predictions represented in a model to actual observations and behavior.	1	2	1	2	3	1	1		1	1	2	
3	2	2	Describe advantages and disadvantages of using models to simulate processes and outcomes.			1	1	1		1		1		1	
3	2	3	Describe how relationships represented in models are used to explain scientific or technological concepts (e.g., dimensions of objects within the solar system, life spans, size of atomic particles, topographic maps).	1		1	1	1				1		1	
3	3	1	Describe or interpret recurring patterns that form the basis of biological classification, chemical periodicity, geological order, or astronomical order.	1		1	1	1				1		1	

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3	3	2	Compare stationary physical patterns (e.g., crystals, layers of rocks, skeletal systems, tree rings, atomic structure) to the object's properties.	1				1	1	1				1	1
3	3	3	Analyze physical patterns of motion to make predictions or draw conclusions (e.g., solar system, tectonic plates, weather systems, atomic motion, waves).	1				1	1	1				1	1
Total For Assessment Anchor A.3 Systems, Models, and Patterns				8	2	1		9	2	11	8	1	1	9	10
Total For Reporting Category A				24	14	8		32	14	46	24	7	8	32	39

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Grade 11

Science

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points								Items						
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)				Number of Items				Total Number of Items (Core & EB)		
					MC	OE	MC	OE	MC	OE	Total	Core		EB		Total			
												MC	OE	MC	OE	MC	OE	MC	OE
	1	1	1	Explain how structure determines function at multiple levels of organization (e.g., chemical, cellular, anatomical).	2		1		3		3		2		1		3		3
	1	1	2	Compare and contrast the structural and functional similarities and differences among living things (e.g., classify organisms into classification groups, compare systems).															
	1	1	3	Compare and contrast cellular processes (e.g., photosynthesis and respiration, meiosis and mitosis, protein synthesis and DNA replication).															
<b>Total For Assessment Anchor B.1 Structures and Functions of Organisms</b>					<b>2</b>		<b>1</b>		<b>3</b>		<b>3</b>		<b>2</b>		<b>1</b>		<b>3</b>		<b>3</b>
	2	1	1	Explain the theory of evolution by interpreting data from fossil records, similarities in anatomy and physiology, or DNA studies that are relevant to the theory of evolution.			1		1		1				1		1		1
	2	1	2	Explain the role of mutations, differential reproduction, and gene recombination in changing the genetic makeup of a population.	1				1		1		1				1		1
	2	1	3	Explain the role of selective breeding and biotechnology in changing the genetic makeup of a population.															
	2	1	4	Explain why natural selection can act only on inherited traits.															
	2	2	1	Describe how genetic information is expressed (i.e., DNA, genes, chromosomes, transcription, translation, and replication).		2			2					1				1	
	2	2	2	Compare and contrast mitosis and meiosis in passing on genetic information.															
	2	2	3	Explain how different patterns of inheritance affect population variability (i.e., multiple alleles, co-dominance, dominance, recessiveness, sex-influenced traits, and sex-linked traits).	1				1		1		1				1		1

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Total For Assessment Anchor B.2 Continuity of Life				2	2	1		3	2	5	2	1	1		3	1	4	
<b>B: Biological Sciences</b>	3	1	1	Explain the significance of diversity in ecosystems.														
	3	1	2	Explain the biotic (i.e., plant, animal, and microbial communities) and abiotic (i.e., soil, air, temperature, and water) components of an ecosystem and their interaction.		2			2	2		1				1	1	
	3	1	3	Describe how living organisms affect the survival of one another.	1				1	1		1				1		1
	3	1	4	Compare the similarities and differences in the major biomes (e.g., desert, tropical rain forest, temperate forest, coniferous forest, tundra) and the communities that inhabit them.														
	3	1	5	Predict how limiting factors (e.g., physical, biological, chemical) can affect organisms.														
	3	2	1	Use evidence to explain how cyclical patterns in population dynamics affect natural systems.	1				1	1		1				1		1
	3	2	2	Explain biological diversity as an indicator of a healthy environment.														
	3	2	3	Explain how natural processes (e.g., seasonal change, catastrophic events, habitat alterations) impact the environment over time.														
	3	3	1	Describe different human-made systems and how they use renewable and nonrenewable natural resources (i.e., energy, transportation, distribution, management, and processing).	1				1	1		1				1		1
	3	3	2	Compare the impact of management practices (e.g., production, processing, research, development, marketing, distribution, consumption, by-products) in meeting the need for commodities locally and globally.														

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3	3	3	Explain the environmental benefits and risks associated with human-made systems (e.g., integrated pest management, genetically engineered organisms, organic food production).	1		1		2		2		1		1		2		2
Total For Assessment Anchor B.3 Ecological Behavior and Systems				4	2	1		5	2	7		4	1	1		5	1	6
Total For Reporting Category B				8	4	3		11	4	15		8	2	3		11	2	13

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Grade 11

Science

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points							Items							
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)			
					MC	OE	MC	OE	MC	OE	Total	Core		EB		Total			
												MC	OE	MC	OE	MC	OE	MC	OE
	1	1	1	Explain that matter is made of particles called atoms and that atoms are composed of even smaller particles (e.g., protons, neutrons, electrons).	1				1		1	1					1		1
	1	1	2	Explain the relationship between the physical properties of a substance and its molecular or atomic structure.															
	1	1	3	Explain the formation of compounds (ionic and covalent) and their resulting properties using bonding theories.															
	1	1	4	Explain how the relationships of chemical properties of elements are represented in the repeating patterns within the periodic table.		2				2			1					1	
	1	1	5	Predict the behavior of gases through the application of laws (e.g., Boyle's law, Charles' law, or ideal gas law).	1				1		1	1					1		1
	1	1	6	Describe factors that influence the frequency of collisions during chemical reactions that might affect the reaction rates (e.g., surface area, concentration, catalyst, temperature). surface area, concentration, catalyst, temperature).	1				1		1	1					1		1
<b>Total For Assessment Anchor C.1 Structures, Properties, and Interaction of Matter and Energy</b>					<b>3</b>	<b>2</b>			<b>3</b>	<b>2</b>	<b>5</b>	<b>3</b>	<b>1</b>				<b>3</b>	<b>1</b>	<b>4</b>
	2	1	1	Compare or analyze waves in the electromagnetic spectrum (e.g., ultraviolet, infrared, visible light, X-rays, microwaves) as well as their properties, energy levels, and motion.															
	2	1	2	Describe energy changes in chemical reactions.			2		2		2		2				2		2
	2	1	3	Apply the knowledge of conservation of energy to explain common systems (e.g., refrigeration, rocket propulsion, heat pump).															

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C: Physical Sciences	2	1	4	Use Ohm's Law to explain relative resistances, currents, and voltage.															
	2	2	1	Explain the environmental impacts of energy use by various economic sectors (e.g., mining, logging, transportation) on environmental systems.															
	2	2	2	Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion, resource depletion).	1			1	1	1					1				1
	2	2	3	Give examples of renewable energy resources (e.g., wind, solar, biomass) and nonrenewable resources (e.g., coal, oil, natural gas) and explain the environmental and economic advantages and disadvantages of their use.	1			1	1	1					1				1
	Total For Assessment Anchor C.2 Forms, Sources, Conversions, and Transfer of Energy				2		2		4	4	2		2		4				4
	3	1	1	Explain common phenomena (e.g., a rock in a landslide, an astronaut during a space walk, a car hitting a patch of ice on the road) using an understanding of conservation of momentum.	1			1	1	1					1				1
	3	1	2	Design or evaluate simple technological or natural systems that incorporate the principles of force and motion (e.g., simple machines, compound machines).															
	3	1	3	Describe the motion of an object using variables (i.e., acceleration, velocity, displacement).	2			2	2		1						1		1
	3	1	4	Explain how electricity induces magnetism and how magnetism induces electricity as two aspects of a single electromagnetic force.	1			1	1	1					1				1
	3	1	5	Calculate the mechanical advantage for moving an object by using a simple machine.	1		1	2	2	1		1			2				2
	3	1	6	Identify elements of simple machines in compound machines.															
	Total For Assessment Anchor C.3 Principles of Motion and Force				3	2	1		4	2	6	3	1	1		4	1		5
	Total For Reporting Category C				8	4	3		11	4	15	8	2	3		11	2		13

Appendix C: 2010 PSSA Tally Sheets

Grade 11

Science

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items							
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)			
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total
					1	1	1	Classify and describe major types of rocks (i.e., igneous – granite, basalt, obsidian, pumice; sedimentary – limestone, sandstone, shale, coal; and metamorphic – slate, quartzite, marble, gneiss) and minerals (e.g., quartz, calcite, dolomite, clay, feldspar, mica, halite, pyrite) by their origin and formation.	2		1		3		3		2	
1	1	2	Explain the processes that take place at plate boundaries and how these processes continue to shape Earth (e.g., volcanic activity, earthquakes, mountain building, mid-ocean ridges, deep-sea trenches, new land being formed).	2				2		2		2				2		2
1	1	3	Analyze features caused by the interaction of processes that change Earth's surface (e.g., wind and moving water help break down rock into soil; plate movement, earthquakes, and volcanic activity help cause mountains and valleys to form; flowing water and deposition of material help form deltas).															
1	2	1	Evaluate factors affecting availability, location, extraction, and use of natural resources.	1				1		1		1				1		1
1	2	2	Explain the impact of obtaining and using natural resources for the production of energy and materials (e.g., resource renewal, amount of pollution, deforestation).															
1	3	1	Explain the multiple functions of different water systems in relation to landforms (e.g., buffer zones, nurseries, food production areas, habitat, water quality control, biological indicators).															

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D: Earth and Space Sciences	1	3	2	Explain relationships among physical characteristics, vegetation, topography, and flow as it relates to water systems.	2				2	2	2				2	2		
	1	3	3	Explain factors (e.g., nutrient loading, turbidity, rate of flow, rate of deposition, biological diversity) that affect water quality and flow through a water system.	1				1	1	1				1	1		
	Total For Assessment Anchor D.1 Earth Features and Processes that Change Earth and its Resources				8		1		9	9	8		1		9	9		
	2	1	1	Describe how changes in concentration of minor components (e.g., O <sub>2</sub> , CO <sub>2</sub> , dust, pollution) in Earth's atmosphere may be linked to climate change.			1		1	1			1		1	1		
	2	1	2	Compare the transmission, reflection, absorption, and radiation of solar energy to and by Earth's surface under different environmental conditions (e.g., major volcanic eruptions, greenhouse effect, reduction of ozone layer, increased global cloud cover).	1	2			1	2	1	1	1		1	1	2	
	2	1	3	Explain weather patterns and seasonal changes using the concepts of heat and density.														
	2	1	4	Analyze weather maps and weather data (e.g., air masses, fronts, temperature, air pressure, wind speed, wind direction, precipitation) to predict regional or global weather events.	1				1	1	1				1	1		
	Total For Assessment Anchor D.2 Weather, Climate, and Atmospheric Processes				2	2	1		3	2	5	2	1	1		3	1	4
	3	1	1	Describe planetary motion and the physical laws that explain planetary motion.														
	3	1	2	Describe the structure, formation, and life cycle of stars.														
	3	1	3	Explain the current scientific theories of the origin of the solar system and universe (e.g., big bang theory, solar nebular theory, stellar evolution).														
	Total For Assessment Anchor D.3 Composition and Structure of the Universe																	
	Total For Reporting Category D				10	2	2		12	2	14	10	1	2		12	1	13

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Grade 05

Writing

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items											
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)							
											Core		EB									
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total				
A: Composition	1			Narrative		4				4	4			1					1	1		
	Total For Assessment Anchor A.1 A.S. 1.4 -- Types of Writing					4				4	4			1						1	1	
	2			Informational		4				4	4			1						1	1	
	Total For Assessment Anchor A.2 A.S. 1.4 -- Types of Writing					4				4	4			1							1	1
	3			Persuasive																		
	Total For Assessment Anchor A.3 A.S. 1.4 -- Types of Writing																					
	Total For Reporting Category A					8				8	8			2							2	2

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Grade 05

Writing

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items							
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)			
											Core		EB					
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total
<b>B: Revising and Edit</b>	5			Editing	6				6		6		6			6		6
	Total For Assessment Anchor B.5 A.S. 1.5 -- Quality of Writing				6				6		6		6			6		6
	6			Revising	6				6		6		6			6		6
	Total For Assessment Anchor B.6 A.S. 1.5 -- Quality of Writing				6				6		6		6			6		6
	Total For Reporting Category B				12				12		12		12			12		12

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Grade 08

Writing

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
					MC	OE	MC	OE	MC	OE	Total	Core		EB		Total				
												MC	OE	MC	OE	MC	OE	Total		
<b>A: Composition</b>	1			Narrative																
	Total For Assessment Anchor A.1 A.S. 1.4 -- Types of Writing																			
	2			Informational		4				4	4		1					1	1	
	Total For Assessment Anchor A.2 A.S. 1.4 -- Types of Writing					4				4	4		1					1	1	
	3			Persuasive		4				4	4		1					1	1	
	Total For Assessment Anchor A.3 A.S. 1.4 -- Types of Writing					4				4	4		1					1	1	
	Total For Reporting Category A					8				8	8		2					2	2	

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Grade 08

Writing

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points							Items					
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)	
									Core		EB						
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE
<b>B: Revising and Edit</b>	5			Editing	7				7		7			7		7	
	Total For Assessment Anchor B.5 A.S. 1.5 -- Quality of Writing				7				7		7			7		7	
	6			Revising	5				5		5			5		5	
	Total For Assessment Anchor B.6 A.S. 1.5 -- Quality of Writing				5				5		5			5		5	
	Total For Reporting Category B				12				12		12			12		12	

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Grade 11

Writing

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points						Items									
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)		Number of Items				Total Number of Items (Core & EB)					
											Core		EB							
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total		
<b>A: Composition</b>	1			Narrative																
	Total For Assessment Anchor A.1 A.S. 1.4 -- Types of Writing																			
	2			Informational		4				4	4		1					1	1	
	Total For Assessment Anchor A.2 A.S. 1.4 -- Types of Writing					4				4	4		1					1	1	
	3			Persuasive		4				4	4		1					1	1	
	Total For Assessment Anchor A.3 A.S. 1.4 -- Types of Writing					4				4	4		1					1	1	
	Total For Reporting Category A					8				8	8		2					2	2	

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Grade 11

Writing

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points							Items						
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)		
									Core		EB							
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total
<b>B: Revising and Edit</b>	5			Editing	5				5		5		5			5		5
	Total For Assessment Anchor B.5 A.S. 1.5 -- Quality of Writing				5				5		5		5			5		5
	6			Revising	7				7		7		7			7		7
	Total For Assessment Anchor B.6 A.S. 1.5 -- Quality of Writing				7				7		7		7			7		7
	Total For Reporting Category B				12				12		12		12			12		12

Appendix D:  
Item and Test Development Process



**Item and Test Development Process for the PSSA**

Step	Description
<b>1. Review Guiding Documentation</b>	Each year item and test development specialists meet internally to review all guiding documentation related to the PSSA. Documentation reviewed includes the test design blueprints, the Pennsylvania Assessment Anchors and Eligible Content [or in the case of Writing, the Pennsylvania Academic Standards], the test item specifications, the test style specifications (style guide), and all test content descriptions.
<b>2. Meet with PDE to Confirm Understanding of Program</b>	The goal of the meeting each year is to ensure that item and test development teams have a clear understanding of PDE’s vision for test development. A successful development cycle requires a clear understanding of Pennsylvania’s content-area test specifications and of any unique interpretations of the Pennsylvania Assessment Anchors (if any).
<b>3. Create Preliminary Test Item Development Plan</b>	Item and test development specialists generate a preliminary development plan which includes an overview of the program, the internal and external (PDE) review and approval processes, a projected schedule for development of test items—including the number of test items to be developed for review by PDE and subsequent review by the committees of Pennsylvania educators. Item and test development specialists also generate strategies for securing passages and developing writing prompts, science scenarios, and passage-based items, etc.
<b>4. Meet with PDE to Finalize Test Item Development Plan</b>	Over the course of the meeting, item and test development specialists verify all steps in the development process including timelines and schedules for test item/test development.
<b>5. Analyze Item Bank</b>	Existing test items in the current PSSA Item Bank are reviewed for technical psychometric quality as well as for their match to the Assessment Anchors. During this phase, test development specialists also make a tally of the test items by Assessment Anchor—including test development specialists’ best thinking regarding the number of usable test items in the existing item bank. A tally is also made of the number of usable passages, as well as other stimulus prompts in the bank, including science scenarios.
<b>6. Refine Test Item Development Plan to Include Writers and Subcontractors</b>	Item and test development specialists identify the writers who will write the test items (test development specialists or other professional item writers, subcontractors, etc.), the estimated number of writers needed, the qualifications of writers, and the approximate number of test items to be submitted by each source.
<b>7. Train Item Writers</b>	Item and test development specialists train item writers, as needed. Item writers who have written for the PSSA in the past receive updated information, as needed.

### Item and Test Development Process for the PSSA

Step	Description
<b>8. Write and Review Items</b>	Test items are written by item writers after training is complete, and feedback is provided by the item and test development specialists to item writers on a regular basis. As test items are written, they are reviewed and edited in a series of internal reviews. Item and test development specialists review and edit items to include, but not limited to, the following: match to Assessment Anchor/Eligible Content, relevance to purpose, accuracy of content, item difficulty, interest level, grade appropriateness, depth of knowledge and cognitive complexity, adherence to the principles of Universal Design, and freedom from issues of bias/fairness/sensitivity. At the same time, the process of procuring permissions also begins, including securing permissions for passages, art, prompts, etc.
<b>9. Enter Test Items into Database</b>	Upon acceptance from item writers, test items are entered into the item management system, IDEAS ( <i>Item Development and Educational Assessment System</i> ). Item data stored in the system database includes, but is not limited to, the following: readability, cognitive level, estimated level of difficulty, alignment to assessment anchors, and correlation to stimulus prompts and passages.
<b>10. Prepare Item Set for Sample Item Review by PDE</b>	Item and test development specialists prepare a subset of the items for review by PDE.
<b>11. PDE Conducts Sample Item Review</b>	After a subset of the items is submitted to PDE for review, PDE reviews the items and provides feedback to item and test development teams via a conference call. Items are revised per PDE feedback.
<b>12. Continue to Write and Review Items</b>	The remaining items are written, and feedback is provided by the item and test development specialists to item writers on a regular basis. Items are entered into the item management system, IDEAS ( <i>Item Development and Educational Assessment System</i> ) (See step 8 and step 9).
<b>13. Review Items Prior to Test Item Review and Validation Sessions</b>	Prior to New Item Content Review, all items are submitted to PDE for review. Item and test development specialists incorporate all PDE feedback, and PDE-requested edits to items are made.
<b>14. Prepare for Test Item Review Sessions (the New Item Content Review and the Bias, Fairness, and Sensitivity Review)</b>	Item and test development specialists prepare all items and stimulus passages for review by the New Item Content Review Committee (consisting of Pennsylvania educators) and by the separate Bias, Fairness, and Sensitivity Committee (consisting of a panel of experts). Item and test development specialists also prepare training materials needed for training committee members to review items for content or for bias, fairness, and sensitivity issues. All training materials and other ancillary materials (e.g. agendas, presentations, etc.) are also developed and then submitted to PDE for review and approval. Invitations are also sent to Pennsylvania educators and national experts from PDE-approved committee lists.

### Item and Test Development Process for the PSSA

Step	Description
<b>15. Conduct Test Item Review Sessions (the New Item Content Review and the Bias, Fairness, and Sensitivity Review)</b>	Committees of Pennsylvania educators and national experts review items in two meetings: one addressing item content and quality, the other addressing bias, fairness, and sensitivity. PDE, with support from item and test development specialists, presents training on how to review new test items for content considerations or bias/fairness/sensitivity issues. At the New Item Content Review, suggested edits to test items are made and/or replacement test items are written during the actual item review so that both the committee and the PDE are able to observe changes to the test items and approve the test items during the committee review process. At the Bias, Fairness, and Sensitivity Review, experts in bias, fairness, and sensitivity review all test items and passages and come to a consensus about any issues that are noted. At both meetings the results are carefully documented.
<b>16. Conduct Item Review Resolution and Cleanup</b>	Following the conclusion of the New Item Content Review Committee meetings, PDE re-examines the consensus changes suggested by the committee members during the New Item Content Review Committee meetings. DRC item and test development specialists then record all of PDE's follow-up decisions and changes. During this cleanup process, PDE either accepts the changes as requested by the committee, or PDE rejects the decision of the committee. If a committee decision is rejected, PDE provides an alternate decision for DRC to implement. During this cleanup process, PDE also interprets the report from the Bias, Fairness, and Sensitivity Committee meetings and subsequently applies changes to test items and passages. DRC item and test development specialists then apply the changes to the test items and passages per PDE's decisions.
<b>17. Submit Field Test Items for Final Sign-Off</b>	PDE-approved changes are applied to the items, scenarios, non-permissioned passages, prompts, etc. (Changes reflect PDE's arbitration of the committee decisions.) Once all revisions to the items, non-permissioned passage text, and/or the art used by test items and passages are completed, the test items are submitted to PDE for final review and sign-off. (Changes requested to permissioned passages are sought from the publisher of record, and, if approved by the copyright holders, changes are implemented.) [PDE's approval process for field test items generally occurs simultaneously with PDE's approval of the core test forms. See step 25.]
<p><i>To follow the path for new field test items, skip to <b>step 22</b>.</i></p> <p style="margin: 10px 0;"><i>OR</i></p> <p><i>To follow the chronological test development path, continue with <b>step 18</b>.</i></p>	

### Item and Test Development Process for the PSSA

Step	Description
<b>18. Review Results of the Field Test</b>	<p>Following the administration of a field test form and the subsequent ranging and field test scoring processes for field test items, performance data for all field test items are analyzed by DRC psychometricians and test development specialists. Test item performance data that meet certain triggering criteria are flagged for additional reviews by test development specialists. Flagged field test items with extreme performance data are considered psychometrically unusable and are removed from future operational consideration. Field test items with marginal performance data are prepared for the Field Test Item Data Review meeting.</p>
<b>19. Prepare for Field Test Item Data Review</b>	<p>Test development specialists prepare all items and stimulus passages for review by the Field Test Item Data Review Committee (which consists of Pennsylvania educators). Psychometricians also prepare training materials needed for training committee members to review items for their performance. All training materials and other ancillary materials (e.g. agendas, presentations, etc.) are submitted to PDE for review and approval. Invitations are also sent to Pennsylvania educators from PDE-approved committee lists.</p>
<b>20. Conduct Field Test Item Data Review</b>	<p>Committees of Pennsylvania educators review the performance data of flagged field test items. Psychometricians present training on how to review field test items based on their performance data. At the Item Data Review, committee members examine the performance of the items and determine whether the field test item is technically sound and appropriate for use on an operational PSSA test. Since test items cannot be modified at the Field Test Item Data Review, the committee can either accept an item as is or the committee can reject the item.</p>
<b>21. Conduct Field Test Item Data Review Reconciliation</b>	<p>Following the conclusion of the Field Test Item Data Review Committee meetings, PDE re-examines the consensus decisions (accept or reject) suggested by the committee members during the Field Test Item Data Review Committee meetings. Test development specialists record all of PDE's follow-up decisions and changes. During this cleanup process, PDE either accepts the decisions of the data review committee, or PDE rejects the decisions of the data review committee. If a committee decision is not accepted, PDE provides an alternate decision for test development specialists to implement. All PDE-approved changes to the test items status (accepted or rejected) are incorporated into the <i>Item Development and Educational Assessment System, IDEAS</i>.</p>
<b>22. Select Items to Fill Core, Field Test, and Equating Block Positions in Core and Field Test Forms</b>	<p>After the PDE-approved changes to the new field test items is completed AND the results of the prior field test have been finalized following data review, test development specialists collaborate with psychometricians to follow the Test Design Blueprints and build requirements to make the initial selection of items for core, field-test, and equating block positions for all test forms.</p>

### Item and Test Development Process for the PSSA

Step	Description
<b>23. Review Core and Equating Block Selections</b>	After test content and psychometric requirements have been achieved for core and equating block positions, the core and equating block items are provided to PDE for review and approval. Any changes to the content of the core or equating block requested by PDE are balanced with psychometric requirements until all core and equating block positions are approved by PDE, test development specialists, and psychometricians.
<b>24. Construct Test Forms</b>	Items, passages, and test components are assembled into forms using the form construction and typesetting function of DRC's <i>Item Development and Educational Assessment System</i> , IDEAS. Forms are reviewed internally for style and formatting requirements.
<b>25. Review Typeset Forms</b>	After forms are constructed in IDEAS, draft hard copies of the forms are produced and presented to PDE for review and approval. Any changes to the content of the core or equating block requested by PDE are balanced with psychometric requirements until all core and equating block positions are approved by PDE, test development specialists, and psychometricians. PDE also re-reviews all field test items appearing in the test forms. DRC applies changes to the field test items as required.
<b>26. Print Test Forms</b>	Following PDE's approval of the test forms, DRC completes a series of final proofing of all test forms. Final forms (along with ancillary materials) are then approved for printing.
<b>27. Assemble Documentation of Test Materials</b>	Metadata for each test item and form is documented and proofed, including: grade, form, session/section, item sequence, reporting category, Assessment Anchor, descriptor (sub-anchor), Eligible Content, number of points, item type, number of answer options, item usage, stimulus ID, etc.
<i>To follow the path for new field test items, return to <b>step 18</b>.</i>	

Note: As discussed in Chapter 3, the development for PSSA field test items in 2008 did not include reading and mathematics items or writing multiple-choice items. The items for the 2009 field test were selected from the item bank and had been developed prior to the 2008 development cycle.



Appendix E:  
PSSA Item Review Cards



Appendix E: PSSA Item Review Cards

<p>Standard: Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers, and number systems.</p>		<p><b>PA - Item Card</b></p>
<p>1. Some students worked together on a group project. Matt has done <math>\frac{2}{8}</math> of the project, Sandy has done <math>\frac{3}{8}</math> of the project, and Nathan has done <math>\frac{1}{2}</math> of the project.</p>		<p>Item ID</p>
<p>A. What fraction of the project is done? Show all your work. Give the answer in simplest form.</p>		<p>Content Area</p> <p>Mathematics</p>
<p>B. Using decimals, indicate how much of the project is still not done. Show all your work.</p>		<p>Passage ID</p>
		<p>Passage Title</p>
		<p>Grade</p>
		<p>AACS Standards</p> <p>A.1</p>
		<p>Item Type</p> <p>Open Ended</p>
		<p>Points</p> <p>4</p>
		<p>Depth of Knowledge</p>
		<p>Est Difficulty</p>
		<p>Calculator</p> <p>C</p>
		<p>Focus</p>
<p>Data Recognition Corporation</p>		<p>09/25/09 Page 1</p>

Appendix E: PSSA Item Review Cards

PA - Data Card continued

**Administration**

Name	Use Function	Rptg Flag	Seq	Period	Year	Day	Session	Calc	Model/Ext	Grade
08	FT							No		

**Traditional Statistics**

# In group	P-Value	Item Mean	Item/Tot Corr
14185	0.68		0.31

**Fit Statistics**

Outfit t	Infit t	Deg Free	Chi-sq/df	Fit
7.3	9.7			

**IRT Statistics**

Label	Final	Final S.E.	Preliminary	Preliminary S.E.
Location	0.08	0.02		

**Distractor/Step Specific**

Label	Proportion	Correlation	Avg Meas	Step Logit
A	0.16	-0.26		
B	0.13	-0.22		
C*	0.68	0.31		
D	0.03	-0.28		
OMITS	0.00			

**DIF Analysis**

Category	Blas Code	Num Value	N - Ref	N - Focal
MALEFEMALE	A+	0.05	7231	6948
WHITEBLACK	A-	-0.70	10419	2145

## Appendix F:

### Item Rating Sheet and Criteria Guidelines



## Item Review Criteria Guidelines

The purpose of this form is to provide guidelines to the item review process in terms of item characteristics that are essential in building a fair and balanced assessment. Use these guidelines in conjunction with the Item Rating Sheet when recording your feedback on individual items.

<b>Content Alignment</b>		<b>Options</b>
Standards, Anchors, Eligible Content	Does the content of the item align with the Standard/Anchor/Eligible Content? Each item was written to assess a particular Standard/Anchor/ Eligible Content statement which is indicated on the individual Item Card. Consider the degree to which the item is, in fact, aligned with the indicated Eligible Content. In making this judgment, it is important to consider whether the <b>content</b> is aligned (e.g., do the Eligible Content and the item both deal with fractions) and whether the required <b>performance</b> is aligned (e.g., if the Eligible Content calls for a comparison to be made, is this reflected in the item).	<b>HIGHER</b> —Aligns to the higher level of the EC <b>LOWER</b> —Aligns to the lower level of the EC <b>NONE</b> —No alignment with EC

<b>Rigor Level Alignment</b>		<b>Options</b>
Grade	Is the item grade-level appropriate? Is the content consistent with the experiences of a student at the grade level assessed? Is the challenge level appropriate for the grade?	<b>ABOVE</b> Grade Level <b>AT</b> Grade Level <b>BELOW</b> Grade Level
Difficulty	Do you agree with the item’s difficulty rating? Item Difficulty is indicated as Easy, Medium, and Hard. Is your rating in agreement with the difficulty rating on the Item Form?	<b>HARD</b> <b>MEDIUM</b> <b>EASY</b>
Depth of Knowledge	Depth of Knowledge is based on the alignment work of Norman Webb. Rate each item based on the cognitive demand, using the following levels: <ol style="list-style-type: none"> <li>1. Recall – <b>Recall</b> of a fact, information, or procedure.</li> <li>2. Basic Application of Skill or Concept – <b>Use</b> of information, conceptual knowledge, procedures, two or more steps, etc.</li> <li>3. Strategic Thinking – Requires reasoning, developing a plan or sequence of steps; has some complexity; more than one possible answer.</li> <li>4. Extended Thinking – Requires an investigation, time to think and process multiple conditions of the problem or task, and more than 10 minutes to do non-routine manipulations. (This level is generally not assessed in on-demand assessments.)</li> </ol>	<b>4</b> = Extended Thinking <b>3</b> = Strategic Thinking <b>2</b> = Basic Application <b>1</b> = Recall
Source of Challenge	Is the source of challenge appropriately targeted to the content? The hardest part of the item (i.e., source of challenge) should be the content that is targeted. For example, in mathematics, the mathematics should be the major source of challenge rather than the wording or graphic. Students should not give an incorrect answer to a mathematics item because the reading level is too high or a graphic is flawed. Conversely, students should not give correct answers for reasons such as prior knowledge that make the answer to the question obvious (e.g., if the question asks which country has the largest population and students are to read a graph that includes China, there is no need to read the graph to answer the question).	<b>Y</b> = Yes <b>N</b> = No

Appendix F: Item Rating Sheet and Criteria Guidelines

<b>Technical Design</b>		<b>Options</b>
Correct Answer	Is there one clear, correct answer? There should be no other answer that “could” be correct. CAUTION: This does not mean that “good” distractors are unfair.	Y = Yes N = No
Distractors	Are distractors fair and appropriate? Distractors that are appropriate offer students reasonable choices that can be arrived at by making common errors. There should be no distractors that make no sense at all. It should be possible to examine each option and to reason how a student with some deficiency in knowledge or skill could choose it. The distractors should be formatted according to acceptable standards of test construction (e.g., a phrase that is common to each distractor should be placed in the stem).	Y = Yes N = No
Graphics	Are the graphics clear and accurate?	Y = Yes N = No

<b>Universal Design</b>		<b>Options</b>
Language Demand	Is language clear, well-formatted, and precise? Does the item use correct terminology for the content area? In order for all students to enter into the questions of the assessment, they must be able to understand them. If the items are formatted poorly, use unnecessarily complex words or phrases, or use figures or layouts that are difficult to understand, some students will give incorrect answers due to these factors rather than the content that is being assessed.	Y = Yes N = No
Bias	Is the item free of bias? All students will not be able to enter into the assessment if bias considerations are not resolved. Does the item contain clear bias problems? <i>A thorough, independent bias review (separate from this meeting) will be completed for all items.</i>	Y = Yes N = No

<b>Status</b>		<b>Options</b>
Acceptance Status	This is an overall judgment about the item. Based on the consensus of the committee, indicate whether the item was approved without revision to the content of the item or whether the item was accepted by the committee after revision of the content of the item. If there is a dissenting view (opposed to the committee consensus), record a brief explanation of the dissenting view on the back of the Item Rating Sheet.	— <b>Approved</b> as is — <b>Accepted</b> with suggested revisions — <b>Dissenting View</b>

NOTES:

- If you leave a box blank on the Item Rating Sheet, it will be recorded to indicate that you did not have any specific feedback for that item or issue.
- If you object to the consensus of the committee, please note this on the item rating sheet and then record a brief explanation of the dissenting view on the back of the Item Rating Sheet.
- Do NOT remove any items from the item binder at any time.**
- You must sign your item rating sheet.





Appendix G:  
2010 Test Book Section Layout Plans



Mathematics and Reading Test/Answer Book Section Layout for Grades 4, 5, 6, 7, 8, and 11**Mathematics Core**

Core/common MC items	60 (16 core linking)
3 core 4 pt OE items	12 (8 core linking)
<b>Total</b>	<b>72 points</b>

**Reading Core**

Core/common MC items	40 (16 core linking)
4 core 3 pt OE items	12 (6 core linking)
<b>Total</b>	<b>52 points</b>

The estimated testing time for mathematics is approximately 130–185 minutes. The estimated testing time for reading is approximately 160–215 minutes (including equating block items and embedded field test items). [Timing assumes 5 to 10 min per OE, 1½ to 2 min per MC, and 7 min per reading passage set.]

Section	Content	Number of MC	MC Item Breakdown	Number of OE	OE Item Breakdown	Estimated Number of Passages	Section Time (in minutes)
1	Mathematics	24	24–common (core) items (includes 4 non-calc)	2	2–common (core) items	N/A	55–65
2	Reading	19–24	19-24–common (core) items	2	2–common (core) items	3	55–85
3	Mathematics	24	12–common (core) items 2–equating block items 10–field test items	1	1–field test	N/A	50–60
4	Reading	18	8–equating block items 10–field test items	1	1–field test	2	50–60
5	Mathematics	24	24–common (core) items	1	1–common (core) item	N/A	50–60
6	Reading	16–21	16-21–common (core) items	2	2–common (core) items	2 or 3	50–80

## Notes:

1) There will be 9 forms. 2) The ruler items may fall in Section 1, 3, or 5. 3) Sections 2 and 6 must equal a combined total of 40 MC items. 4) Section 2 cannot be more than 24 MC items. Section 6 cannot be less than 16 MC items.

Mathematics and Reading Test/Answer Book Section Layout for Grade 3

**Mathematics Core**

Core/common MC items	60 (16 core linking)
3 core 4 pt OE items	12 (8 core linking)
<b>Total</b>	<b>72 points</b>

**Reading Core**

Core/common MC items	40 (16 core linking)
2 core 3 pt OE items	6 (3 core linking)
<b>Total</b>	<b>46 points</b>

The estimated testing time for mathematics is approximately 130–185 minutes. The estimated testing time for reading is approximately 160–215 minutes (including equating block items and embedded field test items). [Timing assumes 5 to 10 min per OE, 1½ to 2 min per MC, and 7 min per reading passage set.]

Section	Content	Number of MC	MC Item Breakdown	Number of OE	OE Item Breakdown	Estimated Number of Passages	Section Time (in minutes)
1	Mathematics	24	24–common (core) items	2	2–common (core) item	N/A	55–65
2	Reading	19–24	19-24–common (core) items	1	1–common (core) item	3	55–80
3	Mathematics	24	12–common (core) items 2–equating block items 10–field test items	1	1–field test	N/A	50–60
4	Reading	18	8–equating block items 10–field test items	1	1–field test	2	50–60
5	Mathematics	24	24–common (core) items	1	1–common (core) item	N/A	50–60
6	Reading	16–21	16-21–common (core) items	1	1–common (core) item	2	45–65

Notes:

- 1) The ruler items may fall in Section 1, 3, or 5.
- 2) Sections 2 and 6 must equal a combined total of 40 MC items.
- 3) Section 2 cannot be more than 24 MC items. Section 6 cannot be less than 16 MC items.

Science Test/Answer Book Section Layout

General Information (see grade level page for specifics)

- Timing Key: MC = 1 to 1½ min; 2 pt OE = 5 min; 4 pt OE = 10 min; G8 Scenario stimulus = 3 min; G11 Scenario stimulus = 6 min
- The number of forms varies per grade.
- Within a section at grade 4, MC *most likely* will precede OE items.
- Within a section at grades 8 & 11, non-scenario MC items *most likely* will precede scenario-based MC items which will precede OE items.
- Grade 4 and 8 will have both Test Booklets and scannable Answer Booklets; G11 will have one consumable science booklet.
- *Generally*, core items will precede equating block items, which will precede field test items.

**Science: Grade 4**

Core/common MC items	58 (16 core linking)
5 core 2 pt OE items	10 (2 core linking)
Total	68 points

The estimated grade 4 testing time for science is approximately 95–100 minutes or 110–115 minutes administration time (including equating block items and embedded field test items). [Timing assumes 5 min per 2 pt OE and 1 min per MC.]

Grade	Section	Number of MC	Estimated MC Item Breakdown	Number of OE	Estimated OE Item Breakdown	Testing Time
4	1	34	29-common (core) items 1-equating block item 4-embedded field test item	3	3-common (core) items	45–55
4	2	34	29-common (core) items 1-equating block item 4- embedded field test items	3	2-common (core) items 1-embedded field test item	45–55

Appendix G: 2010 Test Book Section Layout Plans

**Science: Grade 8**

Core/common MC items	58 (16 core linking)
5 core 2 pt OE items	10 (2 core linking)
<u>Total</u>	<u>68 points</u>

The estimated grade 8 testing time is 105–110 minutes per grade for science or 120–125 minutes administration time (including equating block items and embedded field test items). [Timing assumes 5 min per 2 pt OE, 1 min per MC, and 3 min per grade 8 scenario.]

Grade	Section	Number of MC	Estimated MC Item Breakdown	Number of OE	Estimated OE Item Breakdown	Testing Time
8	1	35	27-common (core) items 4-embedded field test scenario-based items 1-equating block item 3-embedded field test item	3	3-common (core) items	50–60
8	2	35	27-common (core) items 4-common (core) scenario-based items 1-equating block item 3-embedded field test item	3	2-common (core) items 1-embedded field test item	50–60

Appendix G: 2010 Test Book Section Layout Plans

**Science: Grade 11**

Core/common MC items	50 (16 core linking)
6 core 2 pt Standalone OE items	12 (6 core linking)
<u>3 core 4 pt Scenario-based OE items</u>	<u>12 (no core linking)</u>
Total	74 points

The estimated grade 11 testing time is 160–165 minutes for science or 175–180 minutes administration time (including equating block items and embedded field test items). [Timing assumes 5 min per 2 pt OE, 10 min per 4 pt OE, 1 min per MC, and 6 min per grade 11 scenario.]

Grade	Section	Number of MC	Estimated MC Item Breakdown	Number of OE	Estimated OE Item Breakdown	Testing Time
11	1	22	14-common (core) standalone items 8-common (core) scenario-based items	3	1-common (core) standalone items 2-common (core) scenario-based items	55–65
11	2	20	12-common (core) standalone items 4-common (core) scenario-based items 1-equating block item 3-embedded field test standalone items	4	3-common (core) standalone items 1-common (core) scenario-based items	45–55
11	3	20	12-common (core) standalone items 4-embedded field test scenario-based items 1-equating block item 3-embedded field test standalone items	4	2-common (core) standalone items 1-embedded field test scenario-based item 1-embedded field test standalone item	45–55

Proposed 2010 Writing Test Book Page Map for Grades 5, 8, 11  
**Writing Booklet**

<b>Grade 5</b>	<b>Grade 8</b>	<b>Grade 11</b>
<p>Section 1</p> <ol style="list-style-type: none"> <li>1. Cover</li> <li>2. Demographics 1</li> <li>3. Demographics 2</li> <li>4. Blank</li> <li>5. DFA for stimulus-based MC items and sample</li> <li>6. <b>(Core)</b> Stimulus-based passage 1 with 1 MC item</li> <li>7. 3 MC items for Passage 1</li> <li>8. <b>(FT)</b> Stimulus-based passage 2 with 1 MC item</li> <li>9. 3 MC items for Passage 2</li> <li>10. <b>(Core)</b> Stimulus-based passage 3 with 1 MC item</li> <li>11. 3 MC items for Passage 3</li> <li>12. <b>(FT)</b> Stimulus-based passage 4 with 1 MC item</li> <li>13. 3 MC items for Passage 4</li> <li>14. <b>(Core)</b> Stimulus-based passage 5 with 1 MC item</li> <li>15. 3 MC items for Passage 5</li> <li>16. Blank</li> </ol>	<p>Section 1</p> <ol style="list-style-type: none"> <li>1. Cover</li> <li>2. Demographics 1</li> <li>3. Demographics 2</li> <li>4. Blank</li> <li>5. DFA for stimulus-based MC items and sample</li> <li>6. <b>(Core)</b> Stimulus-based passage 1 with 1 MC item</li> <li>7. 3 MC items for Passage 1</li> <li>8. <b>(FT)</b> Stimulus-based passage 2 with 1 MC item</li> <li>9. 3 MC items for Passage 2</li> <li>10. <b>(Core)</b> Stimulus-based passage 3 with 1 MC item</li> <li>11. 3 MC items for Passage 3</li> <li>12. <b>(FT)</b> Stimulus-based passage 4 with 1 MC item</li> <li>13. 3 MC items for Passage 4</li> <li>14. <b>(Core)</b> Stimulus-based passage 5 with 1 MC item</li> <li>15. 3 MC items for Passage 5</li> <li>16. Blank</li> </ol>	<p>Section 1</p> <ol style="list-style-type: none"> <li>1. Cover</li> <li>2. Demographics 1</li> <li>3. Demographics 2</li> <li>4. Blank</li> <li>5. DFA for stimulus-based MC items and sample</li> <li>6. <b>(Core)</b> Stimulus-based passage 1 with 1 MC item</li> <li>7. 3 MC items for Passage 1</li> <li>8. <b>(FT)</b> Stimulus-based passage 2 with 1 MC item</li> <li>9. 3 MC items for Passage 2</li> <li>10. <b>(Core)</b> Stimulus-based passage 3 with 1 MC item</li> <li>11. 3 MC items for Passage 3</li> <li>12. <b>(FT)</b> Stimulus-based passage 4 with 1 MC item</li> <li>13. 3 MC items for Passage 4</li> <li>14. <b>(Core)</b> Stimulus-based passage 5 with 1 MC item</li> <li>15. 3 MC items for Passage 5</li> <li>16. Blank</li> </ol>
<p>Section 2</p> <ol style="list-style-type: none"> <li>17. Prompt 1 with DFA for operational pre-equated prompt (<i>Narrative</i>)</li> <li>18. Prompt response space page 1</li> <li>19. Prompt response space page 2</li> <li>20. Blank</li> </ol>	<p>Section 2</p> <ol style="list-style-type: none"> <li>17. Prompt 1 with DFA for operational pre-equated prompt (<i>Informative</i>)</li> <li>18. Prompt response space page 1</li> <li>19. Prompt response space page 2</li> <li>20. Prompt response space page 3</li> <li>21. Blank</li> <li>22. Blank</li> </ol>	<p>Section 2</p> <ol style="list-style-type: none"> <li>17. Prompt 1 with DFA for operational pre-equated prompt (<i>Informative</i>)</li> <li>18. Prompt response space page 1</li> <li>19. Prompt response space page 2</li> <li>20. Prompt response space page 3</li> <li>21. Prompt response space page 4</li> <li>22. Blank</li> </ol>

Appendix G: 2010 Test Book Section Layout Plans

<b>Grade 5 (continued)</b>	<b>Grade 8 (continued)</b>	<b>Grade 11 (continued)</b>
<p>Section 3</p> <ul style="list-style-type: none"> <li>21. Prompt 2 with DFA for operational pre-equated prompt (<i>Persuasive</i>)</li> <li>22. Prompt response space page 1</li> <li>23. Prompt response space page 2</li> <li>24. Blank</li> </ul>	<p>Section 3</p> <ul style="list-style-type: none"> <li>23. Prompt 2 with DFA for operational pre-equated prompt (<i>Persuasive</i>)</li> <li>24. Prompt response space page 1</li> <li>25. Prompt response space page 2</li> <li>26. Prompt response space page 3</li> <li>27. Blank</li> <li>28. Blank</li> </ul>	<p>Section 3</p> <ul style="list-style-type: none"> <li>23. Prompt 2 with DFA for operational pre-equated prompt (<i>Persuasive</i>)</li> <li>24. Prompt response space page 1</li> <li>25. Prompt response space page 2</li> <li>26. Prompt response space page 3</li> <li>27. Prompt response space page 4</li> <li>28. Blank</li> </ul>
<p>Section 4</p> <ul style="list-style-type: none"> <li>25. Prompt 3 with DFA for prompt (<i>Field Test</i>)</li> <li>26. Prompt response space page 1</li> <li>27. Prompt response space page 2</li> </ul>	<p>Section 4</p> <ul style="list-style-type: none"> <li>29. Prompt 3 with DFA for prompt (<i>Field Test</i>)</li> <li>30. Prompt response space page 1</li> <li>31. Prompt response space page 2</li> <li>32. Prompt response space page 3</li> <li>33. Blank</li> <li>34. Blank</li> </ul>	<p>Section 4</p> <ul style="list-style-type: none"> <li>29. Prompt 3 with DFA for prompt (<i>Field Test</i>)</li> <li>30. Prompt response space page 1</li> <li>31. Prompt response space page 2</li> <li>32. Prompt response space page 3</li> <li>33. Prompt response space page 4</li> <li>34. Blank</li> </ul>
<p>Scoring Guidelines</p> <ul style="list-style-type: none"> <li>28. Conventions Scoring Guideline</li> <li>29. Narrative Scoring Guideline</li> <li>30. Informational Scoring Guideline</li> <li>31. Persuasive Scoring Guideline</li> <li>32. Back cover</li> </ul>	<p>Scoring Guidelines</p> <ul style="list-style-type: none"> <li>35. Blank</li> <li>36. Blank</li> <li>37. Conventions Scoring Guideline</li> <li>38. Informational Scoring Guideline</li> <li>39. Persuasive Scoring Guideline</li> <li>40. Back cover</li> </ul>	<p>Scoring Guidelines</p> <ul style="list-style-type: none"> <li>35. Blank</li> <li>36. Blank</li> <li>37. Conventions Scoring Guideline</li> <li>38. Informational Scoring Guideline</li> <li>39. Persuasive Scoring Guideline</li> <li>40. Back cover</li> </ul>



Appendix H:  
Mean Raw Scores by Form

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<b>Column Heading</b>	<b>Definition</b>
Form	Form
N	N students
L	Length
Pts	Points possible
Min	Minimum
Max	Maximum
Mean	Mean
Med	Median
<i>SD</i>	Standard deviation

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Appendix H: Mean Raw Scores by Form

	Form	N	L	Pts	Min	Max	Mean	Med	SD		Form	N	L	Pts	Min	Max	Mean	Med	SD
Mathematics 3	0	126676	63	72	6	72	60.3	63.0	9.97	Mathematics 4	0	126333	63	72	6	72	49.1	51.0	12.95
	1	14197	63	72	10	72	59.8	63.0	10.34		1	14212	63	72	8	72	48.8	51.0	13.09
	2	14024	63	72	9	72	60.2	63.0	10.07		2	14018	63	72	10	72	49.0	51.0	13.07
	3	14001	63	72	8	72	60.2	63.0	9.98		3	13990	63	72	9	72	49.1	51.0	12.92
	4	14094	63	72	11	72	60.3	63.0	9.87		4	14001	63	72	8	72	49.0	51.0	12.95
	5	14108	63	72	10	72	60.4	63.0	9.90		5	13967	63	72	7	72	49.2	51.0	12.94
	6	14192	63	72	10	72	60.6	63.0	9.90		6	14031	63	72	8	72	49.1	51.0	12.95
	7	14138	63	72	8	72	60.5	63.0	9.87		7	14021	63	72	7	72	49.2	51.0	12.92
	8	14052	63	72	6	72	60.3	63.0	9.98		8	14036	63	72	6	72	49.3	51.0	12.81
	9	13870	63	72	11	72	60.6	63.0	9.79	9	14057	63	72	8	72	49.3	51.0	12.91	
Mathematics 5	0	126419	63	72	2	72	48.6	51.0	13.60	Mathematics 6	0	126288	63	72	4	72	49.4	52.0	13.68
	1	14284	63	72	7	72	47.9	50.0	13.86		1	14291	63	72	6	72	49.0	51.0	13.91
	2	14017	63	72	7	72	48.5	50.0	13.64		2	14043	63	72	8	72	49.2	51.0	13.71
	3	14015	63	72	7	72	48.3	50.0	13.59		3	14031	63	72	8	72	49.4	52.0	13.59
	4	14017	63	72	8	72	48.8	51.0	13.56		4	13945	63	72	7	72	49.3	52.0	13.67
	5	14066	63	72	8	72	48.8	51.0	13.62		5	13958	63	72	9	72	49.4	52.0	13.74
	6	14009	63	72	10	72	48.8	51.0	13.45		6	14065	63	72	8	72	49.6	52.0	13.60
	7	14005	63	72	8	72	48.7	51.0	13.59		7	14016	63	72	4	72	49.4	52.0	13.78
	8	14015	63	72	7	72	48.7	51.0	13.51		8	13966	63	72	6	72	49.8	52.0	13.60
	9	13991	63	72	2	72	48.8	51.0	13.52	9	13973	63	72	7	72	49.6	52.0	13.52	
Mathematics 7	0	127685	63	72	2	72	47.9	50.0	14.61	Mathematics 8	0	129983	63	72	4	72	49.3	52.0	14.53
	1	14432	63	72	7	72	47.4	50.0	14.78		1	14671	63	72	7	72	48.8	51.0	14.79
	2	14173	63	72	5	72	47.8	50.0	14.69		2	14394	63	72	8	72	49.3	52.0	14.49
	3	14139	63	72	7	72	48.1	51.0	14.55		3	14433	63	72	6	72	49.2	52.0	14.54
	4	14095	63	72	7	72	47.9	50.0	14.51		4	14456	63	72	4	72	49.2	52.0	14.57
	5	14149	63	72	7	72	47.9	51.0	14.62		5	14404	63	72	7	72	49.4	52.0	14.53
	6	14162	63	72	2	72	47.9	50.0	14.61		6	14439	63	72	8	72	49.5	52.0	14.47
	7	14241	63	72	8	72	48.0	50.0	14.55		7	14385	63	72	6	72	49.4	52.0	14.46
	8	14128	63	72	5	72	48.1	51.0	14.60		8	14441	63	72	7	72	49.6	52.0	14.44
	9	14166	63	72	5	72	47.9	50.0	14.57	9	14360	63	72	6	72	49.5	52.0	14.46	
Mathematics 11	0	129910	63	72	1	72	47.6	50.0	15.23										
	1	14635	63	72	7	72	47.4	50.0	15.37										
	2	14399	63	72	7	72	47.7	50.0	15.20										
	3	14429	63	72	7	72	47.8	50.0	15.22										
	4	14431	63	72	6	72	47.4	50.0	15.31										
	5	14456	63	72	4	72	47.6	50.0	15.27										
	6	14394	63	72	1	72	47.8	50.0	15.11										
	7	14435	63	72	4	72	47.6	50.0	15.22										
	8	14364	63	72	5	72	47.7	50.0	15.09										
	9	14367	63	72	1	72	47.7	50.0	15.23										

Appendix H: Mean Raw Scores by Form

	Form	N	L	Pts	Min	Max	Mean	Med	SD	Form	N	L	Pts	Min	Max	Mean	Med	SD	
Reading 3	0	126588	42	46	2	46	30.6	32.0	9.09	Reading 4	0	128452	44	52	2	52	35.0	37.0	9.98
	1	14174	42	46	2	46	30.3	32.0	9.24		1	14488	44	52	3	52	34.5	37.0	10.24
	2	14016	42	46	3	46	30.5	32.0	9.14		2	14253	44	52	3	52	34.9	37.0	10.08
	3	13994	42	46	3	46	30.6	32.0	9.08		3	14224	44	52	4	52	35.0	37.0	9.95
	4	14087	42	46	3	46	30.6	32.0	9.08		4	14214	44	52	2	52	34.9	37.0	9.95
	5	14104	42	46	2	46	30.7	32.0	9.04		5	14209	44	52	3	52	35.0	37.0	9.98
	6	14179	42	46	4	46	30.9	33.0	9.03		6	14272	44	52	3	52	35.0	37.0	9.90
	7	14129	42	46	3	46	30.8	33.0	9.06		7	14251	44	52	4	52	35.1	37.0	9.93
	8	14039	42	46	4	46	30.7	33.0	9.04		8	14260	44	52	3	52	35.1	38.0	9.85
9	13866	42	46	2	46	30.8	33.0	9.06	9	14281	44	52	4	52	35.1	37.0	9.88		
Reading 5	0	128933	44	52	1	52	35.6	38.0	8.79	Reading 6	0	128921	44	52	2	52	35.7	38.0	9.72
	1	14603	44	52	4	52	35.2	37.0	9.12		1	14606	44	52	3	52	35.4	38.0	9.90
	2	14314	44	52	1	52	35.6	38.0	8.83		2	14325	44	52	3	52	35.8	38.0	9.72
	3	14295	44	52	2	52	35.5	38.0	8.84		3	14338	44	52	4	52	35.7	38.0	9.71
	4	14283	44	52	4	52	35.7	38.0	8.75		4	14261	44	52	3	52	35.6	38.0	9.79
	5	14332	44	52	3	52	35.6	38.0	8.85		5	14270	44	52	2	52	35.7	38.0	9.76
	6	14258	44	52	4	52	35.9	38.0	8.65		6	14303	44	52	4	52	35.8	38.0	9.70
	7	14276	44	52	4	52	35.8	38.0	8.71		7	14298	44	52	3	52	35.7	38.0	9.70
	8	14287	44	52	5	52	35.8	38.0	8.67		8	14256	44	52	2	52	35.8	38.0	9.57
9	14285	44	52	4	52	35.8	38.0	8.67	9	14264	44	52	3	52	35.9	38.0	9.59		
Reading 7	0	130376	44	52	0	52	34.8	37.0	9.48	Reading 8	0	132906	44	52	1	52	34.6	36.0	8.89
	1	14736	44	52	4	52	34.4	36.0	9.72		1	15046	44	52	2	52	34.2	36.0	9.13
	2	14455	44	52	4	52	34.8	37.0	9.43		2	14720	44	52	3	52	34.6	36.0	8.87
	3	14472	44	52	1	52	34.9	37.0	9.45		3	14767	44	52	4	52	34.6	36.0	8.93
	4	14428	44	52	3	52	34.8	37.0	9.49		4	14807	44	52	1	52	34.5	36.0	8.86
	5	14425	44	52	2	52	34.8	37.0	9.46		5	14722	44	52	3	52	34.6	36.0	8.84
	6	14453	44	52	0	52	34.8	37.0	9.40		6	14731	44	52	3	52	34.7	36.0	8.95
	7	14502	44	52	3	52	34.9	37.0	9.44		7	14718	44	52	4	52	34.7	36.0	8.77
	8	14441	44	52	2	52	35.0	37.0	9.46		8	14721	44	52	4	52	34.8	36.0	8.74
9	14464	44	52	4	52	34.9	37.0	9.48	9	14674	44	52	3	52	34.8	36.0	8.87		
Reading 11	0	133291	44	52	2	52	35.3	37.0	9.38										
	1	15036	44	52	3	52	35.0	37.0	9.62										
	2	14782	44	52	5	52	35.2	37.0	9.36										
	3	14803	44	52	4	52	35.3	37.0	9.33										
	4	14787	44	52	4	52	35.2	37.0	9.35										
	5	14829	44	52	4	52	35.3	37.0	9.38										
	6	14765	44	52	5	52	35.4	37.0	9.31										
	7	14811	44	52	2	52	35.2	37.0	9.33										
	8	14730	44	52	3	52	35.4	37.0	9.31										
9	14748	44	52	3	52	35.3	37.0	9.38											

Appendix H: Mean Raw Scores by Form

	Form	N	L	Pts	Min	Max	Mean	Med	SD		Form	N	L	Pts	Min	Max	Mean	Med	SD	
<b>Science 4</b>	0	128565	63	68	3	68	48.6	51.0	12.22	<b>Science 8</b>	0	132452	63	68	4	68	42.6	45.0	13.74	
	1	11089	63	68	6	68	47.9	51.0	12.53		1	11462	63	68	4	68	41.8	44.0	14.09	
	2	10682	63	68	7	68	48.7	51.0	12.29		2	11009	63	68	4	68	42.5	44.0	13.78	
	3	10725	63	68	6	68	48.6	51.0	12.26		3	11054	63	68	4	68	42.6	45.0	13.76	
	4	10709	63	68	8	68	48.6	51.0	12.18		4	11013	63	68	4	67	43.0	45.0	13.63	
	5	10699	63	68	8	68	48.6	51.0	12.34		5	11038	63	68	6	68	42.8	45.0	13.65	
	6	10675	63	68	6	68	48.7	51.0	12.26		6	10979	63	68	6	68	42.5	45.0	13.58	
	7	10627	63	68	8	68	48.7	51.0	12.13		7	10989	63	68	6	68	42.8	45.0	13.74	
	8	10652	63	68	7	68	48.8	51.0	11.98		8	10980	63	68	5	68	42.8	45.0	13.73	
	9	10665	63	68	7	68	48.9	52.0	12.21		9	10969	63	68	4	68	42.7	45.0	13.60	
	10	10648	63	68	8	68	48.8	51.0	12.07		10	10961	63	68	6	68	42.6	45.0	13.64	
	11	10681	63	68	7	68	48.8	52.0	12.10		11	11010	63	68	7	68	42.6	45.0	13.79	
12	10713	63	68	3	68	48.6	51.0	12.18	12	10988	63	68	5	68	42.6	45.0	13.78			
<b>Science 11</b>	0	129926	59	74	3	74	39.5	41.0	13.02											
	1	16323	59	74	4	70	39.4	41.0	13.04											
	2	16283	59	74	3	70	39.4	41.0	13.05											
	3	16210	59	74	3	72	39.4	41.0	12.95											
	4	16382	59	74	3	72	39.5	41.0	13.07											
	5	16410	59	74	4	72	39.5	41.0	13.01											
	6	16427	59	74	5	70	39.6	41.0	13.05											
	7	15959	59	74	4	70	39.5	41.0	12.95											
	8	15932	59	74	4	74	39.5	41.0	13.01											

Appendix H: Mean Raw Scores by Form

	Form	N	L	Pts	Min	Max	Mean	Med	SD		Form	N	L	Pts	Min	Max	Mean	Med	SD	
<b>Writing 5</b>	0	128201	16	100	22	100	65.4	66.0	14.55	<b>Writing 8</b>	0	131780	16	100	22	100	68.4	73.0	14.90	
	1	21507	16	100	22	100	65.3	66.0	14.74		1	21991	16	100	22	100	68.3	73.0	14.86	
	2	21368	16	100	22	100	65.4	66.0	14.56		2	21979	16	100	22	100	68.4	73.0	15.01	
	3	21384	16	100	22	100	65.4	66.0	14.53		3	22040	16	100	22	100	68.4	73.0	14.80	
	4	21365	16	100	22	100	65.4	66.0	14.50		4	22027	16	100	22	100	68.4	73.0	14.90	
	5	21334	16	100	22	100	65.6	66.0	14.49		5	21983	16	100	22	100	68.3	73.0	14.91	
	6	21243	16	100	22	100	65.4	66.0	14.49		6	21760	16	100	22	100	68.4	73.0	14.91	
<b>Writing 11</b>	0	130352	16	100	22	100	69.6	75.0	14.35											
	1	21816	16	100	22	100	69.5	74.0	14.29											
	2	21801	16	100	22	100	69.6	75.0	14.47											
	3	21824	16	100	22	100	69.5	74.0	14.34											
	4	21708	16	100	22	100	69.7	75.0	14.31											
	5	21723	16	100	22	100	69.8	75.0	14.33											
	6	21480	16	100	22	100	69.5	74.0	14.33											

## Appendix I:

### Item Statistics

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<b>Column Heading</b>	<b>Definition</b>
Form	Form
Seq	Sequence
Std	Standard
DOK	Depth of knowledge
N	N
PVal	P-Value
P()	Proportion selecting given response (=-blank)
PtBis	Point biserial
PT()	Point biserial of response
Meas	Rasch item measure
MeasSE	Rasch item measure item difficulty
t	t fit statistic
MS	Mean square fit statistic
M/F	Male/female DIF statistic
W/B	White/black DIF statistic

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## Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Math	3	557327	1	0	1	E.1.1.1	2	126675	0.95	0.00	0.03	0.95	0.01	0.00	0.33	-0.15	-0.29	0.33	-0.14	-0.8434	0.0143	-2.7	1.0	-2.2	1.0		
Math	3	550251	2	0	2	C.2.1.2	1	126675	0.96	0.01	0.03	0.01	0.96	0.00	0.27	-0.17	-0.18	-0.17	0.27	-0.9649	0.0150	2.8	1.0	3.1	1.1		
Math	3	549494	3	0	3	B.1.1.3	2	126675	0.88	0.08	0.02	0.88	0.03	0.00	0.36	-0.28	-0.24	0.36	-0.23	0.4427	0.0094	6.3	1.0	-2.3	1.0		
Math	3	550641	4	0	4	A.3.1.2	2	126675	0.82	0.14	0.02	0.82	0.02	0.00	0.54	-0.53	-0.28	0.54	-0.22	0.9853	0.0082	-9.9	0.9	-9.9	0.7		
Math	3	550612	5	0	5	A.1.3.1	1	126675	0.89	0.04	0.04	0.89	0.03	0.00	0.44	-0.33	-0.30	0.44	-0.27	0.2587	0.0099	-7.4	1.0	-8.9	0.9		
Math	3	550670	6	0	6	B.1.2.2	2	126675	0.85	0.06	0.85	0.07	0.02	0.00	0.43	-0.33	0.43	-0.33	-0.26	0.6748	0.0088	-4.4	1.0	-4.9	1.0		
Math	3	550720	7	0	7	D.2.2.1	2	126675	0.87	0.10	0.87	0.01	0.01	0.01	0.23	-0.17	0.23	-0.20	-0.15	0.5366	0.0091	9.9	1.2	9.9	1.7		
Math	3	557195	8	0	8	A.1.2.1	1	126675	0.88	0.04	0.03	0.88	0.05	0.00	0.44	-0.22	-0.30	0.44	-0.39	0.3744	0.0096	-6.1	1.0	-9.9	0.8		
Math	3	550681	9	0	9	C.1.1.1	1	126675	0.85	0.11	0.85	0.04	0.00	0.00	0.29	-0.24	0.29	-0.20	-0.09	0.7230	0.0087	9.9	1.1	9.9	1.1		
Math	3	557181	10	0	10	A.1.1.3	1	126675	0.90	0.02	0.04	0.90	0.03	0.00	0.39	-0.28	-0.29	0.39	-0.22	0.0817	0.0104	-1.5	1.0	-6.7	0.9		
Math	3	557229	11	0	11	A.2.1.3	1	126675	0.72	0.08	0.06	0.72	0.14	0.00	0.51	-0.45	-0.30	0.51	-0.46	1.7611	0.0070	-9.9	0.9	-9.9	0.8		
Math	3	550271	12	0	12	E.1.2.1	2	126675	0.88	0.88	0.02	0.03	0.07	0.00	0.43	0.43	-0.20	-0.29	-0.36	0.4333	0.0094	-4.6	1.0	-9.9	0.8		
Math	3	550525	13	0	13	A.1.1.5	1	126675	0.93	0.05	0.00	0.93	0.01	0.00	0.31	-0.19	-0.15	0.31	-0.31	-0.4048	0.0122	2.4	1.0	9.9	1.4		
Math	3	557246	14	0	14	A.3.1.3	2	126675	0.96	0.03	0.01	0.01	0.96	0.00	0.28	-0.17	-0.22	-0.18	0.28	-0.8976	0.0146	0.0	1.0	9.9	1.4		
Math	3	550702	15	0	15	D.1.1.1	2	126675	0.88	0.00	0.07	0.88	0.03	0.01	0.47	-0.18	-0.39	0.47	-0.37	0.3789	0.0095	-9.9	0.9	-9.9	0.8		
Math	3	557764	16	0	16	B.1.1.1	1	126675	0.67	0.11	0.67	0.04	0.18	0.00	0.40	-0.21	0.40	-0.45	-0.39	2.0633	0.0067	8.4	1.0	7.9	1.0		
Math	3	550590	17	0	17	A.1.1.4	1	126675	0.92	0.92	0.03	0.02	0.02	0.00	0.46	0.46	-0.37	-0.25	-0.29	-0.2382	0.0116	-9.9	0.9	-9.9	0.8		
Math	3	550217	18	0	18	A.1.2.2	1	126675	0.95	0.01	0.95	0.03	0.01	0.00	0.45	-0.13	0.45	-0.37	-0.32	-0.6537	0.0134	-9.9	0.9	-9.9	0.6		
Math	3	549477	19	0	19	A.2.1.2	2	126675	0.83	0.05	0.07	0.83	0.05	0.00	0.44	-0.27	-0.33	0.44	-0.36	0.9146	0.0083	-4.6	1.0	-9.9	0.9		
Math	3	550707	20	0	20	D.1.1.2	2	126675	0.80	0.80	0.04	0.10	0.06	0.00	0.58	0.58	-0.37	-0.47	-0.53	1.1141	0.0079	-9.9	0.8	-9.9	0.6		
Math	3	550715	21	0	21	D.2.1.2	2	126675	0.93	0.02	0.01	0.04	0.93	0.00	0.40	-0.29	-0.26	-0.27	0.40	-0.4072	0.0123	-5.7	1.0	-9.9	0.8		
Math	3	550561	22	0	22	C.1.1.2	1	126675	0.92	0.00	0.01	0.06	0.92	0.00	0.32	-0.18	-0.16	-0.27	0.32	-0.2323	0.0115	5.2	1.0	2.1	1.0		
Math	3	550673	23	0	23	B.2.1.1	1	126675	0.88	0.03	0.88	0.03	0.07	0.00	0.41	-0.22	0.41	-0.28	-0.33	0.4265	0.0094	-1.6	1.0	-4.7	0.9		
Math	3	550738	24	0	24	E.1.2.1	2	126675	0.97	0.01	0.01	0.01	0.97	0.00	0.38	-0.28	-0.22	-0.20	0.38	-1.3318	0.0173	-6.8	0.9	-9.9	0.7		
Math	3	550211	27	0	52	E.1.1.2	2	126675	0.98	0.01	0.01	0.98	0.01	0.00	0.30	-0.23	-0.16	0.30	-0.17	-1.7574	0.0207	-3.2	0.9	-5.4	0.8		
Math	3	550482	28	0	53	A.1.1.3	1	126675	0.93	0.03	0.02	0.02	0.93	0.00	0.40	-0.25	-0.25	-0.30	0.40	-0.2532	0.0116	-4.4	1.0	-9.9	0.8		
Math	3	557763	29	0	54	A.2.1.1	1	126675	0.81	0.81	0.08	0.05	0.05	0.00	0.48	0.48	-0.32	-0.24	-0.55	1.0338	0.0081	-9.9	0.9	-9.9	0.9		
Math	3	550697	30	0	55	C.2.1.2	1	126675	0.89	0.03	0.02	0.06	0.89	0.00	0.44	-0.30	-0.19	-0.37	0.44	0.2148	0.0100	-6.9	1.0	-9.9	0.8		
Math	3	557273	31	0	56	B.2.1.1	1	126675	0.87	0.02	0.87	0.04	0.07	0.00	0.40	-0.24	0.40	-0.28	-0.31	0.5037	0.0092	1.3	1.0	-2.0	1.0		
Math	3	550618	32	0	57	A.1.3.2	1	126675	0.83	0.01	0.83	0.05	0.11	0.00	0.43	-0.18	0.43	-0.50	-0.27	0.8736	0.0084	-3.9	1.0	1.8	1.0		
Math	3	550575	33	0	58	A.1.1.1	1	126675	0.91	0.03	0.91	0.02	0.04	0.00	0.37	-0.32	0.37	-0.17	-0.23	-0.0081	0.0107	-0.2	1.0	-0.2	1.0		
Math	3	550639	34	0	59	A.3.1.1	1	126675	0.93	0.01	0.04	0.93	0.01	0.01	0.32	-0.18	-0.26	0.32	-0.23	-0.3127	0.0119	2.7	1.0	9.6	1.2		
Math	3	557344	35	0	60	E.1.2.2	2	126675	0.93	0.93	0.01	0.04	0.02	0.00	0.34	0.34	-0.23	-0.20	-0.30	-0.3435	0.0120	-0.5	1.0	7.5	1.2		
Math	3	557257	36	0	61	B.1.1.1	1	126675	0.93	0.01	0.93	0.03	0.02	0.00	0.38	-0.13	0.38	-0.32	-0.24	-0.3736	0.0121	-3.1	1.0	-9.9	0.8		
Math	3	557184	37	0	62	A.1.1.4	1	126675	0.89	0.01	0.09	0.01	0.89	0.00	0.44	-0.29	-0.38	-0.25	0.44	0.2833	0.0098	-7.8	1.0	-7.1	0.9		
Math	3	557968	38	0	63	D.2.2.2	1	126675	0.98	0.98	0.01	0.00	0.00	0.00	0.22	0.22	-0.16	-0.13	-0.13	-1.5216	0.0187	0.4	1.0	1.9	1.1		
Math	3	549474	39	0	96	E.1.2.2	2	126675	0.98	0.98	0.00	0.00	0.01	0.00	0.29	0.29	-0.16	-0.16	-0.20	-1.9549	0.0225	-3.0	0.9	-3.3	0.9		
Math	3	557224	40	0	97	A.2.1.2	1	126675	0.93	0.01	0.03	0.03	0.93	0.00	0.37	-0.24	-0.25	-0.25	0.37	-0.3254	0.0119	-1.0	1.0	-9.9	0.8		
Math	3	557207	41	0	98	A.1.3.1	1	126675	0.88	0.02	0.08	0.02	0.88	0.00	0.40	-0.19	-0.33	-0.30	0.40	0.4435	0.0094	-0.2	1.0	2.1	1.0		
Math	3	550476	42	0	99	C.2.1.1	1	126675	0.96	0.00	0.04	0.00	0.96	0.00	0.28	-0.14	-0.24	-0.12	0.28	-0.9656	0.0150	2.5	1.0	0.5	1.0		
Math	3	550734	43	0	100	E.1.1.2	2	126675	0.97	0.00	0.01	0.97	0.02	0.00	0.36	-0.12	-0.22	0.36	-0.30	-1.2138	0.0165	-6.0	0.9	-6.5	0.8		
Math	3	550461	44	0	101	B.1.1.3	2	126675	0.75	0.03	0.75	0.05	0.17	0.00	0.29	-0.30	0.29	-0.24	-0.20	1.5381	0.0073	9.9	1.2	9.9	1.2		
Math	3	557248	45	0	102	A.3.1.3	2	126675	0.86	0.05	0.86	0.02	0.07	0.00	0.49	-0.23	0.49	-0.38	-0.47	0.6329	0.0089	-9.9	0.9	-9.9	0.8		
Math	3	557765	46	0	103	C.1.1.2	1	126675	0.91	0.04	0.03	0.02	0.91	0.00	0.31	-0.22	-0.16	-0.24	0.31	0.0118	0.0107	9.1	1.1	8.2	1.1		
Math	3	550710	47	0	104	D.2.1.1	2	126675	0.89	0.89	0.07	0.02	0.01	0.00	0.38	0.38	-0.27	-0.28	-0.26	0.2460	0.0099	2.6	1.0	-5.9	0.9		
Math	3	557192	48	0	105	A.1.1.5	1	126675	0.95	0.01	0.02	0.02	0.95	0.00	0.43	-0.19	-0.35	-0.28	0.43	-0.7708	0.0140	-9.9	0.9	-9.9	0.6		
Math	3	550621	49	0	106	A.1.3.3	2	126675	0.69	0.08	0.14	0.09	0.69	0.00	0.46	-0.26	-0.41	-0.47	0.46	1.9347	0.0068	-9.9	0.9	-9.9	0.9		
Math	3	550508	50	0	107	B.1.1.2	2	126675	0.63	0.63	0.16	0.09	0.12	0.00	0.35	0.35	-0.32	-0.27	-0.28	2.2647	0.0066	9.9	1.1	9.9	1.1		
Math	3	557241	51	0	108	A.3.1.2	2	126675	0.89	0.05	0.04	0.89	0.02	0.00	0.53	-0.44	-0.34	0.53	-0.34	0.2667	0.0099	-9.9	0.9	-9.9	0.6		
Math	3	557337	52	0	109	E.1.1.2	2	126675	0.91	0.03	0.01	0.91	0.05	0.00	0.43	-0.39	-0.25	0.43	-0.27	0.0454	0.0106	-7.9	0.9	-9.7	0.9		
Math	3	550497	53	0	110	A.1.2.1	1	126675	0.85	0.85	0.09	0.05	0.01	0.00	0.35	0.35	-0.19	-0.									

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Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Math	3	550208	54	0	111	A.3.2.1	1	126675	0.83	0.10	0.83	0.04	0.02	0.00	0.39	-0.28	0.39	-0.29	-0.32	0.9172	0.0083	6.4	1.0	5.2	1.1		
Math	3	550528	55	0	112	A.1.1.2	1	126675	0.88	0.88	0.04	0.04	0.04	0.01	0.41	0.41	-0.27	-0.28	-0.30	0.3665	0.0096	-0.7	1.0	-9.9	0.8		
Math	3	550674	56	0	113	B.2.1.1	1	126675	0.94	0.00	0.01	0.94	0.05	0.00	0.29	-0.13	-0.13	0.29	-0.25	-0.5909	0.0131	5.1	1.1	-1.1	1.0		
Math	3	557202	57	0	114	A.1.2.2	1	126675	0.87	0.02	0.87	0.09	0.02	0.00	0.43	-0.13	0.43	-0.41	-0.26	0.4873	0.0093	-4.2	1.0	-9.5	0.9		
Math	3	550462	58	0	115	B.1.2.1	2	126675	0.67	0.25	0.03	0.67	0.06	0.01	0.21	-0.16	-0.32	0.21	-0.13	2.0695	0.0067	9.9	1.3	9.9	1.5		
Math	3	557279	59	0	116	C.1.1.1	1	126675	0.83	0.15	0.83	0.02	0.01	0.01	0.36	-0.31	0.36	-0.24	-0.25	0.9306	0.0083	9.9	1.1	0.7	1.0		
Math	3	550275	60	0	117	E.1.1.1	2	126675	0.97	0.01	0.97	0.01	0.00	0.00	0.28	-0.20	0.28	-0.17	-0.14	-1.4688	0.0183	-0.5	1.0	-3.2	0.9		
Math	3	557307	61	0	118	D.1.1.2	2	126675	0.78	0.04	0.07	0.78	0.12	0.00	0.42	-0.39	-0.38	0.42	-0.26	1.2956	0.0076	1.2	1.0	2.0	1.0		
Math	3	557228	62	0	119	A.2.1.3	1	126675	0.79	0.05	0.06	0.10	0.79	0.00	0.46	-0.45	-0.40	-0.27	0.46	1.2180	0.0077	-9.5	1.0	-6.2	1.0		
Math	3	593893	64	1	64	E.1.1.1	2	14197	0.95	0.04	0.95	0.01	0.00	0.00	0.34	-0.30	0.34	-0.15	-0.17	-0.8337	0.0414	-1.8	0.9	0.4	1.0	A-	C-
Math	3	592506	65	1	65	A.3.1.3	1	14197	0.96	0.02	0.01	0.96	0.01	0.00	0.26	-0.19	-0.16	0.26	-0.12	-1.1960	0.0475	0.0	1.0	2.0	1.2	A+	A-
Math	3	567132	66	1	66	B.1.2.1	1	14197	0.73	0.05	0.73	0.02	0.19	0.00	0.22	-0.17	0.22	-0.30	-0.14	1.5615	0.0214	9.9	1.3	9.9	1.4	A-	A-
Math	3	565067	67	1	67	D.1.1.1	2	14197	0.91	0.03	0.02	0.04	0.91	0.00	0.40	-0.27	-0.26	-0.27	0.40	-0.0855	0.0321	-1.0	1.0	-4.7	0.8	A-	A-
Math	3	550501	68	1	68	B.1.1.1	1	14197	0.92	0.06	0.01	0.01	0.92	0.00	0.41	-0.34	-0.24	-0.24	0.41	-0.1817	0.0331	-1.2	1.0	-3.0	0.9		
Math	3	592503	69	1	69	A.1.2.1	1	14197	0.92	0.02	0.92	0.01	0.04	0.00	0.43	-0.20	0.43	-0.23	-0.40	-0.2700	0.0340	-3.3	0.9	-5.9	0.7	A+	B-
Math	3	566598	70	1	70	A.2.1.3	2	14197	0.79	0.79	0.06	0.07	0.08	0.00	0.27	0.27	-0.27	-0.10	-0.23	1.1829	0.0229	9.9	1.2	7.4	1.2	A+	A-
Math	3	566617	71	1	71	A.1.1.2	2	14197	0.74	0.08	0.74	0.14	0.03	0.00	0.49	-0.48	0.49	-0.35	-0.38	1.4975	0.0216	-6.7	0.9	-8.3	0.8	A-	A-
Math	3	592812	72	1	72	E.1.2.1	2	14197	0.95	0.02	0.01	0.01	0.95	0.00	0.44	-0.27	-0.27	-0.33	0.44	-0.9174	0.0427	-4.9	0.8	-4.4	0.7	A+	B-
Math	3	593891	73	1	73	C.2.1.1	1	14197	0.97	0.01	0.97	0.01	0.00	0.00	0.24	-0.14	0.24	-0.16	-0.16	-1.5766	0.0554	-0.4	1.0	0.2	1.0	A+	A-
Math	3	566602	74	1	74	B.2.1.1	1	14197	0.90	0.03	0.90	0.03	0.03	0.00	0.38	-0.28	0.38	-0.20	-0.29	0.0949	0.0303	0.2	1.0	-3.3	0.9	A-	C-
Math	3	557250	75	1	75	A.3.2.1	2	14197	0.74	0.05	0.15	0.74	0.04	0.01	0.52	-0.40	-0.45	0.52	-0.41	1.4834	0.0216	-9.9	0.9	-9.9	0.8		
Math	3	565060	77	2	64	A.1.1.1	1	14024	0.94	0.94	0.02	0.01	0.03	0.00	0.41	0.41	-0.25	-0.29	-0.28	-0.4779	0.0375	-2.9	0.9	-4.2	0.8	A-	B-
Math	3	567126	78	2	65	A.3.2.1	2	14024	0.69	0.19	0.69	0.08	0.03	0.00	0.48	-0.42	0.48	-0.36	-0.51	1.8532	0.0207	-7.4	0.9	-7.3	0.9	A-	A-
Math	3	567123	79	2	66	A.1.2.1	1	14024	0.85	0.09	0.04	0.85	0.02	0.00	0.45	-0.33	-0.43	0.45	-0.21	0.6906	0.0262	-2.8	1.0	-3.9	0.9	A+	A-
Math	3	565605	80	2	67	A.2.1.2	1	14024	0.86	0.86	0.03	0.07	0.03	0.01	0.37	0.37	-0.24	-0.28	-0.26	0.5593	0.0271	2.1	1.0	1.9	1.1	A+	A-
Math	3	557329	81	2	68	E.1.1.1	2	14024	0.96	0.02	0.01	0.00	0.96	0.00	0.20	-0.11	-0.15	-0.15	0.20	-0.9689	0.0449	2.1	1.1	7.1	1.7		
Math	3	593887	82	2	69	B.1.1.2	2	14024	0.61	0.04	0.61	0.04	0.31	0.00	0.35	-0.35	0.35	-0.34	-0.29	2.3473	0.0196	6.1	1.1	8.8	1.1	B-	A-
Math	3	566601	83	2	70	B.2.1.1	1	14024	0.80	0.02	0.10	0.08	0.80	0.00	0.39	-0.33	-0.31	-0.27	0.39	1.1452	0.0235	2.6	1.0	0.3	1.0	A-	B-
Math	3	565609	84	2	71	D.1.1.2	2	14024	0.84	0.03	0.84	0.09	0.04	0.00	0.38	-0.30	0.38	-0.21	-0.35	0.7697	0.0257	2.0	1.0	1.8	1.1	A-	A-
Math	3	567135	85	2	72	C.1.1.2	1	14024	0.89	0.02	0.01	0.89	0.09	0.00	0.20	-0.19	-0.17	0.20	-0.11	0.3166	0.0290	9.4	1.2	9.9	1.5	A+	A-
Math	3	550636	86	2	73	A.3.1.1	1	14024	0.83	0.83	0.09	0.04	0.04	0.00	0.46	0.46	-0.34	-0.28	-0.43	0.8685	0.0250	-3.4	1.0	-4.0	0.9		
Math	3	593560	87	2	74	D.2.2.2	1	14024	0.49	0.35	0.49	0.04	0.12	0.00	0.39	-0.42	0.39	-0.24	-0.31	2.9873	0.0191	-2.8	1.0	3.5	1.1	A+	A-
Math	3	592515	88	2	75	E.1.2.1	2	14024	0.94	0.03	0.01	0.02	0.94	0.00	0.43	-0.31	-0.30	-0.24	0.43	-0.4823	0.0375	-4.1	0.9	-4.8	0.7	A+	B-
Math	3	567142	90	3	64	E.1.2.2	2	14001	0.92	0.04	0.02	0.02	0.92	0.00	0.42	-0.20	-0.34	-0.38	0.42	-0.1081	0.0332	-3.2	0.9	0.5	1.0	A+	B-
Math	3	565063	91	3	65	A.2.1.1	1	14001	0.86	0.01	0.07	0.86	0.07	0.00	0.51	-0.34	-0.33	0.51	-0.47	0.6211	0.0268	-6.5	0.9	-8.7	0.7	A-	A-
Math	3	550484	92	3	66	A.3.1.2	2	14001	0.89	0.09	0.89	0.01	0.01	0.01	0.51	-0.48	0.51	-0.22	-0.30	0.3176	0.0292	-6.8	0.9	-9.9	0.6		
Math	3	566632	93	3	67	A.1.1.4	1	14001	0.94	0.02	0.02	0.01	0.94	0.01	0.45	-0.30	-0.35	-0.27	0.45	-0.5981	0.0392	-4.7	0.9	-4.2	0.8	A-	C-
Math	3	567125	94	3	68	A.1.3.1	2	14001	0.92	0.01	0.02	0.92	0.05	0.00	0.45	-0.32	-0.30	0.45	-0.33	-0.1676	0.0339	-4.0	0.9	-6.3	0.7	A-	A-
Math	3	566619	95	3	69	D.1.1.2	2	14001	0.90	0.02	0.04	0.90	0.04	0.00	0.54	-0.35	-0.42	0.54	-0.39	0.1806	0.0304	-8.5	0.8	-9.9	0.6	A-	A-
Math	3	567127	96	3	70	A.3.2.1	2	14001	0.71	0.14	0.71	0.11	0.04	0.00	0.48	-0.45	0.48	-0.32	-0.44	1.7401	0.0212	-6.7	0.9	-6.0	0.9	A-	A-
Math	3	567134	97	3	71	C.1.1.2	1	14001	0.96	0.01	0.02	0.01	0.96	0.00	0.33	-0.22	-0.21	-0.19	0.33	-1.1087	0.0474	-1.2	1.0	-2.8	0.8	A-	C-
Math	3	592803	98	3	72	B.1.1.3	1	14001	0.89	0.04	0.02	0.89	0.05	0.00	0.38	-0.29	-0.25	0.38	-0.24	0.2727	0.0296	1.0	1.0	-1.1	1.0	A+	A-
Math	3	566638	99	3	73	D.2.2.1	1	14001	0.92	0.03	0.92	0.03	0.01	0.00	0.44	-0.32	0.44	-0.30	-0.30	-0.1676	0.0339	-3.4	0.9	-6.7	0.7	A-	A-
Math	3	550736	100	3	74	E.1.1.2	2	14001	0.71	0.10	0.71	0.05	0.14	0.00	0.52	-0.33	0.52	-0.31	-0.56	1.8178	0.0209	-9.9	0.9	-8.5	0.9		
Math	3	593558	101	3	75	B.2.2.1	2	14001	0.93	0.02	0.93	0.02	0.03	0.00	0.38	-0.22	0.38	-0.32	-0.21	-0.3413	0.0359	-1.3	1.0	-3.4	0.8	A+	C-
Math	3	592811	103	4	64	E.1.2.1	2	14094	0.98	0.01	0.01	0.01	0.98	0.00	0.32	-0.26	-0.18	-0.13	0.32	-1.5637	0.0571	-1.8	0.9	-1.3	0.9	A+	B-
Math	3	567129	104	4	65	B.1.1.1	1	14094	0.89	0.06	0.03	0.89	0.03	0.00	0.48	-0.31	-0.37	0.48	-0.38	0.3202	0.0291	-5.4	0.9	-7.7	0.7	A-	A-
Math	3	565064	105	4	66	A.2.1.1	1	14094	0.84	0.03	0.84	0.04	0.09	0.00	0.45	-0.37	0.45	-0.40	-0.29	0.8422	0.0253	-2.8	1.0	-4.6	0.9	A-	A-
Math	3	592505	106	4	67	A.3.1.3	2	14094	0.88	0.05	0.88	0.04	0.02	0.01	0.44	-0.22	0.44	-0.40	-0.35	0.4263	0.0282	-2.9	1.0	-3.0	0.9	A-	B-
Math	3	593885	107	4	68	A.1.3.2	2	14094	0.85	0.07	0.04	0.04	0.85	0.00	0.56	-0.51	-0.41	-0.29	0.56	0.7063	0.0262	-9.9	0.8	-9.9	0.6	A-	A-
Math	3	592509	108	4	69	D.2.1.2	2	14094	0.94	0.02	0.94	0.04															

## Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Math	3	567137	109	4	70	C.1.1.2	1	14094	0.93	0.00	0.01	0.06	0.93	0.00	0.34	-0.18	-0.19	-0.29	0.34	-0.3321	0.0358	0.0	1.0	-1.0	0.9	A-	B-
Math	3	566603	110	4	71	E.1.1.2	2	14094	0.85	0.02	0.85	0.04	0.07	0.01	0.54	-0.18	0.54	-0.40	-0.53	0.6688	0.0264	-9.9	0.8	-9.9	0.7	A-	C-
Math	3	565602	111	4	72	A.2.1.2	1	14094	0.87	0.08	0.87	0.01	0.03	0.00	0.40	-0.31	0.40	-0.21	-0.31	0.5153	0.0275	0.0	1.0	-3.9	0.9	A+	A-
Math	3	550591	112	4	73	A.1.1.4	1	14094	0.93	0.04	0.02	0.93	0.01	0.00	0.49	-0.37	-0.33	0.49	-0.33	-0.2350	0.0346	-6.1	0.9	-7.8	0.6		
Math	3	549491	113	4	74	D.1.1.2	2	14094	0.81	0.12	0.81	0.02	0.04	0.00	0.44	-0.36	0.44	-0.24	-0.34	1.0574	0.0240	-1.7	1.0	-3.1	0.9		
Math	3	566635	114	4	75	B.2.2.1	2	14094	0.79	0.79	0.12	0.07	0.01	0.01	0.28	0.28	-0.25	-0.12	-0.31	1.2066	0.0233	9.9	1.2	9.9	1.4	A+	C-
Math	3	593892	116	5	64	E.1.1.1	2	14108	0.54	0.54	0.09	0.21	0.16	0.00	0.37	0.37	-0.52	-0.32	-0.27	2.7195	0.0192	5.8	1.1	8.8	1.1	A-	A-
Math	3	567133	117	5	65	B.1.2.1	1	14108	0.96	0.03	0.96	0.01	0.00	0.00	0.31	-0.22	0.31	-0.21	-0.17	-0.9041	0.0443	-0.8	1.0	-1.1	0.9	A+	B-
Math	3	566599	118	5	66	A.2.1.3	2	14108	0.64	0.03	0.01	0.31	0.64	0.00	0.39	-0.50	-0.38	-0.33	0.39	2.2124	0.0198	3.5	1.0	3.1	1.1	A-	A-
Math	3	592809	119	5	67	C.2.1.2	1	14108	0.87	0.04	0.87	0.05	0.04	0.00	0.37	-0.24	0.37	-0.29	-0.24	0.5510	0.0273	1.7	1.0	-1.0	1.0	A-	A-
Math	3	592510	120	5	68	D.2.1.2	2	14108	0.96	0.03	0.96	0.01	0.01	0.00	0.34	-0.25	0.34	-0.21	-0.21	-0.8271	0.0430	-1.6	1.0	-3.3	0.8	A+	A-
Math	3	565601	121	5	69	A.1.1.2	1	14108	0.83	0.06	0.05	0.06	0.83	0.01	0.50	-0.36	-0.42	-0.35	0.50	0.8723	0.0251	-6.8	0.9	-9.9	0.7	A-	A-
Math	3	557340	122	5	70	E.1.2.1	2	14108	0.92	0.04	0.02	0.02	0.92	0.00	0.43	-0.37	-0.26	-0.21	0.43	-0.0762	0.0330	-2.5	0.9	-2.9	0.9		
Math	3	592806	123	5	71	A.1.3.3	2	14108	0.63	0.05	0.63	0.13	0.19	0.00	0.52	-0.31	0.52	-0.49	-0.50	2.2456	0.0198	-9.9	0.9	-9.9	0.8	A-	A-
Math	3	592502	124	5	72	C.1.1.1	1	14108	0.97	0.00	0.01	0.01	0.97	0.00	0.24	-0.13	-0.14	-0.19	0.24	-1.1714	0.0492	0.2	1.0	0.2	1.0	A-	A-
Math	3	566633	125	5	73	A.3.1.1	2	14108	0.90	0.02	0.06	0.90	0.02	0.00	0.36	-0.31	-0.21	0.36	-0.27	0.1755	0.0305	0.0	1.0	1.4	1.1	A+	A-
Math	3	550630	126	5	74	A.2.1.2	1	14108	0.83	0.09	0.83	0.05	0.03	0.00	0.45	-0.33	0.45	-0.33	-0.34	0.9058	0.0249	-2.2	1.0	-6.4	0.8		
Math	3	592805	127	5	75	B.1.1.3	1	14108	0.66	0.11	0.66	0.09	0.14	0.01	0.22	-0.29	0.22	-0.19	-0.07	2.1015	0.0201	9.9	1.3	9.9	1.4	A+	A-
Math	3	592517	129	6	64	E.1.2.2	2	14192	0.90	0.04	0.90	0.04	0.02	0.00	0.42	-0.38	0.42	-0.26	-0.20	0.1348	0.0310	-2.6	0.9	0.1	1.0	A+	B-
Math	3	593894	130	6	65	E.1.1.1	2	14192	0.96	0.03	0.96	0.01	0.00	0.00	0.37	-0.33	0.37	-0.14	-0.16	-0.9681	0.0454	-2.6	0.9	-2.8	0.8	A+	C-
Math	3	566596	131	6	66	A.1.1.3	1	14192	0.91	0.91	0.02	0.07	0.01	0.00	0.42	0.42	-0.22	-0.35	-0.27	0.1084	0.0313	-2.0	1.0	-3.0	0.9	A-	B-
Math	3	592500	132	6	67	A.3.1.2	1	14192	0.91	0.03	0.02	0.91	0.03	0.01	0.42	-0.37	-0.23	0.42	-0.31	0.0024	0.0323	-2.7	0.9	-2.5	0.9	A+	A-
Math	3	566620	133	6	68	B.1.2.2	2	14192	0.94	0.94	0.02	0.03	0.01	0.00	0.44	0.44	-0.34	-0.31	-0.20	-0.5463	0.0389	-4.1	0.9	-6.4	0.6	A+	C-
Math	3	592810	134	6	69	C.2.1.2	1	14192	0.84	0.06	0.84	0.09	0.01	0.00	0.40	-0.34	0.40	-0.30	-0.24	0.8460	0.0254	1.1	1.0	-1.6	1.0	A+	A-
Math	3	566637	135	6	70	B.2.2.1	2	14192	0.84	0.84	0.04	0.04	0.07	0.00	0.35	0.35	-0.28	-0.25	-0.21	0.8008	0.0257	4.9	1.1	2.5	1.1	A-	A-
Math	3	550487	136	6	71	A.1.3.2	2	14192	0.83	0.05	0.07	0.83	0.04	0.00	0.49	-0.38	-0.41	0.49	-0.31	0.9295	0.0249	-6.0	0.9	-6.6	0.8		
Math	3	566640	137	6	72	D.2.2.1	1	14192	0.96	0.01	0.96	0.02	0.01	0.00	0.32	-0.22	0.32	-0.22	-0.16	-0.9342	0.0448	-1.1	1.0	-1.2	0.9	A-	B-
Math	3	550477	138	6	73	C.1.1.2	1	14192	0.93	0.01	0.06	0.93	0.00	0.00	0.35	-0.22	-0.29	0.35	-0.18	-0.3444	0.0362	0.1	1.0	-1.5	0.9		
Math	3	565062	139	6	74	A.2.1.1	1	14192	0.83	0.05	0.83	0.03	0.08	0.00	0.46	-0.37	0.46	-0.44	-0.28	0.9118	0.0250	-3.1	1.0	-3.4	0.9	A+	A-
Math	3	565065	140	6	75	D.1.1.1	2	14192	0.96	0.01	0.01	0.96	0.01	0.00	0.38	-0.22	-0.28	0.38	-0.24	-1.0940	0.0477	-2.7	0.9	-4.6	0.7	A+	C-
Math	3	565066	142	7	64	D.1.1.1	2	14136	0.88	0.02	0.02	0.88	0.08	0.00	0.29	-0.16	-0.14	0.29	-0.24	0.4276	0.0284	5.7	1.1	4.0	1.2	A+	A-
Math	3	565604	143	7	65	A.2.1.2	1	14136	0.88	0.08	0.88	0.02	0.02	0.00	0.38	-0.30	0.38	-0.25	-0.24	0.4658	0.0281	0.6	1.0	-2.8	0.9	A+	A-
Math	3	566600	144	7	66	B.2.1.1	1	14136	0.84	0.02	0.84	0.03	0.11	0.00	0.31	-0.24	0.31	-0.26	-0.21	0.8211	0.0255	6.5	1.1	5.6	1.2	A+	A-
Math	3	592808	145	7	67	C.2.1.2	1	14136	0.96	0.03	0.01	0.01	0.96	0.00	0.39	-0.30	-0.22	-0.20	0.39	-0.8481	0.0435	-2.1	0.9	-7.2	0.6	A+	C-
Math	3	550215	146	7	68	A.1.1.1	1	14136	0.94	0.03	0.02	0.01	0.94	0.00	0.35	-0.22	-0.25	-0.20	0.35	-0.3919	0.0369	-0.1	1.0	-1.0	0.9		
Math	3	592740	147	7	69	D.2.1.1	2	14136	0.56	0.19	0.05	0.56	0.20	0.00	0.36	-0.37	-0.41	0.36	-0.25	2.6242	0.0192	5.2	1.0	7.5	1.1	A-	A-
Math	3	566634	148	7	70	A.3.1.1	1	14136	0.79	0.79	0.13	0.05	0.03	0.00	0.42	0.42	-0.37	-0.31	-0.26	1.2416	0.0231	0.1	1.0	-0.6	1.0	A+	B-
Math	3	567138	149	7	71	D.2.2.2	1	14136	0.94	0.03	0.94	0.02	0.01	0.00	0.36	-0.33	0.36	-0.18	-0.14	-0.4242	0.0373	-1.2	1.0	-0.8	1.0	A-	A-
Math	3	565061	150	7	72	A.1.1.1	1	14136	0.92	0.02	0.05	0.92	0.02	0.00	0.46	-0.36	-0.34	0.46	-0.25	-0.0500	0.0328	-4.5	0.9	-5.7	0.7	A-	B-
Math	3	550466	151	7	73	C.1.1.1	1	14136	0.85	0.09	0.05	0.85	0.01	0.00	0.28	-0.17	-0.26	0.28	-0.19	0.6926	0.0264	7.9	1.1	7.2	1.3		
Math	3	567130	152	7	74	B.1.1.1	1	14136	0.91	0.91	0.02	0.02	0.04	0.00	0.48	0.48	-0.30	-0.36	-0.36	0.0218	0.0321	-5.4	0.9	-9.3	0.6	A-	C-
Math	3	592516	153	7	75	E.1.2.2	2	14136	0.96	0.01	0.96	0.02	0.01	0.00	0.34	-0.29	0.34	-0.18	-0.19	-0.9860	0.0459	-2.1	0.9	-1.3	0.9	A+	C-
Math	3	566604	155	8	64	E.1.1.2	2	14053	0.99	0.00	0.00	0.00	0.99	0.00	0.21	-0.15	-0.14	-0.13	0.21	-2.4487	0.0847	-0.6	1.0	-0.7	0.9	A+	B-
Math	3	592507	156	8	65	C.1.1.1	1	14053	0.87	0.87	0.08	0.05	0.00	0.00	0.21	0.21	-0.22	-0.08	-0.12	0.5286	0.0275	9.9	1.2	7.2	1.3	A+	A+
Math	3	566597	157	8	66	A.2.1.3	2	14053	0.79	0.09	0.05	0.07	0.79	0.00	0.48	-0.44	-0.37	-0.30	0.48	1.2195	0.0232	-5.2	0.9	-4.2	0.9	A-	A-
Math	3	566639	158	8	67	D.2.2.1	1	14053	0.82	0.82	0.11	0.03	0.03	0.00	0.44	0.44	-0.34	-0.34	-0.34	0.9516	0.0247	-1.9	1.0	-5.8	0.8	A-	A-
Math	3	593888	159	8	68	B.1.1.2	2	14053	0.54	0.05	0.54	0.30	0.11	0.00	0.33	-0.43	0.33	-0.28	-0.27	2.7461	0.0192	8.4	1.1	9.9	1.2	B-	A-
Math	3	550532	160	8	69	D.1.1.1	2	14053	0.56	0.12	0.15	0.56	0.16	0.00	0.42	-0.44	-0.30	0.42	-0.43	2.6831	0.0192	-4.9	1.0	-1.0	1.0		
Math	3	593559	161	8	70	A.3.2.1	2	14053	0.73	0.05	0.14	0.73	0.07	0.00	0.43	-0.39	-0.36	0.43	-0.30	1.6355	0.0215	-1.4	1.0	-0.4	1.0	A-	A-
Math	3	593889	162	8	71	C.2.1.1	1	14053	0.99	0.00	0.99	0.00	0.01	0.00	0.20	-0.14	0.20	-0.11	-0.13	-2.2254	0.0766	-0.4	1.0	-0.8	0.9	A+	A-
Math	3	592514	163	8	72	E.1.2.1	2	1405																			

## Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Math	3	550243	164	8	73	B.1.2.2	2	14053	0.91	0.02	0.04	0.91	0.03	0.00	0.40	-0.32	-0.25	0.40	-0.26	0.0297	0.0319	-1.3	1.0	1.5	1.1		
Math	3	566595	165	8	74	A.1.1.3	1	14053	0.88	0.06	0.03	0.03	0.88	0.00	0.46	-0.38	-0.28	-0.30	0.46	0.4585	0.0280	-3.8	0.9	-6.1	0.8	A-	A-
Math	3	592807	166	8	75	A.1.3.3	2	14053	0.55	0.13	0.55	0.20	0.13	0.00	0.42	-0.33	0.42	-0.45	-0.38	2.6946	0.0192	-8.3	0.9	-0.8	1.0	A+	A+
Math	3	593886	168	9	64	A.1.3.2	2	13870	0.74	0.17	0.03	0.07	0.74	0.00	0.48	-0.49	-0.25	-0.31	0.48	1.6387	0.0217	-5.8	0.9	-4.7	0.9	A+	A-
Math	3	566618	169	9	65	B.1.2.2	2	13870	0.87	0.04	0.03	0.87	0.06	0.00	0.44	-0.34	-0.26	0.44	-0.34	0.5145	0.0280	-2.8	1.0	-4.9	0.8	A+	C-
Math	3	565068	170	9	66	E.1.1.2	2	13870	0.86	0.04	0.86	0.01	0.09	0.00	0.56	-0.26	0.56	-0.27	-0.57	0.6593	0.0269	-9.9	0.8	-9.4	0.7	A-	C-
Math	3	567140	171	9	67	D.2.2.2	1	13870	0.56	0.33	0.56	0.05	0.06	0.00	0.44	-0.45	0.44	-0.26	-0.36	2.6723	0.0195	-7.0	1.0	-3.3	1.0	A+	A-
Math	3	565610	172	9	68	D.1.1.2	2	13870	0.78	0.08	0.10	0.78	0.03	0.01	0.45	-0.33	-0.36	0.45	-0.39	1.3332	0.0230	-2.2	1.0	-4.8	0.9	A-	A-
Math	3	593890	173	9	69	C.2.1.1	1	13870	0.94	0.01	0.06	0.00	0.94	0.00	0.35	-0.17	-0.32	-0.09	0.35	-0.3673	0.0369	-0.3	1.0	-2.6	0.9	A+	B-
Math	3	550627	174	9	70	A.2.1.1	1	13870	0.92	0.02	0.92	0.03	0.03	0.00	0.47	-0.33	0.47	-0.20	-0.43	-0.1225	0.0340	-5.1	0.9	-6.7	0.7		
Math	3	567131	175	9	71	B.1.1.1	1	13870	0.86	0.86	0.05	0.04	0.05	0.00	0.51	0.51	-0.37	-0.46	-0.31	0.6233	0.0272	-6.9	0.9	-8.6	0.7	A-	C-
Math	3	592739	176	9	72	A.1.1.5	1	13870	0.92	0.01	0.05	0.92	0.02	0.00	0.45	-0.16	-0.43	0.45	-0.23	-0.0698	0.0334	-4.3	0.9	-4.8	0.8	B-	A-
Math	3	550464	177	9	73	B.2.1.1	1	13870	0.90	0.02	0.90	0.04	0.03	0.00	0.34	-0.13	0.34	-0.22	-0.30	0.1304	0.0314	2.2	1.1	-0.9	1.0		
Math	3	592501	178	9	74	C.1.1.1	1	13870	0.70	0.14	0.08	0.70	0.08	0.00	0.39	-0.29	-0.34	0.39	-0.34	1.8902	0.0209	5.2	1.1	2.4	1.0	A+	A-
Math	3	592499	179	9	75	A.3.1.2	1	13870	0.85	0.07	0.85	0.04	0.03	0.00	0.47	-0.43	0.47	-0.21	-0.37	0.7598	0.0263	-3.9	0.9	-4.3	0.9	A+	A-
Math	4	544287	181	0	1	A.3.2.1	1	126335	0.90	0.06	0.90	0.03	0.02	0.00	0.23	-0.20	0.23	-0.10	-0.11	-1.1662	0.0098	4.6	1.0	9.9	1.3		
Math	4	542312	182	0	2	A.3.2.2	1	126335	0.86	0.11	0.86	0.02	0.01	0.00	0.37	-0.33	0.37	-0.19	-0.15	-0.7488	0.0086	-7.0	1.0	-9.9	0.9		
Math	4	550862	183	0	3	A.3.1.3	2	126335	0.51	0.28	0.51	0.11	0.10	0.00	0.46	-0.48	0.46	-0.39	-0.28	1.3617	0.0063	-9.9	0.9	-9.9	0.9		
Math	4	542428	184	0	4	A.3.1.3	2	126335	0.73	0.11	0.08	0.73	0.08	0.00	0.47	-0.41	-0.33	0.47	-0.30	0.1967	0.0069	-9.9	0.9	-9.9	0.9		
Math	4	542327	185	0	5	E.1.2.1	2	126335	0.79	0.12	0.04	0.05	0.79	0.00	0.48	-0.40	-0.33	-0.30	0.48	-0.1731	0.0074	-9.9	0.9	-9.9	0.8		
Math	4	542409	186	0	6	A.1.1.4	2	126335	0.76	0.07	0.04	0.13	0.76	0.00	0.38	-0.31	-0.26	-0.27	0.38	-0.0093	0.0072	-2.9	1.0	-0.4	1.0		
Math	4	557052	187	0	7	C.1.1.1	1	126335	0.87	0.10	0.87	0.02	0.01	0.00	0.35	-0.32	0.35	-0.17	-0.12	-0.8484	0.0088	-6.5	1.0	-9.9	0.9		
Math	4	557063	188	0	8	C.1.2.1	1	126335	0.47	0.06	0.47	0.39	0.08	0.00	0.34	-0.02	0.34	-0.37	-0.33	1.5692	0.0063	9.9	1.1	9.9	1.1		
Math	4	556967	189	0	9	A.1.3.1	2	126335	0.55	0.20	0.09	0.55	0.16	0.00	0.39	-0.25	-0.33	0.39	-0.43	1.1485	0.0063	7.8	1.0	5.7	1.0		
Math	4	544222	190	0	10	D.1.2.1	1	126335	0.88	0.02	0.07	0.88	0.03	0.00	0.35	-0.23	-0.24	0.35	-0.24	-0.9737	0.0092	-9.0	1.0	-2.0	1.0		
Math	4	557070	191	0	11	C.2.1.1	2	126335	0.70	0.09	0.70	0.15	0.06	0.00	0.41	-0.34	0.41	-0.31	-0.28	0.3440	0.0068	-5.7	1.0	-6.0	1.0		
Math	4	557006	192	0	12	A.3.1.1	1	126335	0.48	0.04	0.11	0.48	0.37	0.00	0.35	-0.29	-0.24	0.35	-0.35	1.5063	0.0063	-9.9	1.0	9.9	1.1		
Math	4	544316	193	0	13	B.2.1.1	1	126335	0.65	0.17	0.02	0.65	0.16	0.00	0.43	-0.34	-0.28	0.43	-0.38	0.6765	0.0065	-9.9	1.0	-9.9	0.9		
Math	4	544077	194	0	14	A.1.1.2	2	126335	0.49	0.46	0.49	0.03	0.02	0.00	0.40	-0.39	0.40	-0.21	-0.26	1.4702	0.0063	0.7	1.0	7.9	1.0		
Math	4	544286	195	0	15	E.3.1.1	2	126335	0.86	0.11	0.02	0.02	0.86	0.00	0.26	-0.20	-0.16	-0.18	0.26	-0.7565	0.0086	6.7	1.0	9.9	1.2		
Math	4	544107	196	0	16	A.2.1.1	2	126335	0.70	0.01	0.07	0.70	0.22	0.00	0.39	-0.22	-0.44	0.39	-0.27	0.3876	0.0067	1.7	1.0	-2.5	1.0		
Math	4	550901	197	0	17	B.1.1.2	1	126335	0.72	0.08	0.03	0.17	0.72	0.00	0.44	-0.28	-0.24	-0.41	0.44	0.2731	0.0068	-9.9	1.0	-9.9	0.9		
Math	4	550967	198	0	18	D.2.2.2	1	126335	0.87	0.87	0.04	0.05	0.03	0.00	0.36	0.36	-0.25	-0.26	-0.19	-0.8962	0.0090	-7.2	1.0	-9.9	0.8		
Math	4	550920	199	0	19	C.1.1.2	1	126335	0.75	0.06	0.75	0.14	0.05	0.00	0.41	-0.32	0.41	-0.31	-0.27	0.0968	0.0070	-8.4	1.0	-8.7	0.9		
Math	4	544190	200	0	20	C.1.2.2	1	126335	0.50	0.50	0.03	0.32	0.15	0.00	0.37	0.37	-0.30	-0.39	-0.23	1.4152	0.0063	9.9	1.0	9.9	1.1		
Math	4	550827	201	0	21	A.1.3.1	1	126335	0.70	0.08	0.70	0.18	0.04	0.00	0.46	-0.35	0.46	-0.39	-0.31	0.3542	0.0067	-9.9	0.9	-9.9	0.9		
Math	4	556995	202	0	22	A.2.1.2	2	126335	0.62	0.12	0.62	0.17	0.09	0.00	0.52	-0.42	0.52	-0.42	-0.48	0.8154	0.0064	-9.9	0.9	-9.9	0.8		
Math	4	544244	203	0	23	E.1.1.1	1	126335	0.93	0.01	0.04	0.93	0.02	0.00	0.35	-0.12	-0.29	0.35	-0.21	-1.6990	0.0118	-9.9	0.9	-9.9	0.7		
Math	4	557097	204	0	24	D.1.2.2	1	126335	0.50	0.06	0.04	0.40	0.50	0.00	0.21	-0.34	-0.33	-0.12	0.21	1.4413	0.0063	9.9	1.2	9.9	1.3		
Math	4	550935	207	0	53	C.2.1.1	1	126335	0.93	0.93	0.03	0.04	0.01	0.00	0.24	0.24	-0.15	-0.19	-0.07	-1.6276	0.0115	0.3	1.0	0.0	1.0		
Math	4	544164	208	0	54	B.1.1.4	1	126335	0.72	0.72	0.15	0.04	0.09	0.00	0.36	0.36	-0.29	-0.19	-0.30	0.2357	0.0069	7.9	1.0	6.4	1.0		
Math	4	542394	209	0	55	A.2.1.2	2	126335	0.53	0.03	0.53	0.36	0.08	0.00	0.31	-0.27	0.31	-0.25	-0.36	1.2574	0.0063	9.9	1.1	9.9	1.1		
Math	4	550970	210	0	56	E.1.1.1	1	126335	0.85	0.05	0.02	0.85	0.08	0.00	0.46	-0.41	-0.21	0.46	-0.31	-0.6982	0.0085	-9.9	0.9	-9.9	0.7		
Math	4	550777	211	0	57	A.1.1.1	1	126335	0.73	0.02	0.21	0.04	0.73	0.00	0.22	-0.15	-0.18	-0.14	0.22	0.1688	0.0069	9.9	1.2	9.9	1.3		
Math	4	556968	212	0	58	A.1.3.1	1	126335	0.51	0.21	0.51	0.14	0.15	0.00	0.44	-0.48	0.44	-0.35	-0.34	1.3935	0.0062	-9.9	1.0	-9.9	1.0		
Math	4	550919	213	0	59	C.1.1.1	1	126335	0.61	0.61	0.24	0.10	0.05	0.00	0.28	0.28	-0.22	-0.24	-0.27	0.8680	0.0064	9.9	1.1	9.9	1.2		
Math	4	550952	214	0	60	D.1.1.2	2	126335	0.80	0.80	0.06	0.04	0.11	0.00	0.30	0.30	-0.26	-0.26	-0.15	-0.2494	0.0075	9.9	1.1	9.9	1.2		
Math	4	556951	215	0	61	A.1.2.1	1	126335	0.62	0.04	0.27	0.07	0.62	0.00	0.36	-0.29	-0.29	-0.30	0.36	0.8023	0.0064	9.9	1.1	9.9	1.1		
Math	4	557767	216	0	62	B.1.1.2	1	126335	0.77	0.10	0.07	0.07	0.77	0.00	0.45	-0.38	-0.31	-0.28	0.45	-0.0708	0.0073	-9.9	0.9	-9.9	0.8		
Math	4	542364	217	0	63	A.1.3.2	2	126335	0.76	0.11	0.09	0.76	0.04	0.00	0.44	-0.39	-0.29	0.44	-0.29	-0.0145	0.0072	-9.9	0.9	-9.9	0.9		
Math	4	544274	218	0	64	E.3.1.1	2	126335	0.62	0.04	0.18																

## Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Math	4	542424	219	0	97	E.1.2.2	2	126335	0.96	0.96	0.01	0.02	0.01	0.00	0.21	0.21	-0.13	-0.12	-0.13	-2.2842	0.0149	-2.3	1.0	4.3	1.1		
Math	4	550803	220	0	98	A.1.1.4	1	126335	0.73	0.05	0.73	0.08	0.14	0.00	0.46	-0.32	0.46	-0.30	-0.40	0.2066	0.0069	-9.9	0.9	-9.9	0.9		
Math	4	544192	221	0	99	C.1.2.1	1	126335	0.57	0.21	0.57	0.06	0.16	0.00	0.26	-0.31	0.26	-0.20	-0.10	1.0848	0.0063	9.9	1.2	9.9	1.2		
Math	4	542463	222	0	100	D.2.1.1	2	126335	0.77	0.77	0.08	0.10	0.05	0.00	0.39	0.39	-0.33	-0.29	-0.21	-0.0528	0.0072	-5.4	1.0	-8.0	0.9		
Math	4	542555	223	0	101	A.1.1.3	1	126335	0.77	0.17	0.77	0.04	0.01	0.00	0.35	-0.27	0.35	-0.32	-0.18	-0.0782	0.0073	3.9	1.0	-1.3	1.0		
Math	4	550838	224	0	102	A.2.1.1	2	126335	0.53	0.17	0.11	0.19	0.53	0.00	0.50	-0.48	-0.58	-0.35	0.50	1.2522	0.0063	-9.9	0.9	-9.9	0.9		
Math	4	557002	225	0	103	A.3.1.1	1	126335	0.57	0.57	0.11	0.16	0.16	0.00	0.38	0.38	-0.25	-0.35	-0.35	1.0560	0.0063	9.9	1.0	9.9	1.0		
Math	4	550912	226	0	104	B.2.1.1	1	126335	0.63	0.13	0.11	0.63	0.13	0.00	0.56	-0.42	-0.49	0.56	-0.51	0.7340	0.0064	-9.9	0.8	-9.9	0.8		
Math	4	544198	227	0	105	C.2.1.1	1	126335	0.79	0.79	0.03	0.02	0.16	0.00	0.29	0.29	-0.24	-0.22	-0.19	-0.1830	0.0074	9.9	1.1	9.9	1.2		
Math	4	557117	228	0	106	E.1.1.1	2	126335	0.85	0.03	0.85	0.04	0.08	0.00	0.39	-0.20	0.39	-0.37	-0.23	-0.6813	0.0084	-9.9	0.9	3.9	1.0		
Math	4	542403	229	0	107	B.1.1.4	2	126335	0.65	0.22	0.65	0.06	0.07	0.00	0.41	-0.29	0.41	-0.43	-0.36	0.6463	0.0065	-5.7	1.0	-2.4	1.0		
Math	4	544088	230	0	108	A.1.2.1	1	126335	0.62	0.15	0.03	0.20	0.62	0.00	0.35	-0.31	-0.28	-0.27	0.35	0.8085	0.0064	9.9	1.1	9.9	1.1		
Math	4	550802	231	0	109	A.1.1.4	1	126335	0.81	0.06	0.81	0.07	0.05	0.00	0.41	-0.32	0.41	-0.24	-0.31	-0.3533	0.0077	-9.9	0.9	-9.9	0.9		
Math	4	550823	232	0	110	A.1.3.1	1	126335	0.63	0.09	0.19	0.09	0.63	0.00	0.44	-0.38	-0.36	-0.34	0.44	0.7692	0.0064	-9.9	1.0	-9.9	0.9		
Math	4	556922	233	0	111	A.1.1.2	1	126335	0.59	0.34	0.59	0.02	0.05	0.00	0.39	-0.36	0.39	-0.19	-0.31	0.9530	0.0063	6.9	1.0	-0.2	1.0		
Math	4	550969	234	0	112	E.1.1.1	1	126335	0.72	0.13	0.07	0.72	0.08	0.00	0.45	-0.29	-0.36	0.45	-0.40	0.2234	0.0069	-9.9	0.9	-8.9	1.0		
Math	4	542301	235	0	113	A.2.1.2	2	126335	0.87	0.87	0.05	0.02	0.05	0.00	0.42	0.42	-0.21	-0.24	-0.38	-0.9072	0.0090	-9.9	0.9	-9.9	0.8		
Math	4	544158	236	0	114	B.1.1.3	1	126335	0.45	0.45	0.14	0.09	0.31	0.00	0.30	0.30	-0.37	-0.33	-0.20	1.6691	0.0063	9.9	1.1	9.9	1.2		
Math	4	557011	237	0	115	A.3.1.2	1	126335	0.48	0.19	0.26	0.48	0.07	0.00	0.35	-0.35	-0.27	0.35	-0.37	1.5189	0.0063	9.9	1.0	9.9	1.1		
Math	4	550937	238	0	116	C.3.1.1	1	126335	0.81	0.02	0.15	0.81	0.02	0.00	0.28	-0.20	-0.22	0.28	-0.19	-0.3621	0.0077	9.9	1.1	9.9	1.2		
Math	4	542377	239	0	117	D.1.1.1	1	126335	0.38	0.29	0.25	0.08	0.38	0.00	0.34	-0.36	-0.28	-0.36	0.34	2.0563	0.0065	7.0	1.0	9.9	1.2		
Math	4	557129	240	0	118	E.1.2.2	1	126335	0.91	0.03	0.01	0.05	0.91	0.00	0.33	-0.20	-0.20	-0.24	0.33	-1.2753	0.0101	-8.0	0.9	-5.5	0.9		
Math	4	556918	241	0	119	A.1.1.1	1	126335	0.75	0.75	0.12	0.05	0.08	0.00	0.41	0.41	-0.36	-0.30	-0.22	0.0427	0.0071	-8.9	1.0	-9.5	0.9		
Math	4	556977	242	0	120	A.1.3.2	2	126335	0.68	0.16	0.11	0.68	0.06	0.00	0.51	-0.45	-0.38	0.51	-0.35	0.5061	0.0066	-9.9	0.9	-9.9	0.8		
Math	4	593562	244	1	65	A.1.3.1	1	14211	0.74	0.09	0.12	0.74	0.05	0.00	0.50	-0.38	-0.40	0.50	-0.34	0.1110	0.0208	-9.9	0.9	-9.9	0.8	A+	A+
Math	4	565804	245	1	66	A.2.1.2	1	14211	0.85	0.06	0.85	0.04	0.05	0.00	0.40	-0.32	0.40	-0.26	-0.24	-0.6714	0.0248	-5.0	0.9	-6.0	0.8	A+	A-
Math	4	593181	246	1	67	C.3.1.1	1	14211	0.82	0.02	0.82	0.01	0.14	0.00	0.27	-0.19	0.27	-0.16	-0.22	-0.4707	0.0235	4.1	1.1	5.4	1.2	A+	A-
Math	4	557001	247	1	68	A.3.1.1	1	14211	0.53	0.27	0.12	0.07	0.53	0.00	0.25	-0.12	-0.34	-0.29	0.25	1.2149	0.0187	9.9	1.2	9.9	1.3		
Math	4	593179	248	1	69	B.1.1.3	1	14211	0.40	0.13	0.40	0.09	0.38	0.00	0.33	-0.46	0.33	-0.40	-0.23	1.9092	0.0190	5.3	1.0	9.9	1.2	A-	A-
Math	4	592342	249	1	70	A.1.2.1	1	14211	0.79	0.04	0.14	0.79	0.04	0.00	0.40	-0.30	-0.29	0.40	-0.29	-0.2081	0.0222	-3.2	1.0	-3.0	0.9	A+	A-
Math	4	565614	250	1	71	A.1.1.1	1	14211	0.85	0.05	0.07	0.85	0.03	0.00	0.42	-0.25	-0.38	0.42	-0.18	-0.7293	0.0252	-6.5	0.9	-6.5	0.8	A+	C-
Math	4	544275	251	1	72	C.1.1.1	1	14211	0.82	0.04	0.03	0.11	0.82	0.00	0.37	-0.24	-0.23	-0.28	0.37	-0.4743	0.0236	-1.4	1.0	-4.0	0.9		
Math	4	566921	252	1	73	A.1.1.4	1	14211	0.88	0.05	0.02	0.88	0.05	0.00	0.38	-0.27	-0.21	0.38	-0.27	-0.9725	0.0271	-4.5	0.9	-5.6	0.8	A-	A-
Math	4	592526	253	1	74	B.1.1.1	1	14211	0.89	0.04	0.02	0.89	0.04	0.00	0.43	-0.34	-0.19	0.43	-0.29	-1.1443	0.0286	-6.7	0.9	-9.9	0.6	A-	B-
Math	4	592534	254	1	75	D.2.2.1	1	14211	0.90	0.04	0.90	0.05	0.01	0.00	0.36	-0.22	0.36	-0.28	-0.17	-1.2584	0.0297	-3.6	0.9	-5.9	0.8	A+	A-
Math	4	593567	255	1	76	E.1.2.1	2	14211	0.69	0.05	0.69	0.03	0.22	0.00	0.43	-0.32	0.43	-0.29	-0.38	0.3990	0.0199	-4.6	1.0	-2.7	1.0	A+	B-
Math	4	593182	257	2	65	D.1.1.1	2	14019	0.92	0.02	0.92	0.03	0.02	0.00	0.25	-0.17	0.25	-0.17	-0.13	-1.5286	0.0331	-0.6	1.0	1.3	1.1	A+	A-
Math	4	592521	258	2	66	A.1.3.2	1	14019	0.69	0.23	0.69	0.05	0.03	0.00	0.53	-0.49	0.53	-0.32	-0.35	0.4018	0.0200	-9.9	0.9	-9.9	0.8	A-	A+
Math	4	565597	259	2	67	B.2.2.1	1	14019	0.57	0.57	0.22	0.18	0.02	0.00	0.11	0.11	0.03	-0.20	-0.27	1.0341	0.0189	9.9	1.3	9.9	1.5	A+	A-
Math	4	550898	260	2	68	B.1.1.1	1	14019	0.84	0.06	0.84	0.07	0.02	0.00	0.31	-0.14	0.31	-0.25	-0.27	-0.6327	0.0248	-0.2	1.0	6.1	1.2		
Math	4	565615	261	2	69	A.1.1.1	1	14019	0.90	0.90	0.03	0.05	0.02	0.00	0.38	0.38	-0.18	-0.32	-0.20	-1.1736	0.0292	-4.6	0.9	-6.7	0.8	B+	B-
Math	4	593564	262	2	70	D.2.2.1	1	14019	0.94	0.94	0.02	0.02	0.02	0.00	0.25	0.25	-0.19	-0.19	-0.09	-1.8102	0.0368	-1.0	1.0	-1.8	0.9	A+	A-
Math	4	544135	263	2	71	A.3.1.1	1	14019	0.71	0.10	0.08	0.11	0.71	0.00	0.46	-0.31	-0.31	-0.43	0.46	0.2902	0.0204	-8.5	0.9	-7.0	0.9		
Math	4	566928	264	2	72	E.3.1.1	2	14019	0.85	0.02	0.09	0.85	0.04	0.00	0.26	-0.20	-0.20	0.26	-0.14	-0.6435	0.0249	2.4	1.0	7.1	1.2	A+	A-
Math	4	592814	265	2	73	C.1.2.1	1	14019	0.60	0.14	0.18	0.08	0.60	0.00	0.38	-0.29	-0.34	-0.30	0.38	0.8708	0.0191	2.9	1.0	1.2	1.0	A-	A-
Math	4	567024	266	2	74	A.1.1.4	1	14019	0.79	0.02	0.04	0.79	0.14	0.00	0.25	-0.27	-0.28	0.25	-0.10	-0.2312	0.0225	6.9	1.1	9.9	1.3	A-	A-
Math	4	565803	267	2	75	A.2.1.2	2	14019	0.85	0.02	0.04	0.85	0.09	0.00	0.50	-0.25	-0.25	0.50	-0.47	-0.6402	0.0249	-9.9	0.8	-9.9	0.7	A+	A-
Math	4	565805	268	2	76	B.2.1.1	1	14019	0.81	0.08	0.81	0.06	0.05	0.00	0.37	-0.22	0.37	-0.25	-0.32	-0.3279	0.0230	-1.8	1.0	0.5	1.0	A-	A-
Math	4	566922	270	3	65	A.1.1.4	1	13989	0.89	0.03	0.03	0.89	0.04	0.00	0.36	-0.26	-0.17	0.36	-0.27	-1.1271	0.0290	-3.8	0.9	-4.9	0.8	A-	A-
Math	4	566925	271	3	66	C.1.1.1	1	13989	0.61	0.61	0.07	0.22	0.11	0.00	0.42	0.42	-0.30	-0.37	-0.36	0.8835	0.0191	-2.5	1.0	-2.1	1.0	A+	A-
Math	4	592701	272	3	67	A.3.1.2	1																				

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Math	4	544238	273	3	68	D.2.2.2	1	13989	0.82	0.12	0.04	0.82	0.02	0.00	0.30	-0.22	-0.20	0.30	-0.22	-0.3873	0.0235	2.6	1.0	3.7	1.1		
Math	4	566516	274	3	69	E.1.1.1	1	13989	0.90	0.04	0.90	0.02	0.03	0.00	0.35	-0.20	0.35	-0.22	-0.27	-1.2474	0.0301	-3.8	0.9	-4.4	0.8	A+	B-
Math	4	565616	275	3	70	A.1.1.1	1	13989	0.89	0.89	0.07	0.02	0.02	0.00	0.37	0.37	-0.33	-0.18	-0.18	-1.0531	0.0283	-4.3	0.9	-6.0	0.8	A+	B-
Math	4	592703	276	3	71	E.3.1.1	2	13989	0.94	0.01	0.03	0.02	0.94	0.00	0.29	-0.16	-0.21	-0.15	0.29	-1.7196	0.0357	-1.9	1.0	-4.8	0.8	A+	C-
Math	4	593174	277	3	72	A.2.1.1	2	13989	0.58	0.27	0.09	0.58	0.07	0.00	0.54	-0.57	-0.36	0.54	-0.32	1.0314	0.0190	-9.9	0.9	-9.9	0.8	A-	B-
Math	4	565622	278	3	73	B.1.1.4	1	13989	0.74	0.04	0.07	0.14	0.74	0.00	0.39	-0.15	-0.34	-0.33	0.39	0.1485	0.0210	-1.0	1.0	0.3	1.0	A-	A-
Math	4	593184	279	3	74	D.1.1.1	2	13989	0.65	0.11	0.08	0.65	0.16	0.00	0.47	-0.37	-0.36	0.47	-0.39	0.6285	0.0196	-8.6	0.9	-9.5	0.9	A-	A+
Math	4	542431	280	3	75	A.1.2.2	1	13989	0.68	0.68	0.12	0.07	0.13	0.00	0.38	0.38	-0.40	-0.34	-0.17	0.5014	0.0199	1.2	1.0	5.1	1.1		
Math	4	592346	281	3	76	C.1.1.2	1	13989	0.86	0.02	0.05	0.07	0.86	0.00	0.28	-0.20	-0.21	-0.16	0.28	-0.7874	0.0261	1.5	1.0	3.1	1.1	A-	A-
Math	4	565620	283	4	65	B.1.1.4	1	14002	0.78	0.04	0.09	0.78	0.09	0.00	0.43	-0.29	-0.26	0.43	-0.37	-0.1180	0.0220	-5.5	0.9	-4.9	0.9	A-	B-
Math	4	566923	284	4	66	A.3.1.1	1	14002	0.74	0.05	0.07	0.74	0.14	0.00	0.36	-0.26	-0.32	0.36	-0.24	0.1345	0.0210	1.6	1.0	1.5	1.0	A-	A-
Math	4	592347	285	4	67	C.1.1.2	1	14002	0.94	0.02	0.94	0.03	0.01	0.00	0.21	-0.15	0.21	-0.13	-0.12	-1.7453	0.0359	-0.3	1.0	2.1	1.1	A+	B-
Math	4	593565	286	4	68	D.2.2.2	1	14002	0.80	0.05	0.08	0.80	0.08	0.00	0.37	-0.23	-0.22	0.37	-0.33	-0.2732	0.0227	-2.2	1.0	-2.1	1.0	A-	A-
Math	4	542295	287	4	69	A.1.1.3	1	14002	0.79	0.03	0.03	0.79	0.15	0.00	0.38	-0.27	-0.22	0.38	-0.31	-0.2230	0.0225	-2.0	1.0	-3.1	0.9		
Math	4	593818	288	4	70	D.1.1.3	2	14002	0.67	0.06	0.16	0.11	0.67	0.00	0.52	-0.39	-0.51	-0.33	0.52	0.5473	0.0197	-9.9	0.9	-9.9	0.8	A+	A-
Math	4	592345	289	4	71	A.3.1.2	1	14002	0.59	0.19	0.59	0.09	0.13	0.00	0.40	-0.32	0.40	-0.29	-0.38	0.9647	0.0190	-0.3	1.0	-1.0	1.0	A-	A-
Math	4	593570	290	4	72	E.1.2.2	2	14002	0.89	0.07	0.89	0.02	0.02	0.00	0.39	-0.37	0.39	-0.15	-0.17	-1.0531	0.0282	-5.7	0.9	-4.5	0.8	A+	C-
Math	4	592815	291	4	73	C.1.2.1	1	14002	0.83	0.06	0.06	0.83	0.04	0.00	0.33	-0.25	-0.23	0.33	-0.18	-0.5419	0.0243	0.2	1.0	-1.5	1.0	A+	A-
Math	4	542360	292	4	74	E.3.1.1	2	14002	0.86	0.04	0.04	0.04	0.86	0.00	0.34	-0.26	-0.20	-0.23	0.34	-0.8211	0.0262	-2.2	1.0	-2.3	0.9		
Math	4	593563	293	4	75	C.2.1.1	1	14002	0.89	0.06	0.02	0.02	0.89	0.00	0.34	-0.27	-0.17	-0.20	0.34	-1.1281	0.0288	-2.3	1.0	-4.4	0.8	A+	B-
Math	4	592523	294	4	76	A.1.3.2	2	14002	0.75	0.11	0.10	0.75	0.04	0.00	0.50	-0.37	-0.44	0.50	-0.29	0.0653	0.0212	-9.9	0.9	-9.9	0.8	A-	A-
Math	4	592536	296	5	65	D.2.2.2	1	13967	0.87	0.05	0.87	0.02	0.05	0.00	0.29	-0.19	0.29	-0.17	-0.20	-0.8845	0.0269	0.4	1.0	2.6	1.1	A+	A-
Math	4	566517	297	5	66	A.1.1.3	1	13967	0.78	0.78	0.11	0.09	0.02	0.00	0.35	0.35	-0.27	-0.23	-0.28	-0.1201	0.0221	0.3	1.0	-0.7	1.0	A+	A+
Math	4	592403	298	5	67	A.1.2.2	1	13967	0.94	0.02	0.94	0.02	0.02	0.00	0.29	-0.17	0.29	-0.18	-0.19	-1.8553	0.0378	-2.6	0.9	-4.6	0.8	A+	A-
Math	4	593568	299	5	68	E.1.2.1	2	13967	0.52	0.20	0.08	0.52	0.20	0.00	0.18	-0.15	-0.20	0.18	-0.12	1.3202	0.0188	9.9	1.3	9.9	1.4	A-	A+
Math	4	544109	300	5	69	A.2.1.1	2	13967	0.69	0.69	0.07	0.12	0.11	0.00	0.50	0.50	-0.34	-0.31	-0.52	0.4245	0.0201	-9.9	0.9	-9.9	0.8	A-	A-
Math	4	592817	301	5	70	D.1.1.2	2	13967	0.93	0.93	0.03	0.02	0.01	0.00	0.36	0.36	-0.24	-0.23	-0.22	-1.6711	0.0352	-4.4	0.9	-8.2	0.6	A+	B-
Math	4	566924	302	5	71	A.3.1.1	1	13967	0.60	0.05	0.60	0.26	0.09	0.00	0.40	-0.27	0.40	-0.33	-0.40	0.9281	0.0191	0.4	1.0	-0.3	1.0	A-	A-
Math	4	565621	303	5	72	B.1.1.4	2	13967	0.73	0.73	0.16	0.05	0.05	0.00	0.46	0.46	-0.41	-0.41	-0.19	0.1808	0.0208	-9.0	0.9	-7.5	0.9	A-	A-
Math	4	544241	304	5	73	E.1.1.1	2	13967	0.79	0.04	0.79	0.11	0.06	0.00	0.45	-0.31	0.45	-0.33	-0.33	-0.1630	0.0223	-7.3	0.9	-7.7	0.8		
Math	4	592816	305	5	74	C.1.2.1	1	13967	0.76	0.09	0.76	0.06	0.10	0.00	0.34	-0.22	0.34	-0.26	-0.27	0.0286	0.0214	2.9	1.0	0.1	1.0	A-	A-
Math	4	592522	306	5	75	A.1.3.2	1	13967	0.59	0.15	0.59	0.06	0.20	0.00	0.50	-0.38	0.50	-0.39	-0.48	0.9518	0.0190	-9.9	0.9	-9.9	0.9	A+	A-
Math	4	565807	307	5	76	B.2.1.1	1	13967	0.68	0.03	0.04	0.68	0.25	0.00	0.37	-0.20	-0.23	0.37	-0.35	0.5157	0.0198	2.6	1.0	2.0	1.0	A-	A-
Math	4	592524	309	6	65	A.3.2.2	1	14031	0.86	0.02	0.09	0.03	0.86	0.00	0.29	-0.19	-0.19	-0.22	0.29	-0.7740	0.0260	1.5	1.0	-1.2	1.0	A+	A-
Math	4	592535	310	6	66	D.2.2.2	1	14031	0.93	0.04	0.93	0.02	0.02	0.00	0.30	-0.22	0.30	-0.18	-0.17	-1.6051	0.0342	-2.5	0.9	-3.6	0.8	A+	A-
Math	4	592401	311	6	67	A.1.2.2	1	14031	0.94	0.94	0.02	0.02	0.02	0.00	0.29	0.29	-0.19	-0.18	-0.18	-1.8200	0.0371	-2.4	0.9	-4.8	0.8	A+	B-
Math	4	593732	312	6	68	E.1.2.2	2	14031	0.82	0.13	0.03	0.82	0.01	0.00	0.50	-0.50	-0.19	0.50	-0.15	-0.4292	0.0237	-9.9	0.8	-9.3	0.8	A+	C-
Math	4	542554	313	6	69	C.2.1.1	2	14031	0.79	0.06	0.79	0.10	0.05	0.00	0.40	-0.31	0.40	-0.22	-0.35	-0.2013	0.0224	-3.4	1.0	-2.0	1.0		
Math	4	565598	314	6	70	B.2.2.1	1	14031	0.72	0.04	0.16	0.72	0.08	0.00	0.28	-0.25	-0.21	0.28	-0.19	0.2466	0.0206	9.4	1.1	9.9	1.3	A-	A-
Math	4	592410	315	6	71	D.1.2.1	1	14031	0.88	0.03	0.88	0.07	0.03	0.00	0.33	-0.24	0.33	-0.22	-0.21	-0.9196	0.0271	-2.4	1.0	0.3	1.0	A+	A-
Math	4	542334	316	6	72	A.3.1.2	1	14031	0.54	0.05	0.54	0.15	0.27	0.00	0.36	-0.31	0.36	-0.32	-0.31	1.2253	0.0188	4.5	1.0	5.1	1.1		
Math	4	593172	317	6	73	A.2.1.1	2	14031	0.84	0.03	0.04	0.09	0.84	0.00	0.51	-0.26	-0.31	-0.44	0.51	-0.5899	0.0247	-9.9	0.8	-9.9	0.7	A-	C-
Math	4	592527	318	6	74	B.1.1.1	1	14031	0.90	0.02	0.90	0.03	0.05	0.00	0.37	-0.22	0.37	-0.27	-0.24	-1.1964	0.0296	-4.1	0.9	-5.9	0.8	A-	C-
Math	4	592528	319	6	75	C.1.2.2	1	14031	0.57	0.24	0.08	0.11	0.57	0.00	0.28	-0.30	-0.14	-0.16	0.28	1.0590	0.0189	9.9	1.1	9.9	1.2	A+	A+
Math	4	565801	320	6	76	A.1.1.2	1	14031	0.78	0.08	0.10	0.78	0.04	0.00	0.43	-0.31	-0.33	0.43	-0.29	-0.1029	0.0220	-4.9	0.9	-6.6	0.9	A+	A-
Math	4	592525	322	7	65	A.3.2.2	1	14021	0.72	0.07	0.16	0.72	0.05	0.00	0.24	-0.24	-0.12	0.24	-0.21	0.2786	0.0205	9.9	1.2	9.9	1.3	A+	A-
Math	4	566519	323	7	66	B.2.2.1	1	14021	0.86	0.07	0.02	0.86	0.05	0.00	0.37	-0.32	-0.21	0.37	-0.20	-0.7682	0.0259	-3.6	0.9	-4.6	0.9	A-	C-
Math	4	592533	324	7	67	D.2.2.1	1	14021	0.92	0.92	0.03	0.02	0.03	0.00	0.31	0.31	-0.16	-0.21	-0.21	-1.5212	0.0332	-2.4	0.9	-4.3	0.8	A+	A-
Math	4	592520	325	7	68	A.1.3.1	1	14021	0.75	0.09	0.75	0.11	0.04	0.00	0.50	-0.43	0.50	-0.37	-0.29	0.0609	0.0213	-9.9	0.9	-9.9	0.8	A+	A-
Math	4	565802	326	7	69	A.1.1.2	1	14021	0.75	0.10	0.75	0.08	0.07	0.00	0.41	-0.36	0.41	-0.27	-0.26	0.0499	0.0213	-3.8	1.0	-4.5	0.9	A+	A-
Math	4	557074	327	7	70	C.3.1.1	1	14021																			

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Math	4	565623	328	7	71	D.2.1.1	1	14021	0.70	0.20	0.04	0.70	0.06	0.00	0.52	-0.52	-0.32	0.52	-0.26	0.3850	0.0202	-9.9	0.9	-9.9	0.8	A-	A-
Math	4	557014	329	7	72	A.3.1.2	1	14021	0.52	0.16	0.52	0.13	0.19	0.00	0.36	-0.35	0.36	-0.32	-0.27	1.3501	0.0188	5.0	1.0	6.2	1.1		
Math	4	593173	330	7	73	A.2.1.1	2	14021	0.73	0.04	0.12	0.73	0.11	0.00	0.46	-0.31	-0.33	0.46	-0.40	0.2198	0.0207	-8.4	0.9	-6.5	0.9	A+	A-
Math	4	593176	331	7	74	B.1.1.2	1	14021	0.73	0.04	0.73	0.13	0.10	0.00	0.39	-0.22	0.39	-0.30	-0.31	0.1916	0.0208	-0.2	1.0	-4.3	0.9	A+	B-
Math	4	592529	332	7	75	C.1.2.2	1	14021	0.60	0.60	0.08	0.22	0.10	0.00	0.41	0.41	-0.39	-0.34	-0.31	0.9416	0.0191	-0.3	1.0	-1.2	1.0	A+	B-
Math	4	565809	333	7	76	E.1.1.1	2	14021	0.87	0.06	0.02	0.87	0.05	0.00	0.44	-0.38	-0.22	0.44	-0.26	-0.8079	0.0262	-7.7	0.9	-7.7	0.8	A+	B-
Math	4	565806	335	8	65	B.2.1.1	1	14037	0.96	0.01	0.01	0.02	0.96	0.00	0.21	-0.13	-0.13	-0.13	0.21	-2.1230	0.0420	-0.8	1.0	-1.0	0.9	A+	C-
Math	4	566518	336	8	66	A.3.1.1	1	14037	0.76	0.04	0.09	0.76	0.10	0.00	0.40	-0.30	-0.32	0.40	-0.28	0.0456	0.0213	-3.4	1.0	-3.1	0.9	A+	B-
Math	4	566515	337	8	67	D.2.1.1	2	14037	0.63	0.30	0.63	0.04	0.03	0.00	0.51	-0.49	0.51	-0.35	-0.25	0.7624	0.0193	-9.9	0.9	-9.9	0.8	A+	A-
Math	4	592530	338	8	68	C.2.1.1	2	14037	0.86	0.86	0.08	0.03	0.03	0.00	0.32	0.32	-0.25	-0.16	-0.19	-0.7715	0.0260	0.0	1.0	-2.1	0.9	A+	A-
Math	4	592402	339	8	69	A.1.2.2	1	14037	0.94	0.01	0.03	0.94	0.02	0.00	0.25	-0.18	-0.16	0.25	-0.14	-1.7117	0.0357	-1.5	1.0	-0.5	1.0	A+	A-
Math	4	544252	340	8	70	E.1.2.1	2	14037	0.83	0.03	0.04	0.11	0.83	0.00	0.43	-0.24	-0.27	-0.37	0.43	-0.4613	0.0239	-7.5	0.9	-7.5	0.8		
Math	4	550905	341	8	71	B.1.1.3	1	14037	0.69	0.05	0.10	0.69	0.16	0.00	0.44	-0.29	-0.32	0.44	-0.38	0.4214	0.0201	-5.8	1.0	-6.3	0.9		
Math	4	565592	342	8	72	A.1.1.3	1	14037	0.90	0.05	0.90	0.04	0.02	0.00	0.35	-0.26	0.35	-0.21	-0.21	-1.1268	0.0290	-3.4	0.9	-5.2	0.8	A+	A-
Math	4	592702	343	8	73	E.3.1.1	2	14037	0.93	0.02	0.04	0.93	0.02	0.00	0.27	-0.16	-0.19	0.27	-0.16	-1.5320	0.0334	-1.3	1.0	-1.0	1.0	A+	B-
Math	4	566513	344	8	74	A.2.1.2	2	14037	0.80	0.80	0.09	0.04	0.06	0.00	0.49	0.49	-0.35	-0.34	-0.37	-0.2469	0.0227	-9.9	0.9	-9.9	0.8	A-	A-
Math	4	565808	345	8	75	E.1.1.1	2	14037	0.76	0.09	0.06	0.09	0.76	0.00	0.50	-0.37	-0.29	-0.43	0.50	-0.0058	0.0216	-9.9	0.9	-9.9	0.8	A-	A-
Math	4	566926	346	8	76	C.1.1.1	2	14037	0.67	0.10	0.14	0.67	0.08	0.00	0.35	-0.31	-0.27	0.35	-0.23	0.5572	0.0197	5.5	1.1	2.6	1.0	A+	A-
Math	4	566927	348	9	65	C.1.1.1	1	14058	0.89	0.02	0.06	0.89	0.03	0.00	0.28	-0.17	-0.21	0.28	-0.15	-1.0124	0.0280	0.3	1.0	-1.5	0.9	A+	A+
Math	4	565593	349	9	66	A.1.1.3	1	14058	0.76	0.04	0.13	0.06	0.76	0.00	0.37	-0.31	-0.23	-0.30	0.37	-0.0039	0.0215	-1.0	1.0	-1.3	1.0	A+	A-
Math	4	593183	350	9	67	D.1.2.2	2	14058	0.66	0.18	0.09	0.07	0.66	0.00	0.39	-0.23	-0.37	-0.36	0.39	0.6260	0.0196	1.2	1.0	1.0	1.0	A+	A+
Math	4	592700	351	9	68	A.1.2.1	1	14058	0.76	0.04	0.06	0.76	0.14	0.00	0.39	-0.29	-0.30	0.39	-0.27	0.0341	0.0214	-1.7	1.0	-1.8	1.0	A-	A-
Math	4	565596	352	9	69	A.3.1.1	1	14058	0.70	0.08	0.70	0.13	0.10	0.00	0.49	-0.34	0.49	-0.41	-0.40	0.4166	0.0201	-9.9	0.9	-9.9	0.8	A-	A-
Math	4	593180	353	9	70	C.3.1.1	1	14058	0.81	0.16	0.81	0.02	0.01	0.00	0.30	-0.26	0.30	-0.17	-0.16	-0.3438	0.0232	2.6	1.0	5.0	1.1	A+	A-
Math	4	542515	354	9	71	A.2.1.2	1	14058	0.47	0.43	0.05	0.47	0.06	0.00	0.27	-0.22	-0.34	0.27	-0.30	1.6096	0.0188	9.9	1.1	9.9	1.2		
Math	4	593566	355	9	72	E.1.2.1	2	14058	0.92	0.03	0.92	0.03	0.02	0.00	0.26	-0.16	0.26	-0.16	-0.18	-1.4418	0.0323	-1.3	1.0	2.4	1.1	A+	B-
Math	4	593561	356	9	73	A.1.3.1	1	14058	0.75	0.11	0.75	0.08	0.06	0.00	0.47	-0.32	0.47	-0.36	-0.38	0.0855	0.0212	-9.0	0.9	-8.9	0.8	A+	A+
Math	4	593177	357	9	74	B.1.1.2	1	14058	0.79	0.08	0.06	0.07	0.79	0.00	0.46	-0.41	-0.26	-0.31	0.46	-0.1874	0.0224	-9.2	0.9	-6.1	0.9	A+	B-
Math	4	544313	358	9	75	D.2.1.1	2	14058	0.84	0.03	0.09	0.04	0.84	0.00	0.45	-0.31	-0.35	-0.27	0.45	-0.5701	0.0246	-8.1	0.9	-9.9	0.7		
Math	4	565800	359	9	76	A.1.1.2	1	14058	0.47	0.04	0.47	0.12	0.36	0.00	0.44	-0.36	0.44	-0.36	-0.43	1.5683	0.0188	-6.7	1.0	-4.7	1.0	A+	A+
Math	5	544494	361	0	1	A.3.2.1	1	126411	0.73	0.73	0.12	0.14	0.02	0.00	0.41	0.41	-0.28	-0.37	-0.25	0.5147	0.0071	4.5	1.0	-1.9	1.0		
Math	5	541850	362	0	2	A.2.1.2	2	126411	0.68	0.68	0.07	0.06	0.18	0.00	0.51	0.51	-0.37	-0.33	-0.47	0.8461	0.0067	-9.9	0.9	-9.9	0.8		
Math	5	541860	363	0	3	A.3.1.2	1	126411	0.63	0.17	0.63	0.13	0.07	0.00	0.42	-0.35	0.42	-0.31	-0.39	1.1100	0.0066	8.7	1.0	9.9	1.1		
Math	5	551077	364	0	4	A.3.1.2	2	126411	0.73	0.04	0.09	0.14	0.73	0.00	0.48	-0.37	-0.37	-0.38	0.48	0.4904	0.0071	-9.9	0.9	-9.9	0.9		
Math	5	544538	365	0	5	A.1.2.2	1	126411	0.85	0.85	0.03	0.05	0.08	0.00	0.32	0.32	-0.15	-0.27	-0.21	-0.3411	0.0084	9.9	1.1	4.9	1.1		
Math	5	544453	366	0	6	D.2.1.2	1	126411	0.70	0.04	0.08	0.18	0.70	0.00	0.46	-0.42	-0.33	-0.37	0.46	0.6902	0.0069	-9.9	1.0	-9.9	0.9		
Math	5	544654	367	0	7	E.2.1.1	1	126411	0.72	0.14	0.72	0.06	0.08	0.00	0.45	-0.38	0.45	-0.22	-0.39	0.5664	0.0070	-7.3	1.0	-3.1	1.0		
Math	5	540123	368	0	8	A.1.5.1	1	126411	0.86	0.04	0.06	0.04	0.86	0.00	0.44	-0.29	-0.34	-0.25	0.44	-0.4612	0.0087	-9.9	0.9	-9.9	0.7		
Math	5	544641	369	0	9	D.1.2.1	1	126411	0.37	0.03	0.52	0.08	0.37	0.00	0.49	-0.50	-0.50	-0.46	0.49	2.4919	0.0066	-9.9	0.9	-9.9	0.9		
Math	5	551106	370	0	10	C.1.1.1	2	126411	0.65	0.13	0.10	0.65	0.11	0.00	0.39	-0.40	-0.30	0.39	-0.21	0.9743	0.0066	9.9	1.1	9.9	1.1		
Math	5	556879	371	0	11	E.2.1.2	1	126411	0.86	0.02	0.86	0.09	0.04	0.00	0.33	-0.18	0.33	-0.25	-0.22	-0.4346	0.0086	3.9	1.0	8.6	1.1		
Math	5	544535	372	0	12	A.1.1.1	2	126411	0.66	0.25	0.66	0.04	0.04	0.00	0.43	-0.39	0.43	-0.33	-0.24	0.9311	0.0067	3.2	1.0	0.5	1.0		
Math	5	551142	373	0	13	D.2.1.2	2	126411	0.59	0.06	0.59	0.30	0.05	0.00	0.40	-0.43	0.40	-0.30	-0.38	1.3159	0.0065	9.9	1.1	9.9	1.1		
Math	5	540065	374	0	14	A.1.6.1	1	126411	0.69	0.09	0.10	0.11	0.69	0.00	0.48	-0.33	-0.40	-0.37	0.48	0.7627	0.0068	-9.9	1.0	-9.9	0.9		
Math	5	556861	375	0	15	D.1.2.1	2	126411	0.90	0.03	0.06	0.90	0.01	0.00	0.35	-0.26	-0.25	0.35	-0.17	-0.8731	0.0098	-6.5	1.0	-3.7	0.9		
Math	5	540040	376	0	16	B.2.2.3	1	126411	0.45	0.12	0.45	0.22	0.21	0.00	0.36	-0.37	0.36	-0.24	-0.40	2.0721	0.0064	9.9	1.1	9.9	1.2		
Math	5	544425	377	0	17	E.3.1.2	2	126411	0.88	0.04	0.03	0.88	0.05	0.00	0.35	-0.26	-0.20	0.35	-0.23	-0.7305	0.0094	-4.2	1.0	-7.5	0.9		
Math	5	544523	378	0	18	B.1.1.1	1	126411	0.72	0.03	0.15	0.10	0.72	0.00	0.35	-0.28	-0.28	-0.25	0.35	0.5815	0.0070	9.9	1.1	9.9	1.1		
Math	5	540138	379	0	19	A.1.3.3	1	126411	0.68	0.09	0.08	0.68	0.15	0.00	0.55	-0.41	-0.38	0.55	-0.51	0.8118	0.0068	-9.9	0.9	-9.9	0.8		
Math	5	556754	380	0	20	A.1.2.1	1	126411	0.81	0.03	0.81	0.11	0.05	0.00	0.40	-0.23	0.40	-0.28	-0.35	-0.0591	0.0079	-5.5	1.0	-2.9	1.0		
Math	5	544402	381	0	21	D.2.1.1	1	126411	0.93	0.93	0.02																

## Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Math	5	556775	382	0	22	A.1.4.1	1	126411	0.49	0.06	0.49	0.35	0.10	0.00	0.39	-0.41	0.39	-0.33	-0.42	1.8289	0.0064	9.9	1.1	9.9	1.1		
Math	5	551148	383	0	23	E.2.1.1	1	126411	0.76	0.05	0.76	0.07	0.12	0.00	0.51	-0.33	0.51	-0.30	-0.47	0.3204	0.0073	-9.9	0.9	-9.9	0.8		
Math	5	544474	384	0	24	C.2.1.2	1	126411	0.77	0.03	0.19	0.01	0.77	0.00	0.32	-0.27	-0.27	-0.16	0.32	0.2791	0.0073	9.9	1.1	9.9	1.2		
Math	5	544395	387	0	52	C.1.2.1	1	126411	0.79	0.09	0.79	0.05	0.07	0.00	0.35	-0.25	0.35	-0.27	-0.22	0.1134	0.0076	9.9	1.1	7.2	1.1		
Math	5	544521	388	0	53	A.3.1.1	1	126411	0.73	0.03	0.07	0.73	0.17	0.00	0.38	-0.28	-0.37	0.38	-0.25	0.4985	0.0071	9.9	1.1	9.9	1.1		
Math	5	544531	389	0	54	B.1.2.1	1	126411	0.74	0.03	0.74	0.16	0.07	0.00	0.46	-0.21	0.46	-0.39	-0.39	0.4338	0.0071	-9.9	0.9	-9.3	0.9		
Math	5	551064	390	0	55	A.2.1.1	2	126411	0.55	0.39	0.03	0.03	0.55	0.00	0.42	-0.40	-0.27	-0.30	0.42	1.5475	0.0064	9.7	1.0	9.9	1.1		
Math	5	540173	391	0	56	B.2.2.2	1	126411	0.44	0.09	0.44	0.02	0.44	0.00	0.44	-0.52	-0.40	-0.35	0.44	2.0907	0.0064	-5.3	1.0	0.6	1.0		
Math	5	556875	392	0	57	E.2.1.1	2	126411	0.73	0.04	0.73	0.06	0.16	0.00	0.53	-0.28	0.53	-0.33	-0.50	0.5126	0.0071	-9.9	0.9	-9.9	0.8		
Math	5	551155	393	0	58	E.3.1.2	2	126411	0.85	0.09	0.03	0.85	0.03	0.00	0.30	-0.18	-0.27	0.30	-0.20	-0.3549	0.0085	7.8	1.0	9.9	1.4		
Math	5	544477	394	0	59	D.1.1.1	2	126411	0.86	0.08	0.03	0.03	0.86	0.00	0.42	-0.31	-0.28	-0.24	0.42	-0.4478	0.0087	-9.9	0.9	-9.9	0.8		
Math	5	541903	395	0	60	C.2.1.2	1	126411	0.72	0.72	0.14	0.07	0.06	0.00	0.34	0.34	-0.25	-0.27	-0.24	0.5573	0.0070	9.9	1.1	9.9	1.1		
Math	5	541831	396	0	61	A.1.3.3	1	126411	0.71	0.07	0.71	0.12	0.10	0.00	0.50	-0.42	0.50	-0.43	-0.31	0.6525	0.0069	-9.9	0.9	-9.9	0.8		
Math	5	556749	397	0	62	A.1.1.1	1	126411	0.90	0.90	0.03	0.03	0.03	0.00	0.37	0.37	-0.26	-0.23	-0.22	-0.9676	0.0101	-9.9	0.9	-9.9	0.8		
Math	5	556800	398	0	63	A.2.1.1	2	126411	0.55	0.55	0.14	0.08	0.22	0.00	0.52	0.52	-0.41	-0.52	-0.46	1.5257	0.0064	-9.9	0.9	-9.9	0.9		
Math	5	541836	399	0	96	A.1.4.2	1	126411	0.80	0.03	0.06	0.80	0.11	0.00	0.35	-0.16	-0.13	0.35	-0.37	0.0140	0.0077	7.8	1.0	9.9	1.2		
Math	5	551140	400	0	97	D.2.1.2	1	126411	0.93	0.04	0.93	0.03	0.01	0.00	0.37	-0.29	0.37	-0.23	-0.14	-1.3192	0.0114	-9.9	0.9	-9.9	0.7		
Math	5	544428	401	0	98	E.2.1.2	1	126411	0.89	0.89	0.02	0.03	0.06	0.00	0.30	0.30	-0.13	-0.13	-0.29	-0.7995	0.0096	2.1	1.0	4.8	1.1		
Math	5	551075	402	0	99	A.3.1.1	1	126411	0.74	0.15	0.09	0.74	0.03	0.00	0.44	-0.35	-0.36	0.44	-0.29	0.4790	0.0071	-7.8	1.0	-9.5	0.9		
Math	5	556783	403	0	100	A.1.5.1	2	126411	0.66	0.06	0.04	0.23	0.66	0.00	0.45	-0.44	-0.20	-0.40	0.45	0.9256	0.0067	-5.0	1.0	-6.2	1.0		
Math	5	544441	404	0	101	D.1.1.2	2	126411	0.43	0.52	0.03	0.43	0.01	0.00	0.36	-0.33	-0.43	0.36	-0.35	2.1705	0.0064	9.9	1.1	9.9	1.2		
Math	5	551056	405	0	102	A.1.6.2	1	126411	0.75	0.75	0.16	0.05	0.04	0.00	0.47	0.47	-0.38	-0.33	-0.30	0.3997	0.0072	-9.9	1.0	-9.9	0.8		
Math	5	544652	406	0	103	C.2.1.1	1	126411	0.90	0.03	0.90	0.01	0.05	0.00	0.29	-0.22	0.29	-0.16	-0.19	-0.9778	0.0102	0.8	1.0	3.6	1.1		
Math	5	544609	407	0	104	A.2.1.1	2	126411	0.88	0.05	0.88	0.05	0.02	0.00	0.35	-0.29	0.35	-0.19	-0.20	-0.7250	0.0094	-5.1	1.0	2.5	1.0		
Math	5	541818	408	0	105	A.1.2.1	1	126411	0.82	0.03	0.12	0.82	0.03	0.00	0.45	-0.35	-0.35	0.45	-0.27	-0.1363	0.0080	-9.9	0.9	-9.9	0.9		
Math	5	556876	409	0	106	E.2.1.1	1	126411	0.72	0.03	0.18	0.72	0.08	0.00	0.41	-0.31	-0.37	0.41	-0.24	0.6002	0.0070	4.9	1.0	9.9	1.1		
Math	5	556866	410	0	107	D.2.1.2	2	126411	0.64	0.05	0.03	0.28	0.64	0.00	0.38	-0.41	-0.31	-0.29	0.38	1.0512	0.0066	9.9	1.1	9.9	1.1		
Math	5	544562	411	0	108	A.1.3.2	1	126411	0.61	0.61	0.26	0.12	0.01	0.00	0.45	0.45	-0.36	-0.46	-0.20	1.2292	0.0065	-2.8	1.0	-9.3	1.0		
Math	5	556809	412	0	109	A.2.1.3	2	126411	0.58	0.20	0.11	0.10	0.58	0.00	0.50	-0.43	-0.44	-0.41	0.50	1.3606	0.0064	-9.9	0.9	-9.9	0.9		
Math	5	544504	413	0	110	B.2.2.1	2	126411	0.39	0.03	0.36	0.22	0.39	0.00	0.39	-0.45	-0.44	-0.31	0.39	2.4010	0.0065	7.7	1.0	9.9	1.1		
Math	5	544626	414	0	111	C.1.1.2	1	126411	0.85	0.85	0.06	0.06	0.03	0.00	0.34	0.34	-0.19	-0.25	-0.24	-0.3632	0.0085	5.3	1.0	2.4	1.0		
Math	5	544455	415	0	112	E.3.1.1	1	126411	0.80	0.05	0.07	0.80	0.80	0.00	0.49	-0.34	-0.34	-0.36	0.49	0.0249	0.0077	-9.9	0.9	-9.9	0.8		
Math	5	551094	416	0	113	B.1.3.2	1	126411	0.52	0.28	0.52	0.13	0.06	0.00	0.34	-0.25	0.34	-0.34	-0.38	1.7166	0.0064	9.9	1.1	9.9	1.2		
Math	5	556854	417	0	114	D.1.1.2	2	126411	0.90	0.02	0.02	0.06	0.90	0.00	0.35	-0.19	-0.18	-0.28	0.35	-0.9163	0.0100	-6.9	1.0	-8.8	0.9		
Math	5	556810	418	0	115	A.3.1.1	2	126411	0.65	0.07	0.65	0.20	0.08	0.00	0.52	-0.32	0.52	-0.49	-0.38	0.9657	0.0066	-9.9	0.9	-9.9	0.8		
Math	5	556789	419	0	116	A.1.6.1	1	126411	0.63	0.63	0.11	0.14	0.12	0.00	0.47	0.47	-0.31	-0.43	-0.40	1.1122	0.0066	-9.9	1.0	-9.9	0.9		
Math	5	544533	420	0	117	B.2.1.1	1	126411	0.48	0.02	0.04	0.48	0.46	0.00	0.28	-0.26	-0.36	0.28	-0.24	1.8900	0.0064	9.9	1.2	9.9	1.3		
Math	5	556774	421	0	118	A.1.3.3	2	126411	0.46	0.08	0.30	0.15	0.46	0.00	0.44	-0.42	-0.31	-0.59	0.44	1.9916	0.0064	-2.7	1.0	1.2	1.0		
Math	5	544586	422	0	119	A.2.1.3	1	126411	0.84	0.09	0.05	0.02	0.84	0.00	0.44	-0.30	-0.36	-0.26	0.44	-0.2624	0.0083	-9.9	0.9	-9.9	0.8		
Math	5	556785	424	1	64	D.2.1.1	1	14283	0.65	0.31	0.02	0.02	0.65	0.00	0.39	-0.36	-0.26	-0.25	0.39	0.9233	0.0197	6.6	1.1	1.5	1.0	A+	A+
Math	5	593038	425	1	65	B.2.2.1	2	14283	0.84	0.06	0.05	0.84	0.05	0.00	0.45	-0.33	-0.29	0.45	-0.31	-0.3582	0.0248	-7.3	0.9	-8.0	0.8	A+	A-
Math	5	594394	426	1	66	B.1.2.1	2	14283	0.80	0.06	0.10	0.80	0.03	0.00	0.43	-0.36	-0.30	0.43	-0.25	-0.0475	0.0230	-4.4	1.0	-5.0	0.9	A-	A-
Math	5	544634	427	1	67	A.1.3.2	2	14283	0.47	0.29	0.09	0.15	0.47	0.00	0.49	-0.41	-0.49	-0.54	0.49	1.8810	0.0190	-8.9	0.9	-6.5	0.9		
Math	5	593101	428	1	68	C.1.1.2	2	14283	0.27	0.27	0.40	0.16	0.18	0.00	0.13	0.13	0.00	-0.15	-0.40	2.9925	0.0211	9.9	1.3	9.9	1.9	A-	A+
Math	5	595095	429	1	69	A.1.6.1	1	14283	0.37	0.33	0.15	0.15	0.37	0.00	0.36	-0.33	-0.45	-0.35	0.36	2.4154	0.0196	7.8	1.1	9.9	1.2	A+	A+
Math	5	544613	430	1	70	B.2.1.1	1	14283	0.39	0.12	0.39	0.24	0.24	0.00	0.34	-0.40	0.34	-0.36	-0.27	2.3131	0.0194	9.9	1.1	9.9	1.2		
Math	5	566793	431	1	71	E.2.1.1	1	14283	0.69	0.10	0.14	0.69	0.08	0.00	0.32	-0.23	-0.20	0.32	-0.31	0.7074	0.0202	9.9	1.1	9.9	1.2	A+	A+
Math	5	594455	432	1	72	A.3.1.1	1	14283	0.62	0.14	0.11	0.14	0.62	0.00	0.50	-0.35	-0.36	-0.53	0.50	1.1197	0.0194	-8.5	0.9	-7.1	0.9	A-	A-
Math	5	593104	433	1	73	C.2.1.2	1	14283	0.38	0.02	0.38	0.36	0.24	0.00	0.21	-0.18	0.21	-0.18	-0.26	2.3424	0.0195	-9.9	1.3	9.9	1.5	A+	A-
Math	5	594989	434	1	74	A.1.1.1	1	14283	0.84	0.03	0.84	0.07	0.06	0.00	0.44	-0.26	0.44	-0.33	-0.31	-0.3887	0.0250	-6.2	0.9	-8.0	0.8	A-	A-
Math	5	594447	435	1	75	A.2.1.2	2	14283																			

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Math	5	566786	437	2	64	D.2.1.2	2	14017	0.37	0.18	0.36	0.09	0.37	0.00	0.28	-0.36	-0.21	-0.39	0.28	2.4482	0.0197	9.9	1.2	9.9	1.3	A+	A-
Math	5	593084	438	2	65	D.1.1.1	2	14017	0.89	0.89	0.04	0.04	0.04	0.00	0.41	0.41	-0.30	-0.25	-0.26	-0.7470	0.0283	-5.0	0.9	-7.5	0.7	A+	A-
Math	5	595057	439	2	66	A.1.1.1	1	14017	0.84	0.84	0.03	0.10	0.03	0.00	0.43	0.43	-0.25	-0.32	-0.32	-0.2641	0.0248	-4.7	0.9	-4.5	0.9	A-	A-
Math	5	544644	440	2	67	E.3.1.1	1	14017	0.89	0.03	0.03	0.89	0.05	0.00	0.33	-0.21	-0.23	0.33	-0.21	-0.7588	0.0284	-0.8	1.0	-0.5	1.0		
Math	5	594980	441	2	68	A.1.4.1	1	14017	0.91	0.05	0.02	0.91	0.03	0.00	0.37	-0.30	-0.23	0.37	-0.18	-1.0041	0.0307	-4.1	0.9	-2.9	0.9	A-	A-
Math	5	595084	442	2	69	A.1.6.2	1	14017	0.86	0.06	0.04	0.04	0.86	0.00	0.47	-0.36	-0.31	-0.28	0.47	-0.4603	0.0261	-7.7	0.9	-9.9	0.6	A+	A+
Math	5	594348	443	2	70	A.2.1.2	2	14017	0.63	0.63	0.12	0.08	0.17	0.00	0.41	0.41	-0.37	-0.37	-0.28	1.1006	0.0197	4.2	1.0	2.9	1.1	A+	A-
Math	5	593134	444	2	71	C.1.2.1	1	14017	0.74	0.10	0.05	0.10	0.74	0.00	0.45	-0.34	-0.28	-0.37	0.45	0.4294	0.0215	-3.2	1.0	-2.8	0.9	A-	A-
Math	5	544604	445	2	72	A.3.1.1	1	14017	0.61	0.20	0.13	0.61	0.06	0.00	0.40	-0.30	-0.38	0.40	-0.30	1.2306	0.0195	6.2	1.1	4.2	1.1		
Math	5	594395	446	2	73	B.1.2.2	2	14017	0.76	0.76	0.08	0.13	0.04	0.00	0.46	0.46	-0.28	-0.38	-0.38	0.3236	0.0219	-5.4	0.9	-2.6	0.9	A+	B-
Math	5	593034	447	2	74	B.2.2.1	2	14017	0.34	0.09	0.34	0.02	0.54	0.00	0.35	-0.32	0.35	-0.35	-0.34	2.6182	0.0201	5.4	1.1	9.9	1.3	A-	A-
Math	5	566878	448	2	75	E.2.1.2	1	14017	0.86	0.86	0.07	0.03	0.03	0.00	0.35	0.35	-0.27	-0.19	-0.23	-0.4965	0.0264	-0.3	1.0	0.0	1.0	A+	A-
Math	5	566873	450	3	64	D.1.2.1	2	14012	0.86	0.04	0.86	0.05	0.04	0.00	0.40	-0.21	0.40	-0.30	-0.29	-0.5070	0.0263	-4.4	0.9	-2.0	0.9	A-	A-
Math	5	566830	451	3	65	D.2.1.2	2	14012	0.69	0.69	0.10	0.11	0.09	0.00	0.48	0.48	-0.36	-0.33	-0.44	0.7221	0.0205	-6.9	0.9	-7.0	0.9	A-	A-
Math	5	594391	452	3	66	B.1.2.1	2	14012	0.68	0.68	0.08	0.17	0.07	0.00	0.54	0.54	-0.37	-0.54	-0.28	0.8023	0.0203	-9.9	0.9	-9.9	0.8	A-	B-
Math	5	595093	453	3	67	A.1.1.1	1	14012	0.84	0.04	0.03	0.09	0.84	0.00	0.35	-0.26	-0.22	-0.24	0.35	-0.2883	0.0248	1.0	1.0	0.3	1.0	A-	A+
Math	5	541902	454	3	68	C.2.1.1	1	14012	0.78	0.14	0.78	0.05	0.03	0.00	0.36	-0.29	0.36	-0.25	-0.20	0.1331	0.0226	3.5	1.0	4.1	1.1		
Math	5	594346	455	3	69	A.2.1.3	2	14012	0.60	0.17	0.10	0.13	0.60	0.00	0.50	-0.43	-0.43	-0.40	0.50	1.2407	0.0195	-8.6	0.9	-8.2	0.9	A+	A-
Math	5	593103	456	3	70	C.1.2.1	1	14012	0.65	0.08	0.65	0.25	0.03	0.00	0.43	-0.31	0.43	-0.39	-0.28	0.9459	0.0200	2.1	1.0	-0.5	1.0	A-	A-
Math	5	564870	457	3	71	B.2.2.1	2	14012	0.61	0.28	0.61	0.08	0.04	0.00	0.45	-0.43	0.45	-0.30	-0.28	1.2138	0.0196	-0.7	1.0	-1.4	1.0	A+	A-
Math	5	544478	458	3	72	D.1.1.1	2	14012	0.57	0.21	0.57	0.14	0.08	0.00	0.44	-0.30	0.44	-0.39	-0.48	1.3834	0.0194	1.3	1.0	-1.0	1.0		
Math	5	594981	459	3	73	A.1.3.3	1	14012	0.69	0.69	0.21	0.05	0.04	0.00	0.51	0.51	-0.46	-0.31	-0.35	0.7235	0.0205	-9.1	0.9	-8.7	0.8	A-	A-
Math	5	566881	460	3	74	E.3.1.1	2	14012	0.73	0.03	0.03	0.20	0.73	0.00	0.48	-0.28	-0.32	-0.43	0.48	0.4609	0.0213	-7.0	0.9	-7.3	0.9	A-	C-
Math	5	564884	461	3	75	A.1.6.2	1	14012	0.68	0.10	0.11	0.68	0.11	0.00	0.49	-0.32	-0.39	0.49	-0.43	0.8136	0.0203	-7.0	0.9	-7.1	0.9	A+	A-
Math	5	566783	463	4	64	D.1.1.1	2	14017	0.92	0.03	0.92	0.03	0.02	0.00	0.39	-0.27	0.39	-0.25	-0.24	-1.2293	0.0333	-5.2	0.9	-8.0	0.6	A-	A-
Math	5	566831	464	4	65	E.1.1.1	2	14017	0.88	0.01	0.02	0.88	0.08	0.00	0.49	-0.18	-0.21	0.49	-0.47	-0.6943	0.0281	-9.9	0.8	-9.9	0.6	A-	C-
Math	5	595072	465	4	66	A.1.3.3	2	14017	0.52	0.52	0.15	0.22	0.11	0.00	0.47	0.47	-0.39	-0.49	-0.30	1.6815	0.0192	-4.6	1.0	-2.9	1.0	A-	A-
Math	5	595071	466	4	67	A.1.2.1	1	14017	0.83	0.12	0.02	0.03	0.83	0.00	0.46	-0.39	-0.24	-0.31	0.46	-0.1562	0.0244	-6.2	0.9	-8.2	0.8	A+	A-
Math	5	544640	467	4	68	E.3.1.2	2	14017	0.79	0.05	0.03	0.13	0.79	0.00	0.37	-0.29	-0.28	-0.25	0.37	0.0843	0.0231	2.2	1.0	5.4	1.2		
Math	5	594466	468	4	69	A.3.1.1	2	14017	0.70	0.17	0.70	0.05	0.07	0.00	0.47	-0.39	0.47	-0.32	-0.36	0.7012	0.0207	-4.4	1.0	-3.4	0.9	A-	A-
Math	5	595043	469	4	70	A.1.4.1	1	14017	0.83	0.83	0.13	0.03	0.01	0.00	0.45	0.45	-0.38	-0.32	-0.21	-0.2260	0.0248	-6.4	0.9	-6.0	0.8	A-	A-
Math	5	593119	470	4	71	C.2.1.1	1	14017	0.88	0.07	0.88	0.04	0.01	0.00	0.34	-0.26	0.34	-0.22	-0.17	-0.7135	0.0283	-1.3	1.0	1.6	1.1	A+	C-
Math	5	594343	471	4	72	B.1.1.1	2	14017	0.77	0.05	0.07	0.11	0.77	0.00	0.32	-0.25	-0.27	-0.19	0.32	0.2651	0.0223	7.9	1.1	9.0	1.2	A-	B-
Math	5	564863	472	4	73	D.2.1.2	2	14017	0.87	0.87	0.05	0.06	0.02	0.00	0.42	0.42	-0.27	-0.33	-0.24	-0.5517	0.0270	-5.3	0.9	-5.0	0.8	A+	B-
Math	5	541845	473	4	74	A.2.1.1	1	14017	0.82	0.82	0.05	0.06	0.07	0.00	0.51	0.51	-0.37	-0.41	-0.32	-0.0834	0.0240	-9.9	0.9	-9.9	0.7		
Math	5	594393	474	4	75	B.1.3.2	2	14017	0.45	0.19	0.27	0.45	0.09	0.00	0.33	-0.47	-0.21	0.33	-0.28	2.0930	0.0193	9.9	1.1	9.9	1.2	A+	A-
Math	5	566784	476	5	64	D.1.1.2	2	14065	0.54	0.30	0.11	0.54	0.05	0.00	0.58	-0.59	-0.48	0.58	-0.35	1.5738	0.0192	-9.9	0.8	-9.9	0.8	A-	A-
Math	5	594990	477	5	65	A.1.2.1	1	14065	0.72	0.06	0.17	0.05	0.72	0.00	0.51	-0.47	-0.42	-0.25	0.51	0.6135	0.0209	-9.3	0.9	-9.3	0.8	A+	A-
Math	5	593115	478	5	66	B.2.2.2	1	14065	0.69	0.07	0.22	0.02	0.69	0.00	0.49	-0.41	-0.43	-0.23	0.49	0.8080	0.0204	-6.8	0.9	-8.2	0.9	A+	A-
Math	5	566762	479	5	67	E.3.1.1	2	14065	0.74	0.09	0.74	0.09	0.08	0.00	0.38	-0.26	0.38	-0.31	-0.28	0.4854	0.0213	3.9	1.0	1.6	1.0	A-	B-
Math	5	594463	480	5	68	A.3.1.1	2	14065	0.79	0.05	0.07	0.79	0.09	0.00	0.46	-0.33	-0.29	0.46	-0.37	0.1565	0.0226	-5.7	0.9	-4.5	0.9	A-	A-
Math	5	544664	481	5	69	A.2.1.3	1	14065	0.72	0.12	0.04	0.72	0.12	0.00	0.39	-0.28	-0.31	0.39	-0.30	0.5971	0.0210	4.2	1.0	3.0	1.1		
Math	5	594412	482	5	70	B.1.1.1	2	14065	0.64	0.21	0.64	0.04	0.11	0.00	0.28	-0.25	0.28	-0.20	-0.21	1.0784	0.0198	9.9	1.2	9.9	1.3	A-	A-
Math	5	593118	483	5	71	C.1.2.1	1	14065	0.64	0.64	0.04	0.18	0.14	0.00	0.35	0.35	-0.18	-0.24	-0.37	1.0457	0.0198	9.9	1.1	7.4	1.1	A-	A-
Math	5	594392	484	5	72	B.1.3.1	2	14065	0.73	0.73	0.03	0.07	0.18	0.00	0.21	0.21	-0.19	-0.10	-0.18	0.5479	0.0211	9.9	1.2	9.9	1.5	A+	A-
Math	5	544452	485	5	73	D.2.1.2	1	14065	0.82	0.10	0.82	0.04	0.03	0.00	0.49	-0.42	0.49	-0.36	-0.24	-0.1100	0.0240	-9.2	0.9	-9.9	0.7		
Math	5	566900	486	5	74	E.2.1.1	1	14065	0.72	0.09	0.72	0.16	0.04	0.00	0.46	-0.26	0.46	-0.44	-0.35	0.6274	0.0209	-3.8	1.0	-2.9	0.9	B+	A+
Math	5	595059	487	5	75	A.1.4.2	1	14065	0.71	0.01	0.02	0.71	0.26	0.00	0.40	-0.25	-0.21	0.40	-0.37	0.6564	0.0208	3.2	1.0	3.9	1.1	B-	A-
Math	5	564869	489	6	64	C.1.1.1	2	14009	0.51	0.03	0.12	0.34	0.51	0.00	0.35	-0.37	-0.41	-0.27	0.35	1.7418	0.0191	9.9	1.1	9.9	1.2	A-	A-
Math	5	564885	490	6	65	A.2.1.1	2	14009	0.52	0.16	0.52	0.09	0.24	0.00	0.48	-0.35	0.48	-0.47	-0.46	1.7061	0.0191	-7.1	1.0	-5.3	0.9	A+	A-
Math	5	593135	491	6	66	C.2.1.1	1	14009																			

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Math	5	566792	492	6	67	E.1.1.1	2	14009	0.81	0.03	0.05	0.12	0.81	0.00	0.43	-0.29	-0.29	-0.33	0.43	-0.0007	0.0234	-4.3	0.9	-2.9	0.9	A+	A-
Math	5	566827	493	6	68	D.1.1.2	2	14009	0.70	0.09	0.13	0.08	0.70	0.00	0.39	-0.28	-0.29	-0.34	0.39	0.7226	0.0206	3.6	1.0	1.4	1.0	A+	A-
Math	5	540055	494	6	69	B.2.2.3	2	14009	0.84	0.84	0.07	0.06	0.02	0.00	0.36	0.36	-0.31	-0.19	-0.24	-0.2999	0.0252	-0.7	1.0	1.4	1.1		
Math	5	594448	495	6	70	A.2.1.3	2	14009	0.61	0.61	0.15	0.11	0.12	0.00	0.45	0.45	-0.40	-0.36	-0.33	1.2234	0.0195	-2.4	1.0	-4.3	0.9	A+	A+
Math	5	594423	496	6	71	B.1.3.1	2	14009	0.40	0.52	0.04	0.04	0.40	0.00	0.27	-0.24	-0.29	-0.27	0.27	2.3298	0.0195	9.9	1.2	9.9	1.4	A+	A-
Math	5	594987	497	6	72	A.1.4.2	1	14009	0.76	0.10	0.05	0.76	0.09	0.00	0.37	-0.35	-0.16	0.37	-0.25	0.3292	0.0219	2.5	1.0	5.1	1.1	A-	A-
Math	5	541815	498	6	73	A.1.1.1	1	14009	0.77	0.77	0.08	0.06	0.08	0.00	0.45	0.45	-0.33	-0.35	-0.29	0.2536	0.0222	-4.7	1.0	-7.7	0.8		
Math	5	564860	499	6	74	E.3.1.2	2	14009	0.64	0.29	0.04	0.64	0.04	0.00	0.43	-0.38	-0.36	0.43	-0.30	1.0805	0.0197	-0.3	1.0	-2.6	1.0	A-	A-
Math	5	594991	500	6	75	A.1.2.2	1	14009	0.74	0.74	0.03	0.11	0.12	0.00	0.48	0.48	-0.26	-0.35	-0.43	0.4816	0.0213	-7.5	0.9	-6.8	0.9	A-	A-
Math	5	593132	502	7	64	B.2.2.3	2	14005	0.52	0.06	0.52	0.19	0.22	0.00	0.44	-0.30	0.44	-0.55	-0.28	1.6631	0.0191	-2.6	1.0	-1.2	1.0	A-	A-
Math	5	594979	503	7	65	A.1.5.1	2	14005	0.67	0.03	0.08	0.22	0.67	0.00	0.40	-0.20	-0.32	-0.35	0.40	0.8779	0.0201	3.8	1.0	-1.1	1.0	A-	A+
Math	5	594986	504	7	66	A.1.6.1	1	14005	0.47	0.19	0.47	0.19	0.16	0.00	0.37	-0.43	0.37	-0.33	-0.25	1.9585	0.0191	7.6	1.1	9.5	1.1	A+	A-
Math	5	566768	505	7	67	E.3.1.2	2	14005	0.84	0.07	0.04	0.84	0.06	0.00	0.41	-0.30	-0.25	0.41	-0.30	-0.2658	0.0249	-4.9	0.9	-3.1	0.9	A+	B-
Math	5	593039	506	7	68	C.2.1.1	1	14005	0.59	0.59	0.13	0.07	0.20	0.00	0.31	0.31	-0.36	-0.22	-0.20	1.3063	0.0194	9.9	1.2	9.9	1.2	A-	B-
Math	5	544461	507	7	69	D.2.1.2	1	14005	0.74	0.06	0.03	0.74	0.17	0.00	0.33	-0.39	-0.27	0.33	-0.17	0.4632	0.0213	7.7	1.1	8.9	1.2		
Math	5	594347	508	7	70	A.2.1.1	2	14005	0.78	0.09	0.78	0.07	0.06	0.00	0.47	-0.42	0.47	-0.28	-0.29	0.1798	0.0225	-7.0	0.9	-9.4	0.8	A+	A-
Math	5	593037	509	7	71	B.1.3.2	2	14005	0.40	0.27	0.21	0.40	0.11	0.00	0.30	-0.35	-0.21	0.30	-0.29	2.3004	0.0194	9.9	1.1	9.9	1.3	A+	A-
Math	5	566870	510	7	72	D.1.1.2	2	14005	0.87	0.87	0.03	0.07	0.03	0.00	0.29	0.29	-0.19	-0.21	-0.16	-0.5597	0.0270	1.5	1.0	3.7	1.2	A+	A-
Math	5	544577	511	7	73	A.1.2.2	1	14005	0.74	0.74	0.06	0.02	0.17	0.00	0.30	0.30	-0.32	-0.26	-0.17	0.4520	0.0214	9.9	1.1	8.6	1.2		
Math	5	594449	512	7	74	A.3.1.1	1	14005	0.79	0.02	0.06	0.79	0.13	0.00	0.39	-0.28	-0.36	0.39	-0.26	0.1569	0.0226	-0.6	1.0	-0.7	1.0	A+	A-
Math	5	566901	513	7	75	E.1.1.1	2	14005	0.65	0.04	0.65	0.05	0.25	0.00	0.18	-0.26	0.18	-0.30	-0.05	0.9848	0.0199	9.9	1.3	9.9	1.6	A-	A-
Math	5	593095	515	8	64	B.2.1.1	1	14014	0.95	0.03	0.01	0.95	0.01	0.00	0.18	-0.10	-0.13	0.18	-0.11	-1.7660	0.0408	0.2	1.0	5.5	1.5	A+	B-
Math	5	566767	516	8	65	E.2.1.2	1	14014	0.88	0.02	0.03	0.07	0.88	0.00	0.31	-0.20	-0.15	-0.24	0.31	-0.6959	0.0281	0.7	1.0	1.9	1.1	A+	A-
Math	5	594465	517	8	66	A.2.1.3	2	14014	0.59	0.22	0.10	0.08	0.59	0.00	0.50	-0.40	-0.45	-0.45	0.50	1.3152	0.0194	-9.0	0.9	-8.5	0.9	A-	A-
Math	5	593136	518	8	67	C.2.1.2	1	14014	0.73	0.01	0.73	0.21	0.05	0.00	0.25	-0.16	0.25	-0.16	-0.30	0.5131	0.0212	9.9	1.2	9.9	1.4	A+	B-
Math	5	594992	519	8	68	A.1.3.1	1	14014	0.90	0.90	0.05	0.04	0.01	0.00	0.35	0.35	-0.26	-0.23	-0.19	-0.8627	0.0296	-2.6	1.0	-2.9	0.9	A+	C-
Math	5	566764	520	8	69	D.1.2.1	2	14014	0.89	0.89	0.04	0.03	0.04	0.00	0.45	0.45	-0.28	-0.28	-0.33	-0.7440	0.0285	-7.3	0.9	-9.1	0.7	A+	A-
Math	5	544582	521	8	70	A.1.4.1	1	14014	0.70	0.24	0.70	0.05	0.01	0.00	0.33	-0.27	0.33	-0.29	-0.22	0.7370	0.0205	9.9	1.1	8.4	1.2		
Math	5	593099	522	8	71	B.2.2.2	1	14014	0.80	0.03	0.14	0.80	0.03	0.00	0.44	-0.30	-0.38	0.44	-0.20	0.0879	0.0230	-3.3	1.0	-7.0	0.8	A+	A-
Math	5	594446	523	8	72	A.2.1.1	2	14014	0.82	0.07	0.82	0.07	0.04	0.00	0.50	-0.37	0.50	-0.37	-0.30	-0.1101	0.0240	-9.7	0.9	-9.9	0.7	A+	A-
Math	5	544433	524	8	73	E.1.1.1	1	14014	0.67	0.12	0.14	0.67	0.07	0.00	0.43	-0.41	-0.32	0.43	-0.28	0.8934	0.0202	0.0	1.0	0.0	1.0		
Math	5	593133	525	8	74	C.1.1.2	2	14014	0.31	0.32	0.31	0.21	0.15	0.00	0.18	-0.12	0.18	-0.19	-0.32	2.7982	0.0204	9.9	1.2	9.9	1.7	A-	A-
Math	5	595076	526	8	75	A.1.5.1	2	14014	0.74	0.09	0.74	0.08	0.09	0.00	0.57	-0.46	0.57	-0.36	-0.49	0.4885	0.0213	-9.9	0.8	-9.9	0.7	A-	A-
Math	5	566763	528	9	64	E.2.1.1	1	13989	0.74	0.16	0.05	0.74	0.05	0.00	0.51	-0.47	-0.30	0.51	-0.31	0.4994	0.0213	-9.9	0.9	-9.9	0.8	A+	A+
Math	5	566829	529	9	65	D.2.1.1	1	13989	0.70	0.70	0.08	0.17	0.04	0.00	0.24	0.24	-0.19	-0.16	-0.23	0.6958	0.0206	9.9	1.2	9.9	1.5	A+	A+
Math	5	595000	530	9	66	A.1.3.2	1	13989	0.50	0.50	0.09	0.30	0.12	0.00	0.45	0.45	-0.28	-0.42	-0.50	1.7966	0.0191	-3.7	1.0	-1.1	1.0	A-	A+
Math	5	593098	531	9	67	B.2.1.1	1	13989	0.96	0.02	0.01	0.96	0.01	0.00	0.17	-0.09	-0.11	0.17	-0.12	-1.9865	0.0450	0.0	1.0	4.3	1.4	A+	A-
Math	5	595045	532	9	68	A.1.5.1	2	13989	0.96	0.01	0.01	0.96	0.02	0.00	0.25	-0.12	-0.12	0.25	-0.20	-1.9399	0.0441	-1.7	0.9	-1.2	0.9	A+	B-
Math	5	593116	533	9	69	C.1.1.1	1	13989	0.39	0.30	0.18	0.13	0.39	0.00	0.34	-0.37	-0.38	-0.20	0.34	2.3886	0.0196	8.8	1.1	9.9	1.2	A-	A-
Math	5	544566	534	9	70	A.1.6.1	1	13989	0.65	0.21	0.06	0.09	0.65	0.00	0.49	-0.40	-0.42	-0.39	0.49	1.0404	0.0198	-6.8	0.9	-6.9	0.9		
Math	5	594461	535	9	71	A.2.1.1	2	13989	0.77	0.09	0.77	0.11	0.04	0.00	0.45	-0.39	0.45	-0.34	-0.25	0.2906	0.0221	-5.3	0.9	-3.8	0.9	A+	A-
Math	5	544473	536	9	72	C.2.1.2	1	13989	0.56	0.03	0.33	0.56	0.08	0.00	0.33	-0.22	-0.27	0.33	-0.39	1.4906	0.0192	9.9	1.1	9.9	1.2		
Math	5	594349	537	9	73	A.3.1.1	1	13989	0.83	0.05	0.05	0.83	0.07	0.00	0.37	-0.29	-0.26	0.37	-0.22	-0.1995	0.0246	-1.0	1.0	-0.8	1.0	A-	A-
Math	5	593036	538	9	74	B.2.2.3	2	13989	0.59	0.07	0.59	0.23	0.11	0.00	0.52	-0.37	0.52	-0.46	-0.50	1.3498	0.0194	-9.9	0.9	-9.9	0.9	A-	A-
Math	5	566828	539	9	75	D.1.2.1	2	13989	0.70	0.70	0.19	0.05	0.06	0.00	0.16	0.16	-0.05	-0.22	-0.17	0.7286	0.0206	9.9	1.3	9.9	1.5	A+	A-
Math	6	542565	541	0	1	A.1.1.1	1	126263	0.76	0.18	0.01	0.05	0.76	0.00	0.56	-0.55	-0.18	-0.31	0.56	-0.0344	0.0073	-9.9	0.8	-9.9	0.7		
Math	6	542605	542	0	2	A.3.2.1	1	126263	0.64	0.12	0.64	0.17	0.07	0.00	0.29	-0.25	0.29	-0.25	-0.18	0.6909	0.0066	9.9	1.2	9.9	1.2		
Math	6	551181	543	0	3	A.3.1.1	1	126263	0.72	0.08	0.10	0.10	0.72	0.00	0.47	-0.43	-0.35	-0.31	0.47	0.2588	0.0069	-9.9	0.9	-9.9	0.9		
Math	6	545115	544	0	4	A.3.1.1	2	126263	0.63	0.02	0.63	0.21	0.13	0.00	0.43	-0.14	0.43	-0.34	-0.45	0.7558	0.0065	3.2	1.0	5.0	1.0		
Math	6	551202	545	0	5	C.1.1.1	1	126263	0.89	0.89	0.07	0.04	0.00	0.00	0.41	0.41	-0.32	-0.31	-0.12	-1.1517	0.0096	-9.9	0.9	-9.9	0.7		
Math	6	556622	546	0	6	A.1.4.1	2	126263	0.76	0																	

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Math	6	545047	547	0	7	D.2.2.1	1	126263	0.61	0.14	0.04	0.61	0.21	0.00	0.39	-0.41	-0.29	0.39	-0.27	0.8849	0.0065	9.9	1.0	5.5	1.0		
Math	6	542590	548	0	8	B.1.1.1	2	126263	0.60	0.04	0.60	0.15	0.21	0.00	0.49	-0.31	0.49	-0.54	-0.36	0.9404	0.0065	-9.9	0.9	-9.9	0.9		
Math	6	551264	549	0	9	E.3.1.1	2	126263	0.65	0.17	0.05	0.65	0.13	0.00	0.59	-0.53	-0.42	0.59	-0.50	0.6452	0.0066	-9.9	0.8	-9.9	0.7		
Math	6	545216	550	0	10	C.1.2.2	1	126263	0.79	0.12	0.79	0.02	0.08	0.00	0.34	-0.28	0.34	-0.17	-0.24	-0.1960	0.0075	9.9	1.1	8.5	1.1		
Math	6	556606	551	0	11	A.1.2.1	1	126263	0.72	0.72	0.12	0.12	0.04	0.00	0.33	0.33	-0.44	-0.08	-0.20	0.2333	0.0070	9.9	1.1	9.9	1.2		
Math	6	545185	552	0	12	B.2.1.3		126263	0.73	0.01	0.73	0.23	0.03	0.00	0.39	-0.21	0.39	-0.37	-0.20	0.1944	0.0070	7.5	1.0	8.6	1.1		
Math	6	551249	553	0	13	D.2.2.1	1	126263	0.66	0.10	0.05	0.19	0.66	0.00	0.42	-0.47	-0.33	-0.26	0.42	0.6113	0.0066	3.5	1.0	-1.0	1.0		
Math	6	549531	554	0	14	A.1.3.2	1	126263	0.58	0.32	0.05	0.58	0.05	0.00	0.37	-0.35	-0.31	0.37	-0.21	1.0281	0.0064	9.9	1.1	9.9	1.1		
Math	6	542786	555	0	15	E.3.1.2	2	126263	0.61	0.26	0.61	0.07	0.06	0.00	0.39	-0.40	0.39	-0.23	-0.16	0.8985	0.0065	9.9	1.1	8.1	1.0		
Math	6	556668	556	0	16	C.3.1.1	1	126263	0.67	0.02	0.02	0.29	0.67	0.00	0.30	-0.18	-0.14	-0.28	0.30	0.5472	0.0067	9.9	1.2	9.9	1.3		
Math	6	551235	557	0	17	D.1.2.1	1	126263	0.87	0.87	0.04	0.04	0.06	0.00	0.44	0.44	-0.26	-0.35	-0.28	-0.8938	0.0089	-9.9	0.9	-9.9	0.7		
Math	6	545064	558	0	18	C.1.1.3	1	126263	0.75	0.75	0.04	0.11	0.10	0.00	0.49	0.49	-0.35	-0.49	-0.23	0.0220	0.0072	-9.9	0.9	-9.9	0.8		
Math	6	556631	559	0	19	B.2.1.1	1	126263	0.70	0.70	0.15	0.06	0.10	0.00	0.41	0.41	-0.39	-0.30	-0.23	0.3635	0.0068	4.6	1.0	1.2	1.0		
Math	6	545075	560	0	20	D.2.1.2	2	126263	0.80	0.16	0.03	0.02	0.80	0.00	0.33	-0.24	-0.29	-0.25	0.33	-0.2797	0.0077	9.9	1.1	9.9	1.2		
Math	6	545098	561	0	21	B.2.3.1	1	126263	0.81	0.03	0.11	0.05	0.81	0.00	0.44	-0.30	-0.32	-0.34	0.44	-0.4186	0.0079	-9.9	0.9	-9.9	0.9		
Math	6	551262	562	0	22	E.1.1.3	2	126263	0.75	0.75	0.20	0.03	0.02	0.00	0.35	0.35	-0.32	-0.16	-0.24	0.0572	0.0072	9.9	1.1	4.5	1.0		
Math	6	544999	563	0	23	E.2.1.1	2	126263	0.79	0.10	0.09	0.79	0.03	0.00	0.37	-0.35	-0.19	0.37	-0.26	-0.2173	0.0076	3.9	1.0	9.9	1.1		
Math	6	545126	564	0	24	A.1.1.4	1	126263	0.87	0.04	0.87	0.06	0.02	0.00	0.49	-0.31	0.49	-0.42	-0.23	-0.9018	0.0090	-9.9	0.9	-9.9	0.7		
Math	6	545203	567	0	50	C.3.1.1	1	126263	0.88	0.00	0.11	0.01	0.88	0.00	0.36	-0.12	-0.34	-0.10	0.36	-1.0278	0.0093	-4.5	1.0	-6.8	0.9		
Math	6	545212	568	0	51	D.1.1.1	2	126263	0.87	0.02	0.08	0.87	0.03	0.00	0.29	-0.16	-0.22	0.29	-0.18	-0.8973	0.0089	8.9	1.1	6.2	1.1		
Math	6	551205	569	0	52	C.1.1.2	1	126263	0.53	0.08	0.10	0.53	0.29	0.00	0.41	-0.43	-0.30	0.41	-0.36	1.3046	0.0064	9.9	1.0	9.9	1.0		
Math	6	551299	570	0	53	A.1.1.2	1	126263	0.72	0.12	0.72	0.06	0.10	0.00	0.48	-0.39	0.48	-0.20	-0.47	0.2296	0.0070	-9.9	0.9	-9.9	0.8		
Math	6	545121	571	0	54	D.2.1.1	1	126263	0.68	0.06	0.07	0.19	0.68	0.00	0.39	-0.30	-0.28	-0.33	0.39	0.4818	0.0067	9.9	1.0	9.9	1.1		
Math	6	545111	572	0	55	A.2.1.1	1	126263	0.53	0.53	0.16	0.21	0.10	0.00	0.35	0.35	-0.25	-0.33	-0.32	1.3101	0.0064	9.9	1.1	9.9	1.1		
Math	6	545030	573	0	56	E.1.1.1	2	126263	0.77	0.04	0.06	0.13	0.77	0.00	0.32	-0.19	-0.27	-0.22	0.32	-0.0962	0.0074	9.9	1.1	9.9	1.2		
Math	6	551198	574	0	57	B.2.1.3	1	126263	0.71	0.10	0.03	0.71	0.17	0.00	0.36	-0.26	-0.26	0.36	-0.30	0.3323	0.0069	9.9	1.1	9.9	1.1		
Math	6	545176	575	0	58	A.1.4.1	2	126263	0.68	0.20	0.06	0.68	0.05	0.00	0.59	-0.61	-0.33	0.59	-0.29	0.4601	0.0067	-9.9	0.8	-9.9	0.7		
Math	6	545059	576	0	59	D.2.1.1	1	126263	0.82	0.10	0.05	0.03	0.82	0.00	0.47	-0.35	-0.34	-0.32	0.47	-0.4322	0.0079	-9.9	0.9	-9.9	0.8		
Math	6	545096	577	0	60	B.2.2.1	2	126263	0.74	0.13	0.74	0.09	0.04	0.00	0.48	-0.42	0.48	-0.35	-0.29	0.1113	0.0071	-9.9	0.9	-9.9	0.9		
Math	6	556598	578	0	61	A.1.1.2	1	126263	0.67	0.11	0.13	0.67	0.08	0.00	0.44	-0.32	-0.41	0.44	-0.29	0.5277	0.0067	-4.0	1.0	-9.9	0.9		
Math	6	542587	579	0	94	E.3.1.1	2	126263	0.88	0.06	0.88	0.04	0.03	0.00	0.39	-0.32	0.39	-0.25	-0.18	-0.9773	0.0092	-9.1	1.0	-8.3	0.9		
Math	6	542735	580	0	95	A.1.1.3	1	126263	0.80	0.08	0.05	0.80	0.07	0.00	0.37	-0.25	-0.25	0.37	-0.28	-0.3210	0.0077	4.6	1.0	0.5	1.0		
Math	6	556623	581	0	96	A.2.1.1	1	126263	0.88	0.88	0.03	0.04	0.04	0.00	0.43	0.43	-0.27	-0.29	-0.29	-1.0560	0.0094	-9.9	0.9	-9.9	0.7		
Math	6	556677	582	0	97	D.1.2.1	2	126263	0.78	0.78	0.05	0.07	0.10	0.00	0.34	0.34	-0.30	-0.26	-0.19	-0.1771	0.0075	9.9	1.1	9.9	1.2		
Math	6	545205	583	0	98	C.1.2.1	1	126263	0.80	0.03	0.13	0.04	0.80	0.00	0.34	-0.28	-0.26	-0.20	0.34	-0.2895	0.0077	9.9	1.1	9.9	1.1		
Math	6	545009	584	0	99	E.3.1.2	2	126263	0.82	0.04	0.06	0.08	0.82	0.00	0.46	-0.31	-0.33	-0.32	0.46	-0.4858	0.0080	-9.9	0.9	-9.9	0.8		
Math	6	556615	585	0	100	A.1.3.2	1	126263	0.82	0.07	0.09	0.82	0.03	0.00	0.41	-0.32	-0.30	0.41	-0.19	-0.4289	0.0079	-4.7	1.0	-8.8	0.9		
Math	6	542580	586	0	101	A.1.3.1	2	126263	0.44	0.11	0.44	0.14	0.31	0.00	0.30	-0.33	0.30	-0.33	-0.24	1.7762	0.0064	9.9	1.1	9.9	1.3		
Math	6	542572	587	0	102	C.1.2.1	1	126263	0.53	0.19	0.11	0.53	0.16	0.00	0.41	-0.39	-0.48	0.41	-0.23	1.2845	0.0064	9.9	1.0	9.9	1.1		
Math	6	542716	588	0	103	C.3.1.1	2	126263	0.89	0.10	0.89	0.01	0.01	0.00	0.36	-0.33	0.36	-0.15	-0.13	-1.0834	0.0094	-5.1	1.0	-8.7	0.9		
Math	6	556688	589	0	104	D.2.1.2	1	126263	0.56	0.34	0.05	0.04	0.56	0.00	0.45	-0.40	-0.39	-0.35	0.45	1.1186	0.0064	-9.9	1.0	-9.9	1.0		
Math	6	551187	590	0	105	B.1.1.1	1	126263	0.61	0.06	0.61	0.23	0.11	0.00	0.49	-0.29	0.49	-0.43	-0.46	0.9030	0.0065	-9.9	0.9	-9.9	0.9		
Math	6	556605	591	0	106	A.1.1.4	1	126263	0.88	0.02	0.08	0.88	0.02	0.00	0.50	-0.25	-0.45	0.50	-0.23	-0.9961	0.0092	-9.9	0.8	-9.9	0.6		
Math	6	545035	592	0	107	E.2.1.1	2	126263	0.65	0.07	0.20	0.08	0.65	0.00	0.48	-0.35	-0.48	-0.26	0.48	0.6522	0.0066	-9.9	0.9	-9.9	0.9		
Math	6	545025	593	0	108	E.1.1.2	2	126263	0.82	0.82	0.01	0.14	0.02	0.00	0.30	0.30	-0.20	-0.22	-0.26	-0.4399	0.0079	9.9	1.1	9.9	1.2		
Math	6	551233	594	0	109	D.1.2.1	1	126263	0.80	0.04	0.08	0.09	0.80	0.00	0.48	-0.32	-0.34	-0.38	0.48	-0.2986	0.0077	-9.9	0.9	-9.9	0.8		
Math	6	557952	595	0	110	B.1.1.1	2	126263	0.52	0.31	0.11	0.06	0.52	0.00	0.41	-0.42	-0.25	-0.41	0.41	1.3492	0.0064	9.9	1.0	9.9	1.1		
Math	6	556697	596	0	111	D.2.2.1	1	126263	0.68	0.68	0.17	0.08	0.07	0.00	0.38	0.38	-0.26	-0.31	-0.34	0.5007	0.0067	9.9	1.1	3.8	1.0		
Math	6	556718	597	0	112	E.3.1.1	2	126263	0.64	0.21	0.64	0.12	0.03	0.00	0.48	-0.41	0.48	-0.40	-0.35	0.7260	0.0066	-9.9	0.9	-9.9	0.9		
Math	6	556685	598	0	113	D.2.1.1	1	126263	0.76	0.76	0.13	0.08	0.03	0.00	0.48	0.48	-0.38	-0.36	-0.32	-0.0118	0.0073	-9.9	0.9	-9.9	0.8		
Math	6	551307	599	0	114	A.1.2.1	1	126263	0.67	0.07	0.67</																

## Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Math	6	542712	600	0	115	C.1.1.4	1	126263	0.49	0.11	0.21	0.19	0.49	0.00	0.45	-0.46	-0.43	-0.37	0.45	1.5118	0.0064	-9.9	1.0	-2.4	1.0		
Math	6	556639	601	0	116	B.2.2.1	1	126263	0.77	0.08	0.09	0.77	0.06	0.00	0.40	-0.35	-0.25	0.40	-0.26	-0.1163	0.0074	-0.8	1.0	3.8	1.0		
Math	6	545040	602	0	117	D.1.2.1	2	126263	0.85	0.85	0.07	0.04	0.04	0.00	0.42	0.42	-0.27	-0.30	-0.31	-0.7292	0.0085	-9.9	0.9	-9.9	0.9		
Math	6	566874	604	1	62	E.2.1.1	2	14289	0.55	0.08	0.55	0.10	0.28	0.00	0.40	-0.46	0.40	-0.22	-0.37	1.1700	0.0190	6.0	1.1	6.5	1.1	A-	A-
Math	6	566866	605	1	63	D.2.1.2	1	14289	0.88	0.88	0.05	0.02	0.05	0.00	0.40	0.40	-0.30	-0.27	-0.24	-1.0361	0.0274	-4.2	0.9	-5.0	0.8	A+	A-
Math	6	595049	606	1	64	A.1.1.2	1	14289	0.45	0.32	0.45	0.14	0.09	0.00	0.22	-0.10	0.22	-0.37	-0.25	1.6859	0.0191	9.9	1.3	9.9	1.4	A+	A+
Math	6	566876	607	1	65	E.3.1.2	2	14289	0.64	0.09	0.06	0.21	0.64	0.00	0.53	-0.53	-0.37	-0.44	0.53	0.6494	0.0197	-9.9	0.9	-9.9	0.8	A+	B-
Math	6	595068	608	1	66	A.3.2.1	2	14289	0.61	0.03	0.61	0.19	0.17	0.00	0.49	-0.32	0.49	-0.40	-0.46	0.8355	0.0194	-7.3	0.9	-6.5	0.9	A-	B-
Math	6	551208	609	1	67	C.1.1.2	1	14289	0.80	0.06	0.06	0.80	0.07	0.00	0.47	-0.38	-0.35	0.47	-0.28	-0.3843	0.0232	-6.8	0.9	-6.5	0.8		
Math	6	566889	610	1	68	D.2.1.2	1	14289	0.79	0.12	0.04	0.05	0.79	0.00	0.52	-0.45	-0.30	-0.35	0.52	-0.2465	0.0225	-9.9	0.9	-9.9	0.7	A+	A-
Math	6	594384	611	1	69	B.1.1.1	2	14289	0.55	0.06	0.55	0.21	0.18	0.00	0.48	-0.30	0.48	-0.47	-0.42	1.1281	0.0191	-5.2	1.0	-3.5	1.0	B-	A-
Math	6	595052	612	1	70	A.2.1.1	1	14289	0.65	0.13	0.09	0.13	0.65	0.00	0.39	-0.34	-0.32	-0.29	0.39	0.6011	0.0198	6.1	1.1	2.1	1.0	A+	A+
Math	6	593144	613	1	71	C.3.1.1	1	14289	0.87	0.01	0.01	0.11	0.87	0.00	0.40	-0.16	-0.20	-0.36	0.40	-0.9086	0.0264	-3.1	1.0	-4.3	0.9	A+	A-
Math	6	594408	614	1	72	C.1.1.1	2	14289	0.73	0.73	0.08	0.12	0.08	0.00	0.44	0.44	-0.35	-0.31	-0.37	0.1642	0.0209	-1.9	1.0	-2.6	1.0	A-	A-
Math	6	542813	615	1	73	D.1.2.1	2	14289	0.79	0.12	0.05	0.04	0.79	0.00	0.49	-0.38	-0.35	-0.35	0.49	-0.2452	0.0225	-8.3	0.9	-8.6	0.8		
Math	6	593069	617	2	62	D.1.1.1	2	14041	0.69	0.23	0.69	0.05	0.03	0.00	0.32	-0.25	0.32	-0.23	-0.33	0.4067	0.0203	9.9	1.1	9.9	1.3	A-	A-
Math	6	564883	618	2	63	A.3.2.1	2	14041	0.60	0.22	0.07	0.11	0.60	0.00	0.47	-0.35	-0.45	-0.44	0.47	0.9199	0.0193	-4.8	1.0	-2.9	1.0	A-	B-
Math	6	594419	619	2	64	B.1.1.1	2	14041	0.55	0.10	0.55	0.18	0.17	0.00	0.49	-0.30	0.49	-0.45	-0.49	1.1340	0.0191	-8.6	0.9	-6.5	0.9	B-	A-
Math	6	594999	620	2	65	A.1.1.1	1	14041	0.90	0.04	0.04	0.90	0.01	0.00	0.48	-0.39	-0.31	0.48	-0.22	-1.3221	0.0304	-9.0	0.8	-9.9	0.5	A-	A-
Math	6	545006	621	2	66	E.2.1.1	1	14041	0.70	0.70	0.11	0.05	0.14	0.00	0.48	0.48	-0.45	-0.37	-0.32	0.3532	0.0205	-6.1	0.9	-5.8	0.9		
Math	6	593117	622	2	67	C.1.2.1	1	14041	0.75	0.75	0.03	0.02	0.20	0.00	0.29	0.29	-0.22	-0.21	-0.23	0.0323	0.0215	9.9	1.1	9.9	1.2	A-	A-
Math	6	566871	623	2	68	E.1.1.2	2	14041	0.70	0.04	0.70	0.11	0.15	0.00	0.38	-0.34	0.38	-0.34	-0.25	0.3336	0.0205	4.1	1.0	4.2	1.1	A+	A-
Math	6	595050	624	2	69	A.1.3.1	1	14041	0.76	0.05	0.16	0.76	0.03	0.00	0.39	-0.33	-0.28	0.39	-0.30	-0.0189	0.0217	0.7	1.0	3.6	1.1	A+	A-
Math	6	545089	625	2	70	B.2.1.1		14041	0.74	0.03	0.15	0.07	0.74	0.00	0.53	-0.39	-0.50	-0.27	0.53	0.0881	0.0213	-9.9	0.9	-9.9	0.8		
Math	6	566761	626	2	71	E.3.1.1	2	14041	0.75	0.11	0.11	0.75	0.02	0.00	0.39	-0.39	-0.21	0.39	-0.28	0.0048	0.0216	0.5	1.0	5.3	1.1	A+	B-
Math	6	593087	627	2	72	C.1.1.4	2	14041	0.69	0.08	0.12	0.69	0.11	0.00	0.36	-0.36	-0.37	0.36	-0.12	0.3962	0.0204	6.9	1.1	7.6	1.1	A-	A-
Math	6	593071	628	2	73	D.2.1.1	1	14041	0.68	0.17	0.68	0.08	0.07	0.00	0.38	-0.24	0.38	-0.35	-0.35	0.4672	0.0202	6.0	1.1	4.5	1.1	A+	A-
Math	6	595064	630	3	62	A.1.1.3	1	14027	0.91	0.03	0.01	0.91	0.05	0.00	0.34	-0.24	-0.18	0.34	-0.22	-1.3440	0.0308	-2.2	1.0	-1.4	0.9	A+	A+
Math	6	564887	631	3	63	A.1.4.1	2	14027	0.59	0.06	0.30	0.05	0.59	0.00	0.53	-0.34	-0.54	-0.29	0.53	0.9653	0.0193	-9.9	0.9	-9.9	0.8	A-	A-
Math	6	594418	632	3	64	C.1.1.1	1	14027	0.89	0.89	0.02	0.04	0.04	0.00	0.32	0.32	-0.18	-0.18	-0.26	-1.1694	0.0291	-0.7	1.0	-1.5	0.9	A+	A-
Math	6	593053	633	3	65	D.1.1.1	2	14027	0.61	0.14	0.12	0.61	0.13	0.00	0.45	-0.37	-0.42	0.45	-0.33	0.8741	0.0194	-2.3	1.0	-3.2	1.0	A-	A-
Math	6	564858	634	3	66	C.1.2.2	1	14027	0.82	0.10	0.02	0.82	0.07	0.00	0.28	-0.23	-0.17	0.28	-0.16	-0.4402	0.0238	6.9	1.1	7.2	1.2	A+	A-
Math	6	551266	635	3	67	E.3.1.1	2	14027	0.70	0.18	0.70	0.06	0.07	0.00	0.60	-0.53	0.60	-0.40	-0.49	0.3838	0.0204	-9.9	0.8	-9.9	0.7		
Math	6	594404	636	3	68	B.2.1.2	2	14027	0.20	0.09	0.52	0.18	0.20	0.00	0.06	-0.13	0.00	-0.25	0.06	3.1568	0.0231	9.9	1.3	9.9	2.3	A-	A+
Math	6	566872	637	3	69	E.2.1.1	2	14027	0.52	0.23	0.17	0.52	0.09	0.00	0.42	-0.38	-0.34	0.42	-0.44	1.3561	0.0191	2.1	1.0	3.0	1.0	A+	A-
Math	6	593082	638	3	70	D.1.1.1	2	14027	0.90	0.02	0.04	0.90	0.04	0.00	0.44	-0.29	-0.30	0.44	-0.29	-1.2188	0.0296	-6.7	0.9	-9.9	0.6	A-	A-
Math	6	545177	639	3	71	A.2.1.1	2	14027	0.48	0.29	0.18	0.05	0.48	0.00	0.42	-0.46	-0.28	-0.41	0.42	1.5506	0.0191	0.8	1.0	1.5	1.0		
Math	6	594453	640	3	72	A.3.2.1	2	14027	0.55	0.25	0.55	0.13	0.08	0.00	0.44	-0.45	0.44	-0.34	-0.27	1.1856	0.0191	-3.2	1.0	-1.3	1.0	A-	A-
Math	6	566890	641	3	73	E.1.1.3	2	14027	0.75	0.13	0.07	0.75	0.05	0.00	0.35	-0.19	-0.32	0.35	-0.31	0.0521	0.0215	5.2	1.1	8.3	1.2	A+	A-
Math	6	593086	643	4	62	D.1.2.1	2	13942	0.73	0.10	0.06	0.73	0.11	0.00	0.42	-0.34	-0.36	0.42	-0.25	0.1588	0.0211	-0.9	1.0	-1.8	1.0	A+	A+
Math	6	595055	644	4	63	A.1.4.1	2	13942	0.93	0.01	0.93	0.04	0.02	0.00	0.28	-0.13	0.28	-0.20	-0.17	-1.6564	0.0344	-0.8	1.0	-1.5	0.9	A+	A-
Math	6	566862	645	4	64	D.2.1.2	1	13942	0.95	0.02	0.02	0.95	0.02	0.00	0.28	-0.16	-0.14	0.28	-0.22	-1.9678	0.0387	-1.9	0.9	-1.7	0.9	A+	A-
Math	6	545085	646	4	65	B.2.1.3	1	13942	0.57	0.57	0.03	0.25	0.15	0.00	0.37	0.37	-0.24	-0.24	-0.45	1.0771	0.0192	8.8	1.1	7.3	1.1		
Math	6	595009	647	4	66	A.1.1.3	1	13942	0.73	0.18	0.73	0.07	0.02	0.00	0.34	-0.24	0.34	-0.29	-0.28	0.1731	0.0211	6.6	1.1	8.6	1.2	A+	A+
Math	6	595056	648	4	67	A.2.1.1	1	13942	0.92	0.92	0.01	0.02	0.04	0.00	0.35	0.35	-0.21	-0.23	-0.22	-1.5679	0.0333	-3.2	0.9	-5.1	0.8	A+	A-
Math	6	593088	649	4	68	C.1.2.2	1	13942	0.67	0.16	0.10	0.67	0.07	0.00	0.36	-0.24	-0.33	0.36	-0.28	0.5061	0.0201	7.3	1.1	4.6	1.1	A-	A-
Math	6	594401	650	4	69	B.1.1.1	2	13942	0.36	0.28	0.36	0.17	0.20	0.00	0.26	-0.36	0.26	-0.15	-0.21	2.1456	0.0198	9.9	1.1	9.9	1.4	A-	A-
Math	6	542657	651	4	70	D.2.2.1	2	13942	0.75	0.75	0.17	0.06	0.03	0.00	0.43	0.43	-0.31	-0.40	-0.29	0.0709	0.0214	-3.0	1.0	-2.8	0.9		
Math	6	564878	652	4	71	C.1.1.3	1	13942	0.82	0.03	0.82	0.03	0.11	0.00	0.43	-0.26	0.43	-0.33	-0.33	-0.4812	0.0240	-5.1	0.9	-7.0	0.8	A+	A-
Math	6	594410	653	4	72	B.2.2.1	2	13942	0.79	0.79	0.07	0.07	0.08	0.00	0.24	0.24	-0.25	-0.18	-0.06	-0.2332	0.0227	9.9	1.1	9.9	1.4	A+	A-
Math	6	564864	654	4	73	E.3.1.1	2	1394																			

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Math	6	593070	656	5	62	D.1.2.1	2	13956	0.52	0.52	0.35	0.09	0.03	0.00	0.05	0.05	0.05	-0.21	-0.20	1.3123	0.0191	9.9	1.5	9.9	1.7	A+	A-
Math	6	566834	657	5	63	E.3.1.2	2	13956	0.44	0.19	0.44	0.25	0.11	0.00	0.44	-0.59	0.44	-0.35	-0.31	1.7184	0.0192	-3.5	1.0	-1.2	1.0	A-	B-
Math	6	594405	658	5	64	B.2.2.1	1	13956	0.93	0.03	0.02	0.93	0.02	0.00	0.20	-0.13	-0.15	0.20	-0.10	-1.6976	0.0349	1.7	1.0	3.4	1.2	A+	A-
Math	6	595051	659	5	65	A.2.1.1	1	13956	0.69	0.05	0.07	0.19	0.69	0.00	0.43	-0.31	-0.40	-0.33	0.43	0.4331	0.0204	-0.9	1.0	-1.0	1.0	A+	A-
Math	6	595002	660	5	66	A.1.2.1	1	13956	0.72	0.72	0.16	0.03	0.09	0.00	0.50	0.50	-0.53	-0.24	-0.26	0.2461	0.0209	-9.9	0.9	-8.4	0.8	A-	B-
Math	6	542649	661	5	67	B.1.1.1	2	13956	0.67	0.03	0.67	0.11	0.19	0.00	0.51	-0.26	0.51	-0.37	-0.50	0.5573	0.0201	-9.9	0.9	-9.9	0.8		
Math	6	593161	662	5	68	C.3.1.1	1	13956	0.79	0.79	0.02	0.10	0.09	0.00	0.33	0.33	-0.20	-0.30	-0.19	-0.2123	0.0227	5.2	1.1	7.9	1.2	A+	A-
Math	6	594407	663	5	69	C.1.1.1	2	13956	0.78	0.05	0.14	0.04	0.78	0.00	0.46	-0.38	-0.34	-0.33	0.46	-0.1422	0.0224	-6.4	0.9	-7.1	0.8	A+	B-
Math	6	593075	664	5	70	D.2.1.1	1	13956	0.61	0.61	0.33	0.03	0.03	0.00	0.45	0.45	-0.42	-0.38	-0.26	0.8539	0.0195	-2.0	1.0	-3.4	1.0	B+	A-
Math	6	594368	665	5	71	B.2.1.3	1	13956	0.77	0.07	0.03	0.77	0.12	0.00	0.42	-0.27	-0.27	0.42	-0.35	-0.1171	0.0223	-1.4	1.0	-3.5	0.9	A-	A-
Math	6	566891	666	5	72	E.2.1.1	1	13956	0.53	0.07	0.53	0.35	0.05	0.00	0.44	-0.48	0.44	-0.38	-0.41	1.3045	0.0191	-0.7	1.0	0.3	1.0	A+	A-
Math	6	544990	667	5	73	C.1.2.2		13956	0.84	0.03	0.11	0.02	0.84	0.00	0.41	-0.27	-0.33	-0.25	0.41	-0.6345	0.0250	-3.0	1.0	-4.4	0.9		
Math	6	593083	669	6	62	D.1.1.1	2	14064	0.76	0.07	0.76	0.11	0.06	0.00	0.35	-0.31	0.35	-0.15	-0.33	-0.0351	0.0219	4.8	1.1	7.1	1.2	A+	A-
Math	6	593129	670	6	63	C.1.2.1	1	14064	0.87	0.02	0.05	0.06	0.87	0.00	0.43	-0.28	-0.36	-0.25	0.43	-0.9007	0.0269	-6.5	0.9	-5.8	0.8	A+	C-
Math	6	595053	671	6	64	A.2.1.1	1	14064	0.90	0.02	0.06	0.90	0.02	0.00	0.40	-0.22	-0.30	0.40	-0.26	-1.1713	0.0292	-4.1	0.9	-8.4	0.7	A+	A-
Math	6	566869	672	6	65	E.2.1.1	2	14064	0.67	0.67	0.19	0.08	0.07	0.00	0.42	0.42	-0.37	-0.30	-0.31	0.5674	0.0200	1.7	1.0	-0.4	1.0	A+	A-
Math	6	595030	673	6	66	A.1.1.1	1	14064	0.72	0.03	0.72	0.14	0.12	0.00	0.42	-0.21	0.42	-0.31	-0.39	0.2606	0.0209	0.2	1.0	-2.5	1.0	B-	A-
Math	6	542835	674	6	67	D.2.1.2	2	14064	0.88	0.02	0.08	0.88	0.02	0.00	0.37	-0.22	-0.31	0.37	-0.17	-0.9975	0.0277	-2.2	1.0	-3.3	0.9		
Math	6	566894	675	6	68	E.3.1.2	2	14064	0.78	0.08	0.09	0.05	0.78	0.00	0.51	-0.42	-0.40	-0.27	0.51	-0.1725	0.0225	-9.9	0.9	-9.9	0.8	A+	B-
Math	6	594452	676	6	69	A.3.2.1	2	14064	0.48	0.12	0.04	0.48	0.36	0.00	0.47	-0.45	-0.43	0.47	-0.45	1.5811	0.0191	-9.7	0.9	-4.0	1.0	A-	B-
Math	6	594341	677	6	70	B.2.1.2	2	14064	0.28	0.08	0.25	0.39	0.28	0.00	0.23	-0.26	-0.27	-0.23	0.23	2.6590	0.0210	9.9	1.2	9.9	1.5	A-	A-
Math	6	593113	678	6	71	C.1.1.4	2	14064	0.80	0.80	0.10	0.04	0.05	0.00	0.38	0.38	-0.24	-0.29	-0.32	-0.3150	0.0232	0.1	1.0	1.0	1.0	A+	A-
Math	6	545166	679	6	72	A.1.2.1	2	14064	0.56	0.56	0.22	0.14	0.08	0.00	0.47	0.47	-0.51	-0.32	-0.28	1.1669	0.0192	-5.4	1.0	-3.8	1.0		
Math	6	566824	680	6	73	D.2.2.1	2	14064	0.75	0.10	0.75	0.07	0.08	0.00	0.45	-0.33	0.45	-0.33	-0.34	0.0463	0.0216	-4.2	1.0	-6.0	0.9	A+	A-
Math	6	566832	682	7	62	E.1.1.2	2	14014	0.95	0.02	0.02	0.02	0.95	0.00	0.31	-0.18	-0.20	-0.20	0.31	-2.0616	0.0398	-2.7	0.9	-4.5	0.7	B+	A-
Math	6	594385	683	7	63	B.2.1.1	1	14014	0.82	0.07	0.82	0.08	0.02	0.00	0.40	-0.32	0.40	-0.29	-0.20	-0.4782	0.0241	-1.5	1.0	-4.6	0.9	A-	A-
Math	6	594451	684	7	64	A.3.2.1	2	14014	0.70	0.14	0.70	0.10	0.06	0.00	0.48	-0.44	0.48	-0.34	-0.30	0.3677	0.0206	-5.8	0.9	-7.8	0.9	A+	A-
Math	6	593128	685	7	65	C.1.1.3	1	14014	0.72	0.19	0.05	0.72	0.03	0.00	0.48	-0.40	-0.40	0.48	-0.30	0.2247	0.0210	-6.6	0.9	-6.0	0.9	A+	A-
Math	6	545154	686	7	66	A.1.1.2	1	14014	0.69	0.21	0.08	0.69	0.02	0.00	0.54	-0.50	-0.42	0.54	-0.18	0.3900	0.0205	-9.9	0.9	-9.9	0.8		
Math	6	593081	687	7	67	D.2.1.1	1	14014	0.67	0.04	0.67	0.25	0.03	0.00	0.42	-0.31	0.42	-0.37	-0.26	0.5093	0.0202	2.3	1.0	-0.6	1.0	A+	A-
Math	6	566893	688	7	68	E.3.1.1	2	14014	0.59	0.24	0.10	0.59	0.07	0.00	0.58	-0.58	-0.47	0.58	-0.35	0.9947	0.0194	-9.9	0.8	-9.9	0.8	A+	A-
Math	6	545231	689	7	69	E.1.1.3	2	14014	0.81	0.81	0.08	0.06	0.05	0.00	0.47	0.47	-0.34	-0.34	-0.32	-0.3817	0.0235	-7.0	0.9	-6.9	0.8		
Math	6	594983	690	7	70	A.1.3.2	1	14014	0.67	0.10	0.09	0.67	0.14	0.00	0.45	-0.40	-0.39	0.45	-0.29	0.5278	0.0202	-1.4	1.0	-3.0	1.0	A+	A+
Math	6	593143	691	7	71	C.1.2.1	2	14014	0.27	0.12	0.32	0.28	0.27	0.00	0.17	-0.36	-0.10	-0.21	0.17	2.7457	0.0214	9.9	1.2	9.9	1.8	A-	A+
Math	6	564857	692	7	72	B.2.3.1	1	14014	0.90	0.06	0.90	0.03	0.01	0.00	0.37	-0.28	0.37	-0.27	-0.16	-1.1955	0.0293	-3.1	0.9	-3.6	0.8	A+	A-
Math	6	595031	693	7	73	A.1.2.1	1	14014	0.89	0.89	0.02	0.02	0.06	0.00	0.29	0.29	-0.14	-0.22	-0.19	-1.1333	0.0287	1.9	1.0	-1.2	1.0	A+	A-
Math	6	593072	695	8	62	D.1.2.1	2	13961	0.68	0.12	0.08	0.68	0.12	0.00	0.37	-0.26	-0.31	0.37	-0.30	0.5263	0.0201	5.9	1.1	4.4	1.1	A+	A+
Math	6	594406	696	8	63	B.2.3.1	1	13961	0.69	0.69	0.07	0.16	0.08	0.00	0.35	0.35	-0.36	-0.23	-0.24	0.4480	0.0203	7.9	1.1	6.4	1.1	A-	A-
Math	6	595001	697	8	64	A.2.1.1	1	13961	0.53	0.53	0.17	0.10	0.19	0.00	0.42	0.42	-0.37	-0.41	-0.33	1.3046	0.0191	-0.5	1.0	0.3	1.0	A+	A+
Math	6	545104	698	8	65	A.1.4.1	2	13961	0.67	0.09	0.67	0.10	0.13	0.00	0.36	-0.30	0.36	-0.26	-0.27	0.5517	0.0201	7.4	1.1	7.0	1.1		
Math	6	564865	699	8	66	D.2.2.1	2	13961	0.68	0.68	0.18	0.05	0.10	0.00	0.29	0.29	-0.19	-0.28	-0.23	0.5291	0.0201	9.9	1.2	9.1	1.2	A+	A+
Math	6	594417	700	8	67	C.1.1.2	2	13961	0.73	0.05	0.73	0.05	0.18	0.00	0.35	-0.28	0.35	-0.32	-0.24	0.2370	0.0210	6.3	1.1	5.4	1.1	A+	A-
Math	6	566833	701	8	68	E.2.1.1	2	13961	0.77	0.05	0.06	0.11	0.77	0.00	0.35	-0.23	-0.32	-0.21	0.35	-0.0469	0.0220	3.9	1.1	5.8	1.2	A+	A-
Math	6	545238	702	8	69	D.1.1.1	2	13961	0.68	0.16	0.68	0.11	0.04	0.00	0.39	-0.27	0.39	-0.36	-0.28	0.5069	0.0202	3.6	1.0	5.2	1.1		
Math	6	595065	703	8	70	A.1.1.4	1	13961	0.82	0.04	0.06	0.82	0.08	0.00	0.45	-0.36	-0.41	-0.22	0.45	-0.4132	0.0239	-7.1	0.9	-0.1	1.0	A+	A-
Math	6	594403	704	8	71	B.1.1.1	2	13961	0.42	0.10	0.42	0.14	0.34	0.00	0.40	-0.24	0.40	-0.44	-0.42	1.8574	0.0193	0.2	1.0	4.4	1.1	A-	A-
Math	6	594988	705	8	72	A.1.3.1	2	13961	0.54	0.15	0.18	0.13	0.54	0.00	0.25	-0.18	-0.19	-0.28	0.25	1.2721	0.0191	9.9	1.2	9.9	1.3	A+	A-
Math	6	593097	706	8	73	C.3.1.1	1	13961	0.88	0.01	0.88	0.09	0.01	0.00	0.34	-0.15	0.34	-0.30	-0.18	-1.0179	0.0281	-1.7	1.0	-0.9	1.0	A+	B-
Math	6	566864	708	9	62	E.1.1.1	2	13969	0.84	0.01	0.05	0.10	0.84	0.00	0.33	-0.21	-0.32	-0.19	0.33	-0.5681	0.0247	1.3	1.0	1.6	1.1	A-	A-
Math	6	595003	709	9	63	A.1.1.4	1	13969	0.88	0.06	0.04	0.88	0.03	0.00	0.49	-0.37	-0.32	0.49	-0.31	-0.9286	0.0273	-9.9	0.8	-9.9	0.6	A+	A-
Math	6	566895	710	9	64	D.2.2.1	2	13969	0.																		

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Math	6	545168	711	9	65	A.1.3.1	1	13969	0.54	0.07	0.14	0.54	0.25	0.00	0.37	-0.28	-0.40	0.37	-0.30	1.2587	0.0191	7.4	1.1	6.2	1.1		
Math	6	594409	712	9	66	B.2.3.1	1	13969	0.89	0.05	0.89	0.04	0.02	0.00	0.35	-0.26	0.35	-0.24	-0.17	-1.1095	0.0288	-2.5	1.0	-2.4	0.9	A+	A-
Math	6	566892	713	9	67	E.2.1.1	1	13969	0.82	0.09	0.03	0.82	0.05	0.00	0.23	-0.15	-0.14	0.23	-0.19	-0.4356	0.0239	8.6	1.1	9.9	1.4	A+	A+
Math	6	542796	714	9	68	C.3.1.1	1	13969	0.89	0.89	0.01	0.01	0.09	0.00	0.33	0.33	-0.15	-0.13	-0.29	-1.1552	0.0292	-0.4	1.0	-2.4	0.9		
Math	6	593112	715	9	69	C.1.2.2	1	13969	0.26	0.08	0.06	0.60	0.26	0.00	0.16	-0.45	-0.45	-0.09	0.16	2.7853	0.0215	9.9	1.2	9.9	1.6	A+	A-
Math	6	595067	716	9	70	A.2.1.1	1	13969	0.60	0.60	0.28	0.07	0.05	0.00	0.43	0.43	-0.37	-0.35	-0.34	0.9160	0.0194	-0.3	1.0	-1.8	1.0	A+	A+
Math	6	595054	717	9	71	A.3.2.1	2	13969	0.55	0.18	0.17	0.55	0.10	0.00	0.48	-0.49	-0.39	0.48	-0.37	1.1707	0.0191	-9.9	0.9	-8.2	0.9	A+	A-
Math	6	593142	718	9	72	C.1.1.4	2	13969	0.64	0.20	0.08	0.08	0.64	0.00	0.21	-0.06	-0.26	-0.26	0.21	0.7122	0.0197	9.9	1.2	9.9	1.3	A-	A-
Math	6	594402	719	9	73	B.2.1.1	1	13969	0.84	0.09	0.84	0.05	0.01	0.00	0.37	-0.32	0.37	-0.22	-0.19	-0.6285	0.0251	-1.7	1.0	-0.6	1.0	A-	B-
Math	7	542925	721	0	1	A.3.2.1	1	127650	0.83	0.83	0.03	0.08	0.06	0.00	0.35	0.35	-0.15	-0.23	-0.30	-0.6353	0.0081	7.4	1.0	9.9	1.1		
Math	7	542864	722	0	2	A.1.1.1	2	127650	0.70	0.04	0.23	0.70	0.03	0.00	0.52	-0.38	-0.46	0.52	-0.33	0.2329	0.0069	-9.9	0.9	-9.9	0.9		
Math	7	551363	723	0	3	A.3.1.1	1	127650	0.78	0.03	0.07	0.12	0.78	0.00	0.40	-0.27	-0.26	-0.31	0.40	-0.2664	0.0075	5.0	1.0	-1.2	1.0		
Math	7	543105	724	0	4	A.3.1.1	2	127650	0.42	0.42	0.29	0.24	0.05	0.00	0.42	0.42	-0.42	-0.39	-0.40	1.8250	0.0065	5.1	1.0	9.9	1.1		
Math	7	543088	725	0	5	E.3.1.1	1	127650	0.84	0.08	0.04	0.03	0.84	0.00	0.41	-0.33	-0.20	-0.31	0.41	-0.7773	0.0084	-9.9	1.0	-5.5	0.9		
Math	7	556476	726	0	6	B.2.1.3	1	127650	0.76	0.07	0.76	0.03	0.14	0.00	0.42	-0.40	0.42	-0.24	-0.28	-0.1542	0.0073	-0.3	1.0	-0.5	1.0		
Math	7	544866	727	0	7	C.1.1.1	1	127650	0.80	0.04	0.05	0.10	0.80	0.00	0.46	-0.27	-0.34	-0.36	0.46	-0.4029	0.0077	-9.9	0.9	-9.9	0.8		
Math	7	542867	728	0	8	D.2.1.1	1	127650	0.77	0.77	0.15	0.05	0.03	0.00	0.46	0.46	-0.40	-0.26	-0.30	-0.1882	0.0074	-9.9	1.0	-9.9	0.9		
Math	7	542910	729	0	9	E.4.1.1	2	127650	0.53	0.04	0.53	0.12	0.30	0.00	0.35	-0.35	0.35	-0.43	-0.23	1.1865	0.0064	9.9	1.1	9.9	1.2		
Math	7	556502	730	0	10	C.3.1.1	1	127650	0.77	0.03	0.14	0.06	0.77	0.00	0.40	-0.31	-0.34	-0.22	0.40	-0.1761	0.0073	5.0	1.0	9.9	1.1		
Math	7	556459	731	0	11	A.2.2.5	2	127650	0.65	0.04	0.65	0.18	0.12	0.00	0.37	-0.35	0.37	-0.37	-0.17	0.5279	0.0067	9.9	1.1	9.9	1.1		
Math	7	544797	732	0	12	C.1.1.3	1	127650	0.42	0.08	0.43	0.07	0.42	0.00	0.35	-0.27	-0.37	-0.22	0.35	1.8065	0.0065	9.9	1.1	9.9	1.2		
Math	7	551436	733	0	13	D.3.1.1	2	127650	0.70	0.04	0.07	0.70	0.19	0.00	0.35	-0.23	-0.29	0.35	-0.27	0.2461	0.0069	9.9	1.1	9.9	1.2		
Math	7	544862	734	0	14	B.2.2.2	1	127650	0.79	0.08	0.79	0.11	0.03	0.00	0.49	-0.36	0.49	-0.45	-0.17	-0.3136	0.0075	-9.9	0.9	-9.9	0.9		
Math	7	551457	735	0	15	E.3.1.2	2	127650	0.68	0.12	0.14	0.07	0.68	0.00	0.56	-0.54	-0.37	-0.44	0.56	0.3841	0.0068	-9.9	0.9	-9.9	0.8		
Math	7	549532	736	0	16	C.3.1.1	1	127650	0.76	0.02	0.01	0.21	0.76	0.00	0.42	-0.22	-0.22	-0.38	0.42	-0.1091	0.0073	1.4	1.0	2.6	1.0		
Math	7	551391	737	0	17	B.2.1.3	1	127650	0.78	0.10	0.10	0.78	0.02	0.00	0.52	-0.45	-0.39	0.52	-0.22	-0.2579	0.0075	-9.9	0.9	-9.9	0.8		
Math	7	551345	738	0	18	A.2.2.1	2	127650	0.75	0.75	0.18	0.04	0.03	0.00	0.47	0.47	-0.37	-0.35	-0.35	-0.0716	0.0072	-9.9	1.0	-6.4	1.0		
Math	7	551336	739	0	19	A.1.2.1	2	127650	0.70	0.08	0.12	0.70	0.10	0.00	0.57	-0.48	-0.48	0.57	-0.39	0.2443	0.0069	-9.9	0.8	-9.9	0.7		
Math	7	551443	740	0	20	D.3.1.2	2	127650	0.61	0.11	0.07	0.61	0.20	0.00	0.33	-0.38	-0.34	0.33	-0.15	0.7560	0.0065	9.9	1.2	9.9	1.2		
Math	7	544887	741	0	21	C.1.2.1	1	127650	0.56	0.56	0.03	0.26	0.15	0.00	0.31	0.31	-0.17	-0.36	-0.16	1.0656	0.0064	9.9	1.2	9.9	1.3		
Math	7	551394	742	0	22	B.2.2.1	2	127650	0.80	0.06	0.10	0.80	0.04	0.00	0.50	-0.37	-0.38	0.50	-0.30	-0.4356	0.0077	-9.9	0.9	-9.9	0.7		
Math	7	544938	743	0	23	E.2.1.1	1	127650	0.75	0.06	0.04	0.14	0.75	0.00	0.45	-0.39	-0.28	-0.33	0.45	-0.0789	0.0072	-8.2	1.0	-9.9	0.9		
Math	7	556509	744	0	24	D.1.1.1	2	127650	0.76	0.02	0.05	0.76	0.16	0.00	0.40	-0.24	-0.25	0.40	-0.34	-0.1190	0.0073	7.7	1.0	1.2	1.0		
Math	7	544795	747	0	48	C.1.1.2	1	127650	0.86	0.04	0.07	0.86	0.04	0.00	0.39	-0.26	-0.34	0.39	-0.16	-0.9162	0.0087	-6.7	1.0	-6.6	0.9		
Math	7	556433	748	0	49	A.1.1.1	1	127650	0.80	0.06	0.13	0.01	0.80	0.00	0.46	-0.18	-0.48	-0.19	0.46	-0.4423	0.0077	-9.9	0.9	-9.9	0.9		
Math	7	556546	749	0	50	E.2.1.1	1	127650	0.77	0.11	0.77	0.10	0.02	0.00	0.50	-0.46	0.50	-0.34	-0.26	-0.2042	0.0074	-9.9	0.9	-9.9	0.8		
Math	7	544901	750	0	51	A.2.2.2	1	127650	0.90	0.06	0.03	0.90	0.01	0.00	0.37	-0.28	-0.27	0.37	-0.12	-1.3325	0.0098	-7.6	1.0	-5.0	0.9		
Math	7	551414	751	0	52	C.3.1.2	1	127650	0.81	0.81	0.11	0.06	0.02	0.00	0.40	0.40	-0.28	-0.31	-0.26	-0.4699	0.0078	-1.2	1.0	-0.5	1.0		
Math	7	556436	752	0	53	A.1.2.1	2	127650	0.68	0.68	0.07	0.15	0.10	0.00	0.51	0.51	-0.46	-0.33	-0.48	0.3860	0.0068	-9.9	0.9	-9.9	0.9		
Math	7	544767	753	0	54	D.2.1.2	1	127650	0.67	0.10	0.67	0.20	0.03	0.00	0.52	-0.30	0.52	-0.53	-0.29	0.4048	0.0067	-9.9	0.9	-9.9	0.9		
Math	7	544832	754	0	55	B.2.1.1	2	127650	0.58	0.19	0.08	0.58	0.15	0.00	0.43	-0.46	-0.41	0.43	-0.18	0.9372	0.0065	7.3	1.0	1.1	1.0		
Math	7	544936	755	0	56	D.3.1.2	2	127650	0.76	0.15	0.76	0.04	0.04	0.00	0.46	-0.39	0.46	-0.34	-0.25	-0.1575	0.0073	-9.9	1.0	-9.9	0.9		
Math	7	556523	756	0	57	D.2.2.1	2	127650	0.77	0.08	0.09	0.77	0.06	0.00	0.47	-0.31	-0.36	0.47	-0.36	-0.2128	0.0074	-9.9	0.9	-9.9	0.8		
Math	7	551362	757	0	58	A.2.2.6	2	127650	0.46	0.12	0.29	0.46	0.13	0.00	0.38	-0.39	-0.32	0.38	-0.39	1.5933	0.0064	9.9	1.1	9.9	1.2		
Math	7	542919	758	0	59	D.3.1.1	2	127650	0.59	0.59	0.19	0.13	0.09	0.00	0.39	0.39	-0.32	-0.33	-0.32	0.8710	0.0065	9.9	1.1	9.9	1.1		
Math	7	542953	759	0	92	C.1.2.2	1	127650	0.93	0.93	0.04	0.02	0.01	0.00	0.25	0.25	-0.17	-0.18	-0.12	-1.7515	0.0113	1.9	1.0	9.3	1.2		
Math	7	556457	760	0	93	A.2.2.4	2	127650	0.78	0.01	0.05	0.78	0.16	0.00	0.51	-0.20	-0.39	0.51	-0.44	-0.2640	0.0075	-9.9	0.9	-9.9	0.7		
Math	7	556522	761	0	94	D.2.1.2	2	127650	0.69	0.05	0.19	0.07	0.69	0.00	0.50	-0.42	-0.41	-0.37	0.50	0.2950	0.0068	-9.9	0.9	-9.9	0.9		
Math	7	544777	762	0	95	C.3.1.1	1	127650	0.83	0.01	0.83	0.01	0.14	0.00	0.36	-0.15	0.36	-0.19	-0.32	-0.6678	0.0081	5.2	1.0	4.4	1.1		
Math	7	542969	763	0	96	B.1.1.1	2	127650	0.56	0.56	0.13	0.17	0.14	0.00	0.52	0.52	-0.40	-0.43	-0.55	1.0315	0.0064	-9.9	0.9	-9.9	0.9		
Math	7	544779	764	0	97	D.1.1.1	1	127650	0.53	0.07	0.29	0.10	0														

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Math	7	544735	765	0	98	E.1.1.1	2	127650	0.72	0.16	0.72	0.06	0.06	0.00	0.40	-0.27	0.40	-0.33	-0.35	0.1361	0.0070	9.9	1.0	8.1	1.1		
Math	7	556530	766	0	99	D.3.1.1	2	127650	0.62	0.62	0.09	0.05	0.25	0.00	0.52	0.52	-0.42	-0.39	-0.46	0.7447	0.0065	-9.9	0.9	-9.9	0.9		
Math	7	556479	767	0	100	B.2.2.1	2	127650	0.62	0.11	0.15	0.13	0.62	0.00	0.53	-0.60	-0.36	-0.43	0.53	0.7425	0.0065	-9.9	0.9	-9.9	0.9		
Math	7	556469	768	0	101	B.1.1.1	2	127650	0.52	0.52	0.31	0.14	0.03	0.00	0.49	0.49	-0.46	-0.46	-0.29	1.2493	0.0064	-9.9	1.0	-9.9	0.9		
Math	7	544717	769	0	102	E.2.1.2		127650	0.54	0.54	0.05	0.28	0.13	0.00	0.33	0.33	-0.34	-0.23	-0.37	1.1657	0.0064	9.9	1.2	9.9	1.2		
Math	7	542937	770	0	103	A.2.2.5	1	127650	0.74	0.09	0.74	0.09	0.08	0.00	0.41	-0.33	0.41	-0.27	-0.30	0.0334	0.0071	8.4	1.0	3.3	1.0		
Math	7	544733	771	0	104	E.4.1.1	2	127650	0.61	0.26	0.10	0.61	0.03	0.00	0.51	-0.51	-0.34	0.51	-0.33	0.7897	0.0065	-9.9	0.9	-9.9	0.9		
Math	7	542879	772	0	105	A.2.1.1	2	127650	0.83	0.04	0.83	0.09	0.04	0.00	0.30	-0.27	0.30	-0.23	-0.11	-0.6580	0.0081	9.9	1.1	9.9	1.2		
Math	7	544791	773	0	106	D.1.1.1	2	127650	0.76	0.05	0.05	0.14	0.76	0.00	0.50	-0.29	-0.32	-0.45	0.50	-0.1299	0.0073	-9.9	0.9	-9.9	0.9		
Math	7	556535	774	0	107	D.3.1.2	2	127650	0.73	0.73	0.10	0.12	0.05	0.00	0.44	0.44	-0.34	-0.34	-0.30	0.0662	0.0071	-2.7	1.0	-9.9	0.9		
Math	7	542890	775	0	108	A.2.2.3	2	127650	0.64	0.17	0.13	0.64	0.05	0.00	0.48	-0.35	-0.46	0.48	-0.35	0.5988	0.0066	-9.9	1.0	-9.9	0.9		
Math	7	556515	776	0	109	D.2.1.1	1	127650	0.71	0.18	0.71	0.04	0.07	0.00	0.48	-0.37	0.48	-0.39	-0.40	0.1908	0.0069	-9.9	1.0	-9.9	0.9		
Math	7	544778	777	0	110	C.3.1.2	1	127650	0.72	0.03	0.10	0.15	0.72	0.00	0.27	-0.20	-0.22	-0.20	0.27	0.1222	0.0070	9.9	1.2	9.9	1.5		
Math	7	544855	778	0	111	B.2.1.2	1	127650	0.57	0.15	0.21	0.57	0.08	0.00	0.43	-0.45	-0.36	0.43	-0.24	1.0015	0.0064	9.9	1.0	9.9	1.1		
Math	7	544860	779	0	112	B.2.2.1	1	127650	0.77	0.09	0.06	0.07	0.77	0.00	0.55	-0.47	-0.39	-0.36	0.55	-0.2091	0.0074	-9.9	0.9	-9.9	0.7		
Math	7	543112	780	0	113	E.3.1.3	1	127650	0.75	0.75	0.08	0.14	0.04	0.00	0.33	0.33	-0.22	-0.27	-0.23	-0.0576	0.0072	9.9	1.1	9.9	1.3		
Math	7	542986	781	0	114	D.1.1.1	2	127650	0.76	0.12	0.76	0.07	0.05	0.00	0.37	-0.22	0.37	-0.34	-0.28	-0.1051	0.0073	9.9	1.1	9.9	1.2		
Math	7	544736	782	0	115	E.1.1.1	1	127650	0.73	0.06	0.10	0.12	0.73	0.00	0.46	-0.33	-0.43	-0.29	0.46	0.0861	0.0070	-9.9	1.0	-1.2	1.0		
Math	7	595062	784	1	60	A.1.1.1	1	14426	0.76	0.12	0.76	0.07	0.05	0.00	0.43	-0.34	0.43	-0.40	-0.18	-0.1446	0.0216	-0.9	1.0	-0.7	1.0	A+	A+
Math	7	593073	785	1	61	D.2.1.1	1	14426	0.83	0.05	0.11	0.83	0.01	0.00	0.31	-0.22	-0.23	0.31	-0.21	-0.6662	0.0240	5.0	1.1	4.8	1.2	A+	A+
Math	7	594400	786	1	62	B.2.1.3	1	14426	0.43	0.13	0.43	0.22	0.22	0.00	0.35	-0.53	0.35	-0.22	-0.29	1.6982	0.0192	9.9	1.1	9.9	1.3	A+	A-
Math	7	564862	787	1	63	C.1.1.2	1	14426	0.86	0.04	0.86	0.03	0.07	0.00	0.43	-0.28	0.43	-0.30	-0.30	-0.9652	0.0259	-5.0	0.9	-6.9	0.8	A+	A-
Math	7	544890	788	1	64	D.1.1.1	1	14426	0.47	0.23	0.13	0.17	0.47	0.00	0.44	-0.47	-0.43	-0.34	0.44	1.5092	0.0191	0.4	1.0	3.2	1.0		
Math	7	594995	789	1	65	A.2.2.2	1	14426	0.86	0.04	0.06	0.86	0.04	0.00	0.45	-0.32	-0.32	0.45	-0.28	-1.0125	0.0262	-7.1	0.9	-9.6	0.7	A+	A+
Math	7	566875	790	1	66	E.1.1.1	2	14426	0.58	0.10	0.17	0.16	0.58	0.00	0.38	-0.25	-0.34	-0.34	0.38	0.9127	0.0192	9.9	1.1	9.9	1.2	A+	A-
Math	7	595041	791	1	67	A.3.2.2	1	14426	0.68	0.07	0.13	0.68	0.12	0.00	0.28	-0.22	-0.24	0.28	-0.18	0.3459	0.0201	9.9	1.2	9.9	1.4	A-	A+
Math	7	566803	792	1	68	E.3.1.2	2	14426	0.55	0.15	0.24	0.06	0.55	0.00	0.51	-0.62	-0.35	-0.39	0.51	1.0280	0.0191	-7.1	0.9	-5.3	0.9	A+	A-
Math	7	542974	793	1	69	A.1.2.1	2	14426	0.59	0.07	0.59	0.11	0.23	0.00	0.50	-0.37	0.50	-0.43	-0.45	0.8528	0.0193	-5.5	1.0	-4.2	0.9		
Math	7	593058	794	1	70	D.3.1.1	2	14426	0.67	0.07	0.09	0.18	0.67	0.00	0.54	-0.42	-0.41	-0.46	0.54	0.3965	0.0200	-9.9	0.9	-9.9	0.8	A+	A-
Math	7	593150	795	1	71	C.3.1.1	1	14426	0.77	0.04	0.16	0.03	0.77	0.00	0.46	-0.33	-0.40	-0.24	0.46	-0.2239	0.0219	-4.4	1.0	-2.9	0.9	A+	A-
Math	7	595085	797	2	60	A.1.1.1	1	14170	0.81	0.12	0.04	0.81	0.03	0.00	0.50	-0.44	-0.30	0.50	-0.25	-0.4887	0.0234	-9.3	0.9	-9.8	0.7	A+	A+
Math	7	594360	798	2	61	B.2.1.3	1	14170	0.74	0.74	0.15	0.06	0.06	0.00	0.49	0.49	-0.36	-0.40	-0.39	-0.0030	0.0214	-7.0	0.9	-4.8	0.9	A+	A-
Math	7	564861	799	2	62	E.2.1.1	1	14170	0.82	0.04	0.10	0.04	0.82	0.00	0.47	-0.27	-0.41	-0.26	0.47	-0.5616	0.0238	-7.0	0.9	-6.6	0.8	A+	A-
Math	7	542980	800	2	63	A.2.2.1	2	14170	0.66	0.19	0.66	0.08	0.07	0.00	0.39	-0.19	0.39	-0.42	-0.43	0.4871	0.0201	8.5	1.1	9.9	1.2		
Math	7	594344	801	2	64	C.1.2.2	2	14170	0.86	0.03	0.03	0.08	0.86	0.00	0.40	-0.24	-0.25	-0.31	0.40	-0.9023	0.0259	-3.4	1.0	-3.0	0.9	A+	A-
Math	7	593074	802	2	65	D.2.2.1	2	14170	0.76	0.76	0.09	0.12	0.03	0.00	0.48	0.48	-0.30	-0.44	-0.28	-0.1346	0.0219	-6.0	0.9	-4.2	0.9	A+	A-
Math	7	594364	803	2	66	B.2.2.1	2	14170	0.49	0.19	0.25	0.08	0.49	0.00	0.52	-0.42	-0.52	-0.52	0.52	1.4234	0.0193	-9.9	0.9	-6.8	0.9	B-	A-
Math	7	542856	804	2	67	E.1.1.1	1	14170	0.78	0.02	0.08	0.78	0.11	0.00	0.41	-0.26	-0.32	0.41	-0.30	-0.2688	0.0224	0.1	1.0	0.0	1.0		
Math	7	594369	805	2	68	C.1.1.1	1	14170	0.67	0.19	0.67	0.08	0.05	0.00	0.40	-0.30	0.40	-0.38	-0.29	0.4151	0.0202	6.0	1.1	7.0	1.1	A-	A-
Math	7	566897	806	2	69	E.3.1.1	2	14170	0.20	0.20	0.28	0.09	0.44	0.00	0.23	0.23	-0.36	-0.52	-0.16	3.1670	0.0235	5.9	1.1	9.9	1.8	B-	A-
Math	7	566789	807	2	70	D.3.1.2	2	14170	0.60	0.60	0.11	0.23	0.05	0.00	0.42	0.42	-0.30	-0.40	-0.29	0.7995	0.0196	5.6	1.1	2.9	1.0	B-	A-
Math	7	594430	808	2	71	B.1.1.1	2	14170	0.44	0.09	0.44	0.28	0.19	0.00	0.37	-0.38	0.37	-0.30	-0.42	1.6917	0.0194	9.4	1.1	9.9	1.2	A-	A-
Math	7	595011	810	3	60	A.1.2.1	1	14138	0.86	0.86	0.06	0.04	0.03	0.00	0.37	0.37	-0.17	-0.34	-0.27	-0.9396	0.0264	-2.6	1.0	2.2	1.1	B-	B-
Math	7	595040	811	3	61	A.2.2.2	1	14138	0.89	0.03	0.05	0.89	0.02	0.00	0.44	-0.29	-0.34	0.44	-0.23	-1.2546	0.0289	-6.9	0.9	-9.3	0.6	A+	A+
Math	7	594431	812	3	62	B.2.1.2	1	14138	0.46	0.33	0.19	0.46	0.03	0.00	0.50	-0.60	-0.32	0.50	-0.31	1.5820	0.0192	-9.9	0.9	-5.4	0.9	A+	A-
Math	7	593151	813	3	63	C.3.1.2	1	14138	0.67	0.13	0.67	0.13	0.08	0.00	0.31	-0.34	0.31	-0.18	-0.19	0.4520	0.0202	9.9	1.2	9.9	1.4	A-	A-
Math	7	544825	814	3	64	A.2.1.1	1	14138	0.79	0.04	0.08	0.08	0.79	0.00	0.33	-0.27	-0.16	-0.28	0.33	-0.3041	0.0227	6.1	1.1	8.1	1.2		
Math	7	566765	815	3	65	E.3.1.1	2	14138	0.85	0.85	0.09	0.04	0.02	0.00	0.43	0.43	-0.33	-0.30	-0.26	-0.8078	0.0255	-5.6	0.9	-3.6	0.9	B+	A-
Math	7	593060	816	3	66	D.2.1.1	1	14138	0.94	0.01	0.94	0.03	0.01	0.00	0.29	-0.19	0.29	-0.20	-0.15	-2.0059	0.0374	-1.9	1.0	-1.9	0.9	A+	A-
Math	7	595035	817	3	67	A.3.2.1	2	14138	0.47	0.10	0.47	0.20	0.23	0.00	0.45	-0.47	0.45	-0.49	-0.32	1.5200	0.0192	-1.7	1.0	2.4	1.0	A+	A-
Math	7	543117	818	3	68	D.3.1.1	2	14138																			

## Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Math	7	594421	819	3	69	C.1.1.2	1	14138	0.80	0.13	0.05	0.80	0.03	0.00	0.51	-0.42	-0.38	0.51	-0.26	-0.3850	0.0231	-9.8	0.9	-9.9	0.7	A+	A-
Math	7	593079	820	3	70	D.2.2.1	2	14138	0.50	0.23	0.17	0.10	0.50	0.00	0.40	-0.25	-0.46	-0.40	0.40	1.3726	0.0192	6.9	1.1	8.3	1.1	A+	A+
Math	7	566886	821	3	71	E.1.1.1	2	14138	0.46	0.14	0.32	0.08	0.46	0.00	0.25	-0.10	-0.25	-0.32	0.25	1.5671	0.0192	9.9	1.2	9.9	1.4	A+	A-
Math	7	594433	823	4	60	C.1.1.1	1	14091	0.84	0.04	0.84	0.08	0.04	0.00	0.41	-0.24	0.41	-0.31	-0.29	-0.7162	0.0248	-3.5	1.0	-4.7	0.9	A+	A-
Math	7	593056	824	4	61	D.2.1.2	2	14091	0.81	0.07	0.06	0.81	0.07	0.00	0.49	-0.34	-0.35	0.49	-0.34	-0.4778	0.0234	-8.2	0.9	-9.9	0.7	A+	A-
Math	7	595086	825	4	62	A.2.1.1	1	14091	0.65	0.13	0.09	0.13	0.65	0.00	0.37	-0.17	-0.35	-0.36	0.37	0.5177	0.0200	9.9	1.1	7.0	1.1	A+	A-
Math	7	594359	826	4	63	B.2.1.1	2	14091	0.50	0.02	0.29	0.50	0.19	0.00	0.58	-0.42	-0.66	0.58	-0.40	1.3676	0.0192	-9.9	0.8	-9.9	0.8	A+	B-
Math	7	566879	827	4	64	E.4.1.1	2	14091	0.32	0.55	0.32	0.05	0.08	0.00	0.37	-0.35	0.37	-0.44	-0.48	2.3309	0.0204	5.0	1.1	9.3	1.2	A-	A-
Math	7	593080	828	4	65	D.3.1.1	2	14091	0.39	0.06	0.31	0.24	0.39	0.00	0.41	-0.60	-0.40	-0.39	0.41	1.9489	0.0197	2.9	1.0	4.1	1.1	B-	A-
Math	7	594397	829	4	66	C.1.2.2	2	14091	0.77	0.77	0.06	0.09	0.08	0.00	0.41	0.41	-0.22	-0.35	-0.31	-0.1631	0.0220	-0.5	1.0	-1.0	1.0	A+	A-
Math	7	544761	830	4	67	D.2.2.1	2	14091	0.65	0.10	0.14	0.65	0.11	0.00	0.49	-0.41	-0.36	0.49	-0.40	0.5502	0.0199	-5.7	1.0	-7.1	0.9		
Math	7	595015	831	4	68	A.3.2.2	1	14091	0.82	0.06	0.82	0.06	0.06	0.00	0.31	-0.29	0.31	-0.16	-0.18	-0.6088	0.0241	3.9	1.1	8.7	1.3	A+	A-
Math	7	566826	832	4	69	E.2.1.2	2	14091	0.45	0.45	0.17	0.21	0.17	0.00	0.24	0.24	-0.12	-0.22	-0.33	1.6308	0.0193	9.9	1.3	9.9	1.5	A+	A+
Math	7	595033	833	4	70	A.2.2.3	2	14091	0.58	0.10	0.15	0.17	0.58	0.00	0.42	-0.33	-0.36	-0.34	0.42	0.9374	0.0194	4.7	1.0	1.3	1.0	A+	A+
Math	7	544879	834	4	71	C.3.1.1	1	14091	0.82	0.03	0.12	0.03	0.82	0.00	0.43	-0.26	-0.37	-0.22	0.43	-0.5381	0.0237	-3.5	1.0	-2.8	0.9		
Math	7	564866	836	5	60	E.4.1.1	2	14146	0.56	0.14	0.56	0.16	0.14	0.00	0.22	-0.09	0.22	-0.29	-0.17	1.0343	0.0193	9.9	1.3	9.9	1.5	A-	A+
Math	7	594434	837	5	61	C.1.1.3	1	14146	0.41	0.41	0.11	0.30	0.18	0.00	0.34	0.34	-0.36	-0.37	-0.24	1.8333	0.0195	9.9	1.1	9.9	1.3	A-	A-
Math	7	566801	838	5	62	E.1.1.1	2	14146	0.66	0.06	0.10	0.18	0.66	0.00	0.46	-0.41	-0.41	-0.34	0.46	0.5197	0.0200	-1.9	1.0	-3.4	0.9	A-	B-
Math	7	593114	839	5	63	C.3.1.2	1	14146	0.64	0.08	0.12	0.16	0.64	0.00	0.42	-0.37	-0.37	-0.30	0.42	0.6098	0.0198	5.4	1.1	8.3	1.1	A+	B-
Math	7	593046	840	5	64	D.2.1.1	1	14146	0.68	0.68	0.18	0.09	0.05	0.00	0.41	0.41	-0.28	-0.38	-0.34	0.3509	0.0204	4.4	1.0	0.3	1.0	A+	A-
Math	7	543009	841	5	65	B.1.1.1	2	14146	0.42	0.11	0.29	0.18	0.42	0.00	0.37	-0.43	-0.37	-0.26	0.37	1.8073	0.0194	8.1	1.1	9.9	1.2		
Math	7	594390	842	5	66	B.2.1.1	2	14146	0.21	0.25	0.21	0.44	0.10	0.00	0.22	-0.37	0.22	-0.17	-0.26	3.0687	0.0230	6.0	1.1	9.9	1.9	A-	A-
Math	7	593062	843	5	67	D.3.1.1	2	14146	0.79	0.06	0.07	0.79	0.08	0.00	0.53	-0.36	-0.43	0.53	-0.37	-0.3207	0.0227	-9.9	0.9	-9.9	0.7	A-	A-
Math	7	594996	844	5	68	A.2.2.4	2	14146	0.66	0.11	0.16	0.07	0.66	0.00	0.48	-0.36	-0.38	-0.41	0.48	0.5084	0.0200	-3.9	1.0	-3.9	0.9	A+	A-
Math	7	544737	845	5	69	E.2.1.1	1	14146	0.82	0.07	0.07	0.82	0.04	0.00	0.47	-0.37	-0.33	0.47	-0.27	-0.5474	0.0238	-7.0	0.9	-5.4	0.8		
Math	7	593059	846	5	70	D.1.1.1	2	14146	0.65	0.08	0.10	0.17	0.65	0.00	0.53	-0.46	-0.42	-0.43	0.53	0.5645	0.0199	-9.9	0.9	-9.9	0.8	A-	A+
Math	7	564882	847	5	71	A.1.2.1	1	14146	0.61	0.15	0.09	0.61	0.15	0.00	0.54	-0.58	-0.41	0.54	-0.38	0.7849	0.0196	-9.9	0.9	-9.9	0.8	A-	A-
Math	7	594439	849	6	60	B.2.2.1	2	14158	0.56	0.15	0.09	0.20	0.56	0.00	0.54	-0.46	-0.47	-0.49	0.54	1.0235	0.0193	-9.9	0.9	-9.9	0.9	A-	A-
Math	7	566802	850	6	61	E.2.1.1	1	14158	0.60	0.13	0.11	0.60	0.15	0.00	0.37	-0.22	-0.25	0.37	-0.41	0.7998	0.0195	9.9	1.1	9.9	1.2	A+	A+
Math	7	566883	851	6	62	E.4.1.1	2	14158	0.63	0.15	0.63	0.14	0.08	0.00	0.46	-0.37	0.46	-0.40	-0.31	0.6595	0.0197	-0.9	1.0	-4.2	0.9	A-	A-
Math	7	595070	852	6	63	A.2.2.4	2	14158	0.86	0.06	0.86	0.04	0.04	0.00	0.34	-0.17	0.34	-0.22	-0.31	-0.9641	0.0264	-0.9	1.0	3.0	1.1	A+	A-
Math	7	593054	853	6	64	D.1.1.1	2	14158	0.53	0.05	0.53	0.06	0.35	0.00	0.33	-0.43	0.33	-0.41	-0.23	1.1732	0.0192	9.9	1.2	9.9	1.3	A+	A-
Math	7	544706	854	6	65	B.2.1.3	1	14158	0.55	0.08	0.03	0.55	0.33	0.00	0.54	-0.62	-0.44	0.54	-0.46	1.0766	0.0192	-9.9	0.9	-9.9	0.9		
Math	7	593078	855	6	66	D.2.1.2	1	14158	0.73	0.13	0.06	0.08	0.73	0.00	0.40	-0.23	-0.39	-0.33	0.40	0.0541	0.0212	2.2	1.0	6.4	1.1	B+	A+
Math	7	594365	856	6	67	C.1.1.3	1	14158	0.45	0.08	0.45	0.42	0.05	0.00	0.38	-0.28	0.38	-0.39	-0.25	1.6203	0.0192	9.8	1.1	9.9	1.1	A+	A-
Math	7	594373	857	6	68	B.1.1.1	2	14158	0.34	0.25	0.34	0.17	0.24	0.00	0.24	-0.12	0.24	-0.34	-0.30	2.2151	0.0201	9.9	1.2	9.9	1.5	A+	A-
Math	7	542968	858	6	69	E.3.1.2	1	14158	0.64	0.26	0.06	0.04	0.64	0.00	0.54	-0.47	-0.42	-0.44	0.54	0.6063	0.0198	-9.9	0.9	-9.9	0.8		
Math	7	595032	859	6	70	A.1.2.2	1	14158	0.58	0.19	0.15	0.58	0.08	0.00	0.46	-0.40	-0.42	0.46	-0.33	0.9163	0.0194	-1.2	1.0	-1.6	1.0	A-	A-
Math	7	593105	860	6	71	C.3.1.2	1	14158	0.63	0.05	0.07	0.26	0.63	0.00	0.26	-0.24	-0.28	-0.16	0.26	0.6840	0.0197	9.9	1.2	9.9	1.4	A-	A-
Math	7	566860	862	7	60	E.3.1.3	2	14235	0.79	0.09	0.07	0.79	0.04	0.00	0.37	-0.32	-0.22	0.37	-0.24	-0.3372	0.0227	2.0	1.0	4.7	1.1	A+	A-
Math	7	594363	863	7	61	B.2.1.2	1	14235	0.68	0.07	0.13	0.68	0.12	0.00	0.48	-0.38	-0.51	0.48	-0.24	0.3661	0.0203	-5.0	1.0	-4.6	0.9	A+	A-
Math	7	593042	864	7	62	C.3.1.1	1	14235	0.82	0.13	0.82	0.02	0.03	0.00	0.39	-0.35	0.39	-0.23	-0.18	-0.5244	0.0236	-0.7	1.0	2.4	1.1	A+	A-
Math	7	595100	865	7	63	A.2.2.6	2	14235	0.69	0.13	0.12	0.69	0.06	0.00	0.50	-0.42	-0.39	0.50	-0.34	0.3362	0.0203	-6.8	0.9	-9.3	0.8	A+	A-
Math	7	593068	866	7	64	D.1.1.1	2	14235	0.60	0.12	0.21	0.60	0.06	0.00	0.41	-0.34	-0.37	0.41	-0.27	0.8153	0.0195	5.6	1.1	2.0	1.0	A+	A-
Math	7	566805	867	7	65	E.2.1.2	2	14235	0.40	0.22	0.40	0.20	0.18	0.00	0.33	-0.26	0.33	-0.35	-0.33	1.9056	0.0195	9.9	1.1	9.9	1.3	A+	A-
Math	7	593063	868	7	66	D.3.1.1	2	14235	0.57	0.08	0.07	0.57	0.28	0.00	0.42	-0.47	-0.33	0.42	-0.33	1.0200	0.0193	5.5	1.1	3.2	1.0	A-	A-
Math	7	543052	869	7	67	C.1.2.2	1	14235	0.74	0.05	0.11	0.74	0.10	0.00	0.38	-0.27	-0.28	0.38	-0.31	0.0431	0.0212	4.2	1.0	4.3	1.1		
Math	7	593057	870	7	68	D.2.2.1	2	14235	0.47	0.47	0.34	0.10	0.10	0.00	0.35	0.35	-0.27	-0.40	-0.38	1.5403	0.0192	9.9	1.1	9.9	1.2	A-	A-
Math	7	594975	871	7	69	A.1.2.2	1	14235	0.88	0.06	0.88	0.04	0.03	0.00	0.37	-0.27	0.37	-0.27	-0.19	-1.0762	0.0272	-2.8	1.0	-2.3	0.9	A-	A-
Math	7	544753	872	7	70	D.2.1.2	1	14235	0.82	0.07	0.82	0.06	0.04	0.00	0.51	-0.43	0.51	-0.32	-0.32	-0.6078	0.0241	-9.9	0.9	-9.9	0.7		
Math	7	564881	873	7	71	B.1.1.1	2	14																			

## Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Math	7	566771	875	8	60	E.2.1.1	1	14125	0.67	0.03	0.03	0.67	0.27	0.00	0.31	-0.29	-0.30	0.31	-0.24	0.4654	0.0202	9.9	1.2	9.9	1.3	A-	A-
Math	7	593061	876	8	61	D.2.1.2	1	14125	0.67	0.16	0.67	0.10	0.06	0.00	0.43	-0.38	0.43	-0.31	-0.28	0.4214	0.0203	3.2	1.0	-0.3	1.0	A+	A-
Math	7	594438	877	8	62	B.1.1.1	2	14125	0.66	0.07	0.16	0.66	0.11	0.00	0.46	-0.40	-0.46	0.46	-0.21	0.5197	0.0201	-0.4	1.0	-0.8	1.0	A-	A-
Math	7	595078	878	8	63	A.2.2.3	2	14125	0.55	0.23	0.55	0.10	0.12	0.00	0.44	-0.38	0.44	-0.40	-0.37	1.1187	0.0194	1.1	1.0	-0.6	1.0	A+	A+
Math	7	593045	879	8	64	D.1.1.1	2	14125	0.68	0.17	0.07	0.68	0.07	0.00	0.38	-0.24	-0.37	0.38	-0.33	0.3613	0.0204	7.7	1.1	9.9	1.2	A+	A+
Math	7	594440	880	8	65	C.1.1.1	1	14125	0.84	0.84	0.08	0.04	0.05	0.00	0.44	0.44	-0.35	-0.26	-0.27	-0.6897	0.0247	-4.0	0.9	-7.3	0.8	A+	B-
Math	7	594422	881	8	66	C.1.2.1	2	14125	0.70	0.70	0.09	0.11	0.10	0.00	0.52	0.52	-0.41	-0.42	-0.38	0.2812	0.0206	-9.8	0.9	-9.9	0.8	A-	A+
Math	7	544798	882	8	67	A.1.1.1	1	14125	0.82	0.11	0.03	0.82	0.04	0.00	0.54	-0.47	-0.33	0.54	-0.30	-0.5492	0.0239	-9.9	0.8	-9.9	0.7		
Math	7	594994	883	8	68	A.2.1.1	1	14125	0.64	0.64	0.14	0.10	0.11	0.00	0.48	0.48	-0.40	-0.38	-0.37	0.5982	0.0199	-3.2	1.0	-4.6	0.9	A+	A+
Math	7	566880	884	8	69	E.3.1.3	2	14125	0.56	0.12	0.56	0.07	0.25	0.00	0.41	-0.29	0.41	-0.38	-0.38	1.0375	0.0194	6.4	1.1	4.9	1.1	A-	A-
Math	7	544865	885	8	70	B.2.2.2	1	14125	0.73	0.06	0.13	0.73	0.07	0.00	0.51	-0.30	-0.46	0.51	-0.37	0.1050	0.0211	-8.7	0.9	-8.2	0.8		
Math	7	564880	886	8	71	D.3.1.1	2	14125	0.66	0.11	0.66	0.09	0.14	0.00	0.44	-0.42	0.44	-0.43	-0.23	0.4855	0.0202	1.6	1.0	3.3	1.1	A-	A-
Math	7	595014	888	9	60	A.3.2.1	2	14161	0.59	0.59	0.07	0.25	0.08	0.00	0.47	0.47	-0.39	-0.41	-0.36	0.8784	0.0194	-2.1	1.0	-2.1	1.0	A-	A-
Math	7	595077	889	9	61	A.2.2.1	1	14161	0.80	0.09	0.80	0.07	0.04	0.00	0.44	-0.35	0.44	-0.26	-0.34	-0.3779	0.0229	-4.0	1.0	-2.6	0.9	A+	A-
Math	7	566884	890	9	62	E.3.1.2	2	14161	0.71	0.21	0.04	0.04	0.71	0.00	0.48	-0.40	-0.37	-0.35	0.48	0.2158	0.0207	-5.0	1.0	-6.8	0.9	A-	A-
Math	7	542912	891	9	63	D.2.1.1	1	14161	0.76	0.19	0.03	0.02	0.76	0.00	0.51	-0.45	-0.38	-0.27	0.51	-0.1075	0.0218	-9.0	0.9	-9.8	0.8		
Math	7	593147	892	9	64	C.3.1.1	1	14161	0.87	0.87	0.02	0.09	0.02	0.00	0.36	0.36	-0.20	-0.31	-0.17	-1.0241	0.0268	-1.2	1.0	-1.5	0.9	A+	A-
Math	7	594993	893	9	65	A.1.1.1	1	14161	0.84	0.02	0.07	0.07	0.84	0.00	0.53	-0.26	-0.42	-0.40	0.53	-0.7286	0.0248	-9.9	0.8	-9.9	0.6	A+	A+
Math	7	594358	894	9	66	B.2.2.2	2	14161	0.73	0.12	0.73	0.07	0.08	0.00	0.49	-0.30	0.49	-0.41	-0.45	0.0568	0.0212	-7.5	0.9	-6.4	0.9	A-	A-
Math	7	564876	895	9	67	D.1.1.1	2	14161	0.34	0.34	0.14	0.33	0.19	0.00	0.24	0.24	-0.34	-0.19	-0.24	2.2208	0.0201	9.9	1.2	9.9	1.5	A-	A+
Math	7	544868	896	9	68	C.1.1.2	1	14161	0.79	0.09	0.08	0.04	0.79	0.00	0.56	-0.38	-0.48	-0.36	0.56	-0.3665	0.0229	-9.9	0.8	-9.9	0.7		
Math	7	566867	897	9	69	E.1.1.1	1	14161	0.56	0.56	0.08	0.10	0.26	0.00	0.33	0.33	-0.34	-0.38	-0.22	1.0405	0.0193	9.9	1.2	9.9	1.2	A+	A-
Math	7	566821	898	9	70	D.3.1.2	2	14161	0.37	0.10	0.05	0.37	0.49	0.00	0.30	-0.47	-0.49	0.30	-0.22	2.0452	0.0197	9.9	1.2	9.9	1.3	B-	A-
Math	7	594441	899	9	71	C.1.2.1	2	14161	0.38	0.38	0.09	0.45	0.08	0.00	0.26	0.26	-0.42	-0.17	-0.43	1.9658	0.0196	9.9	1.2	9.9	1.4	A-	A-
Math	8	540305	901	0	1	A.3.3.1	1	129950	0.59	0.59	0.17	0.07	0.17	0.00	0.45	0.45	-0.25	-0.39	-0.52	1.0395	0.0065	9.9	1.0	9.9	1.1		
Math	8	551528	902	0	2	A.3.3.1	1	129950	0.76	0.76	0.04	0.07	0.13	0.00	0.49	0.49	-0.29	-0.29	-0.46	0.0168	0.0072	-9.9	0.9	-9.9	0.8		
Math	8	545741	903	0	3	A.3.2.1	2	129950	0.62	0.07	0.12	0.18	0.62	0.00	0.44	-0.33	-0.41	-0.33	0.44	0.8366	0.0065	9.9	1.0	-0.7	1.0		
Math	8	541971	904	0	4	A.3.2.1	2	129950	0.69	0.11	0.05	0.15	0.69	0.00	0.46	-0.30	-0.35	-0.43	0.46	0.4714	0.0068	-2.2	1.0	-3.1	1.0		
Math	8	556377	905	0	5	D.4.1.1	2	129950	0.76	0.76	0.15	0.06	0.03	0.00	0.41	0.41	-0.35	-0.27	-0.23	-0.0026	0.0073	9.1	1.0	4.7	1.0		
Math	8	542048	906	0	6	B.1.1.3	1	129950	0.66	0.66	0.04	0.15	0.15	0.00	0.52	0.52	-0.39	-0.40	-0.46	0.5940	0.0067	-9.9	0.9	-9.9	0.9		
Math	8	545628	907	0	7	D.2.2.2	1	129950	0.80	0.10	0.05	0.05	0.80	0.00	0.52	-0.36	-0.43	-0.36	0.52	-0.3146	0.0077	-9.9	0.9	-9.9	0.8		
Math	8	545787	908	0	8	B.2.2.2	1	129950	0.91	0.05	0.91	0.02	0.02	0.00	0.41	-0.38	0.41	-0.19	-0.15	-1.4740	0.0105	-9.9	0.9	-9.9	0.7		
Math	8	540298	909	0	9	E.1.1.3	1	129950	0.46	0.11	0.05	0.46	0.38	0.00	0.36	-0.34	-0.28	0.36	-0.34	1.7317	0.0064	9.9	1.1	9.9	1.2		
Math	8	556392	910	0	10	E.1.1.2	2	129950	0.74	0.74	0.09	0.09	0.08	0.00	0.34	0.34	-0.30	-0.23	-0.23	0.1219	0.0071	9.9	1.1	9.9	1.3		
Math	8	545700	911	0	11	B.1.1.2	1	129950	0.84	0.84	0.05	0.05	0.06	0.00	0.55	0.55	-0.37	-0.38	-0.41	-0.6669	0.0083	-9.9	0.8	-9.9	0.6		
Math	8	545774	912	0	12	D.2.1.1	1	129950	0.60	0.09	0.10	0.21	0.60	0.00	0.44	-0.37	-0.43	-0.33	0.44	0.9505	0.0065	9.9	1.0	9.9	1.1		
Math	8	551563	913	0	13	C.3.1.1	1	129950	0.79	0.79	0.01	0.15	0.05	0.00	0.39	0.39	-0.19	-0.29	-0.38	-0.2516	0.0076	5.3	1.0	9.9	1.1		
Math	8	556349	914	0	14	D.1.1.1	2	129950	0.71	0.05	0.15	0.09	0.71	0.00	0.56	-0.44	-0.50	-0.38	0.56	0.3236	0.0069	-9.9	0.9	-9.9	0.8		
Math	8	545584	915	0	15	C.1.1.3	1	129950	0.60	0.08	0.25	0.07	0.60	0.00	0.39	-0.40	-0.29	-0.36	0.39	0.9790	0.0065	9.9	1.1	9.9	1.2		
Math	8	556303	916	0	16	B.2.1.1	1	129950	0.61	0.12	0.17	0.61	0.10	0.00	0.42	-0.40	-0.38	0.42	-0.23	0.8921	0.0065	9.9	1.1	9.9	1.1		
Math	8	551489	917	0	17	A.1.1.1	1	129950	0.77	0.77	0.10	0.03	0.10	0.00	0.43	0.43	-0.28	-0.24	-0.38	-0.1106	0.0074	1.5	1.0	2.8	1.0		
Math	8	545641	918	0	18	D.4.1.2	1	129950	0.80	0.07	0.08	0.80	0.05	0.00	0.46	-0.34	-0.36	0.46	-0.28	-0.2819	0.0076	-9.9	1.0	-9.9	0.9		
Math	8	556309	919	0	19	B.2.2.1	1	129950	0.67	0.07	0.23	0.67	0.03	0.00	0.53	-0.32	-0.54	0.53	-0.24	0.5317	0.0067	-9.9	0.9	-9.9	0.9		
Math	8	545698	920	0	20	A.2.2.1	2	129950	0.85	0.06	0.85	0.06	0.03	0.00	0.45	-0.27	0.45	-0.37	-0.26	-0.7881	0.0086	-9.9	0.9	-9.9	0.7		
Math	8	540432	921	0	21	E.3.2.1	2	129950	0.45	0.11	0.04	0.40	0.45	0.00	0.34	-0.54	-0.36	-0.23	0.34	1.7698	0.0064	9.9	1.2	9.9	1.3		
Math	8	540349	922	0	22	C.1.2.1	1	129950	0.50	0.50	0.11	0.06	0.32	0.00	0.53	0.53	-0.36	-0.39	-0.56	1.4782	0.0064	-9.9	0.9	-9.9	0.9		
Math	8	545597	923	0	23	E.1.1.1	2	129950	0.86	0.05	0.86	0.05	0.04	0.00	0.39	-0.31	0.39	-0.28	-0.19	-0.8377	0.0087	-4.6	1.0	1.0	1.0		
Math	8	545825	924	0	24	E.4.1.2	2	129950	0.84	0.08	0.03	0.84	0.05	0.00	0.31	-0.15	-0.26	0.31	-0.26	-0.6021	0.0082	9.9	1.1	9.9	1.3		
Math	8	545607	927	0	49	E.4.1.1	1	129950	0.88	0.07	0.02	0.03	0.88	0.00	0.35	-0.22	-0.25	-0.27	0.35	-1.0379	0.0092	-0.2	1.0	-0.9	1.0		
Math	8	545573	928	0	50	C.1.1.1	2	129950	0.77	0.09	0.77	0.08	0.06	0.00	0.34	-0.24	0.34	-0.28	-0.21	-0.1066	0.0074	9.9	1.1	9.9	1.2		
Math	8	545630	929	0	51	E.1.1.1	2	129950	0.55	0.17																	

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Math	8	540290	930	0	52	D.4.1.3	2	129950	0.78	0.78	0.13	0.06	0.03	0.00	0.48	0.48	-0.42	-0.34	-0.25	-0.1648	0.0075	-9.9	0.9	-9.9	0.9		
Math	8	540310	931	0	53	C.1.1.2	1	129950	0.81	0.07	0.81	0.06	0.06	0.00	0.27	-0.19	0.27	-0.19	-0.16	-0.3980	0.0078	9.9	1.2	9.9	1.5		
Math	8	545764	932	0	54	B.2.2.3	1	129950	0.77	0.15	0.06	0.77	0.03	0.00	0.42	-0.34	-0.30	0.42	-0.26	-0.0512	0.0073	5.7	1.0	-5.5	1.0		
Math	8	551500	933	0	55	A.2.2.1	1	129950	0.67	0.06	0.67	0.20	0.07	0.00	0.44	-0.33	0.44	-0.36	-0.36	0.5670	0.0067	6.9	1.0	-0.9	1.0		
Math	8	556397	934	0	56	E.3.1.1	2	129950	0.73	0.11	0.09	0.08	0.73	0.00	0.53	-0.42	-0.43	-0.39	0.53	0.2117	0.0070	-9.9	0.9	-9.9	0.8		
Math	8	556363	935	0	57	D.2.1.1	2	129950	0.66	0.07	0.23	0.66	0.05	0.00	0.50	-0.41	-0.43	0.50	-0.35	0.6335	0.0067	-9.9	1.0	-9.9	0.9		
Math	8	540448	936	0	58	C.1.2.1	1	129950	0.65	0.06	0.08	0.65	0.20	0.00	0.54	-0.36	-0.36	0.54	-0.53	0.6510	0.0066	-9.9	0.9	-9.9	0.8		
Math	8	556381	937	0	59	D.4.1.2	1	129950	0.75	0.17	0.03	0.04	0.75	0.00	0.37	-0.27	-0.31	-0.32	0.37	0.0260	0.0072	9.9	1.1	9.9	1.2		
Math	8	540453	938	0	60	C.3.1.1	1	129950	0.82	0.10	0.07	0.82	0.01	0.00	0.45	-0.34	-0.37	0.45	-0.19	-0.4478	0.0079	-9.9	1.0	-9.2	0.9		
Math	8	545802	939	0	93	D.4.1.1	1	129950	0.81	0.81	0.11	0.03	0.05	0.00	0.46	0.46	-0.37	-0.27	-0.31	-0.3884	0.0078	-9.9	1.0	-9.9	0.9		
Math	8	545799	940	0	94	D.2.1.3	1	129950	0.75	0.08	0.75	0.09	0.07	0.00	0.38	-0.29	0.38	-0.23	-0.31	0.0490	0.0072	9.9	1.1	9.9	1.1		
Math	8	551513	941	0	95	A.3.1.2	1	129950	0.81	0.81	0.05	0.09	0.05	0.00	0.36	0.36	-0.25	-0.31	-0.17	-0.3606	0.0078	9.9	1.1	9.9	1.2		
Math	8	545646	942	0	96	D.1.1.3	2	129950	0.68	0.13	0.10	0.08	0.68	0.00	0.56	-0.47	-0.45	-0.44	0.56	0.4735	0.0068	-9.9	0.9	-9.9	0.8		
Math	8	542059	943	0	97	C.1.2.1	2	129950	0.66	0.03	0.06	0.66	0.25	0.00	0.53	-0.30	-0.36	0.53	-0.50	0.5854	0.0067	-9.9	0.9	-9.9	0.8		
Math	8	557794	944	0	98	A.3.1.1	2	129950	0.79	0.07	0.79	0.07	0.07	0.00	0.47	-0.36	0.47	-0.34	-0.33	-0.2553	0.0076	-9.9	0.9	-9.9	0.9		
Math	8	556393	945	0	99	E.1.1.3	2	129950	0.88	0.88	0.04	0.07	0.02	0.00	0.46	0.46	-0.30	-0.35	-0.27	-1.0071	0.0091	-9.9	0.9	-9.9	0.7		
Math	8	549544	946	0	100	C.3.1.1	1	129950	0.82	0.82	0.05	0.02	0.10	0.00	0.56	0.56	-0.28	-0.29	-0.54	-0.5032	0.0080	-9.9	0.8	-9.9	0.7		
Math	8	551541	947	0	101	B.1.1.4	1	129950	0.73	0.06	0.73	0.11	0.10	0.00	0.46	-0.28	0.46	-0.39	-0.35	0.1919	0.0070	-3.7	1.0	-9.9	0.9		
Math	8	556376	948	0	102	D.2.2.2	2	129950	0.63	0.11	0.17	0.63	0.08	0.00	0.43	-0.35	-0.35	0.43	-0.36	0.7636	0.0066	9.9	1.0	8.8	1.1		
Math	8	556406	949	0	103	E.4.1.2	2	129950	0.67	0.11	0.67	0.16	0.06	0.00	0.48	-0.38	0.48	-0.39	-0.35	0.5475	0.0067	-7.5	1.0	-9.9	0.9		
Math	8	551610	950	0	104	E.4.1.2	2	129950	0.81	0.03	0.13	0.81	0.02	0.00	0.49	-0.30	-0.43	0.49	-0.25	-0.4262	0.0079	-9.9	0.9	-9.9	0.8		
Math	8	545715	951	0	105	B.2.1.2	1	129950	0.68	0.06	0.13	0.14	0.68	0.00	0.44	-0.39	-0.31	-0.36	0.44	0.5274	0.0067	8.7	1.0	-1.4	1.0		
Math	8	551488	952	0	106	A.1.1.1	1	129950	0.78	0.78	0.10	0.05	0.06	0.00	0.42	0.42	-0.28	-0.29	-0.34	-0.1919	0.0075	2.0	1.0	-2.2	1.0		
Math	8	551594	953	0	107	E.1.1.2	2	129950	0.58	0.09	0.09	0.24	0.58	0.00	0.40	-0.31	-0.41	-0.33	0.40	1.0867	0.0064	9.9	1.1	9.9	1.1		
Math	8	545672	954	0	108	C.1.1.2	2	129950	0.72	0.06	0.07	0.16	0.72	0.00	0.41	-0.29	-0.36	-0.30	0.41	0.2663	0.0070	9.9	1.1	9.9	1.1		
Math	8	556351	955	0	109	D.1.1.2	2	129950	0.81	0.81	0.09	0.07	0.03	0.00	0.49	0.49	-0.36	-0.38	-0.31	-0.3554	0.0078	-9.9	0.9	-9.9	0.8		
Math	8	551503	956	0	110	A.2.2.2	1	129950	0.83	0.05	0.83	0.07	0.05	0.00	0.44	-0.25	0.44	-0.29	-0.38	-0.5315	0.0081	-9.7	1.0	-9.9	0.9		
Math	8	545581	957	0	111	B.2.2.1	1	129950	0.62	0.14	0.13	0.62	0.11	0.00	0.51	-0.42	-0.53	0.51	-0.31	0.8591	0.0065	-9.9	1.0	-9.9	0.9		
Math	8	551601	958	0	112	E.3.1.1	2	129950	0.84	0.05	0.84	0.08	0.02	0.00	0.46	-0.34	0.46	-0.35	-0.26	-0.6839	0.0084	-9.9	0.9	-9.9	0.9		
Math	8	540347	959	0	113	D.2.2.1	1	129950	0.63	0.21	0.63	0.06	0.09	0.00	0.43	-0.29	0.43	-0.43	-0.41	0.7705	0.0066	9.9	1.0	7.0	1.0		
Math	8	556388	960	0	114	E.1.1.1	2	129950	0.74	0.13	0.07	0.05	0.74	0.00	0.34	-0.23	-0.25	-0.27	0.34	0.0889	0.0071	9.9	1.1	9.9	1.3		
Math	8	542084	961	0	115	D.4.1.3	2	129950	0.74	0.07	0.74	0.12	0.06	0.00	0.50	-0.39	0.50	-0.38	-0.36	0.0886	0.0071	-9.9	0.9	-9.9	0.9		
Math	8	551533	962	0	116	B.1.1.2	1	129950	0.67	0.17	0.67	0.11	0.05	0.00	0.47	-0.41	0.47	-0.40	-0.28	0.5438	0.0067	-6.2	1.0	-8.5	1.0		
Math	8	594370	964	1	61	B.1.1.3	2	14669	0.76	0.04	0.12	0.08	0.76	0.00	0.52	-0.38	-0.41	-0.40	0.52	-0.0658	0.0216	-9.9	0.9	-8.4	0.8	A-	B-
Math	8	593043	965	1	62	D.1.1.1	2	14669	0.67	0.67	0.17	0.08	0.09	0.00	0.54	0.54	-0.51	-0.35	-0.40	0.5022	0.0200	-9.9	0.9	-9.9	0.8	B-	B-
Math	8	595012	966	1	63	A.3.1.2	2	14669	0.67	0.06	0.09	0.17	0.67	0.00	0.28	-0.32	-0.24	-0.15	0.28	0.4744	0.0201	9.9	1.2	9.9	1.6	A+	A-
Math	8	594353	967	1	64	C.1.1.2	2	14669	0.73	0.73	0.21	0.04	0.02	0.00	0.32	0.32	-0.24	-0.28	-0.26	0.1382	0.0209	9.9	1.2	9.4	1.2	A+	A+
Math	8	566905	968	1	65	E.1.1.1	2	14669	0.84	0.04	0.09	0.84	0.04	0.00	0.42	-0.28	-0.33	0.42	-0.26	-0.6807	0.0246	-3.6	1.0	-2.9	0.9	A+	A-
Math	8	545807	969	1	66	D.4.1.3	1	14669	0.57	0.05	0.27	0.10	0.57	0.00	0.42	-0.42	-0.32	-0.41	0.42	1.0522	0.0192	7.9	1.1	6.2	1.1		
Math	8	564895	970	1	67	E.3.2.1	2	14669	0.43	0.10	0.05	0.42	0.43	0.00	0.39	-0.49	-0.40	-0.33	0.39	1.7995	0.0192	9.9	1.1	9.9	1.1	A+	A-
Math	8	564877	971	1	68	B.2.1.3	1	14669	0.63	0.08	0.63	0.13	0.16	0.00	0.46	-0.32	0.46	-0.38	-0.40	0.7276	0.0196	1.5	1.0	-1.6	1.0	A-	A-
Math	8	540269	972	1	69	E.4.1.2	1	14669	0.85	0.03	0.03	0.09	0.85	0.00	0.45	-0.28	-0.32	-0.33	0.45	-0.8199	0.0254	-5.5	0.9	-4.5	0.8		
Math	8	595004	973	1	70	A.2.1.1	1	14669	0.81	0.13	0.81	0.04	0.01	0.00	0.28	-0.16	0.28	-0.28	-0.21	-0.4287	0.0232	9.9	1.1	9.9	1.6	A+	A-
Math	8	593146	974	1	71	D.2.2.2	2	14669	0.44	0.12	0.04	0.40	0.44	0.00	0.36	-0.44	-0.45	-0.28	0.36	1.7743	0.0192	9.9	1.1	9.9	1.2	A+	A+
Math	8	564888	975	1	72	A.2.2.1	2	14669	0.74	0.15	0.74	0.07	0.03	0.00	0.55	-0.48	0.55	-0.39	-0.37	0.0401	0.0213	-9.9	0.9	-9.9	0.7	A-	B-
Math	8	594443	977	2	61	C.1.2.1	2	14388	0.44	0.12	0.29	0.44	0.15	0.00	0.32	-0.36	-0.26	0.32	-0.32	1.8184	0.0192	9.9	1.1	9.9	1.3	A-	A-
Math	8	595047	978	2	62	B.1.1.1	2	14388	0.55	0.55	0.22	0.13	0.10	0.00	0.45	0.45	-0.36	-0.43	-0.44	1.2321	0.0192	1.1	1.0	2.0	1.0	A-	A-
Math	8	593126	979	2	63	D.2.2.1	2	14388	0.66	0.11	0.66	0.08	0.16	0.00	0.47	-0.35	0.47	-0.38	-0.41	0.6341	0.0199	-2.5	1.0	-3.6	0.9	A+	A-
Math	8	545704	980	2	64	B.2.1.1	1	14388	0.64	0.12	0.15	0.64	0.09	0.00	0.43	-0.42	-0.35	0.43	-0.26	0.6988	0.0198	3.7	1.0	-0.6	1.0		
Math	8	566815	981	2	65	E.1.1.2	2	14388	0.58	0.08	0.27	0.07	0.58	0.00	0.40	-0.39	-0.30	-0.41	0.40	1.0639	0.0193	8.8	1.1	5.5	1.1	A-	B-
Math	8	594427	982	2	66	C.1.1.3	1	14388	0.55																		

## Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Math	8	593123	983	2	67	D.1.1.3	2	14388	0.77	0.06	0.08	0.09	0.77	0.00	0.59	-0.43	-0.41	-0.48	0.59	-0.0706	0.0220	-9.9	0.8	-9.9	0.7	A+	A+
Math	8	541977	984	2	68	A.2.2.2	1	14388	0.60	0.05	0.20	0.16	0.60	0.00	0.37	-0.31	-0.29	-0.34	0.37	0.9790	0.0194	9.9	1.1	8.4	1.1		
Math	8	566836	985	2	69	D.4.1.1	1	14388	0.81	0.04	0.81	0.12	0.03	0.00	0.50	-0.32	0.50	-0.42	-0.31	-0.3513	0.0233	-8.6	0.9	-8.9	0.8	A+	A-
Math	8	595096	986	2	70	A.1.1.1	1	14388	0.76	0.13	0.76	0.07	0.04	0.00	0.45	-0.38	0.45	-0.35	-0.22	0.0067	0.0217	-1.9	1.0	-1.5	1.0	A+	A-
Math	8	595005	987	2	71	A.3.1.1	2	14388	0.45	0.03	0.39	0.45	0.13	0.00	0.21	-0.35	-0.10	0.21	-0.40	1.7616	0.0192	9.9	1.3	9.9	1.5	A-	A-
Math	8	593158	988	2	72	C.3.1.1	1	14388	0.87	0.02	0.04	0.87	0.06	0.00	0.45	-0.29	-0.23	0.45	-0.38	-0.9595	0.0271	-7.1	0.9	-4.5	0.8	A+	B-
Math	8	564919	990	3	61	B.1.1.1	2	14432	0.63	0.08	0.18	0.12	0.63	0.00	0.53	-0.47	-0.52	-0.33	0.53	0.7654	0.0197	-9.9	0.9	-6.7	0.9	A-	A-
Math	8	595075	991	3	62	A.3.3.1	2	14432	0.31	0.31	0.20	0.33	0.16	0.00	0.41	0.41	-0.32	-0.50	-0.47	2.5480	0.0205	-4.6	1.0	8.6	1.2	B-	A-
Math	8	593153	992	3	63	D.2.1.1	1	14432	0.91	0.03	0.03	0.91	0.02	0.00	0.41	-0.26	-0.30	0.41	-0.22	-1.4651	0.0313	-5.5	0.9	-3.1	0.8	A+	B-
Math	8	540372	993	3	64	B.2.2.3	1	14432	0.52	0.29	0.09	0.52	0.10	0.00	0.36	-0.31	-0.38	0.36	-0.27	1.3914	0.0192	9.9	1.1	9.9	1.2		
Math	8	593076	994	3	65	D.4.1.1	1	14432	0.74	0.08	0.12	0.74	0.06	0.00	0.50	-0.38	-0.39	0.50	-0.37	0.1078	0.0213	-6.7	0.9	-6.0	0.9	A+	A-
Math	8	566908	995	3	66	E.1.1.3	2	14432	0.58	0.10	0.58	0.17	0.16	0.00	0.36	-0.34	0.36	-0.26	-0.31	1.0420	0.0194	9.9	1.1	9.9	1.2	A+	A-
Math	8	594367	996	3	67	C.1.2.1	2	14432	0.67	0.12	0.08	0.67	0.12	0.00	0.42	-0.39	-0.32	0.42	-0.26	0.5211	0.0202	6.4	1.1	0.6	1.0	A+	A-
Math	8	545644	997	3	68	D.1.1.2	2	14432	0.85	0.03	0.05	0.85	0.07	0.00	0.43	-0.27	-0.24	0.43	-0.36	-0.7766	0.0256	-3.8	0.9	-4.8	0.8		
Math	8	593127	998	3	69	D.2.2.2	2	14432	0.82	0.82	0.09	0.05	0.03	0.00	0.48	0.48	-0.36	-0.33	-0.32	-0.5083	0.0240	-7.4	0.9	-5.0	0.8	A-	A-
Math	8	595098	999	3	70	A.2.2.2	2	14432	0.46	0.46	0.10	0.33	0.11	0.00	0.42	0.42	-0.44	-0.38	-0.41	1.6930	0.0192	3.7	1.0	8.1	1.1	A-	A-
Math	8	593159	1000	3	71	C.3.1.1	1	14432	0.80	0.80	0.12	0.02	0.06	0.00	0.46	0.46	-0.40	-0.28	-0.29	-0.3084	0.0230	-5.0	0.9	-2.0	0.9	A-	A-
Math	8	594425	1001	3	72	C.1.1.1	2	14432	0.63	0.63	0.04	0.23	0.10	0.00	0.34	0.34	-0.28	-0.31	-0.22	0.7788	0.0197	9.9	1.2	9.9	1.3	A+	A-
Math	8	594371	1003	4	61	B.2.1.1	1	14452	0.67	0.17	0.67	0.06	0.10	0.00	0.43	-0.41	0.43	-0.29	-0.25	0.5437	0.0202	5.5	1.1	1.4	1.0	A-	A-
Math	8	566825	1004	4	62	E.3.1.1	2	14452	0.73	0.13	0.08	0.73	0.07	0.00	0.51	-0.43	-0.40	0.51	-0.33	0.1871	0.0211	-7.1	0.9	-8.0	0.8	A+	B-
Math	8	595074	1005	4	63	A.2.2.2	2	14452	0.66	0.17	0.08	0.09	0.66	0.00	0.57	-0.57	-0.45	-0.32	0.57	0.5809	0.0201	-9.9	0.9	-9.9	0.8	A-	B-
Math	8	540427	1006	4	64	D.2.2.1	2	14452	0.79	0.06	0.12	0.79	0.03	0.00	0.54	-0.39	-0.45	0.54	-0.31	-0.2634	0.0229	-9.9	0.9	-9.9	0.7		
Math	8	564873	1007	4	65	C.1.1.1	2	14452	0.31	0.31	0.41	0.17	0.11	0.00	0.16	0.16	-0.12	-0.25	-0.22	2.5395	0.0205	9.9	1.3	9.9	1.8	A-	A-
Math	8	593044	1008	4	66	D.2.1.3	1	14452	0.67	0.12	0.14	0.67	0.07	0.00	0.44	-0.32	-0.35	0.44	-0.36	0.5166	0.0202	3.8	1.0	-0.4	1.0	A+	A-
Math	8	594351	1009	4	67	C.1.2.1	1	14452	0.71	0.08	0.71	0.04	0.17	0.00	0.51	-0.38	0.51	-0.32	-0.45	0.3089	0.0208	-6.3	0.9	-8.9	0.8	A-	A-
Math	8	545744	1010	4	68	B.1.1.1	1	14452	0.76	0.08	0.11	0.76	0.04	0.00	0.43	-0.41	-0.30	0.43	-0.23	-0.0484	0.0220	0.0	1.0	2.1	1.1		
Math	8	566790	1011	4	69	D.4.1.1	1	14452	0.71	0.71	0.06	0.16	0.07	0.00	0.40	0.40	-0.38	-0.27	-0.31	0.3300	0.0207	6.6	1.1	6.3	1.1	A+	A+
Math	8	595007	1012	4	70	A.1.1.1	1	14452	0.92	0.03	0.02	0.02	0.92	0.00	0.39	-0.31	-0.25	-0.19	0.39	-1.6194	0.0330	-4.9	0.9	-6.2	0.7	B+	A-
Math	8	593139	1013	4	71	D.1.1.3	2	14452	0.83	0.06	0.06	0.83	0.05	0.00	0.49	-0.35	-0.38	0.49	-0.31	-0.5702	0.0244	-8.4	0.9	-8.1	0.8	A+	A+
Math	8	593160	1014	4	72	C.3.1.1	1	14452	0.84	0.06	0.84	0.06	0.05	0.00	0.35	-0.21	0.35	-0.24	-0.26	-0.6212	0.0247	2.5	1.0	8.3	1.3	A+	A-
Math	8	595048	1016	5	61	B.1.1.2	2	14402	0.70	0.05	0.14	0.70	0.12	0.00	0.44	-0.34	-0.35	0.44	-0.34	0.4024	0.0205	2.1	1.0	2.8	1.1	A+	A-
Math	8	593041	1017	5	62	D.2.1.1	2	14402	0.84	0.04	0.84	0.08	0.04	0.00	0.39	-0.27	0.39	-0.28	-0.25	-0.6286	0.0249	-1.3	1.0	0.2	1.0	A+	A-
Math	8	593140	1018	5	63	D.1.1.3	2	14402	0.43	0.32	0.15	0.09	0.43	0.00	0.44	-0.39	-0.49	-0.43	0.44	1.8457	0.0193	-0.2	1.0	4.6	1.1	A+	A+
Math	8	564874	1019	5	64	C.3.1.1	1	14402	0.67	0.10	0.16	0.67	0.07	0.00	0.54	-0.45	-0.50	0.54	-0.32	0.5375	0.0202	-9.9	0.9	-9.0	0.8	A+	A-
Math	8	545684	1020	5	65	A.1.1.1	1	14402	0.55	0.05	0.21	0.18	0.55	0.00	0.38	-0.23	-0.31	-0.41	0.38	1.2040	0.0193	9.9	1.1	9.9	1.2	A-	A-
Math	8	566820	1021	5	66	E.3.1.1	2	14402	0.61	0.06	0.16	0.17	0.61	0.00	0.42	-0.43	-0.30	-0.35	0.42	0.8842	0.0196	6.9	1.1	6.2	1.1	A-	A-
Math	8	566838	1022	5	67	D.4.1.3	2	14402	0.66	0.14	0.66	0.13	0.07	0.00	0.41	-0.33	0.41	-0.33	-0.34	0.6367	0.0200	6.0	1.1	3.9	1.1	A+	A+
Math	8	595037	1023	5	68	A.2.1.1	1	14402	0.84	0.84	0.07	0.06	0.03	0.00	0.41	0.41	-0.28	-0.33	-0.24	-0.5995	0.0247	-2.7	1.0	-1.9	0.9	A+	A+
Math	8	542023	1024	5	69	E.1.1.3	1	14402	0.86	0.04	0.06	0.86	0.04	0.00	0.37	-0.26	-0.27	0.37	-0.22	-0.7856	0.0259	-0.4	1.0	1.5	1.1		
Math	8	594354	1025	5	70	B.2.2.2	1	14402	0.86	0.05	0.05	0.04	0.86	0.00	0.47	-0.38	-0.36	-0.20	0.47	-0.8393	0.0262	-7.6	0.9	-5.2	0.8	A+	A-
Math	8	595008	1026	5	71	A.2.2.2	2	14402	0.47	0.47	0.27	0.11	0.15	0.00	0.32	0.32	-0.29	-0.38	-0.24	1.6816	0.0192	9.9	1.2	9.9	1.3	A-	A-
Math	8	594414	1027	5	72	C.1.1.2	1	14402	0.35	0.16	0.37	0.12	0.35	0.00	0.33	-0.36	-0.31	-0.39	0.33	2.3237	0.0200	7.4	1.1	9.9	1.4	A+	A-
Math	8	594340	1029	6	61	B.2.2.2	1	14433	0.78	0.14	0.07	0.78	0.01	0.00	0.52	-0.47	-0.34	0.52	-0.25	-0.1128	0.0223	-9.4	0.9	-8.6	0.8	A+	A-
Math	8	594416	1030	6	62	C.1.2.1	2	14433	0.52	0.36	0.52	0.04	0.08	0.00	0.47	-0.48	0.47	-0.39	-0.28	1.4133	0.0191	-3.0	1.0	-2.7	1.0	A+	A+
Math	8	595036	1031	6	63	A.1.1.1	1	14433	0.94	0.03	0.02	0.94	0.01	0.00	0.39	-0.32	-0.23	0.39	-0.16	-1.8638	0.0364	-4.9	0.9	-7.7	0.6	A+	A-
Math	8	564875	1032	6	64	D.1.1.1	2	14433	0.63	0.05	0.14	0.63	0.18	0.00	0.29	-0.20	-0.28	0.29	-0.20	0.7912	0.0197	9.9	1.2	9.9	1.3	A-	A-
Math	8	595046	1033	6	65	A.3.1.1	2	14433	0.73	0.21	0.73	0.03	0.02	0.00	0.46	-0.41	0.46	-0.27	-0.32	0.2064	0.0211	-1.3	1.0	-4.0	0.9	A-	C-
Math	8	545593	1034	6	66	C.1.1.1	2	14433	0.90	0.03	0.02	0.05	0.90	0.00	0.29	-0.14	-0.18	-0.23	0.29	-1.3004	0.0300	1.1	1.0	5.0	1.3		
Math	8	566813	1035	6	67	D.4.1.3	2	14433	0.75	0.06	0.09	0.10	0.75	0.00	0.58	-0.39	-0.49	-0.46	0.58	0.0542	0.0216	-9.9	0.8	-9.9	0.7	A+	A+
Math	8	594456	1036	6	68	B.2.1.1	1	14433	0.81	0.81	0.13	0.04	0.02	0.00	0.38	0.38	-0.29	-0.28	-0.22	-0.3732	0.0235	-2.9	1.0	-1.3	1.0	A+	A-
Math	8	545650	1037																								

## Appendix I: Item Statistics Multiple Choice

Item Information							Classical												Rasch		Infit		Outfit		DIF		
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Math	8	594998	1038	6	70	B.1.1.2	2	14433	0.57	0.12	0.57	0.15	0.15	0.00	0.23	-0.23	0.23	-0.24	-0.09	1.1286	0.0193	9.9	1.3	9.9	1.5	A-	A-
Math	8	566804	1039	6	71	E.3.1.1	2	14433	0.72	0.12	0.10	0.06	0.72	0.00	0.59	-0.52	-0.46	-0.39	0.59	0.2384	0.0210	-9.9	0.8	-9.9	0.7	A+	C-
Math	8	593154	1040	6	72	D.2.2.1	2	14433	0.25	0.04	0.05	0.66	0.25	0.00	0.26	-0.48	-0.47	-0.22	0.26	2.9162	0.0216	7.2	1.1	9.9	1.8	A+	A+
Math	8	593141	1042	7	61	D.2.1.2	1	14382	0.54	0.17	0.10	0.19	0.54	0.00	0.37	-0.36	-0.40	-0.24	0.37	1.2803	0.0191	9.9	1.1	9.9	1.2	A-	A-
Math	8	593138	1043	7	62	D.1.1.1	2	14382	0.25	0.25	0.14	0.53	0.08	0.00	0.05	0.05	-0.33	0.09	-0.39	2.9102	0.0216	9.9	1.5	9.9	2.2	A-	B+
Math	8	595044	1044	7	63	A.2.2.1	2	14382	0.54	0.08	0.16	0.54	0.22	0.00	0.43	-0.40	-0.40	0.43	-0.35	1.2961	0.0191	2.0	1.0	3.2	1.0	A-	A+
Math	8	594356	1045	7	64	B.2.2.3	1	14382	0.71	0.18	0.71	0.09	0.02	0.00	0.43	-0.33	0.43	-0.37	-0.25	0.3003	0.0208	2.7	1.0	-0.8	1.0	A-	C-
Math	8	566814	1046	7	65	E.1.1.1	1	14382	0.89	0.89	0.03	0.05	0.03	0.00	0.42	0.42	-0.22	-0.32	-0.26	-1.1793	0.0290	-5.2	0.9	-3.6	0.8	A+	A-
Math	8	594445	1047	7	66	B.1.1.3	2	14382	0.80	0.05	0.80	0.09	0.05	0.00	0.49	-0.31	0.49	-0.40	-0.33	-0.2962	0.0231	-7.4	0.9	-9.7	0.8	A+	A-
Math	8	551511	1048	7	67	A.3.1.1	2	14382	0.57	0.11	0.27	0.57	0.05	0.00	0.46	-0.45	-0.39	0.46	-0.36	1.1470	0.0192	-0.5	1.0	0.9	1.0		
Math	8	566818	1049	7	68	E.3.2.1	2	14382	0.54	0.15	0.05	0.54	0.27	0.00	0.36	-0.37	-0.45	0.36	-0.24	1.2880	0.0191	9.9	1.1	9.9	1.2	A+	A-
Math	8	595097	1050	7	69	A.1.1.1	1	14382	0.55	0.10	0.55	0.07	0.28	0.00	0.44	-0.40	0.44	-0.34	-0.40	1.2171	0.0192	2.9	1.0	3.0	1.0	A-	A-
Math	8	545813	1051	7	70	D.4.1.1	1	14382	0.84	0.84	0.08	0.04	0.04	0.00	0.48	0.48	-0.37	-0.34	-0.27	-0.6511	0.0250	-6.6	0.9	-8.4	0.7		
Math	8	566819	1052	7	71	E.4.1.2	2	14382	0.58	0.07	0.23	0.58	0.12	0.00	0.35	-0.30	-0.33	0.35	-0.22	1.0803	0.0193	9.9	1.1	9.9	1.2	A-	A-
Math	8	594350	1053	7	72	C.1.1.3	2	14382	0.69	0.04	0.69	0.09	0.18	0.00	0.46	-0.35	0.46	-0.36	-0.39	0.4367	0.0204	-1.7	1.0	-2.4	1.0	A-	A-
Math	8	593124	1055	8	61	D.2.1.2	1	14435	0.87	0.04	0.04	0.87	0.05	0.00	0.47	-0.34	-0.31	0.47	-0.31	-0.8675	0.0266	-8.1	0.9	-7.2	0.7	A+	A-
Math	8	595073	1056	8	62	A.2.2.1	2	14435	0.58	0.16	0.58	0.10	0.15	0.00	0.31	-0.30	0.31	-0.32	-0.18	1.1074	0.0193	9.9	1.2	9.9	1.2	A+	A-
Math	8	566817	1057	8	63	E.1.1.3	2	14435	0.48	0.16	0.12	0.23	0.48	0.00	0.23	-0.32	-0.19	-0.14	0.23	1.6107	0.0191	9.9	1.3	9.9	1.5	A-	A-
Math	8	566779	1058	8	64	D.4.1.3	2	14435	0.81	0.81	0.08	0.06	0.05	0.00	0.54	0.54	-0.42	-0.37	-0.38	-0.3694	0.0235	-9.9	0.8	-9.9	0.7	B+	A+
Math	8	594450	1059	8	65	B.1.1.4	1	14435	0.71	0.04	0.05	0.19	0.71	0.00	0.52	-0.38	-0.40	-0.44	0.52	0.3098	0.0208	-8.6	0.9	-8.1	0.8	A+	A-
Math	8	593157	1060	8	66	C.3.1.1	1	14435	0.84	0.84	0.05	0.07	0.03	0.00	0.43	0.43	-0.27	-0.32	-0.30	-0.6559	0.0251	-3.9	0.9	-1.6	0.9	A-	A-
Math	8	545754	1061	8	67	C.1.1.2	1	14435	0.81	0.81	0.09	0.08	0.02	0.00	0.44	0.44	-0.34	-0.31	-0.25	-0.3654	0.0235	-1.9	1.0	-4.6	0.9		
Math	8	595006	1062	8	68	A.3.3.1	2	14435	0.16	0.16	0.16	0.30	0.38	0.00	0.17	-0.27	0.17	-0.32	-0.12	3.6838	0.0253	6.0	1.1	9.9	2.4	A-	A-
Math	8	566906	1063	8	69	E.4.1.1	2	14435	0.63	0.07	0.24	0.05	0.63	0.00	0.40	-0.34	-0.31	-0.37	0.40	0.8011	0.0197	9.1	1.1	6.5	1.1	A-	B-
Math	8	594352	1064	8	70	B.2.1.2	2	14435	0.52	0.14	0.52	0.15	0.19	0.00	0.39	-0.33	0.39	-0.33	-0.36	1.4085	0.0191	9.3	1.1	9.3	1.1	A+	A-
Math	8	545602	1065	8	71	E.3.1.1	2	14435	0.77	0.12	0.77	0.05	0.05	0.00	0.57	-0.51	0.57	-0.31	-0.43	-0.0900	0.0222	-9.9	0.8	-9.9	0.7		
Math	8	593121	1066	8	72	D.1.1.2	2	14435	0.71	0.06	0.71	0.19	0.04	0.00	0.44	-0.32	0.44	-0.36	-0.31	0.3626	0.0207	2.4	1.0	-2.0	1.0	A+	A+
Math	8	595038	1068	9	61	A.1.1.1	1	14357	0.79	0.79	0.04	0.14	0.03	0.00	0.41	0.41	-0.27	-0.35	-0.20	-0.2158	0.0228	1.3	1.0	0.6	1.0	A+	A+
Math	8	593122	1069	9	62	D.1.1.2	1	14357	0.84	0.06	0.07	0.84	0.03	0.00	0.52	-0.38	-0.41	0.52	-0.30	-0.6129	0.0249	-9.9	0.8	-9.9	0.7	A+	A-
Math	8	594342	1070	9	63	C.1.1.1	2	14357	0.57	0.57	0.30	0.03	0.10	0.00	0.15	0.15	-0.13	-0.17	-0.10	1.1396	0.0194	9.9	1.4	9.9	1.8	A+	A-
Math	8	566788	1071	9	64	E.1.1.2	2	14357	0.48	0.16	0.48	0.10	0.25	0.00	0.54	-0.54	0.54	-0.43	-0.51	1.5895	0.0192	-9.9	0.9	-8.4	0.9	A-	A-
Math	8	593125	1072	9	65	D.2.1.3	1	14357	0.85	0.85	0.05	0.09	0.02	0.00	0.47	0.47	-0.38	-0.33	-0.26	-0.7259	0.0256	-7.2	0.9	-6.4	0.8	A+	A-
Math	8	594372	1073	9	66	B.1.1.4	1	14357	0.73	0.15	0.73	0.08	0.05	0.00	0.44	-0.34	0.44	-0.37	-0.27	0.2155	0.0211	1.2	1.0	-2.1	1.0	A+	A-
Math	8	566887	1074	9	67	E.4.1.2	2	14357	0.68	0.08	0.68	0.12	0.12	0.00	0.54	-0.36	0.54	-0.41	-0.51	0.4940	0.0204	-9.9	0.9	-9.9	0.8	A-	A-
Math	8	545688	1075	9	68	A.2.2.1	2	14357	0.59	0.14	0.15	0.59	0.12	0.00	0.54	-0.42	-0.53	0.54	-0.46	1.0309	0.0195	-9.9	0.9	-9.9	0.8		
Math	8	566806	1076	9	69	E.3.2.1	2	14357	0.34	0.15	0.34	0.05	0.46	0.00	0.21	-0.31	0.21	-0.42	-0.14	2.3912	0.0201	9.9	1.2	9.9	1.7	A+	A-
Math	8	595099	1077	9	70	A.3.1.2	2	14357	0.82	0.05	0.08	0.82	0.05	0.00	0.48	-0.34	-0.36	0.48	-0.31	-0.4670	0.0240	-6.6	0.9	-7.2	0.8	A+	C-
Math	8	594355	1078	9	71	B.2.2.1	2	14357	0.30	0.15	0.10	0.44	0.30	0.00	0.40	-0.64	-0.47	-0.34	0.40	2.6098	0.0207	-4.4	1.0	8.8	1.2	A-	A-
Math	8	545768	1079	9	72	C.3.1.1	1	14357	0.79	0.79	0.06	0.08	0.07	0.00	0.43	0.43	-0.35	-0.23	-0.37	-0.1910	0.0227	-1.5	1.0	3.7	1.1		
Math	11	540631	1081	0	1	A.2.2.1	1	129874	0.73	0.05	0.15	0.07	0.73	0.00	0.52	-0.43	-0.45	-0.29	-0.52	-0.5469	0.0070	-9.9	0.9	-9.9	0.8		
Math	11	542116	1082	0	2	A.3.1.1	1	129874	0.70	0.70	0.02	0.27	0.00	0.00	0.51	0.51	-0.29	-0.49	-0.15	-0.3412	0.0068	-9.9	0.9	-9.9	0.9		
Math	11	542184	1083	0	3	A.3.2.1	2	129874	0.86	0.03	0.86	0.08	0.02	0.00	0.33	-0.23	0.33	-0.24	-0.18	-1.5454	0.0087	4.0	1.0	1.6	1.0		
Math	11	542118	1084	0	4	A.3.2.1	1	129874	0.86	0.03	0.86	0.05	0.06	0.00	0.37	-0.21	0.37	-0.29	-0.24	-1.4890	0.0086	-3.8	1.0	-4.0	1.0		
Math	11	551720	1085	0	5	D.2.1.4	1	129874	0.71	0.06	0.14	0.09	0.71	0.00	0.35	-0.40	-0.15	-0.32	0.35	-0.3659	0.0069	9.9	1.1	9.9	1.3		
Math	11	540593	1086	0	6	E.4.2.2	2	129874	0.61	0.25	0.13	0.61	0.01	0.00	0.52	-0.51	-0.41	0.52	-0.18	0.2147	0.0065	-9.9	0.9	-9.9	0.9		
Math	11	554504	1087	0	7	B.2.2.1	2	129874	0.74	0.74	0.08	0.13	0.05	0.00	0.45	0.45	-0.43	-0.37	-0.16	-0.5912	0.0071	-9.7	1.0	9.9	1.1		
Math	11	554546	1088	0	8	D.1.1.3	1	129874	0.59	0.22	0.59	0.07	0.12	0.00	0.43	-0.35	0.43	-0.40	-0.37	0.3360	0.0064	9.9	1.0	4.5	1.0		
Math	11	545275	1089	0	9	C.1.2.1	2	129874	0.67	0.09	0.14	0.67	0.10	0.00	0.44	-0.38	-0.42	0.44	-0.22	-0.1508	0.0067	4.3	1.0	6.2	1.0		
Math	11	554489	1090	0	10	A.1.3.1	1	129874	0.70	0.70	0.22	0.02	0.06	0.00	0.34	0.34	-0.24	-0.27	-0.33	-0.3303	0.0068	9.9	1.1	9.9	1.2		
Math	11	545385	1091	0	11	B.2.2.3	2	129874	0.45	0.27	0.45	0.15	0.13	0.00	0.40	-0.51	0.40	-0.31	-0.17	1.0830	0.0064	9.9	1.1	9.9	1.1		
Math	11	55174																									

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF		
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B	
Math	11	554562	1093	0	13	D.2.1.5	1	129874	0.74	0.10	0.07	0.09	0.74	0.00	0.44	-0.29	-0.31	-0.38	0.44	-0.5985	0.0071	-3.9	1.0	-9.9	0.9			
Math	11	542271	1094	0	14	D.4.1.1	2	129874	0.48	0.48	0.16	0.09	0.28	0.00	0.54	0.54	-0.49	-0.44	-0.54	0.9317	0.0064	-9.9	0.9	-9.9	0.9			
Math	11	545292	1095	0	15	E.2.1.1	1	129874	0.74	0.06	0.74	0.10	0.10	0.00	0.40	-0.38	0.40	-0.24	-0.30	-0.5796	0.0071	7.7	1.0	9.9	1.1			
Math	11	542269	1096	0	16	D.3.2.3	2	129874	0.59	0.06	0.23	0.59	0.12	0.00	0.41	-0.35	-0.33	0.41	-0.32	0.3224	0.0064	9.9	1.1	5.1	1.0			
Math	11	551701	1097	0	17	C.3.1.1	1	129874	0.70	0.11	0.70	0.10	0.08	0.00	0.47	-0.26	0.47	-0.48	-0.36	-0.3260	0.0068	-9.9	1.0	-7.5	1.0			
Math	11	554520	1098	0	18	C.1.1.2	1	129874	0.65	0.11	0.18	0.65	0.06	0.00	0.35	-0.33	-0.25	0.35	-0.25	-0.0246	0.0066	9.9	1.1	9.9	1.2			
Math	11	545377	1099	0	19	D.2.2.1	1	129874	0.69	0.05	0.17	0.69	0.09	0.00	0.52	-0.34	-0.46	0.52	-0.37	-0.2479	0.0067	-9.9	0.9	-9.9	0.8			
Math	11	551680	1100	0	20	B.2.2.4	2	129874	0.87	0.87	0.03	0.04	0.06	0.00	0.38	0.38	-0.28	-0.31	-0.19	-1.6043	0.0089	-4.3	1.0	-9.9	0.9			
Math	11	554531	1101	0	21	C.1.4.1	1	129874	0.73	0.05	0.06	0.73	0.16	0.00	0.57	-0.39	-0.39	0.57	-0.50	-0.5229	0.0070	-9.9	0.9	-9.9	0.7			
Math	11	551753	1102	0	22	E.1.1.1	1	129874	0.85	0.08	0.05	0.03	0.85	0.00	0.34	-0.18	-0.26	-0.29	0.34	-1.4048	0.0084	2.2	1.0	9.9	1.2			
Math	11	542165	1103	0	23	E.2.1.3	2	129874	0.67	0.13	0.67	0.11	0.09	0.00	0.42	-0.34	0.42	-0.31	-0.32	-0.1375	0.0067	9.9	1.0	2.4	1.0			
Math	11	542201	1104	0	24	B.2.2.2	2	129874	0.73	0.10	0.08	0.73	0.09	0.00	0.57	-0.41	-0.43	0.57	-0.48	-0.5003	0.0070	-9.9	0.9	-9.9	0.7			
Math	11	545390	1107	0	52	C.1.1.1	2	129874	0.78	0.11	0.78	0.09	0.02	0.00	0.37	-0.23	0.37	-0.35	-0.17	-0.8243	0.0074	9.9	1.1	9.9	1.2			
Math	11	542193	1108	0	53	A.2.1.1	2	129874	0.57	0.35	0.04	0.57	0.04	0.00	0.28	-0.18	-0.38	0.28	-0.35	0.4164	0.0064	9.9	1.2	9.9	1.4			
Math	11	554572	1109	0	54	D.2.2.2	1	129874	0.80	0.05	0.80	0.06	0.08	0.00	0.48	-0.27	0.48	-0.38	-0.36	-1.0034	0.0076	-9.9	0.9	-9.9	0.8			
Math	11	545509	1110	0	55	D.4.1.1	1	129874	0.81	0.06	0.03	0.10	0.81	0.00	0.43	-0.31	-0.30	-0.31	0.43	-1.1033	0.0078	-9.8	1.0	-6.1	0.9			
Math	11	545382	1111	0	56	C.1.2.3	2	129874	0.72	0.72	0.11	0.08	0.08	0.00	0.49	0.49	-0.49	-0.31	-0.27	-0.4594	0.0069	-9.9	1.0	-9.9	0.9			
Math	11	554511	1112	0	57	B.2.2.4	2	129874	0.82	0.82	0.05	0.08	0.06	0.00	0.51	0.51	-0.31	-0.38	-0.39	-1.1893	0.0080	-9.9	0.9	-9.9	0.8			
Math	11	554581	1113	0	58	D.3.2.1	1	129874	0.74	0.05	0.06	0.16	0.74	0.00	0.41	-0.30	-0.37	-0.29	0.41	-0.5611	0.0070	6.6	1.0	6.6	1.1			
Math	11	542138	1114	0	59	D.3.1.1	1	129874	0.74	0.01	0.22	0.03	0.74	0.00	0.37	-0.21	-0.31	-0.29	0.37	-0.5629	0.0071	9.9	1.1	9.9	1.1			
Math	11	545331	1115	0	60	E.3.2.1	2	129874	0.50	0.06	0.12	0.32	0.50	0.00	0.45	-0.49	-0.55	-0.35	0.45	0.8148	0.0064	7.9	1.0	5.5	1.0			
Math	11	551700	1116	0	61	C.1.4.1	1	129874	0.83	0.07	0.83	0.06	0.04	0.00	0.41	-0.32	0.41	-0.17	-0.36	-1.2604	0.0081	-7.4	1.0	-7.3	0.9			
Math	11	554538	1117	0	62	D.1.1.1	2	129874	0.83	0.06	0.07	0.83	0.04	0.00	0.52	-0.39	-0.37	0.52	-0.33	-1.2199	0.0080	-9.9	0.9	-9.9	0.7			
Math	11	554567	1118	0	63	D.2.2.1	1	129874	0.73	0.10	0.12	0.73	0.05	0.00	0.56	-0.48	-0.47	0.56	-0.25	-0.5421	0.0070	-9.9	0.9	-9.9	0.8			
Math	11	542232	1119	0	96	D.1.1.1	2	129874	0.80	0.80	0.07	0.06	0.08	0.00	0.53	0.53	-0.38	-0.43	-0.36	-0.9956	0.0076	-9.9	0.9	-9.9	0.8			
Math	11	545369	1120	0	97	D.1.1.3	1	129874	0.61	0.03	0.29	0.07	0.61	0.00	0.41	-0.33	-0.34	-0.38	0.41	0.1989	0.0065	9.9	1.1	9.9	1.1			
Math	11	551729	1121	0	98	D.2.2.1	1	129874	0.79	0.07	0.08	0.79	0.06	0.00	0.51	-0.36	-0.41	0.51	-0.33	-0.9053	0.0075	-9.9	0.9	-9.9	0.8			
Math	11	545334	1122	0	99	E.4.1.2	2	129874	0.84	0.09	0.84	0.04	0.03	0.00	0.48	-0.40	0.48	-0.29	-0.29	-1.3679	0.0083	-9.9	0.9	-9.9	0.7			
Math	11	545475	1123	0	100	C.3.1.2	1	129874	0.63	0.19	0.08	0.09	0.63	0.00	0.50	-0.48	-0.28	-0.41	0.50	0.0637	0.0065	-9.9	0.9	-9.9	0.9			
Math	11	542200	1124	0	101	B.2.2.1	2	129874	0.85	0.04	0.06	0.06	0.85	0.00	0.48	-0.29	-0.35	-0.34	0.48	-1.4231	0.0084	-9.9	0.9	-9.3	0.9			
Math	11	554588	1125	0	102	D.3.2.3	2	129874	0.59	0.07	0.22	0.59	0.12	0.00	0.45	-0.37	-0.35	0.45	-0.41	0.3297	0.0064	4.1	1.0	-6.0	1.0			
Math	11	542211	1126	0	103	B.2.3.1	2	129874	0.42	0.30	0.21	0.08	0.42	0.00	0.50	-0.50	-0.50	-0.44	0.50	1.2518	0.0064	-9.9	0.9	-9.9	1.0			
Math	11	545352	1127	0	104	D.2.1.3	1	129874	0.89	0.89	0.02	0.06	0.03	0.00	0.47	0.47	-0.25	-0.37	-0.29	-1.9192	0.0097	-9.9	0.9	-9.9	0.6			
Math	11	545453	1128	0	105	B.2.2.3	2	129874	0.53	0.53	0.16	0.11	0.19	0.00	0.46	0.46	-0.31	-0.42	-0.49	0.6331	0.0064	-5.0	1.0	-3.8	1.0			
Math	11	545270	1129	0	106	B.2.1.1	1	129874	0.67	0.12	0.16	0.67	0.05	0.00	0.32	-0.27	-0.23	0.32	-0.24	-0.1281	0.0067	9.9	1.2	9.9	1.3			
Math	11	540519	1130	0	107	D.2.2.2	1	129874	0.72	0.72	0.09	0.11	0.07	0.00	0.57	0.57	-0.45	-0.43	-0.45	-0.4924	0.0070	-9.9	0.8	-9.9	0.7			
Math	11	545326	1131	0	108	E.3.1.1	2	129874	0.70	0.70	0.08	0.04	0.18	0.00	0.51	0.51	-0.34	-0.39	-0.44	-0.3255	0.0068	-9.9	0.9	-9.9	0.9			
Math	11	554590	1132	0	109	D.4.1.1	1	129874	0.73	0.73	0.06	0.15	0.06	0.00	0.47	0.47	-0.38	-0.35	-0.34	-0.4978	0.0070	-9.9	1.0	-9.9	0.9			
Math	11	540619	1133	0	110	C.1.3.1	2	129874	0.76	0.11	0.09	0.76	0.04	0.00	0.36	-0.22	-0.25	0.36	-0.32	-0.7137	0.0072	9.9	1.1	9.9	1.2			
Math	11	551759	1134	0	111	E.2.1.3	2	129874	0.73	0.73	0.12	0.07	0.08	0.00	0.42	0.42	-0.33	-0.37	-0.23	-0.5142	0.0070	5.1	1.0	0.6	1.0			
Math	11	554578	1135	0	112	D.3.1.2	2	129874	0.69	0.09	0.16	0.05	0.69	0.00	0.52	-0.38	-0.43	-0.41	0.52	-0.2846	0.0068	-9.9	0.9	-9.9	0.9			
Math	11	545391	1136	0	113	C.1.1.2	2	129874	0.61	0.14	0.61	0.21	0.03	0.00	0.36	-0.41	0.36	-0.24	-0.21	0.1968	0.0065	9.9	1.1	9.9	1.2			
Math	11	545351	1137	0	114	D.2.1.2	1	129874	0.70	0.10	0.70	0.12	0.08	0.00	0.50	-0.30	0.50	-0.43	-0.44	-0.3119	0.0068	-9.9	0.9	-9.9	0.9			
Math	11	551711	1138	0	115	D.2.1.1	1	129874	0.68	0.10	0.12	0.68	0.09	0.00	0.49	-0.41	-0.43	0.49	-0.31	-0.1980	0.0067	-9.9	1.0	-9.9	0.9			
Math	11	554523	1139	0	116	C.1.2.3	1	129874	0.65	0.65	0.10	0.15	0.10	0.00	0.54	0.54	-0.48	-0.38	-0.49	-0.0032	0.0066	-9.9	0.9	-9.9	0.9			
Math	11	542141	1140	0	117	D.3.2.1	1	129874	0.71	0.71	0.06	0.08	0.15	0.00	0.45	0.45	-0.37	-0.42	-0.27	-0.4128	0.0069	-1.5	1.0	-4.4	1.0			
Math	11	551639	1141	0	118	A.1.1.2	1	129874	0.76	0.76	0.08	0.13	0.03	0.00	0.42	0.42	-0.29	-0.34	-0.29	-0.7020	0.0072	0.3	1.0	-0.5	1.0			
Math	11	542135	1142	0	119	D.1.1.2	1	129874	0.66	0.08	0.17	0.09	0.66	0.00	0.41	-0.37	-0.32	-0.29	0.41	-0.1015	0.0066	9.9	1.1	7.5	1.0			
Math	11	595091	1144	1	64	B.2.2.4	2	14631	0.61	0.61	0.14	0.12	0.14	0.00	0.55	0.55	-0.47	-0.48	-0.46	0.1705	0.0194	-9.9	0.9	-9.9	0.9	A+	A-	
Math	11	594396	1145																									

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Math	11	545332	1147	1	67	E.3.2.1	2	14631	0.48	0.16	0.29	0.48	0.06	0.00	0.28	-0.35	-0.19	0.28	-0.27	0.8873	0.0191	9.9	1.3	9.9	1.4		
Math	11	566809	1148	1	68	D.3.2.3	1	14631	0.58	0.22	0.58	0.12	0.07	0.00	0.37	-0.31	0.37	-0.28	-0.35	0.3227	0.0192	9.9	1.1	8.4	1.1	A+	A-
Math	11	566868	1149	1	69	E.2.1.3	2	14631	0.50	0.16	0.15	0.18	0.50	0.00	0.43	-0.37	-0.38	-0.40	0.43	0.7502	0.0191	5.3	1.0	5.6	1.1	A-	A-
Math	11	593107	1150	1	70	D.1.1.3	1	14631	0.55	0.55	0.29	0.08	0.08	0.00	0.45	0.45	-0.36	-0.45	-0.41	0.4727	0.0191	3.7	1.0	1.7	1.0	A+	A+
Math	11	594467	1151	1	71	C.3.1.2	2	14631	0.61	0.08	0.12	0.18	0.61	0.00	0.53	-0.42	-0.39	-0.48	0.53	0.1466	0.0194	-9.2	0.9	-9.9	0.8	A+	A-
Math	11	566797	1152	1	72	D.4.1.1	1	14631	0.69	0.10	0.10	0.11	0.69	0.00	0.53	-0.45	-0.43	-0.37	0.53	-0.2686	0.0202	-9.8	0.9	-9.4	0.8	A+	A-
Math	11	594437	1153	1	73	C.1.2.2	2	14631	0.36	0.16	0.36	0.34	0.13	0.00	0.28	-0.12	0.28	-0.33	-0.31	1.5054	0.0197	9.9	1.2	9.9	1.5	A-	A-
Math	11	593065	1154	1	74	D.2.2.3	1	14631	0.33	0.19	0.35	0.13	0.33	0.00	0.32	-0.42	-0.25	-0.38	0.32	1.7214	0.0202	8.4	1.1	9.9	1.4	A-	A-
Math	11	540525	1155	1	75	D.2.1.4	2	14631	0.67	0.11	0.13	0.67	0.09	0.00	0.45	-0.36	-0.31	0.45	-0.42	-0.1429	0.0199	0.4	1.0	0.0	1.0		
Math	11	594442	1157	2	64	C.3.1.2	1	14396	0.56	0.08	0.56	0.29	0.08	0.00	0.53	-0.38	0.53	-0.52	-0.38	0.4582	0.0192	-9.9	0.9	-8.5	0.9	A-	A+
Math	11	594382	1158	2	65	C.1.3.1	2	14396	0.35	0.12	0.43	0.35	0.10	0.00	0.35	-0.36	-0.37	0.35	-0.26	1.5942	0.0199	4.8	1.0	9.9	1.3	A-	A+
Math	11	566863	1159	2	66	D.4.1.1	2	14396	0.50	0.25	0.09	0.16	0.50	0.00	0.39	-0.31	-0.35	-0.42	0.39	0.7719	0.0191	9.6	1.1	7.2	1.1	A+	A+
Math	11	595089	1160	2	67	B.2.1.1	1	14396	0.69	0.09	0.69	0.12	0.09	0.00	0.46	-0.24	0.46	-0.41	-0.41	-0.2709	0.0203	-2.3	1.0	-2.1	1.0	B-	B-
Math	11	595018	1161	2	68	A.1.1.2	1	14396	0.67	0.26	0.03	0.67	0.03	0.00	0.51	-0.48	-0.34	0.51	-0.27	-0.1377	0.0200	-8.1	0.9	-9.1	0.8	A+	A-
Math	11	566835	1162	2	69	D.3.2.2	2	14396	0.46	0.46	0.24	0.18	0.12	0.01	0.29	0.29	-0.22	-0.36	-0.23	0.9975	0.0192	9.9	1.2	9.9	1.3	A+	A-
Math	11	545388	1163	2	70	B.2.3.1	2	14396	0.75	0.09	0.07	0.75	0.09	0.00	0.32	-0.33	-0.31	0.32	-0.06	-0.6470	0.0215	9.6	1.1	9.9	1.3		
Math	11	593148	1164	2	71	D.2.1.3	2	14396	0.65	0.12	0.19	0.65	0.04	0.00	0.43	-0.33	-0.40	0.43	-0.28	-0.0276	0.0198	3.0	1.0	2.7	1.1	A+	A-
Math	11	593145	1165	2	72	D.1.1.2	2	14396	0.30	0.30	0.28	0.25	0.17	0.00	0.24	0.24	-0.27	-0.21	-0.31	1.9238	0.0207	9.9	1.2	9.9	1.6	A-	A-
Math	11	566811	1166	2	73	E.3.1.1	2	14396	0.29	0.31	0.29	0.23	0.16	0.00	0.09	-0.17	0.09	-0.06	-0.01	1.9490	0.0208	9.9	1.4	9.9	2.1	A-	A+
Math	11	564900	1167	2	74	B.2.2.4	2	14396	0.53	0.14	0.53	0.19	0.13	0.00	0.40	-0.18	0.40	-0.42	-0.42	0.6075	0.0191	8.6	1.1	9.3	1.1	A-	A-
Math	11	545343	1168	2	75	D.2.2.2	1	14396	0.72	0.72	0.09	0.12	0.06	0.00	0.52	0.52	-0.41	-0.39	-0.39	-0.4746	0.0209	-9.1	0.9	-7.3	0.9		
Math	11	593109	1170	3	64	D.2.1.2	2	14422	0.63	0.63	0.13	0.13	0.11	0.00	0.47	0.47	-0.41	-0.29	-0.45	0.1177	0.0196	-0.7	1.0	-1.4	1.0	A-	A-
Math	11	594464	1171	3	65	B.2.3.1	2	14422	0.38	0.36	0.19	0.38	0.07	0.00	0.29	-0.22	-0.40	0.29	-0.28	1.4699	0.0197	9.9	1.1	9.9	1.4	A-	A-
Math	11	566812	1172	3	66	E.4.1.2	2	14422	0.72	0.13	0.72	0.07	0.07	0.00	0.42	-0.35	0.42	-0.38	-0.21	-0.4347	0.0208	1.5	1.0	0.6	1.0	B-	A-
Math	11	540547	1173	3	67	C.3.1.1	1	14422	0.67	0.13	0.67	0.14	0.06	0.00	0.37	-0.28	0.37	-0.29	-0.27	-0.1024	0.0200	9.9	1.1	4.9	1.1		
Math	11	593051	1174	3	68	D.1.1.3	1	14422	0.71	0.71	0.12	0.07	0.09	0.00	0.46	0.46	-0.31	-0.39	-0.36	-0.3952	0.0207	-1.8	1.0	-3.3	0.9	A+	A-
Math	11	593064	1175	3	69	D.2.2.2	1	14422	0.68	0.10	0.09	0.13	0.68	0.00	0.55	-0.45	-0.42	-0.45	0.55	-0.1719	0.0201	-9.9	0.9	-9.9	0.8	A+	A+
Math	11	594388	1176	3	70	C.1.2.1	1	14422	0.48	0.08	0.40	0.48	0.04	0.00	0.21	-0.18	-0.18	0.21	-0.25	0.9123	0.0191	9.9	1.4	9.9	1.6	A-	A-
Math	11	593094	1177	3	71	D.2.2.1	1	14422	0.46	0.20	0.46	0.20	0.14	0.01	0.43	-0.36	0.43	-0.42	-0.40	1.0246	0.0192	0.2	1.0	5.1	1.1	A+	A-
Math	11	545533	1178	3	72	E.2.1.1	1	14422	0.75	0.05	0.08	0.75	0.12	0.00	0.37	-0.25	-0.32	0.37	-0.25	-0.6188	0.0214	5.4	1.1	9.4	1.3		
Math	11	595081	1179	3	73	B.2.2.3	2	14422	0.54	0.09	0.54	0.24	0.13	0.00	0.22	-0.34	0.22	-0.10	-0.21	0.6026	0.0191	9.9	1.3	9.9	1.4	A-	A-
Math	11	594399	1180	3	74	C.1.4.1	1	14422	0.48	0.16	0.48	0.22	0.15	0.00	0.47	-0.52	0.47	-0.28	-0.56	0.9230	0.0191	-2.5	1.0	1.3	1.0	A-	A-
Math	11	595021	1181	3	75	B.2.1.1	1	14422	0.73	0.05	0.10	0.73	0.11	0.00	0.43	-0.21	-0.39	0.43	-0.32	-0.5099	0.0210	0.8	1.0	-0.4	1.0	B-	B-
Math	11	594383	1183	4	64	C.1.1.1	1	14426	0.87	0.04	0.03	0.87	0.05	0.00	0.27	-0.19	-0.23	0.27	-0.12	-1.6672	0.0269	2.6	1.1	8.3	1.4	A-	B-
Math	11	566902	1184	4	65	D.3.2.1	2	14426	0.69	0.04	0.20	0.69	0.06	0.00	0.43	-0.31	-0.35	0.43	-0.32	-0.2882	0.0203	2.5	1.0	-0.4	1.0	A-	B-
Math	11	593052	1185	4	66	D.2.1.1	2	14426	0.33	0.33	0.27	0.18	0.22	0.00	0.28	0.28	-0.24	-0.29	-0.33	1.6906	0.0201	9.9	1.2	9.9	1.4	A+	A-
Math	11	594457	1186	4	67	B.2.3.1	2	14426	0.44	0.32	0.20	0.44	0.04	0.00	0.43	-0.44	-0.39	0.43	-0.34	1.1053	0.0192	-1.3	1.0	5.6	1.1	A-	A+
Math	11	595063	1187	4	68	A.3.1.1	1	14426	0.63	0.08	0.63	0.22	0.07	0.00	0.37	-0.34	0.37	-0.31	-0.21	0.0755	0.0196	9.9	1.1	6.6	1.1	A+	A-
Math	11	564897	1188	4	69	D.1.1.2	1	14426	0.50	0.50	0.15	0.18	0.17	0.00	0.33	0.33	-0.33	-0.29	-0.26	0.7618	0.0190	9.9	1.2	9.9	1.2	A+	A+
Math	11	566780	1189	4	71	E.3.1.2	2	14426	0.21	0.13	0.21	0.57	0.09	0.00	0.05	-0.35	0.05	0.04	-0.17	2.4872	0.0229	9.9	1.3	9.9	2.5	A+	A+
Math	11	566799	1190	4	72	D.4.1.1	1	14426	0.37	0.37	0.20	0.34	0.10	0.00	0.28	0.28	-0.29	-0.26	-0.33	1.4817	0.0197	9.9	1.2	9.9	1.4	A-	A-
Math	11	542130	1191	4	73	C.3.1.1	1	14426	0.75	0.10	0.75	0.07	0.07	0.00	0.45	-0.31	0.45	-0.37	-0.32	-0.6587	0.0214	-2.8	1.0	-2.4	0.9		
Math	11	593100	1192	4	74	D.2.2.1	2	14426	0.59	0.07	0.14	0.59	0.19	0.00	0.37	-0.29	-0.36	0.37	-0.26	0.2602	0.0193	9.9	1.1	5.9	1.1	A+	A-
Math	11	566775	1193	4	75	E.2.1.2	2	14426	0.45	0.15	0.14	0.45	0.26	0.00	0.37	-0.39	-0.34	0.37	-0.32	1.0262	0.0191	9.9	1.1	9.9	1.2	A-	A-
Math	11	545446	1195	4	70	B.2.2.2	1	14426	0.74	0.10	0.14	0.74	0.03	0.00	0.42	-0.38	-0.32	0.42	-0.26	-0.5583	0.0211	-1.4	1.0	9.9	1.4	A+	A-
Math	11	593092	1196	5	64	D.2.1.3	2	14452	0.72	0.72	0.11	0.08	0.09	0.00	0.53	0.53	-0.36	-0.44	-0.42	-0.4220	0.0206	-9.9	0.9	-9.9	0.8	A+	A-
Math	11	594460	1197	5	65	B.2.3.1	2	14452	0.49	0.09	0.21	0.49	0.21	0.00	0.24	-0.13	-0.36	0.24	-0.12	0.8291	0.0189	9.9	1.3	9.9	1.4	A-	A-
Math	11	595060	1198	5	66	A.3.1.1	1	14452	0.85	0.04	0.07	0.05	0.85	0.00	0.41	-0.28	-0.28	-0.27	0.41	-1.3620	0.0249	-3.9	0.9	-5.4	0.8	A+	A-
Math	11	545438	1199	5	67	B.2.2.1	1	14452	0.70	0.13	0.70	0.11	0.05	0.00	0.41	-0.38	0.41	-0.30	-0.23	-0.3222	0.0203	3.3	1.0	1.1	1.0		
Math	11	593106	1200	5	68	D.1.1.2	1	14452	0.29	0.22	0.16	0.33	0.29	0.00	0.29	-0.41	-0.35	-0.22	0.29	1.9312	0.0206	7.7	1.1	9.			

## Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Math	11	595029	1202	5	70	A.2.1.1	2	14452	0.46	0.13	0.23	0.46	0.18	0.00	0.33	-0.33	-0.34	0.33	-0.23	0.9598	0.0190	9.9	1.1	9.9	1.2	C-	A-
Math	11	594380	1203	5	71	C.1.1.2	2	14452	0.55	0.07	0.27	0.11	0.55	0.00	0.39	-0.39	-0.29	-0.39	0.39	0.5260	0.0190	9.7	1.1	6.9	1.1	A-	B-
Math	11	545338	1204	5	72	D.3.2.3	1	14452	0.64	0.12	0.64	0.06	0.17	0.00	0.35	-0.21	0.35	-0.31	-0.30	0.0251	0.0196	9.9	1.1	6.3	1.1		
Math	11	593066	1205	5	73	D.2.2.3	1	14452	0.26	0.43	0.26	0.21	0.09	0.00	0.18	-0.10	0.18	-0.31	-0.30	2.1216	0.0213	9.9	1.2	9.9	1.9	A-	A+
Math	11	594436	1206	5	74	C.1.2.1	2	14452	0.39	0.23	0.19	0.39	0.18	0.00	0.07	0.02	-0.12	0.07	-0.11	1.3303	0.0193	9.9	1.5	9.9	1.8	A+	A-
Math	11	566774	1207	5	75	E.2.1.1	1	14452	0.78	0.04	0.78	0.10	0.08	0.00	0.32	-0.29	0.32	-0.18	-0.23	-0.8749	0.0223	6.8	1.1	9.9	1.3	A+	A-
Math	11	595087	1209	6	64	A.2.1.2	2	14394	0.53	0.08	0.53	0.12	0.26	0.00	0.25	-0.19	0.25	-0.31	-0.16	0.6467	0.0191	9.9	1.3	9.9	1.3	B-	A-
Math	11	593110	1210	6	65	D.2.1.4	2	14394	0.61	0.23	0.61	0.12	0.04	0.00	0.39	-0.37	0.39	-0.29	-0.23	0.2231	0.0194	8.9	1.1	3.8	1.1	A+	A-
Math	11	594387	1211	6	66	C.3.1.1	2	14394	0.60	0.07	0.23	0.60	0.11	0.00	0.43	-0.37	-0.31	0.43	-0.43	0.2563	0.0194	3.2	1.0	1.4	1.0	A-	A-
Math	11	593090	1212	6	67	D.3.1.2	2	14394	0.35	0.21	0.36	0.08	0.35	0.00	0.44	-0.59	-0.36	-0.51	0.44	1.6239	0.0200	-2.9	1.0	1.9	1.0	A-	A+
Math	11	566795	1213	6	68	E.3.2.1	2	14394	0.43	0.22	0.25	0.43	0.10	0.01	0.23	-0.12	-0.27	0.23	-0.30	1.1784	0.0193	9.9	1.3	9.9	1.4	A-	A-
Math	11	595025	1214	6	69	A.1.1.3	1	14394	0.71	0.07	0.71	0.09	0.14	0.00	0.44	-0.29	0.44	-0.31	-0.37	-0.3743	0.0206	0.1	1.0	-3.5	0.9	A+	A-
Math	11	593067	1215	6	70	D.2.2.2	1	14394	0.61	0.61	0.14	0.11	0.13	0.00	0.47	0.47	-0.37	-0.47	-0.35	0.1856	0.0194	-2.7	1.0	-1.7	1.0	A+	A-
Math	11	566800	1216	6	71	E.1.1.2	2	14394	0.33	0.39	0.20	0.08	0.33	0.00	0.11	-0.05	-0.14	-0.24	0.11	1.7280	0.0202	9.9	1.4	9.9	1.9	A-	A-
Math	11	545494	1217	6	72	D.4.1.1	2	14394	0.56	0.17	0.56	0.18	0.09	0.00	0.46	-0.38	0.46	-0.45	-0.31	0.4934	0.0192	-2.3	1.0	-3.2	1.0		
Math	11	595092	1218	6	73	B.2.2.2	2	14394	0.35	0.35	0.12	0.27	0.26	0.00	0.35	0.35	-0.39	-0.35	-0.32	1.5935	0.0199	5.0	1.1	9.9	1.3	A-	A-
Math	11	545278	1219	6	74	C.1.4.1	1	14394	0.71	0.04	0.71	0.11	0.14	0.00	0.50	-0.30	0.50	-0.35	-0.45	-0.3855	0.0206	-6.9	0.9	-5.6	0.9		
Math	11	594377	1220	6	75	D.1.1.1	2	14394	0.47	0.09	0.04	0.40	0.47	0.00	0.47	-0.44	-0.42	-0.45	0.47	0.9264	0.0191	-2.2	1.0	-0.1	1.0	A+	A-
Math	11	566808	1222	7	64	E.3.1.2	2	14431	0.14	0.08	0.14	0.04	0.74	0.00	0.17	-0.59	0.17	-0.44	-0.13	3.0351	0.0259	4.2	1.1	9.9	2.4	A-	A+
Math	11	595083	1223	7	65	B.2.2.1	2	14431	0.61	0.09	0.15	0.61	0.15	0.00	0.40	-0.32	-0.40	0.40	-0.26	0.2133	0.0194	8.0	1.1	4.2	1.1	A+	A-
Math	11	593155	1224	7	66	D.2.1.2	2	14431	0.49	0.17	0.18	0.15	0.49	0.00	0.53	-0.43	-0.55	-0.49	0.53	0.8405	0.0190	-9.9	0.9	-9.9	0.9	A-	A+
Math	11	594435	1225	7	67	C.1.1.2	2	14431	0.28	0.08	0.28	0.53	0.11	0.00	0.03	-0.20	0.03	0.08	-0.35	1.9967	0.0209	9.9	1.5	9.9	2.1	A-	A-
Math	11	595082	1226	7	68	A.2.2.2	1	14431	0.30	0.30	0.26	0.14	0.30	0.00	0.33	-0.47	-0.21	-0.40	0.33	1.8742	0.0205	8.4	1.1	9.9	1.3	A-	A-
Math	11	545322	1227	7	69	E.1.1.1	2	14431	0.61	0.27	0.61	0.07	0.05	0.00	0.31	-0.23	0.31	-0.31	-0.29	0.2215	0.0194	9.9	1.2	9.9	1.3		
Math	11	594378	1228	7	70	C.1.4.1	2	14431	0.68	0.68	0.13	0.13	0.07	0.00	0.50	0.50	-0.37	-0.48	-0.29	-0.1832	0.0201	-6.7	0.9	-8.5	0.9	A-	A-
Math	11	542249	1229	7	71	D.2.1.5	2	14431	0.68	0.06	0.14	0.68	0.13	0.00	0.45	-0.35	-0.35	0.45	-0.36	-0.2100	0.0201	-0.2	1.0	-2.9	1.0		
Math	11	566796	1230	7	72	D.3.2.1	2	14431	0.47	0.09	0.30	0.47	0.13	0.00	0.38	-0.39	-0.25	0.38	-0.49	0.9174	0.0191	9.9	1.1	9.9	1.2	A-	A-
Math	11	595026	1231	7	73	A.1.2.1	2	14431	0.42	0.21	0.42	0.12	0.24	0.00	0.13	-0.06	0.13	-0.26	-0.09	1.1917	0.0192	9.9	1.4	9.9	1.7	A-	A-
Math	11	593091	1232	7	74	D.1.1.3	1	14431	0.68	0.04	0.23	0.68	0.04	0.00	0.47	-0.33	-0.44	0.47	-0.24	-0.2247	0.0202	-2.7	1.0	-4.4	0.9	A+	A+
Math	11	595027	1233	7	75	A.1.3.1	1	14431	0.75	0.19	0.75	0.03	0.03	0.00	0.53	-0.50	0.53	-0.32	-0.24	-0.6424	0.0214	-9.9	0.9	-9.2	0.8	A+	A-
Math	11	566794	1235	8	64	D.3.1.2	2	14360	0.31	0.27	0.31	0.21	0.21	0.00	0.23	-0.10	0.23	-0.36	-0.28	1.8414	0.0204	9.9	1.2	9.9	1.6	A-	A+
Math	11	595069	1236	8	65	B.2.2.3	2	14360	0.29	0.12	0.20	0.29	0.38	0.00	0.32	-0.41	-0.17	0.32	-0.43	1.9373	0.0206	9.7	1.1	9.9	1.3	A-	A-
Math	11	594389	1237	8	66	D.1.1.1	2	14360	0.73	0.19	0.04	0.73	0.04	0.00	0.54	-0.48	-0.39	0.54	-0.31	-0.4883	0.0211	-9.9	0.9	-9.9	0.8	A+	A+
Math	11	566904	1238	8	67	D.3.2.3	1	14360	0.74	0.74	0.09	0.09	0.08	0.00	0.51	0.51	-0.42	-0.39	-0.33	-0.5510	0.0213	-8.3	0.9	-8.7	0.8	A+	A-
Math	11	566776	1239	8	68	E.3.1.1	2	14360	0.21	0.21	0.51	0.21	0.07	0.00	-0.14	0.12	0.21	-0.14	0.05	2.5096	0.0227	9.9	1.6	9.9	3.3	A-	A-
Math	11	564892	1240	8	69	E.4.2.2	2	14360	0.87	0.03	0.05	0.87	0.04	0.00	0.31	-0.29	-0.17	0.31	-0.16	-1.6109	0.0268	1.1	1.0	5.9	1.3	A-	C-
Math	11	593047	1241	8	70	D.3.1.1	2	14360	0.18	0.05	0.07	0.70	0.18	0.00	0.08	-0.27	-0.26	-0.05	0.08	2.7707	0.0241	9.9	1.2	9.9	2.6	A-	A-
Math	11	595028	1242	8	71	A.1.3.2	1	14360	0.82	0.82	0.06	0.07	0.05	0.00	0.48	0.48	-0.38	-0.30	-0.34	-1.1734	0.0240	-9.1	0.9	-8.1	0.8	A+	A-
Math	11	545486	1243	8	72	D.2.1.3	1	14360	0.82	0.03	0.82	0.08	0.06	0.00	0.53	-0.32	0.53	-0.42	-0.35	-1.2042	0.0242	-9.9	0.9	-9.9	0.7		
Math	11	594379	1244	8	73	C.3.1.1	1	14360	0.71	0.09	0.04	0.16	0.71	0.00	0.47	-0.35	-0.39	-0.38	0.47	-0.3479	0.0207	-3.7	1.0	-4.7	0.9	B-	B-
Math	11	595023	1245	8	74	A.3.1.1	1	14360	0.88	0.04	0.05	0.03	0.88	0.00	0.43	-0.27	-0.31	-0.27	0.43	-1.7271	0.0277	-6.4	0.9	-6.7	0.7	B+	A-
Math	11	545501	1246	8	75	C.1.4.1	2	14360	0.63	0.12	0.63	0.16	0.09	0.00	0.54	-0.46	0.54	-0.39	-0.53	0.1229	0.0196	-9.9	0.9	-9.9	0.9		
Math	11	564891	1248	9	64	D.3.1.1	2	14362	0.48	0.35	0.13	0.48	0.05	0.00	0.28	-0.16	-0.39	0.28	-0.35	0.9090	0.0191	9.9	1.2	9.9	1.3	B-	A-
Math	11	595020	1249	9	65	A.2.1.3	2	14362	0.61	0.14	0.10	0.61	0.15	0.00	0.44	-0.44	-0.35	0.44	-0.30	0.2164	0.0194	2.2	1.0	-0.2	1.0	A-	A-
Math	11	566810	1250	9	66	D.4.1.1	2	14362	0.31	0.07	0.31	0.31	0.31	0.00	0.23	-0.35	-0.25	-0.21	0.23	1.8106	0.0203	9.9	1.2	9.9	1.5	A+	A+
Math	11	594398	1251	9	67	C.1.2.3	2	14362	0.60	0.60	0.19	0.16	0.05	0.00	0.46	0.46	-0.36	-0.43	-0.38	0.2764	0.0193	-0.9	1.0	-1.7	1.0	A-	A-
Math	11	545413	1252	9	68	A.1.3.1	1	14362	0.82	0.06	0.08	0.82	0.03	0.00	0.47	-0.37	-0.35	0.47	-0.24	-1.2109	0.0241	-6.1	0.9	-6.8	0.8		
Math	11	566898	1253	9	69	E.4.2.1	2	14362	0.42	0.11	0.42	0.14	0.33	0.00	0.13	-0.28	0.13	-0.36	0.06	1.2092	0.0192	9.9	1.4	9.9	1.6	A+	A-
Math	11	566899	1254	9	70	E.1.1.1	2	14362	0.41	0.06	0.41	0.13	0.41	0.00	0.17	-0.30	-0.14	-0.16	0.17	1.2836	0.0193	9.9	1.4	9.9	1.6	A-	A-
Math	11	593102	1255	9	71	D.2.1.1	2	14362	0.40	0.15	0.26	0.40	0.19	0.00	0.15	-0.30	-0.11	0.15	-0.04	1.2862	0.0193	9.9	1.				

## Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Math	11	545480	1257	9	73	D.1.1.1	2	14362	0.69	0.07	0.16	0.08	0.69	0.00	0.56	-0.45	-0.44	-0.45	0.56	-0.2631	0.0203	-9.9	0.9	-9.9	0.8		
Math	11	593111	1258	9	74	D.2.1.5	1	14362	0.55	0.13	0.55	0.21	0.10	0.00	0.40	-0.33	0.40	-0.32	-0.39	0.5003	0.0191	7.3	1.1	4.1	1.1	A+	A-
Math	11	564889	1259	9	75	C.1.1.1	1	14362	0.38	0.20	0.19	0.38	0.23	0.00	0.42	-0.51	-0.44	0.42	-0.32	1.4161	0.0195	-0.7	1.0	5.9	1.0	A-	A-
Reading	3	554816	1261	0	27	A.2.4.1		126587	0.67	0.14	0.11	0.09	0.67	0.00	0.44	-0.41	-0.28	-0.37	0.44	0.2310	0.0067	0.4	1.0	-7.6	1.0		
Reading	3	554815	1262	0	28	A.2.4.1		126587	0.79	0.07	0.09	0.79	0.04	0.00	0.48	-0.32	-0.37	0.48	-0.35	-0.5859	0.0077	-9.9	0.9	-9.9	0.8		
Reading	3	554813	1263	0	29	A.2.4.1		126587	0.70	0.70	0.04	0.15	0.11	0.00	0.44	0.44	-0.34	-0.32	-0.39	0.0168	0.0069	-2.3	1.0	4.2	1.0		
Reading	3	554807	1264	0	30	A.2.4.1		126587	0.74	0.08	0.74	0.08	0.09	0.00	0.50	-0.44	0.50	-0.37	-0.33	-0.2334	0.0072	-9.9	0.9	-9.9	0.9		
Reading	3	554810	1265	0	31	A.2.4.1		126587	0.73	0.05	0.73	0.03	0.19	0.00	0.46	-0.34	0.46	-0.36	-0.37	-0.1404	0.0071	-9.4	1.0	-8.8	0.9		
Reading	3	554809	1266	0	32	A.2.3.1		126587	0.68	0.07	0.12	0.13	0.68	0.00	0.39	-0.22	-0.30	-0.36	0.39	0.1646	0.0068	9.9	1.1	9.9	1.1		
Reading	3	554814	1267	0	33	B.3.1.1		126587	0.79	0.79	0.08	0.07	0.07	0.00	0.43	0.43	-0.29	-0.32	-0.30	-0.5312	0.0076	-4.6	1.0	-9.9	0.9		
Reading	3	554812	1268	0	34	A.2.6.1		126587	0.68	0.02	0.68	0.18	0.13	0.00	0.39	-0.34	0.39	-0.29	-0.35	0.1736	0.0068	9.9	1.1	9.9	1.1		
Reading	3	554869	1269	0	35	B.1.1.1		126587	0.77	0.08	0.04	0.10	0.77	0.00	0.41	-0.33	-0.30	-0.27	0.41	-0.4507	0.0075	1.1	1.0	-5.8	1.0		
Reading	3	554877	1270	0	36	A.1.1.2		126587	0.59	0.32	0.06	0.59	0.04	0.00	0.30	-0.22	-0.33	0.30	-0.30	0.6729	0.0065	9.9	1.2	9.9	1.3		
Reading	3	554867	1271	0	37	B.1.1.1		126587	0.74	0.16	0.74	0.04	0.07	0.00	0.48	-0.41	0.48	-0.35	-0.33	-0.1908	0.0071	-9.9	0.9	-9.9	0.9		
Reading	3	554879	1272	0	38	A.1.3.1		126587	0.86	0.06	0.86	0.02	0.05	0.01	0.46	-0.38	0.46	-0.29	-0.26	-1.1825	0.0088	-9.9	0.9	-9.9	0.7		
Reading	3	554868	1273	0	39	A.1.1.1		126587	0.56	0.23	0.14	0.56	0.06	0.00	0.41	-0.43	-0.26	0.41	-0.32	0.8292	0.0064	9.9	1.1	9.9	1.1		
Reading	3	554870	1274	0	40	B.1.1.1		126587	0.52	0.36	0.04	0.07	0.52	0.01	0.37	-0.28	-0.40	-0.46	0.37	1.0246	0.0064	9.9	1.1	9.9	1.2		
Reading	3	554878	1275	0	41	A.1.4.1		126587	0.80	0.80	0.11	0.05	0.04	0.00	0.48	0.48	-0.40	-0.30	-0.29	-0.6410	0.0078	-9.9	0.9	-9.9	0.8		
Reading	3	554872	1276	0	42	B.1.1.1		126587	0.57	0.12	0.07	0.57	0.23	0.00	0.41	-0.42	-0.49	0.41	-0.25	0.7442	0.0065	9.9	1.1	9.9	1.1		
Reading	3	554899	1277	0	43	A.1.3.1		126587	0.43	0.38	0.15	0.04	0.43	0.00	0.35	-0.38	-0.21	-0.37	0.35	1.5047	0.0064	9.9	1.1	9.9	1.2		
Reading	3	554901	1278	0	44	A.1.4.1		126587	0.52	0.22	0.12	0.52	0.13	0.00	0.38	-0.31	-0.27	0.38	-0.48	1.0182	0.0064	9.9	1.1	9.9	1.1		
Reading	3	554900	1279	0	45	A.1.6.1		126587	0.59	0.21	0.59	0.07	0.13	0.00	0.45	-0.40	0.45	-0.37	-0.37	0.6672	0.0065	-2.2	1.0	-5.7	1.0		
Reading	3	554903	1280	0	46	B.3.3.2		126587	0.63	0.08	0.08	0.63	0.20	0.00	0.49	-0.39	-0.46	0.49	-0.38	0.4282	0.0066	-9.9	1.0	-9.9	0.9		
Reading	3	554909	1281	0	47	A.2.4.1		126587	0.74	0.74	0.15	0.07	0.03	0.00	0.32	0.32	-0.19	-0.32	-0.23	-0.2364	0.0072	9.9	1.1	9.9	1.2		
Reading	3	554907	1282	0	48	B.3.3.4		126587	0.57	0.10	0.15	0.57	0.17	0.00	0.45	-0.47	-0.38	0.45	-0.35	0.7485	0.0065	-1.6	1.0	1.3	1.0		
Reading	3	554908	1283	0	49	A.2.4.1		126587	0.61	0.19	0.12	0.61	0.08	0.00	0.50	-0.41	-0.47	0.50	-0.39	0.5583	0.0065	-9.9	0.9	-9.9	0.9		
Reading	3	557922	1284	0	50	B.1.2.1		126587	0.44	0.21	0.44	0.19	0.15	0.00	0.36	-0.37	0.36	-0.32	-0.32	1.4320	0.0064	9.9	1.1	9.9	1.2		
Reading	3	554729	1286	0	121	B.1.1.1		126587	0.81	0.15	0.02	0.81	0.02	0.00	0.49	-0.43	-0.30	0.49	-0.26	-0.7367	0.0079	-9.9	0.9	-9.9	0.8		
Reading	3	554725	1287	0	122	B.1.1.1		126587	0.70	0.70	0.04	0.24	0.02	0.00	0.44	0.44	-0.34	-0.37	-0.33	0.0346	0.0069	0.5	1.0	0.0	1.0		
Reading	3	554721	1288	0	123	A.1.3.1		126587	0.80	0.80	0.11	0.04	0.05	0.00	0.44	0.44	-0.31	-0.29	-0.36	-0.6052	0.0077	-9.9	1.0	-9.6	0.9		
Reading	3	554726	1289	0	124	A.1.4.1		126587	0.76	0.11	0.76	0.09	0.04	0.00	0.38	-0.37	0.38	-0.17	-0.3628	0.0074	9.9	1.1	2.5	1.0			
Reading	3	554727	1290	0	125	A.1.3.1		126587	0.88	0.88	0.03	0.03	0.07	0.00	0.48	0.48	-0.31	-0.32	-0.35	-1.3153	0.0092	-9.9	0.9	-9.9	0.6		
Reading	3	554724	1291	0	126	A.1.5.1		126587	0.76	0.09	0.76	0.09	0.05	0.00	0.40	-0.32	0.40	-0.31	-0.22	-0.3834	0.0074	5.2	1.0	3.9	1.0		
Reading	3	554730	1292	0	127	A.1.6.1		126587	0.84	0.06	0.84	0.05	0.05	0.00	0.47	-0.36	0.47	-0.32	-0.31	-1.0004	0.0084	-9.9	0.9	-9.9	0.7		
Reading	3	554945	1294	0	129	A.2.2.2		126587	0.94	0.94	0.03	0.01	0.01	0.00	0.40	0.40	-0.30	-0.24	-0.21	-2.2888	0.0126	-9.9	0.8	-9.9	0.4		
Reading	3	554942	1295	0	130	A.2.4.1		126587	0.61	0.11	0.11	0.61	0.18	0.00	0.35	-0.39	-0.30	0.35	-0.20	0.5727	0.0065	9.9	1.1	9.9	1.1		
Reading	3	554943	1296	0	131	A.2.3.1		126587	0.72	0.11	0.08	0.08	0.72	0.01	0.46	-0.38	-0.32	-0.34	0.46	-0.1148	0.0071	-9.6	1.0	-9.9	0.9		
Reading	3	554951	1297	0	132	A.2.2.2		126587	0.85	0.05	0.06	0.85	0.03	0.00	0.52	-0.40	-0.33	0.52	-0.35	-1.0357	0.0085	-9.9	0.8	-9.9	0.6		
Reading	3	554952	1298	0	133	A.2.4.1		126587	0.69	0.08	0.16	0.06	0.69	0.01	0.48	-0.45	-0.34	-0.37	0.48	0.0748	0.0069	-9.9	1.0	-9.9	0.9		
Reading	3	554948	1299	0	134	A.2.4.1		126587	0.50	0.18	0.23	0.50	0.09	0.00	0.36	-0.38	-0.22	0.36	-0.43	1.1265	0.0064	9.9	1.1	9.9	1.1		
Reading	3	554946	1300	0	135	A.2.4.1		126587	0.68	0.10	0.68	0.14	0.08	0.00	0.41	-0.29	0.41	-0.28	-0.40	0.1542	0.0068	9.9	1.0	8.7	1.1		
Reading	3	554949	1301	0	136	B.3.1.1		126587	0.79	0.08	0.79	0.06	0.06	0.00	0.52	-0.37	0.52	-0.40	-0.36	-0.5806	0.0077	-9.9	0.9	-9.9	0.7		
Reading	3	554950	1302	0	137	A.2.4.1		126587	0.66	0.11	0.14	0.08	0.66	0.01	0.47	-0.42	-0.39	-0.33	0.47	0.2501	0.0067	-9.9	1.0	-9.9	0.9		
Reading	3	598468	1303	1	77	A.1.3.1	2	14174	0.77	0.08	0.06	0.08	0.77	0.01	0.49	-0.33	-0.43	-0.33	0.49	-0.4779	0.0223	-7.5	0.9	-7.2	0.8	A-	C-
Reading	3	598460	1304	1	78	A.1.3.1	2	14174	0.78	0.09	0.09	0.05	0.78	0.00	0.56	-0.44	-0.44	-0.37	0.56	-0.5215	0.0225	-9.9	0.8	-9.9	0.7	A+	B-
Reading	3	598463	1305	1	79	A.1.1.2	2	14174	0.78	0.78	0.12	0.05	0.04	0.00	0.43	0.43	-0.31	-0.32	-0.33	-0.5586	0.0227	-1.9	1.0	-3.0	0.9	A+	A+
Reading	3	598459	1306	1	80	A.1.3.1	2	14174	0.91	0.03	0.91	0.02	0.04	0.00	0.45	-0.30	0.45	-0.27	-0.31	-1.8586	0.0318	-8.4	0.8	-9.8	0.6	A-	B-
Reading	3	598458	1307	1	81	B.2.1.1	2	14174	0.55	0.14	0.55	0.09	0.21	0.00	0.26	-0.30	0.26	-0.28	-0.13	0.8067	0.0194	9.9	1.3	9.9	1.4	A+	A+
Reading	3	598469	1308	1	82	A.1.3.1	2	14174	0.71	0.71	0.17	0.04	0.08	0.00	0.46	0.46	-0.36	-0.39	-0.35	-0.0675	0.0209	-2.8	1.0	-4.6	0.9	A-	A-
Reading	3	598462	1309	1	83	A.1.4.1	2	14174	0.69	0.03	0.69	0.03	0.25	0.00	0.52	-0.40	0.52	-0.40	-0.46	0.0196	0.0207	-9.9	0.9	-9.7	0.8	A-	B-
Reading	3	598466	1310	1	84	B.1.1.1	2	14174	0.75	0.09	0.08	0.75	0														

## Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Reading	3	598467	1311	1	85	B.1.1.1	2	14174	0.57	0.24	0.05	0.57	0.14	0.00	0.37	-0.26	-0.39	0.37	-0.38	0.7109	0.0194	9.9	1.1	9.0	1.1	A+	A-
Reading	3	598461	1312	1	86	A.1.4.1	2	14174	0.89	0.89	0.02	0.04	0.05	0.01	0.31	0.31	-0.25	-0.25	-0.14	-1.4892	0.0284	0.0	1.0	5.9	1.3	A+	A-
Reading	3	557917	1314	1	88	A.2.4.1		70375	0.70	0.12	0.70	0.06	0.12	0.00	0.38	-0.27	0.38	-0.38	-0.26	0.0305	0.0093	9.9	1.1	9.0	1.1		
Reading	3	554765	1315	1	89	A.2.3.1		70375	0.67	0.05	0.18	0.67	0.10	0.01	0.50	-0.44	-0.42	0.50	-0.38	0.2239	0.0091	-9.9	0.9	-9.9	0.9		
Reading	3	554768	1316	1	90	A.2.4.1		70375	0.54	0.09	0.16	0.54	0.21	0.00	0.41	-0.43	-0.40	0.41	-0.31	0.9025	0.0086	7.5	1.0	8.4	1.1		
Reading	3	554762	1317	1	91	B.1.1.1		70375	0.61	0.09	0.61	0.26	0.03	0.00	0.52	-0.45	0.52	-0.48	-0.34	0.5190	0.0088	-9.9	0.9	-9.9	0.9		
Reading	3	554764	1318	1	92	A.2.2.2		70375	0.82	0.06	0.06	0.82	0.05	0.00	0.49	-0.34	-0.38	0.49	-0.33	-0.8530	0.0109	-9.9	0.9	-9.9	0.7		
Reading	3	554769	1319	1	93	B.3.1.1		70375	0.65	0.10	0.12	0.11	0.65	0.01	0.46	-0.46	-0.37	-0.31	0.46	0.2990	0.0090	-6.7	1.0	-6.1	1.0		
Reading	3	554761	1320	1	94	A.2.6.1		70375	0.81	0.06	0.07	0.05	0.81	0.00	0.49	-0.34	-0.38	-0.34	0.49	-0.7283	0.0106	-9.9	0.9	-9.9	0.8		
Reading	3	554771	1321	1	95	A.2.5.1		70375	0.45	0.45	0.12	0.25	0.18	0.00	0.28	0.28	-0.36	-0.24	-0.21	1.4170	0.0086	9.9	1.2	9.9	1.4		
Reading	3	598480	1322	2	77	B.1.1.1	2	14016	0.83	0.83	0.08	0.02	0.07	0.00	0.37	0.37	-0.29	-0.28	-0.22	-0.8991	0.0246	-0.5	1.0	4.0	1.1	A+	A-
Reading	3	598476	1323	2	78	A.1.4.1	1	14016	0.77	0.12	0.77	0.07	0.05	0.00	0.49	-0.40	0.49	-0.39	-0.28	-0.4276	0.0223	-8.4	0.9	-9.7	0.8	A+	A-
Reading	3	598483	1324	2	79	A.1.3.1	2	14016	0.69	0.05	0.21	0.05	0.69	0.00	0.43	-0.36	-0.33	-0.35	0.43	0.0899	0.0206	1.2	1.0	-1.7	1.0	A+	A-
Reading	3	598481	1325	2	80	B.1.1.1	2	14016	0.86	0.08	0.04	0.86	0.02	0.00	0.42	-0.31	-0.28	0.42	-0.28	-1.2285	0.0267	-5.6	0.9	-4.1	0.9	A+	A-
Reading	3	598478	1326	2	81	A.1.4.1	2	14016	0.76	0.06	0.06	0.76	0.12	0.00	0.48	-0.37	-0.37	0.48	-0.34	-0.3903	0.0222	-7.0	0.9	-8.3	0.8	A+	A-
Reading	3	598482	1327	2	82	A.1.3.1	2	14016	0.40	0.15	0.02	0.43	0.40	0.00	0.30	-0.18	-0.40	-0.32	0.30	1.6375	0.0196	9.9	1.1	9.9	1.3	A-	A-
Reading	3	598484	1328	2	83	B.1.1.1	2	14016	0.77	0.77	0.12	0.06	0.04	0.00	0.45	0.45	-0.41	-0.28	-0.27	-0.4863	0.0225	-4.8	0.9	-4.3	0.9	A+	A-
Reading	3	598485	1329	2	84	A.1.2.2	2	14016	0.86	0.05	0.04	0.04	0.86	0.00	0.52	-0.38	-0.38	-0.32	0.52	-1.2347	0.0267	-9.9	0.8	-9.9	0.6	A+	A-
Reading	3	598477	1330	2	85	B.1.1.1	2	14016	0.81	0.03	0.10	0.06	0.81	0.00	0.48	-0.40	-0.30	-0.38	0.48	-0.7646	0.0238	-8.3	0.9	-7.4	0.8	A+	A-
Reading	3	598487	1331	2	86	A.1.6.1	2	14016	0.56	0.56	0.04	0.05	0.35	0.00	0.27	0.27	-0.38	-0.32	-0.17	0.7876	0.0194	9.9	1.2	9.9	1.4	A+	A-
Reading	3	557917	1314	2	88	A.2.4.1		70375	0.70	0.12	0.70	0.06	0.12	0.00	0.38	-0.27	0.38	-0.38	-0.26	0.0305	0.0093	9.9	1.1	9.0	1.1		
Reading	3	554765	1315	2	89	A.2.3.1		70375	0.67	0.05	0.18	0.67	0.10	0.01	0.50	-0.44	-0.42	0.50	-0.38	0.2239	0.0091	-9.9	0.9	-9.9	0.9		
Reading	3	554768	1316	2	90	A.2.4.1		70375	0.54	0.09	0.16	0.54	0.21	0.00	0.41	-0.43	-0.40	0.41	-0.31	0.9025	0.0086	7.5	1.0	8.4	1.1		
Reading	3	554762	1317	2	91	B.1.1.1		70375	0.61	0.09	0.61	0.26	0.03	0.00	0.52	-0.45	0.52	-0.48	-0.34	0.5190	0.0088	-9.9	0.9	-9.9	0.9		
Reading	3	554764	1318	2	92	A.2.2.2		70375	0.82	0.06	0.06	0.82	0.05	0.00	0.49	-0.34	-0.38	0.49	-0.33	-0.8530	0.0109	-9.9	0.9	-9.9	0.7		
Reading	3	554769	1319	2	93	B.3.1.1		70375	0.65	0.10	0.12	0.11	0.65	0.01	0.46	-0.46	-0.37	-0.31	0.46	0.2990	0.0090	-6.7	1.0	-6.1	1.0		
Reading	3	554761	1320	2	94	A.2.6.1		70375	0.81	0.06	0.07	0.05	0.81	0.00	0.49	-0.34	-0.38	-0.34	0.49	-0.7283	0.0106	-9.9	0.9	-9.9	0.8		
Reading	3	554771	1321	2	95	A.2.5.1		70375	0.45	0.45	0.12	0.25	0.18	0.00	0.28	0.28	-0.36	-0.24	-0.21	1.4170	0.0086	9.9	1.2	9.9	1.4		
Reading	3	593384	1333	3	77	B.1.1.1	2	13994	0.90	0.90	0.02	0.06	0.02	0.00	0.35	0.35	-0.23	-0.24	-0.22	-1.5596	0.0296	-2.3	1.0	-4.2	0.8	A+	A-
Reading	3	593388	1334	3	78	A.1.4.1	1	13994	0.70	0.09	0.70	0.17	0.04	0.00	0.46	-0.40	0.46	-0.33	-0.37	0.0539	0.0207	-3.2	1.0	-6.0	0.9	A+	A-
Reading	3	593385	1335	3	79	B.2.1.1	2	13994	0.55	0.55	0.19	0.06	0.20	0.00	0.32	0.32	-0.26	-0.24	-0.31	0.8404	0.0193	9.9	1.2	9.9	1.2	A+	A+
Reading	3	593382	1336	3	80	A.1.4.1	2	13994	0.59	0.03	0.04	0.59	0.33	0.00	0.37	-0.41	-0.44	0.37	-0.29	0.6539	0.0195	9.1	1.1	7.3	1.1	A-	A-
Reading	3	593387	1337	3	81	A.1.4.1	1	13994	0.75	0.11	0.75	0.11	0.03	0.00	0.50	-0.38	0.50	-0.39	-0.38	-0.3022	0.0218	-9.8	0.9	-9.7	0.8	A+	A-
Reading	3	593381	1338	3	82	B.1.1.1	2	13994	0.87	0.02	0.08	0.03	0.87	0.00	0.44	-0.29	-0.33	-0.26	0.44	-1.2736	0.0272	-6.7	0.9	-8.7	0.7	A+	A-
Reading	3	593389	1339	3	83	B.1.1.1	2	13994	0.84	0.84	0.10	0.03	0.03	0.00	0.40	0.40	-0.26	-0.30	-0.31	-0.9770	0.0252	-2.9	1.0	-2.1	0.9	A+	B-
Reading	3	593386	1340	3	84	A.1.6.1	2	13994	0.55	0.12	0.18	0.16	0.55	0.00	0.31	-0.42	-0.27	-0.14	0.31	0.8829	0.0193	9.9	1.2	9.9	1.2	A+	A-
Reading	3	593390	1341	3	85	B.1.1.1	2	13994	0.41	0.45	0.12	0.02	0.41	0.00	0.22	-0.16	-0.31	-0.35	0.22	1.5913	0.0194	9.9	1.2	9.9	1.4	A-	A-
Reading	3	593383	1342	3	86	A.1.3.1	2	13994	0.94	0.02	0.02	0.02	0.94	0.00	0.40	-0.25	-0.24	-0.27	0.40	-2.1701	0.0364	-5.8	0.9	-9.9	0.5	A+	B-
Reading	3	557917	1314	3	88	A.2.4.1		70375	0.70	0.12	0.70	0.06	0.12	0.00	0.38	-0.27	0.38	-0.38	-0.26	0.0305	0.0093	9.9	1.1	9.0	1.1		
Reading	3	554765	1315	3	89	A.2.3.1		70375	0.67	0.05	0.18	0.67	0.10	0.01	0.50	-0.44	-0.42	0.50	-0.38	0.2239	0.0091	-9.9	0.9	-9.9	0.9		
Reading	3	554768	1316	3	90	A.2.4.1		70375	0.54	0.09	0.16	0.54	0.21	0.00	0.41	-0.43	-0.40	0.41	-0.31	0.9025	0.0086	7.5	1.0	8.4	1.1		
Reading	3	554762	1317	3	91	B.1.1.1		70375	0.61	0.09	0.61	0.26	0.03	0.00	0.52	-0.45	0.52	-0.48	-0.34	0.5190	0.0088	-9.9	0.9	-9.9	0.9		
Reading	3	554764	1318	3	92	A.2.2.2		70375	0.82	0.06	0.06	0.82	0.05	0.00	0.49	-0.34	-0.38	0.49	-0.33	-0.8530	0.0109	-9.9	0.9	-9.9	0.7		
Reading	3	554769	1319	3	93	B.3.1.1		70375	0.65	0.10	0.12	0.11	0.65	0.01	0.46	-0.46	-0.37	-0.31	0.46	0.2990	0.0090	-6.7	1.0	-6.1	1.0		
Reading	3	554761	1320	3	94	A.2.6.1		70375	0.81	0.06	0.07	0.05	0.81	0.00	0.49	-0.34	-0.38	-0.34	0.49	-0.7283	0.0106	-9.9	0.9	-9.9	0.8		
Reading	3	554771	1321	3	95	A.2.5.1		70375	0.45	0.45	0.12	0.25	0.18	0.00	0.28	0.28	-0.36	-0.24	-0.21	1.4170	0.0086	9.9	1.2	9.9	1.4		
Reading	3	566484	1344	4	77	B.1.1.1	2	14087	0.76	0.07	0.08	0.76	0.09	0.00	0.51	-0.35	-0.38	0.51	-0.40	-0.3458	0.0220	-9.5	0.9	-7.9	0.8	A-	A-
Reading	3	566483	1345	4	78	B.1.1.1	2	14087	0.73	0.06	0.13	0.09	0.73	0.00	0.46	-0.37	-0.30	-0.41	0.46	-0.1310	0.0212	-4.4	1.0	-2.2	1.0	A+	A-
Reading	3	566477	1346	4	79	B.1.1.1	2	14087	0.60	0.27	0.60	0.07	0.06	0.00	0.48	-0.47	0.48	-0.26	-0.42	0.5941	0.0196	-6.7	0.9	-6.2	0.9	A+	A-
Reading	3	566478	1347	4	80	A.1.4.1	2	14087	0.94	0.02	0.02	0.02	0.94	0.00	0.38	-0.27	-0.27	-0.20	0.38	-2.1766	0.0362	-5.3	0.9	-7.2	0.6	B+	A-
Reading	3	566486	1348	4	81	A.1.4.1	1	14087	0.88	0.02	0.0																

## Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Reading	3	566481	1349	4	82	A.1.4.1	2	14087	0.75	0.75	0.08	0.04	0.12	0.00	0.44	0.44	-0.29	-0.32	-0.36	-0.3183	0.0219	-1.9	1.0	-6.1	0.9	A-	A-
Reading	3	566482	1350	4	83	A.1.2.1	2	14087	0.80	0.05	0.80	0.06	0.09	0.00	0.30	-0.19	0.30	-0.25	-0.19	-0.6485	0.0233	8.4	1.1	7.4	1.2	A+	A+
Reading	3	566476	1351	4	84	A.1.2.2	2	14087	0.73	0.04	0.11	0.12	0.73	0.00	0.38	-0.30	-0.34	-0.23	0.38	-0.1761	0.0214	5.2	1.1	3.8	1.1	A+	A-
Reading	3	566480	1352	4	85	A.1.6.1	2	14087	0.54	0.14	0.04	0.54	0.28	0.00	0.38	-0.43	-0.36	0.38	-0.28	0.9212	0.0193	8.8	1.1	9.4	1.1	A-	A-
Reading	3	566479	1353	4	86	B.1.1.1	2	14087	0.65	0.06	0.14	0.14	0.65	0.00	0.39	-0.39	-0.29	-0.29	0.39	0.3075	0.0201	7.2	1.1	8.3	1.1	A-	A-
Reading	3	557917	1314	4	88	A.2.4.1		70375	0.70	0.12	0.70	0.06	0.12	0.00	0.38	-0.27	0.38	-0.38	-0.26	0.0305	0.0093	9.9	1.1	9.0	1.1		
Reading	3	554765	1315	4	89	A.2.3.1		70375	0.67	0.05	0.18	0.67	0.10	0.01	0.50	-0.44	-0.42	0.50	-0.38	0.2239	0.0091	-9.9	0.9	-9.9	0.9		
Reading	3	554768	1316	4	90	A.2.4.1		70375	0.54	0.09	0.16	0.54	0.21	0.00	0.41	-0.43	-0.40	0.41	-0.31	0.9025	0.0086	7.5	1.0	8.4	1.1		
Reading	3	554762	1317	4	91	B.1.1.1		70375	0.61	0.09	0.61	0.26	0.03	0.00	0.52	-0.45	0.52	-0.48	-0.34	0.5190	0.0088	-9.9	0.9	-9.9	0.9		
Reading	3	554764	1318	4	92	A.2.2.2		70375	0.82	0.06	0.06	0.82	0.05	0.00	0.49	-0.34	-0.38	0.49	-0.33	-0.8530	0.0109	-9.9	0.9	-9.9	0.7		
Reading	3	554769	1319	4	93	B.3.1.1		70375	0.65	0.10	0.12	0.11	0.65	0.01	0.46	-0.46	-0.37	-0.31	0.46	0.2990	0.0090	-6.7	1.0	-6.1	1.0		
Reading	3	554761	1320	4	94	A.2.6.1		70375	0.81	0.06	0.07	0.05	0.81	0.00	0.49	-0.34	-0.38	-0.34	0.49	-0.7283	0.0106	-9.9	0.9	-9.9	0.8		
Reading	3	554771	1321	4	95	A.2.5.1		70375	0.45	0.45	0.12	0.25	0.18	0.00	0.28	0.28	-0.36	-0.24	-0.21	1.4170	0.0086	9.9	1.2	9.9	1.4		
Reading	3	566490	1355	5	77	A.1.3.1	2	14104	0.85	0.05	0.85	0.08	0.02	0.00	0.35	-0.25	0.35	-0.25	-0.20	-1.0560	0.0257	-0.5	1.0	3.7	1.1	A+	A-
Reading	3	566493	1356	5	78	A.1.2.2	2	14104	0.78	0.78	0.05	0.13	0.04	0.00	0.28	0.28	-0.21	-0.18	-0.25	-0.5022	0.0227	9.9	1.1	9.9	1.3	A-	A-
Reading	3	566492	1357	5	79	A.1.1.2	2	14104	0.88	0.08	0.88	0.01	0.02	0.00	0.39	-0.29	0.39	-0.20	-0.30	-1.3872	0.0282	-4.6	0.9	-2.1	0.9	A-	B-
Reading	3	566497	1358	5	80	A.1.3.1	2	14104	0.85	0.85	0.11	0.02	0.03	0.00	0.30	0.30	-0.16	-0.26	-0.29	-1.0219	0.0255	3.2	1.1	9.1	1.3	A-	A-
Reading	3	566489	1359	5	81	A.1.3.1	2	14104	0.94	0.01	0.02	0.94	0.02	0.00	0.34	-0.21	-0.20	0.34	-0.23	-2.3003	0.0383	-3.8	0.9	-6.0	0.7	A+	A-
Reading	3	566498	1360	5	82	A.1.3.1	2	14104	0.93	0.02	0.93	0.02	0.02	0.01	0.35	-0.23	0.35	-0.26	-0.20	-2.0554	0.0350	-4.5	0.9	-4.3	0.8	A+	A-
Reading	3	566495	1361	5	83	A.1.3.1	2	14104	0.78	0.14	0.02	0.05	0.78	0.00	0.43	-0.33	-0.31	-0.32	0.43	-0.4725	0.0225	-3.2	1.0	-2.2	0.9	A+	A-
Reading	3	593166	1362	5	84	A.1.6.1	2	14104	0.70	0.07	0.06	0.70	0.17	0.00	0.31	-0.33	-0.30	0.31	-0.16	0.0514	0.0207	9.9	1.1	9.9	1.4	A+	A-
Reading	3	566496	1363	5	85	A.1.3.1	2	14104	0.53	0.07	0.05	0.53	0.35	0.00	0.24	-0.34	-0.37	0.24	-0.13	0.9853	0.0192	9.9	1.2	9.9	1.3	A+	A+
Reading	3	566491	1364	5	86	A.1.3.1	2	14104	0.82	0.04	0.06	0.08	0.82	0.00	0.49	-0.33	-0.34	-0.38	0.49	-0.7686	0.0240	-9.4	0.9	-9.9	0.7	A+	A-
Reading	3	557917	1314	5	88	A.2.4.1		70375	0.70	0.12	0.70	0.06	0.12	0.00	0.38	-0.27	0.38	-0.38	-0.26	0.0305	0.0093	9.9	1.1	9.0	1.1		
Reading	3	554765	1315	5	89	A.2.3.1		70375	0.67	0.05	0.18	0.67	0.10	0.01	0.50	-0.44	-0.42	0.50	-0.38	0.2239	0.0091	-9.9	0.9	-9.9	0.9		
Reading	3	554768	1316	5	90	A.2.4.1		70375	0.54	0.09	0.16	0.54	0.21	0.00	0.41	-0.43	-0.40	0.41	-0.31	0.9025	0.0086	7.5	1.0	8.4	1.1		
Reading	3	554762	1317	5	91	B.1.1.1		70375	0.61	0.09	0.61	0.26	0.03	0.00	0.52	-0.45	0.52	-0.48	-0.34	0.5190	0.0088	-9.9	0.9	-9.9	0.9		
Reading	3	554764	1318	5	92	A.2.2.2		70375	0.82	0.06	0.06	0.82	0.05	0.00	0.49	-0.34	-0.38	0.49	-0.33	-0.8530	0.0109	-9.9	0.9	-9.9	0.7		
Reading	3	554769	1319	5	93	B.3.1.1		70375	0.65	0.10	0.12	0.11	0.65	0.01	0.46	-0.46	-0.37	-0.31	0.46	0.2990	0.0090	-6.7	1.0	-6.1	1.0		
Reading	3	554761	1320	5	94	A.2.6.1		70375	0.81	0.06	0.07	0.05	0.81	0.00	0.49	-0.34	-0.38	-0.34	0.49	-0.7283	0.0106	-9.9	0.9	-9.9	0.8		
Reading	3	554771	1321	5	95	A.2.5.1		70375	0.45	0.45	0.12	0.25	0.18	0.00	0.28	0.28	-0.36	-0.24	-0.21	1.4170	0.0086	9.9	1.2	9.9	1.4		
Reading	3	593365	1366	6	77	A.2.3.1	2	14179	0.66	0.66	0.13	0.18	0.04	0.00	0.27	0.27	-0.30	-0.14	-0.22	0.3330	0.0200	9.9	1.2	9.9	1.3	A-	A+
Reading	3	593364	1367	6	78	A.2.4.1	2	14179	0.81	0.08	0.05	0.05	0.81	0.00	0.45	-0.31	-0.34	-0.31	0.45	-0.7112	0.0237	-5.3	0.9	-7.3	0.8	A-	A-
Reading	3	593363	1368	6	79	A.2.4.1	2	14179	0.58	0.11	0.58	0.08	0.23	0.00	0.27	-0.25	0.27	-0.24	-0.19	0.7477	0.0194	9.9	1.2	9.9	1.3	A+	A-
Reading	3	593358	1369	6	80	B.3.3.2	2	14179	0.75	0.06	0.13	0.05	0.75	0.00	0.49	-0.43	-0.33	-0.37	0.49	-0.2736	0.0218	-7.7	0.9	-8.9	0.8	A-	A-
Reading	3	593354	1370	6	81	A.2.1.1	2	14179	0.66	0.13	0.06	0.66	0.15	0.00	0.49	-0.39	-0.39	0.49	-0.40	0.3132	0.0201	-6.5	0.9	-9.2	0.9	A-	A-
Reading	3	593366	1371	6	82	A.2.4.1	2	14179	0.69	0.05	0.16	0.10	0.69	0.00	0.47	-0.28	-0.36	-0.46	0.47	0.1389	0.0205	-4.0	1.0	-1.5	1.0	A-	A-
Reading	3	593356	1372	6	83	A.2.4.1	2	14179	0.66	0.03	0.26	0.66	0.04	0.00	0.35	-0.34	-0.26	0.35	-0.33	0.2926	0.0201	9.9	1.1	9.9	1.2	A+	A-
Reading	3	593362	1373	6	84	B.3.3.2	2	14179	0.76	0.06	0.10	0.06	0.76	0.01	0.49	-0.39	-0.34	-0.38	0.49	-0.3282	0.0220	-8.1	0.9	-9.9	0.8	A-	A-
Reading	3	593359	1374	6	85	B.3.3.3	2	14179	0.72	0.72	0.09	0.08	0.10	0.00	0.55	0.55	-0.47	-0.39	-0.42	-0.0781	0.0211	-9.9	0.9	-9.9	0.7	A-	A-
Reading	3	593360	1375	6	86	B.3.3.3	2	14179	0.72	0.10	0.72	0.12	0.06	0.00	0.54	-0.41	0.54	-0.46	-0.36	-0.0643	0.0211	-9.9	0.9	-9.9	0.7	A+	A-
Reading	3	554843	1377	6	88	A.1.4.1		56212	0.75	0.75	0.07	0.07	0.10	0.00	0.50	0.50	-0.36	-0.44	-0.35	-0.2308	0.0108	-9.9	0.9	-9.9	0.8		
Reading	3	554837	1378	6	89	A.1.1.2		56212	0.78	0.05	0.11	0.78	0.06	0.00	0.44	-0.39	-0.30	0.44	-0.29	-0.4569	0.0113	-6.1	1.0	-9.9	0.8		
Reading	3	554842	1379	6	90	A.1.3.1		56212	0.71	0.05	0.09	0.15	0.71	0.00	0.36	-0.36	-0.24	-0.26	0.36	0.0189	0.0104	9.9	1.1	9.9	1.2		
Reading	3	554847	1380	6	91	A.1.6.1		56212	0.58	0.15	0.03	0.58	0.23	0.01	0.34	-0.25	-0.42	0.34	-0.29	0.7447	0.0097	9.9	1.1	9.9	1.2		
Reading	3	554840	1381	6	92	B.1.1.1		56212	0.85	0.04	0.06	0.85	0.04	0.00	0.51	-0.34	-0.39	0.51	-0.34	-1.0883	0.0130	-9.9	0.8	-9.9	0.6		
Reading	3	554848	1382	6	93	A.1.2.2		56212	0.63	0.08	0.63	0.22	0.06	0.01	0.30	-0.44	0.30	-0.13	-0.30	0.4767	0.0099	9.9	1.2	9.9	1.3		
Reading	3	554839	1383	6	94	B.1.1.1		56212	0.75	0.09	0.08	0.75	0.08	0.00	0.48	-0.41	-0.44	0.48	-0.23	-0.2548	0.0109	-9.9	0.9	-8.5	0.9		
Reading	3	554844	1384	6	95	B.1.1.1		56212	0.58	0.27	0.09	0.06	0.58	0.01	0.42	-0.32	-0.42	-0.45	0.42	0.7145	0.0097	2.8	1.0	6.0	1.0		
Reading	3	593375	1385	7	77	B.1.1.1	2	14127	0.56	0.16	0.15	0.56	0.14	0.00	0.20	-0.13	-0.26	0.20	-0.10	0.8202	0.0192	9.9	1.3	9.9	1.4	A+	A-
Reading	3	593376	1386	7	78	A.1.4.1	2	14127	0.92	0.02	0.0																

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Reading	3	593371	1387	7	79	A.1.4.1	2	14127	0.45	0.05	0.27	0.45	0.22	0.00	0.35	-0.43	-0.33	0.35	-0.30	1.4064	0.0191	9.8	1.1	9.9	1.2	A+	A-
Reading	3	593378	1388	7	80	A.1.3.1	2	14127	0.59	0.08	0.59	0.13	0.19	0.00	0.45	-0.39	0.45	-0.35	-0.41	0.6693	0.0193	-2.1	1.0	-0.8	1.0	A-	A-
Reading	3	593374	1389	7	81	B.2.1.1	2	14127	0.57	0.57	0.15	0.18	0.10	0.00	0.33	0.33	-0.27	-0.32	-0.23	0.7734	0.0192	9.9	1.1	9.9	1.2	A+	A+
Reading	3	593369	1390	7	82	A.1.2.2	2	14127	0.71	0.10	0.08	0.11	0.71	0.00	0.44	-0.42	-0.32	-0.28	0.44	-0.0173	0.0208	-1.9	1.0	-2.3	1.0	A-	A-
Reading	3	593377	1391	7	83	A.1.5.1	2	14127	0.67	0.67	0.11	0.12	0.10	0.00	0.30	0.30	-0.24	-0.24	-0.20	0.2088	0.0202	9.9	1.2	9.9	1.2	A+	A-
Reading	3	593370	1392	7	84	B.1.1.1	2	14127	0.74	0.06	0.74	0.06	0.13	0.01	0.52	-0.28	0.52	-0.41	-0.47	-0.2234	0.0215	-9.9	0.9	-9.9	0.8	A+	A-
Reading	3	593373	1393	7	85	A.1.3.1	2	14127	0.71	0.07	0.07	0.15	0.71	0.00	0.36	-0.37	-0.35	-0.17	0.36	-0.0008	0.0207	7.2	1.1	7.0	1.1	A+	A+
Reading	3	593372	1394	7	86	B.1.1.1	2	14127	0.87	0.87	0.05	0.03	0.04	0.00	0.43	0.43	-0.29	-0.27	-0.31	-1.2421	0.0270	-5.9	0.9	-8.9	0.7	A+	A-
Reading	3	554843	1377	7	88	A.1.4.1		56212	0.75	0.75	0.07	0.07	0.10	0.00	0.50	0.50	-0.36	-0.44	-0.35	-0.2308	0.0108	-9.9	0.9	-9.9	0.8		
Reading	3	554837	1378	7	89	A.1.1.2		56212	0.78	0.05	0.11	0.78	0.06	0.00	0.44	-0.39	-0.30	0.44	-0.29	-0.4569	0.0113	-6.1	1.0	-9.9	0.8		
Reading	3	554842	1379	7	90	A.1.3.1		56212	0.71	0.05	0.09	0.15	0.71	0.00	0.36	-0.36	-0.24	-0.26	0.36	0.0189	0.0104	9.9	1.1	9.9	1.2		
Reading	3	554847	1380	7	91	A.1.6.1		56212	0.58	0.15	0.03	0.58	0.23	0.01	0.34	-0.25	-0.42	0.34	-0.29	0.7447	0.0097	9.9	1.1	9.9	1.2		
Reading	3	554840	1381	7	92	B.1.1.1		56212	0.85	0.04	0.06	0.85	0.04	0.00	0.51	-0.34	-0.39	0.51	-0.34	-1.0883	0.0130	-9.9	0.8	-9.9	0.6		
Reading	3	554848	1382	7	93	A.1.2.2		56212	0.63	0.08	0.63	0.22	0.06	0.01	0.30	-0.44	0.30	-0.13	-0.30	0.4767	0.0099	9.9	1.2	9.9	1.3		
Reading	3	554839	1383	7	94	B.1.1.1		56212	0.75	0.09	0.08	0.75	0.08	0.00	0.48	-0.41	-0.44	0.48	-0.23	-0.2548	0.0109	-9.9	0.9	-8.5	0.9		
Reading	3	554844	1384	7	95	B.1.1.1		56212	0.58	0.27	0.09	0.06	0.58	0.01	0.42	-0.32	-0.42	-0.45	0.42	0.7145	0.0097	2.8	1.0	6.0	1.0		
Reading	3	593392	1396	8	77	A.2.4.1	2	14040	0.65	0.10	0.12	0.65	0.12	0.00	0.44	-0.34	-0.35	0.44	-0.37	0.3637	0.0199	-0.6	1.0	-3.1	1.0	A-	A-
Reading	3	593397	1397	8	78	A.2.3.1	2	14040	0.52	0.03	0.52	0.08	0.37	0.00	0.37	-0.39	0.37	-0.35	-0.32	1.0471	0.0191	9.5	1.1	9.6	1.1	A-	A+
Reading	3	593402	1398	8	79	B.3.1.1	2	14040	0.72	0.72	0.08	0.07	0.12	0.00	0.38	0.38	-0.35	-0.35	-0.19	-0.0605	0.0210	5.6	1.1	4.1	1.1	A+	A-
Reading	3	593398	1399	8	80	A.2.4.1	2	14040	0.72	0.72	0.07	0.04	0.17	0.00	0.43	0.43	-0.28	-0.33	-0.35	-0.0865	0.0211	-0.7	1.0	-2.8	1.0	A-	A-
Reading	3	593395	1400	8	81	A.1.4.1	2	14040	0.82	0.82	0.09	0.03	0.06	0.00	0.47	0.47	-0.38	-0.31	-0.32	-0.7587	0.0240	-8.4	0.9	-6.1	0.8	A-	A-
Reading	3	593393	1401	8	82	B.3.3.2	2	14040	0.74	0.14	0.05	0.74	0.06	0.00	0.52	-0.39	-0.43	0.52	-0.41	-0.2281	0.0216	-9.9	0.9	-9.9	0.8	A-	A-
Reading	3	593399	1402	8	83	A.2.4.1	2	14040	0.43	0.26	0.12	0.19	0.43	0.01	0.30	-0.22	-0.39	-0.30	0.30	1.5211	0.0192	9.9	1.1	9.9	1.3	A-	A+
Reading	3	593396	1403	8	84	A.2.2.2	2	14040	0.90	0.02	0.04	0.90	0.03	0.00	0.49	-0.31	-0.35	0.49	-0.33	-1.5856	0.0300	-9.9	0.8	-9.9	0.5	A-	A-
Reading	3	593400	1404	8	85	A.2.3.1	2	14040	0.73	0.12	0.08	0.73	0.07	0.00	0.42	-0.28	-0.35	0.42	-0.34	-0.1080	0.0212	-0.1	1.0	-1.6	1.0	A-	A-
Reading	3	593394	1405	8	86	B.3.3.1	2	14040	0.20	0.21	0.20	0.15	0.44	0.00	-0.04	-0.02	-0.04	-0.18	0.16	2.8393	0.0228	9.9	1.4	9.9	2.7	A+	A-
Reading	3	554843	1377	8	88	A.1.4.1		56212	0.75	0.75	0.07	0.07	0.10	0.00	0.50	0.50	-0.36	-0.44	-0.35	-0.2308	0.0108	-9.9	0.9	-9.9	0.8		
Reading	3	554837	1378	8	89	A.1.1.2		56212	0.78	0.05	0.11	0.78	0.06	0.00	0.44	-0.39	-0.30	0.44	-0.29	-0.4569	0.0113	-6.1	1.0	-9.9	0.8		
Reading	3	554842	1379	8	90	A.1.3.1		56212	0.71	0.05	0.09	0.15	0.71	0.00	0.36	-0.36	-0.24	-0.26	0.36	0.0189	0.0104	9.9	1.1	9.9	1.2		
Reading	3	554847	1380	8	91	A.1.6.1		56212	0.58	0.15	0.03	0.58	0.23	0.01	0.34	-0.25	-0.42	0.34	-0.29	0.7447	0.0097	9.9	1.1	9.9	1.2		
Reading	3	554840	1381	8	92	B.1.1.1		56212	0.85	0.04	0.06	0.85	0.04	0.00	0.51	-0.34	-0.39	0.51	-0.34	-1.0883	0.0130	-9.9	0.8	-9.9	0.6		
Reading	3	554848	1382	8	93	A.1.2.2		56212	0.63	0.08	0.63	0.22	0.06	0.01	0.30	-0.44	0.30	-0.13	-0.30	0.4767	0.0099	9.9	1.2	9.9	1.3		
Reading	3	554839	1383	8	94	B.1.1.1		56212	0.75	0.09	0.08	0.75	0.08	0.00	0.48	-0.41	-0.44	0.48	-0.23	-0.2548	0.0109	-9.9	0.9	-8.5	0.9		
Reading	3	554844	1384	8	95	B.1.1.1		56212	0.58	0.27	0.09	0.06	0.58	0.01	0.42	-0.32	-0.42	-0.45	0.42	0.7145	0.0097	2.8	1.0	6.0	1.0		
Reading	3	593870	1407	9	77	A.2.2.2	2	13866	0.92	0.03	0.03	0.02	0.92	0.00	0.46	-0.32	-0.30	-0.28	0.46	-1.9063	0.0335	-8.1	0.8	-9.9	0.4	A+	A-
Reading	3	594253	1408	9	78	A.2.3.1	2	13866	0.65	0.14	0.13	0.65	0.08	0.00	0.41	-0.34	-0.40	0.41	-0.23	0.3617	0.0202	4.0	1.0	1.4	1.0	A+	A-
Reading	3	593872	1409	9	79	A.2.3.1	2	13866	0.76	0.05	0.14	0.04	0.76	0.00	0.52	-0.44	-0.38	-0.39	0.52	-0.3612	0.0224	-9.9	0.9	-9.9	0.8	A+	A-
Reading	3	593875	1410	9	80	B.3.3.3	2	13866	0.76	0.07	0.76	0.10	0.07	0.00	0.44	-0.33	0.44	-0.33	-0.31	-0.3447	0.0223	-2.3	1.0	-3.5	0.9	A+	A-
Reading	3	593867	1411	9	81	A.2.4.1	2	13866	0.82	0.03	0.82	0.04	0.10	0.00	0.50	-0.33	0.50	-0.34	-0.38	-0.7971	0.0245	-9.1	0.9	-9.9	0.7	A-	B-
Reading	3	593873	1412	9	82	B.3.1.1	2	13866	0.80	0.07	0.07	0.06	0.80	0.00	0.52	-0.39	-0.39	-0.37	0.52	-0.6150	0.0235	-9.9	0.9	-9.9	0.7	A+	A-
Reading	3	593865	1413	9	83	A.2.3.1	2	13866	0.55	0.09	0.14	0.55	0.21	0.00	0.43	-0.39	-0.41	0.43	-0.35	0.9042	0.0195	0.1	1.0	0.8	1.0	A+	A-
Reading	3	593866	1414	9	84	B.3.2.1	2	13866	0.58	0.14	0.18	0.10	0.58	0.00	0.44	-0.34	-0.37	-0.43	0.44	0.7652	0.0196	0.5	1.0	0.0	1.0	A-	A-
Reading	3	593877	1415	9	85	B.1.2.1	3	13866	0.71	0.11	0.71	0.12	0.05	0.00	0.40	-0.29	0.40	-0.33	-0.26	-0.0285	0.0212	4.6	1.1	-1.2	1.0	A+	A-
Reading	3	594252	1416	9	86	B.1.2.1	2	13866	0.57	0.16	0.19	0.57	0.08	0.00	0.46	-0.46	-0.38	0.46	-0.34	0.8058	0.0196	-4.5	1.0	-3.9	1.0	A+	A-
Reading	3	554843	1377	9	88	A.1.4.1		56212	0.75	0.75	0.07	0.07	0.10	0.00	0.50	0.50	-0.36	-0.44	-0.35	-0.2308	0.0108	-9.9	0.9	-9.9	0.8		
Reading	3	554837	1378	9	89	A.1.1.2		56212	0.78	0.05	0.11	0.78	0.06	0.00	0.44	-0.39	-0.30	0.44	-0.29	-0.4569	0.0113	-6.1	1.0	-9.9	0.8		
Reading	3	554842	1379	9	90	A.1.3.1		56212	0.71	0.05	0.09	0.15	0.71	0.00	0.36	-0.36	-0.24	-0.26	0.36	0.0189	0.0104	9.9	1.1	9.9	1.2		
Reading	3	554847	1380	9	91	A.1.6.1		56212	0.58	0.15	0.03	0.58	0.23	0.01	0.34	-0.25	-0.42	0.34	-0.29	0.7447	0.0097	9.9	1.1	9.9	1.2		
Reading	3	554840	1381	9	92	B.1.1.1		56212	0.85	0.04	0.06	0.85	0.04	0.00	0.51	-0.34	-0.39	0.51	-0.34	-1.0883	0.0130	-9.9	0.8	-9.9	0.6		
Reading	3	554848	1382	9	93	A.1.2.2		56212	0.63	0.08	0.63	0.22	0.06	0.01	0.30	-0.44	0.30	-0.13	-0.30	0.4767	0.0099	9.9	1.2	9.9	1.3		
Reading	3	554839	1383	9	94	B.1.1.1		56212	0.75	0.09	0.08</																

## Appendix I: Item Statistics Multiple Choice

Item Information							Classical												Rasch		Infit		Outfit		DIF			
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B	
Reading	3	554844	1384	9	95	B.1.1.1		56212	0.58	0.27	0.09	0.06	0.58	0.01	0.42	-0.32	-0.42	-0.45	0.42	0.7145	0.0097	2.8	1.0	6.0	1.0			
Reading	4	555063	1418	0	27	A.2.4.1		128453	0.94	0.04	0.94	0.01	0.01	0.00	0.32	-0.26	0.32	-0.15	-0.16	-2.0796	0.0119	-6.1	1.0	-9.9	0.8			
Reading	4	555065	1419	0	28	A.2.4.1		128453	0.77	0.77	0.18	0.04	0.02	0.00	0.37	0.37	-0.26	-0.36	-0.31	-0.3418	0.0072	4.4	1.0	3.3	1.0			
Reading	4	555069	1420	0	29	A.2.3.1		128453	0.58	0.06	0.24	0.12	0.58	0.00	0.41	-0.49	-0.35	-0.30	0.41	0.7481	0.0063	-1.4	1.0	-3.1	1.0			
Reading	4	555064	1421	0	30	A.2.4.1		128453	0.87	0.87	0.05	0.03	0.04	0.00	0.36	0.36	-0.29	-0.19	-0.22	-1.2192	0.0090	-4.7	1.0	-5.8	0.9			
Reading	4	555066	1422	0	31	B.3.1.1		128453	0.63	0.14	0.16	0.63	0.06	0.00	0.31	-0.32	-0.12	0.31	-0.39	0.4566	0.0064	9.9	1.1	9.9	1.2			
Reading	4	555070	1423	0	32	A.2.3.1		128453	0.74	0.09	0.74	0.13	0.04	0.00	0.47	-0.36	0.47	-0.38	-0.34	-0.1498	0.0070	-9.9	0.9	-9.9	0.9			
Reading	4	555061	1424	0	33	B.3.3.3		128453	0.78	0.10	0.03	0.78	0.09	0.00	0.30	-0.25	-0.16	0.30	-0.22	-0.4524	0.0074	9.9	1.1	9.9	1.2			
Reading	4	555071	1425	0	34	B.3.3.1		128453	0.55	0.55	0.30	0.07	0.08	0.00	0.21	0.21	-0.04	-0.36	-0.41	0.9035	0.0062	9.9	1.2	9.9	1.3			
Reading	4	549055	1427	0	36	A.2.4.1		128453	0.70	0.70	0.21	0.05	0.05	0.00	0.42	0.42	-0.36	-0.28	-0.32	0.0948	0.0067	-4.0	1.0	-8.1	1.0			
Reading	4	549057	1428	0	37	A.2.6.1		128453	0.88	0.88	0.04	0.04	0.04	0.00	0.42	0.42	-0.28	-0.24	-0.32	-1.3027	0.0092	-9.9	0.9	-9.9	0.8			
Reading	4	549058	1429	0	38	A.2.4.1		128453	0.61	0.16	0.61	0.12	0.11	0.00	0.41	-0.19	0.41	-0.46	-0.42	0.5569	0.0064	1.0	1.0	8.0	1.0			
Reading	4	549056	1430	0	39	A.2.5.1		128453	0.74	0.09	0.11	0.74	0.06	0.00	0.49	-0.37	-0.38	0.49	-0.36	-0.1725	0.0070	-9.9	0.9	-9.9	0.8			
Reading	4	549063	1431	0	40	A.2.4.1		128453	0.65	0.14	0.13	0.65	0.08	0.00	0.49	-0.44	-0.42	0.49	-0.33	0.3355	0.0065	-9.9	0.9	-9.9	0.9			
Reading	4	549054	1432	0	41	A.2.4.1		128453	0.69	0.17	0.07	0.06	0.69	0.00	0.39	-0.25	-0.33	-0.40	0.39	0.1325	0.0067	6.0	1.0	9.3	1.1			
Reading	4	549059	1433	0	42	B.3.3.2		128453	0.78	0.06	0.06	0.78	0.09	0.00	0.54	-0.39	-0.38	0.54	-0.44	-0.4296	0.0074	-9.9	0.9	-9.9	0.7			
Reading	4	549053	1434	0	43	A.2.3.1		128453	0.67	0.17	0.67	0.09	0.07	0.00	0.37	-0.28	0.37	-0.31	-0.31	0.2323	0.0066	9.9	1.0	9.9	1.1			
Reading	4	555025	1435	0	44	A.1.3.1		128453	0.72	0.13	0.10	0.72	0.04	0.00	0.39	-0.33	-0.29	0.39	-0.29	-0.0755	0.0069	1.5	1.0	9.9	1.1			
Reading	4	555018	1436	0	45	A.1.1.2		128453	0.74	0.14	0.74	0.05	0.07	0.00	0.41	-0.31	0.41	-0.35	-0.28	-0.1568	0.0070	-2.6	1.0	-9.3	1.0			
Reading	4	555015	1437	0	46	B.1.1.1		128453	0.51	0.05	0.19	0.25	0.51	0.00	0.28	-0.44	-0.26	-0.20	0.28	1.1117	0.0062	9.9	1.1	9.9	1.2			
Reading	4	555019	1438	0	47	A.1.2.1		128453	0.65	0.65	0.06	0.07	0.22	0.00	0.43	0.43	-0.37	-0.36	-0.35	0.3658	0.0065	-9.1	1.0	-9.9	0.9			
Reading	4	555016	1439	0	48	B.2.1.2		128453	0.78	0.78	0.07	0.07	0.08	0.00	0.49	0.49	-0.37	-0.41	-0.30	-0.4681	0.0074	-9.9	0.9	-9.9	0.8			
Reading	4	555014	1440	0	49	B.1.1.1		128453	0.75	0.05	0.12	0.75	0.08	0.00	0.50	-0.39	-0.43	0.50	-0.29	-0.2178	0.0071	-9.9	0.9	-9.9	0.8			
Reading	4	555021	1441	0	50	A.1.3.1		128453	0.80	0.09	0.80	0.05	0.06	0.00	0.50	-0.36	0.50	-0.35	-0.37	-0.6158	0.0077	-9.9	0.9	-9.9	0.7			
Reading	4	555022	1442	0	51	A.1.6.1		128453	0.59	0.09	0.16	0.59	0.15	0.00	0.44	-0.36	-0.38	0.44	-0.39	0.6599	0.0063	-9.9	1.0	-9.9	0.9			
Reading	4	549127	1444	0	122	A.1.1.2		128453	0.66	0.15	0.66	0.14	0.06	0.00	0.27	-0.24	0.27	-0.18	-0.20	0.3244	0.0065	9.9	1.2	9.9	1.2			
Reading	4	549137	1445	0	123	B.1.1.1		128453	0.58	0.18	0.08	0.58	0.16	0.00	0.36	-0.35	-0.34	0.36	-0.23	0.7284	0.0063	9.9	1.1	9.9	1.1			
Reading	4	549136	1446	0	124	B.1.1.1		128453	0.70	0.05	0.13	0.12	0.70	0.00	0.45	-0.39	-0.35	-0.35	0.45	0.0837	0.0067	-9.9	1.0	-5.8	1.0			
Reading	4	549145	1447	0	125	B.2.1.3		128453	0.65	0.12	0.16	0.65	0.06	0.00	0.34	-0.27	-0.23	0.34	-0.37	0.3412	0.0065	9.9	1.1	9.9	1.1			
Reading	4	549139	1448	0	126	A.1.6.1		128453	0.55	0.24	0.15	0.06	0.55	0.00	0.36	-0.32	-0.28	-0.39	0.36	0.8690	0.0062	9.9	1.1	9.9	1.1			
Reading	4	549143	1449	0	127	A.1.5.1		128453	0.78	0.78	0.10	0.09	0.04	0.00	0.51	0.51	-0.40	-0.39	-0.34	-0.4220	0.0074	-9.9	0.9	-9.9	0.8			
Reading	4	549138	1450	0	128	B.2.1.1		128453	0.59	0.11	0.59	0.15	0.14	0.00	0.41	-0.42	0.41	-0.32	-0.31	0.6590	0.0063	-1.4	1.0	-3.9	1.0			
Reading	4	549144	1451	0	129	A.1.3.1		128453	0.70	0.16	0.70	0.07	0.07	0.00	0.52	-0.43	0.52	-0.37	-0.45	0.0968	0.0067	-9.9	0.9	-9.9	0.8			
Reading	4	555098	1453	0	131	A.1.2.2		128453	0.91	0.03	0.91	0.04	0.02	0.00	0.45	-0.31	0.45	-0.33	-0.22	-1.6186	0.0101	-9.9	0.9	-9.9	0.6			
Reading	4	555100	1454	0	132	A.1.3.1		128453	0.77	0.03	0.11	0.09	0.77	0.00	0.48	-0.39	-0.36	-0.35	0.48	-0.3744	0.0073	-9.9	0.9	-9.9	0.8			
Reading	4	555101	1455	0	133	A.1.3.1		128453	0.81	0.81	0.11	0.03	0.05	0.00	0.45	0.45	-0.34	-0.33	-0.31	-0.6976	0.0078	-9.9	0.9	-9.9	0.8			
Reading	4	555106	1456	0	134	A.2.6.1		128453	0.79	0.12	0.79	0.06	0.03	0.00	0.44	-0.29	0.44	-0.34	-0.37	-0.5030	0.0075	-9.9	0.9	-9.9	0.9			
Reading	4	555108	1457	0	135	A.2.2.1		128453	0.60	0.60	0.11	0.11	0.17	0.00	0.46	0.46	-0.41	-0.39	-0.37	0.6110	0.0063	-9.9	0.9	-9.9	0.9			
Reading	4	555103	1458	0	136	B.3.3.4		128453	0.76	0.07	0.05	0.76	0.12	0.00	0.39	-0.36	-0.32	0.39	-0.22	-0.3287	0.0072	0.6	1.0	-3.3	1.0			
Reading	4	555105	1459	0	137	B.3.3.2		128453	0.57	0.06	0.12	0.25	0.57	0.00	0.45	-0.47	-0.46	-0.33	0.45	0.7731	0.0063	-9.9	0.9	-9.9	0.9			
Reading	4	555099	1460	0	138	B.1.2.1		128453	0.67	0.12	0.07	0.67	0.14	0.00	0.37	-0.28	-0.34	0.37	-0.27	0.2438	0.0066	9.9	1.1	9.9	1.1			
Reading	4	564939	1462	1	78	A.1.4.1	1	14487	0.90	0.05	0.90	0.03	0.02	0.00	0.42	-0.31	0.42	-0.25	-0.25	-1.5381	0.0289	-6.0	0.9	-8.3	0.7	A+	A-	
Reading	4	564936	1463	1	79	A.1.1.1	2	14487	0.79	0.14	0.04	0.79	0.03	0.00	0.40	-0.27	-0.32	0.40	-0.32	-0.5999	0.0226	-1.4	1.0	-2.1	1.0	A+	A-	
Reading	4	564932	1464	1	80	A.1.3.1	1	14487	0.83	0.83	0.06	0.05	0.06	0.00	0.48	0.48	-0.33	-0.33	-0.35	-0.8674	0.0240	-8.9	0.9	-9.9	0.8	A-	A-	
Reading	4	564930	1465	1	81	A.1.2.1	2	14487	0.76	0.04	0.16	0.03	0.76	0.00	0.30	-0.23	-0.19	-0.28	0.30	-0.3936	0.0216	9.3	1.1	6.4	1.1	A+	A-	
Reading	4	564941	1466	1	82	A.1.3.1	2	14487	0.89	0.03	0.89	0.05	0.02	0.00	0.42	-0.28	0.42	-0.27	-0.28	-1.4835	0.0284	-6.3	0.9	-8.0	0.7	A+	A-	
Reading	4	564938	1467	1	83	B.1.1.1	2	14487	0.72	0.72	0.10	0.09	0.09	0.00	0.34	0.34	-0.21	-0.19	-0.38	-0.1253	0.0206	6.7	1.1	8.9	1.2	A+	A-	
Reading	4	564935	1468	1	84	B.1.1.1	2	14487	0.83	0.08	0.03	0.06	0.83	0.00	0.46	-0.29	-0.36	-0.34	0.46	-0.8760	0.0240	-7.4	0.9	-9.0	0.8	A+	A+	
Reading	4	564933	1469	1	85	A.1.5.1	2	14487	0.83	0.03	0.09	0.83	0.05	0.00	0.45	-0.30	-0.35	0.45	-0.30	-0.8536	0.0239	-6.4	0.9	-9.7	0.8	A+	A-	
Reading	4	564937	1470	1	86	A.1.6.1	2	14487	0.65	0.08	0.16	0.65	0.11	0.00	0.35	-0.37	-0.28</											

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Reading	4	555053	1473	1	89	A.2.4.1		71387	0.73	0.12	0.73	0.06	0.09	0.00	0.46	-0.39	0.46	-0.37	-0.29	-0.1166	0.0093	-9.9	0.9	-9.9	0.9		
Reading	4	555047	1474	1	91	B.3.3.1		71387	0.70	0.13	0.11	0.70	0.06	0.00	0.43	-0.30	-0.36	0.43	-0.36	0.0414	0.0091	-7.1	1.0	-7.2	1.0		
Reading	4	555054	1475	1	92	A.2.4.1		71387	0.47	0.47	0.22	0.21	0.10	0.00	0.37	0.37	-0.46	-0.22	-0.36	1.3021	0.0083	4.7	1.0	9.9	1.1		
Reading	4	555050	1476	1	93	A.2.4.1		71387	0.78	0.12	0.05	0.78	0.04	0.00	0.43	-0.28	-0.36	0.43	-0.35	-0.4862	0.0100	-9.9	0.9	-8.2	0.9		
Reading	4	555056	1477	1	94	B.3.1.1		71387	0.74	0.07	0.12	0.06	0.74	0.00	0.53	-0.48	-0.34	-0.45	0.53	-0.1958	0.0094	-9.9	0.9	-9.9	0.8		
Reading	4	555049	1478	1	95	A.2.3.1		71387	0.64	0.64	0.18	0.07	0.10	0.00	0.47	0.47	-0.36	-0.44	-0.38	0.3933	0.0087	-9.9	0.9	-9.9	0.9		
Reading	4	555052	1479	1	96	A.2.1.1		71387	0.46	0.12	0.46	0.22	0.19	0.00	0.27	-0.32	0.27	-0.26	-0.21	1.3448	0.0083	9.9	1.1	9.9	1.2		
Reading	4	555046	1480	1	90	A.2.2.2		71387	0.74	0.04	0.12	0.10	0.74	0.00	0.35	-0.31	-0.24	-0.25	0.35	-0.1779	0.0094	9.9	1.1	7.1	1.1		
Reading	4	565486	1481	2	78	A.1.3.1	2	14254	0.59	0.22	0.11	0.59	0.08	0.00	0.32	-0.31	-0.17	0.32	-0.30	0.6637	0.0191	9.9	1.1	9.9	1.2	A+	A+
Reading	4	565475	1482	2	79	A.1.2.2	2	14254	0.89	0.03	0.04	0.04	0.89	0.00	0.44	-0.29	-0.30	-0.31	0.44	-1.3874	0.0283	-7.6	0.9	-9.9	0.7	A+	A-
Reading	4	565476	1483	2	80	B.2.1.1	2	14254	0.89	0.05	0.89	0.04	0.03	0.00	0.36	-0.19	0.36	-0.29	-0.26	-1.3658	0.0281	-4.0	0.9	0.5	1.0	A+	A-
Reading	4	565482	1484	2	81	A.1.3.1	2	14254	0.81	0.05	0.08	0.81	0.06	0.00	0.38	-0.32	-0.25	0.38	-0.23	-0.6568	0.0233	-8.2	1.0	-2.4	0.9	A+	A-
Reading	4	565481	1485	2	82	B.2.1.3	2	14254	0.69	0.07	0.14	0.69	0.10	0.00	0.34	-0.35	-0.25	0.34	-0.21	0.1275	0.0202	8.6	1.1	5.1	1.1	A+	A-
Reading	4	565479	1486	2	83	B.1.1.1	2	14254	0.81	0.81	0.05	0.05	0.09	0.00	0.27	0.27	-0.21	-0.29	-0.10	-0.6660	0.0233	7.1	1.1	9.9	1.3	A+	A-
Reading	4	565480	1487	2	84	B.2.1.1	2	14254	0.88	0.03	0.04	0.06	0.88	0.00	0.41	-0.24	-0.32	-0.26	0.41	-1.2539	0.0272	-5.2	0.9	-6.2	0.8	A+	A-
Reading	4	565477	1488	2	85	B.2.1.1	2	14254	0.67	0.13	0.67	0.10	0.10	0.00	0.46	-0.41	0.46	-0.37	-0.31	0.2359	0.0199	-5.3	1.0	-6.9	0.9	A+	A-
Reading	4	565483	1489	2	86	B.2.1.1	2	14254	0.73	0.73	0.13	0.09	0.05	0.00	0.45	0.45	-0.37	-0.32	-0.33	-0.1082	0.0209	-4.3	1.0	-6.2	0.9	A+	A+
Reading	4	565484	1490	2	87	B.1.2.1	2	14254	0.82	0.06	0.05	0.82	0.07	0.00	0.38	-0.29	-0.32	0.38	-0.19	-0.7321	0.0237	-1.1	1.0	-0.3	1.0	A+	C-
Reading	4	555053	1473	2	89	A.2.4.1		71387	0.73	0.12	0.73	0.06	0.09	0.00	0.46	-0.39	0.46	-0.37	-0.29	-0.1166	0.0093	-9.9	0.9	-9.9	0.9		
Reading	4	555047	1474	2	91	B.3.3.1		71387	0.70	0.13	0.11	0.70	0.06	0.00	0.43	-0.30	-0.36	0.43	-0.36	0.0414	0.0091	-7.1	1.0	-7.2	1.0		
Reading	4	555054	1475	2	92	A.2.4.1		71387	0.47	0.47	0.22	0.21	0.10	0.00	0.37	0.37	-0.46	-0.22	-0.36	1.3021	0.0083	4.7	1.0	9.9	1.1		
Reading	4	555050	1476	2	93	A.2.4.1		71387	0.78	0.12	0.05	0.78	0.04	0.00	0.43	-0.28	-0.36	0.43	-0.35	-0.4862	0.0100	-9.9	0.9	-8.2	0.9		
Reading	4	555056	1477	2	94	B.3.1.1		71387	0.74	0.07	0.12	0.06	0.74	0.00	0.53	-0.48	-0.34	-0.45	0.53	-0.1958	0.0094	-9.9	0.9	-9.9	0.8		
Reading	4	555049	1478	2	95	A.2.3.1		71387	0.64	0.64	0.18	0.07	0.10	0.00	0.47	0.47	-0.36	-0.44	-0.38	0.3933	0.0087	-9.9	0.9	-9.9	0.9		
Reading	4	555052	1479	2	96	A.2.1.1		71387	0.46	0.12	0.46	0.22	0.19	0.00	0.27	-0.32	0.27	-0.26	-0.21	1.3448	0.0083	9.9	1.1	9.9	1.2		
Reading	4	555046	1480	2	90	A.2.2.2		71387	0.74	0.04	0.12	0.10	0.74	0.00	0.35	-0.31	-0.24	-0.25	0.35	-0.1779	0.0094	9.9	1.1	7.1	1.1		
Reading	4	565014	1492	3	78	A.1.4.1	1	14223	0.93	0.03	0.01	0.93	0.03	0.00	0.36	-0.26	-0.18	0.36	-0.23	-2.0458	0.0354	-4.1	0.9	-5.4	0.7	B+	A-
Reading	4	565009	1493	3	79	A.1.2.1	2	14223	0.90	0.02	0.03	0.05	0.90	0.00	0.41	-0.28	-0.29	-0.24	0.41	-1.5508	0.0299	-5.3	0.9	-7.6	0.7	A+	A-
Reading	4	565015	1494	3	80	B.1.1.1	2	14223	0.73	0.73	0.09	0.15	0.04	0.00	0.44	0.44	-0.34	-0.35	-0.35	-0.0813	0.0208	-4.5	1.0	-3.5	0.9	A+	B-
Reading	4	565013	1495	3	81	B.1.1.1	2	14223	0.83	0.08	0.06	0.02	0.83	0.00	0.36	-0.20	-0.32	-0.24	0.36	-0.8055	0.0242	-4.4	1.0	0.7	1.0	A+	A-
Reading	4	565011	1496	3	82	B.1.1.1	2	14223	0.90	0.03	0.05	0.90	0.02	0.00	0.36	-0.29	-0.23	0.36	-0.20	-1.5356	0.0297	-4.0	0.9	-2.5	0.9	A+	A-
Reading	4	565010	1497	3	83	A.1.1.2	2	14223	0.86	0.04	0.08	0.02	0.86	0.00	0.46	-0.38	-0.33	-0.24	0.46	-1.0865	0.0260	-7.8	0.9	-9.9	0.7	A+	A-
Reading	4	565012	1498	3	84	A.1.3.1	2	14223	0.55	0.19	0.55	0.16	0.11	0.00	0.29	-0.28	0.29	-0.21	-0.25	0.8983	0.0188	9.9	1.1	9.9	1.2	A-	A-
Reading	4	565008	1499	3	85	A.1.3.1	2	14223	0.83	0.03	0.83	0.09	0.04	0.00	0.43	-0.32	0.43	-0.26	-0.37	-0.8635	0.0245	-6.4	0.9	-4.3	0.9	A+	A-
Reading	4	565017	1500	3	86	A.1.4.1	2	14223	0.48	0.48	0.23	0.15	0.14	0.00	0.31	0.31	-0.23	-0.33	-0.32	1.2417	0.0186	9.9	1.1	9.9	1.2	A-	A-
Reading	4	565018	1501	3	87	A.1.3.1	2	14223	0.81	0.07	0.04	0.81	0.07	0.00	0.46	-0.29	-0.35	0.46	-0.36	-0.6862	0.0235	-7.5	0.9	-6.7	0.8	A+	A-
Reading	4	555053	1473	3	89	A.2.4.1		71387	0.73	0.12	0.73	0.06	0.09	0.00	0.46	-0.39	0.46	-0.37	-0.29	-0.1166	0.0093	-9.9	0.9	-9.9	0.9		
Reading	4	555047	1474	3	91	B.3.3.1		71387	0.70	0.13	0.11	0.70	0.06	0.00	0.43	-0.30	-0.36	0.43	-0.36	0.0414	0.0091	-7.1	1.0	-7.2	1.0		
Reading	4	555054	1475	3	92	A.2.4.1		71387	0.47	0.47	0.22	0.21	0.10	0.00	0.37	0.37	-0.46	-0.22	-0.36	1.3021	0.0083	4.7	1.0	9.9	1.1		
Reading	4	555050	1476	3	93	A.2.4.1		71387	0.78	0.12	0.05	0.78	0.04	0.00	0.43	-0.28	-0.36	0.43	-0.35	-0.4862	0.0100	-9.9	0.9	-8.2	0.9		
Reading	4	555056	1477	3	94	B.3.1.1		71387	0.74	0.07	0.12	0.06	0.74	0.00	0.53	-0.48	-0.34	-0.45	0.53	-0.1958	0.0094	-9.9	0.9	-9.9	0.8		
Reading	4	555049	1478	3	95	A.2.3.1		71387	0.64	0.64	0.18	0.07	0.10	0.00	0.47	0.47	-0.36	-0.44	-0.38	0.3933	0.0087	-9.9	0.9	-9.9	0.9		
Reading	4	555052	1479	3	96	A.2.1.1		71387	0.46	0.12	0.46	0.22	0.19	0.00	0.27	-0.32	0.27	-0.26	-0.21	1.3448	0.0083	9.9	1.1	9.9	1.2		
Reading	4	555046	1480	3	90	A.2.2.2		71387	0.74	0.04	0.12	0.10	0.74	0.00	0.35	-0.31	-0.24	-0.25	0.35	-0.1779	0.0094	9.9	1.1	7.1	1.1		
Reading	4	564958	1503	4	78	B.1.1.1	2	14214	0.75	0.15	0.03	0.75	0.07	0.00	0.44	-0.40	-0.27	0.44	-0.27	-0.2620	0.0214	-5.1	0.9	-8.8	0.8	A+	A-
Reading	4	564965	1504	4	79	B.1.1.1	2	14214	0.66	0.06	0.66	0.05	0.24	0.00	0.37	-0.21	0.37	-0.20	-0.36	0.3152	0.0197	4.8	1.0	3.9	1.1	A+	A-
Reading	4	564960	1505	4	80	B.1.1.1	2	14214	0.66	0.66	0.07	0.17	0.10	0.00	0.46	0.46	-0.32	-0.35	-0.45	0.2972	0.0197	-7.2	0.9	-8.9	0.9	A+	A-
Reading	4	564959	1506	4	81	A.1.2.1	2	14214	0.85	0.85	0.07	0.05	0.03	0.00	0.46	0.46	-0.33	-0.33	-0.29	-1.0478	0.0256	-7.9	0.9	-9.9	0.7	A+	A-
Reading	4	564961	1507	4	82	B.1.1.1	2	14214	0.62	0.20	0.62	0.15	0.03	0.00	0.42	-0.33	0.42	-0.40	-0.34	0.5221	0.0193	-3.5	1.0	-6.0	0.9	A+	A-
Reading	4	564964	1508	4	83	B.1.1.1	2	14214	0.81	0.06	0.04	0.81	0.81	0.00	0.49	-0.36	-0.35	-0.35	0.49	-0.6728	0.0233	-9.9	0.9	-9.9	0.7	A+	A-
Reading	4	564968	1509	4	84	B.1.1.1	3	14214	0.64	0.06	0.16	0.															

## Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Reading	4	564963	1510	4	85	A.1.3.1	2	14214	0.53	0.03	0.40	0.53	0.04	0.00	0.25	-0.34	-0.18	0.25	-0.36	0.9711	0.0187	9.9	1.2	9.9	1.2	A+	A-
Reading	4	564966	1511	4	86	A.1.6.1	2	14214	0.57	0.24	0.13	0.07	0.57	0.00	0.36	-0.21	-0.37	-0.43	0.36	0.7791	0.0189	7.1	1.1	5.3	1.1	A+	A-
Reading	4	564957	1512	4	87	A.1.4.1	2	14214	0.70	0.06	0.10	0.14	0.70	0.00	0.54	-0.29	-0.45	-0.51	0.54	0.0686	0.0203	-9.9	0.8	-9.9	0.8	A+	A-
Reading	4	555053	1473	4	89	A.2.4.1		71387	0.73	0.12	0.73	0.06	0.09	0.00	0.46	-0.39	0.46	-0.37	-0.29	-0.1166	0.0093	-9.9	0.9	-9.9	0.9		
Reading	4	555047	1474	4	91	B.3.3.1		71387	0.70	0.13	0.11	0.70	0.06	0.00	0.43	-0.30	-0.36	0.43	-0.36	0.0414	0.0091	-7.1	1.0	-7.2	1.0		
Reading	4	555054	1475	4	92	A.2.4.1		71387	0.47	0.47	0.22	0.21	0.10	0.00	0.37	0.37	-0.46	-0.22	-0.36	1.3021	0.0083	4.7	1.0	9.9	1.1		
Reading	4	555050	1476	4	93	A.2.4.1		71387	0.78	0.12	0.05	0.78	0.04	0.00	0.43	-0.28	-0.36	0.43	-0.35	-0.4862	0.0100	-9.9	0.9	-8.2	0.9		
Reading	4	555056	1477	4	94	B.3.1.1		71387	0.74	0.07	0.12	0.06	0.74	0.00	0.53	-0.48	-0.34	-0.45	0.53	-0.1958	0.0094	-9.9	0.9	-9.9	0.8		
Reading	4	555049	1478	4	95	A.2.3.1		71387	0.64	0.64	0.18	0.07	0.10	0.00	0.47	0.47	-0.36	-0.44	-0.38	0.3933	0.0087	-9.9	0.9	-9.9	0.9		
Reading	4	555052	1479	4	96	A.2.1.1		71387	0.46	0.12	0.46	0.22	0.19	0.00	0.27	-0.32	0.27	-0.26	-0.21	1.3448	0.0083	9.9	1.1	9.9	1.2		
Reading	4	555046	1480	4	90	A.2.2.2		71387	0.74	0.04	0.12	0.10	0.74	0.00	0.35	-0.31	-0.24	-0.25	0.35	-0.1779	0.0094	9.9	1.1	7.1	1.1		
Reading	4	596211	1514	5	78	A.2.4.1	2	14209	0.90	0.90	0.02	0.07	0.00	0.00	0.40	0.40	-0.25	-0.34	-0.15	-1.5626	0.0301	-4.9	0.9	-9.9	0.7	A+	A-
Reading	4	596214	1515	5	79	A.2.3.1	2	14209	0.46	0.15	0.46	0.07	0.33	0.00	0.18	-0.22	0.18	-0.32	-0.09	1.3345	0.0186	9.9	1.2	9.9	1.3	A-	A-
Reading	4	596210	1516	5	80	A.2.3.1	2	14209	0.56	0.08	0.22	0.14	0.56	0.00	0.26	-0.10	-0.30	-0.20	0.26	0.8353	0.0187	9.9	1.2	9.9	1.2	A+	A-
Reading	4	596209	1517	5	81	B.3.3.2	2	14209	0.56	0.08	0.56	0.19	0.17	0.00	0.41	-0.40	0.41	-0.31	-0.38	0.8212	0.0187	-4.0	1.0	-4.5	1.0	A+	A-
Reading	4	596212	1518	5	82	A.2.6.1	2	14209	0.47	0.04	0.35	0.47	0.14	0.00	0.29	-0.42	-0.22	0.29	-0.32	1.2796	0.0186	9.9	1.1	9.9	1.1	A+	A+
Reading	4	596218	1519	5	83	A.2.3.1	2	14209	0.45	0.08	0.28	0.45	0.20	0.00	0.28	-0.42	-0.21	0.28	-0.24	1.3839	0.0186	9.9	1.1	9.9	1.2	A+	A-
Reading	4	596217	1520	5	84	A.2.3.1	2	14209	0.59	0.59	0.05	0.06	0.29	0.00	0.27	0.27	-0.39	-0.34	-0.15	0.6861	0.0189	9.9	1.1	9.9	1.2	A+	A-
Reading	4	596220	1521	5	85	B.2.1.3	1	14209	0.69	0.09	0.69	0.11	0.12	0.00	0.42	-0.37	0.42	-0.25	-0.37	0.1628	0.0199	-2.4	1.0	-4.0	0.9	A+	A-
Reading	4	596216	1522	5	86	A.2.3.1	2	14209	0.65	0.12	0.11	0.65	0.12	0.00	0.51	-0.43	-0.39	0.51	-0.44	0.3885	0.0194	-9.9	0.9	-9.9	0.8	A+	A-
Reading	4	596215	1523	5	87	B.3.2.1	2	14209	0.42	0.40	0.07	0.11	0.42	0.00	0.20	-0.09	-0.32	-0.40	0.20	1.5259	0.0187	9.9	1.2	9.9	1.3	A+	A-
Reading	4	555053	1473	5	89	A.2.4.1		71387	0.73	0.12	0.73	0.06	0.09	0.00	0.46	-0.39	0.46	-0.37	-0.29	-0.1166	0.0093	-9.9	0.9	-9.9	0.9		
Reading	4	555047	1474	5	91	B.3.3.1		71387	0.70	0.13	0.11	0.70	0.06	0.00	0.43	-0.30	-0.36	0.43	-0.36	0.0414	0.0091	-7.1	1.0	-7.2	1.0		
Reading	4	555054	1475	5	92	A.2.4.1		71387	0.47	0.47	0.22	0.21	0.10	0.00	0.37	0.37	-0.46	-0.22	-0.36	1.3021	0.0083	4.7	1.0	9.9	1.1		
Reading	4	555050	1476	5	93	A.2.4.1		71387	0.78	0.12	0.05	0.78	0.04	0.00	0.43	-0.28	-0.36	0.43	-0.35	-0.4862	0.0100	-9.9	0.9	-8.2	0.9		
Reading	4	555056	1477	5	94	B.3.1.1		71387	0.74	0.07	0.12	0.06	0.74	0.00	0.53	-0.48	-0.34	-0.45	0.53	-0.1958	0.0094	-9.9	0.9	-9.9	0.8		
Reading	4	555049	1478	5	95	A.2.3.1		71387	0.64	0.64	0.18	0.07	0.10	0.00	0.47	0.47	-0.36	-0.44	-0.38	0.3933	0.0087	-9.9	0.9	-9.9	0.9		
Reading	4	555052	1479	5	96	A.2.1.1		71387	0.46	0.12	0.46	0.22	0.19	0.00	0.27	-0.32	0.27	-0.26	-0.21	1.3448	0.0083	9.9	1.1	9.9	1.2		
Reading	4	555046	1480	5	90	A.2.2.2		71387	0.74	0.04	0.12	0.10	0.74	0.00	0.35	-0.31	-0.24	-0.25	0.35	-0.1779	0.0094	9.9	1.1	7.1	1.1		
Reading	4	564971	1525	6	78	A.2.1.2	2	14272	0.69	0.11	0.04	0.15	0.69	0.00	0.51	-0.35	-0.35	-0.50	0.51	0.1197	0.0200	-9.9	0.9	-9.9	0.8	C-	C-
Reading	4	564977	1526	6	79	A.2.4.1	1	14272	0.82	0.04	0.82	0.07	0.07	0.00	0.31	-0.22	0.31	-0.13	-0.29	-0.7254	0.0235	2.8	1.0	2.1	1.1	A-	A-
Reading	4	564976	1527	6	80	A.2.4.1	2	14272	0.78	0.78	0.09	0.09	0.04	0.00	0.24	0.24	-0.15	-0.11	-0.32	-0.4001	0.0219	9.9	1.1	9.9	1.3	A+	A-
Reading	4	564972	1528	6	81	B.2.1.2	2	14272	0.56	0.05	0.56	0.26	0.13	0.00	0.38	-0.42	0.38	-0.28	-0.39	0.8083	0.0187	0.4	1.0	1.0	1.0	A-	A-
Reading	4	564981	1529	6	82	B.3.3.2	2	14272	0.63	0.19	0.06	0.63	0.12	0.00	0.30	-0.24	-0.34	0.30	-0.18	0.4619	0.0192	9.9	1.1	9.9	1.2	A+	A-
Reading	4	564978	1530	6	83	A.2.4.1	2	14272	0.64	0.64	0.16	0.11	0.10	0.00	0.35	0.35	-0.19	-0.34	-0.35	0.4252	0.0192	6.1	1.1	4.8	1.1	A-	A-
Reading	4	564979	1531	6	84	B.3.1.1	2	14272	0.71	0.10	0.71	0.11	0.08	0.00	0.45	-0.33	0.45	-0.38	-0.34	0.0230	0.0203	-6.3	0.9	-7.2	0.9	A+	A-
Reading	4	564980	1532	6	85	A.2.5.1	2	14272	0.42	0.20	0.15	0.42	0.22	0.00	0.35	-0.33	-0.44	0.35	-0.28	1.4925	0.0186	1.6	1.0	6.4	1.1	A-	A-
Reading	4	564975	1533	6	86	B.3.3.3	1	14272	0.55	0.26	0.09	0.11	0.55	0.00	0.32	-0.25	-0.38	-0.25	0.32	0.8838	0.0186	9.9	1.1	9.8	1.1	A+	A-
Reading	4	564974	1534	6	87	B.3.3.3	2	14272	0.63	0.08	0.14	0.63	0.14	0.00	0.35	-0.38	-0.29	0.35	-0.23	0.4489	0.0192	6.0	1.1	5.1	1.1	A-	A-
Reading	4	555113	1536	6	89	A.1.2.2		57066	0.78	0.14	0.05	0.78	0.04	0.00	0.51	-0.41	-0.38	0.51	-0.34	-0.4282	0.0111	-9.9	0.9	-9.9	0.8		
Reading	4	555123	1537	6	91	A.1.3.1		57066	0.70	0.04	0.12	0.70	0.15	0.00	0.42	-0.34	-0.40	0.42	-0.27	0.1107	0.0100	-4.5	1.0	-8.5	0.9		
Reading	4	555121	1538	6	92	A.1.3.1		57066	0.65	0.65	0.22	0.08	0.05	0.00	0.39	0.39	-0.26	-0.41	-0.35	0.3658	0.0097	3.0	1.0	1.0	1.0		
Reading	4	555116	1539	6	93	A.1.4.1		57066	0.75	0.06	0.75	0.11	0.07	0.00	0.37	-0.34	0.37	-0.22	-0.29	-0.2238	0.0106	2.0	1.0	7.1	1.1		
Reading	4	555114	1540	6	94	B.1.1.1		57066	0.47	0.47	0.06	0.39	0.08	0.00	0.27	0.27	-0.36	-0.19	-0.38	1.3112	0.0093	9.9	1.1	9.9	1.2		
Reading	4	555118	1541	6	95	B.3.3.4		57066	0.67	0.67	0.08	0.10	0.15	0.00	0.49	0.49	-0.37	-0.38	-0.43	0.2713	0.0098	-9.9	0.9	-9.9	0.9		
Reading	4	555117	1542	6	96	A.2.6.1		57066	0.68	0.13	0.06	0.13	0.68	0.00	0.26	-0.22	-0.25	-0.16	0.26	0.2183	0.0099	9.9	1.2	9.9	1.3		
Reading	4	555115	1543	6	90	B.2.1.2		57066	0.63	0.06	0.20	0.63	0.11	0.00	0.37	-0.38	-0.24	0.37	-0.35	0.4966	0.0096	9.9	1.0	5.9	1.0		
Reading	4	565490	1544	7	78	A.2.3.1	2	14251	0.68	0.19	0.08	0.05	0.68	0.00	0.42	-0.39	-0.30	-0.26	0.42	0.1966	0.0199	-2.4	1.0	-3.2	1.0	A-	A-
Reading	4	599516	1545	7	79	A.2.1.1	2	14251	0.83	0.83	0.06	0.07	0.04	0.00	0.42	0.42	-0.31	-0.30	-0.26	-0.7804	0.0240	-5.2	0.9	-5.6	0.9	A-	B-
Reading	4	565497	1546	7	80	A.2.4.1	2	14251	0.67	0.06	0.10	0.67	0.16	0.00	0.49	-0.39	-0.37	0.49	-0.42	0.2641	0.0197	-9.9	0.9	-9.9	0.8	A-	A-
Reading	4	565493	1547	7	81	B.3.3.1	2	14251	0.82	0.06	0.8																

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Reading	4	565489	1548	7	82	A.2.2.1	1	14251	0.88	0.05	0.05	0.88	0.02	0.00	0.38	-0.25	-0.28	0.38	-0.22	-1.3225	0.0278	-4.1	0.9	-4.1	0.9	A-	A-
Reading	4	565498	1549	7	83	A.2.4.1	1	14251	0.75	0.75	0.03	0.06	0.16	0.00	0.42	0.42	-0.29	-0.31	-0.34	-0.2223	0.0213	-2.7	1.0	-4.7	0.9	A-	A-
Reading	4	599513	1550	7	84	A.2.3.1	2	14251	0.29	0.09	0.29	0.13	0.48	0.00	0.10	-0.41	0.10	-0.27	0.02	2.1987	0.0200	9.9	1.2	9.9	1.7	A+	A+
Reading	4	565492	1551	7	85	A.2.3.1	2	14251	0.75	0.75	0.13	0.04	0.08	0.00	0.41	0.41	-0.31	-0.31	-0.31	-0.2223	0.0213	-1.4	1.0	-5.2	0.9	A-	B-
Reading	4	565496	1552	7	86	B.2.1.1	2	14251	0.68	0.68	0.12	0.09	0.11	0.00	0.44	0.44	-0.37	-0.36	-0.33	0.2217	0.0198	-4.1	1.0	-4.2	0.9	A-	A-
Reading	4	565491	1553	7	87	A.2.4.1	2	14251	0.80	0.04	0.05	0.80	0.11	0.00	0.45	-0.38	-0.34	0.45	-0.31	-0.5605	0.0228	-7.5	0.9	-7.0	0.9	A-	A-
Reading	4	555113	1536	7	89	A.1.2.2		57066	0.78	0.14	0.05	0.78	0.04	0.00	0.51	-0.41	-0.38	0.51	-0.34	-0.4282	0.0111	-9.9	0.9	-9.9	0.8		
Reading	4	555123	1537	7	91	A.1.3.1		57066	0.70	0.04	0.12	0.70	0.15	0.00	0.42	-0.34	-0.40	0.42	-0.27	0.1107	0.0100	-4.5	1.0	-8.5	0.9		
Reading	4	555121	1538	7	92	A.1.3.1		57066	0.65	0.65	0.22	0.08	0.05	0.00	0.39	0.39	-0.26	-0.41	-0.35	0.3658	0.0097	3.0	1.0	1.0	1.0		
Reading	4	555116	1539	7	93	A.1.4.1		57066	0.75	0.06	0.75	0.11	0.07	0.00	0.37	-0.34	0.37	-0.22	-0.29	-0.2238	0.0106	2.0	1.0	7.1	1.1		
Reading	4	555114	1540	7	94	B.1.1.1		57066	0.47	0.47	0.06	0.39	0.08	0.00	0.27	0.27	-0.36	-0.19	-0.38	1.3112	0.0093	9.9	1.1	9.9	1.2		
Reading	4	555118	1541	7	95	B.3.3.4		57066	0.67	0.67	0.08	0.10	0.15	0.00	0.49	0.49	-0.37	-0.38	-0.43	0.2713	0.0098	-9.9	0.9	-9.9	0.9		
Reading	4	555117	1542	7	96	A.2.6.1		57066	0.68	0.13	0.06	0.13	0.68	0.00	0.26	-0.22	-0.25	-0.16	0.26	0.2183	0.0099	9.9	1.2	9.9	1.3		
Reading	4	555115	1543	7	90	B.2.1.2		57066	0.63	0.06	0.20	0.63	0.11	0.00	0.37	-0.38	-0.24	0.37	-0.35	0.4966	0.0096	9.9	1.0	5.9	1.0		
Reading	4	564982	1555	8	78	B.1.1.1	2	14261	0.59	0.28	0.09	0.59	0.04	0.00	0.42	-0.42	-0.27	0.42	-0.28	0.6860	0.0189	-2.6	1.0	-3.2	1.0	A-	A-
Reading	4	564994	1556	8	79	B.3.3.1	2	14261	0.52	0.28	0.10	0.52	0.10	0.00	0.18	-0.08	-0.26	0.18	-0.21	1.0471	0.0186	9.9	1.2	9.9	1.3	A-	A-
Reading	4	564983	1557	8	80	B.1.1.1	2	14261	0.86	0.05	0.86	0.07	0.02	0.00	0.36	-0.23	0.36	-0.25	-0.27	-1.0406	0.0257	-1.9	1.0	-3.4	0.9	B+	A-
Reading	4	564992	1558	8	81	A.1.4.1	2	14261	0.87	0.06	0.87	0.04	0.03	0.00	0.45	-0.33	0.45	-0.27	-0.31	-1.1910	0.0268	-8.0	0.9	-9.9	0.7	A+	A-
Reading	4	564993	1559	8	82	A.1.4.1	2	14261	0.63	0.63	0.14	0.19	0.04	0.00	0.41	0.41	-0.28	-0.39	-0.38	0.4823	0.0192	-2.1	1.0	-2.6	1.0	A+	A-
Reading	4	564986	1560	8	83	A.1.2.2	2	14261	0.77	0.06	0.12	0.77	0.05	0.00	0.33	-0.32	-0.17	0.33	-0.27	-0.3552	0.0218	4.3	1.1	3.6	1.1	C-	B-
Reading	4	564989	1561	8	84	A.1.4.1	1	14261	0.68	0.08	0.15	0.08	0.68	0.00	0.51	-0.43	-0.41	-0.42	0.51	0.1795	0.0199	-9.9	0.9	-9.9	0.8	A+	A-
Reading	4	564988	1562	8	85	B.2.1.2	2	14261	0.82	0.07	0.07	0.05	0.82	0.00	0.50	-0.31	-0.41	-0.35	0.50	-0.6801	0.0234	-9.9	0.9	-9.9	0.8	A-	A-
Reading	4	564991	1563	8	86	B.1.1.1	2	14261	0.67	0.67	0.08	0.17	0.07	0.00	0.40	0.40	-0.31	-0.28	-0.40	0.2496	0.0197	-0.3	1.0	0.5	1.0	A-	B-
Reading	4	564987	1564	8	87	B.2.1.3	2	14261	0.64	0.11	0.64	0.10	0.15	0.00	0.38	-0.36	0.38	-0.38	-0.22	0.4393	0.0193	4.1	1.0	1.9	1.0	A+	A-
Reading	4	555113	1536	8	89	A.1.2.2		57066	0.78	0.14	0.05	0.78	0.04	0.00	0.51	-0.41	-0.38	0.51	-0.34	-0.4282	0.0111	-9.9	0.9	-9.9	0.8		
Reading	4	555123	1537	8	91	A.1.3.1		57066	0.70	0.04	0.12	0.70	0.15	0.00	0.42	-0.34	-0.40	0.42	-0.27	0.1107	0.0100	-4.5	1.0	-8.5	0.9		
Reading	4	555121	1538	8	92	A.1.3.1		57066	0.65	0.65	0.22	0.08	0.05	0.00	0.39	0.39	-0.26	-0.41	-0.35	0.3658	0.0097	3.0	1.0	1.0	1.0		
Reading	4	555116	1539	8	93	A.1.4.1		57066	0.75	0.06	0.75	0.11	0.07	0.00	0.37	-0.34	0.37	-0.22	-0.29	-0.2238	0.0106	2.0	1.0	7.1	1.1		
Reading	4	555114	1540	8	94	B.1.1.1		57066	0.47	0.47	0.06	0.39	0.08	0.00	0.27	0.27	-0.36	-0.19	-0.38	1.3112	0.0093	9.9	1.1	9.9	1.2		
Reading	4	555118	1541	8	95	B.3.3.4		57066	0.67	0.67	0.08	0.10	0.15	0.00	0.49	0.49	-0.37	-0.38	-0.43	0.2713	0.0098	-9.9	0.9	-9.9	0.9		
Reading	4	555117	1542	8	96	A.2.6.1		57066	0.68	0.13	0.06	0.13	0.68	0.00	0.26	-0.22	-0.25	-0.16	0.26	0.2183	0.0099	9.9	1.2	9.9	1.3		
Reading	4	555115	1543	8	90	B.2.1.2		57066	0.63	0.06	0.20	0.63	0.11	0.00	0.37	-0.38	-0.24	0.37	-0.35	0.4966	0.0096	9.9	1.0	5.9	1.0		
Reading	4	565466	1566	9	78	A.2.4.1	2	14282	0.46	0.33	0.05	0.16	0.46	0.00	0.31	-0.35	-0.34	-0.14	0.31	1.3240	0.0186	9.9	1.1	9.9	1.1	A+	A-
Reading	4	565468	1567	9	79	A.2.3.1	2	14282	0.76	0.04	0.76	0.10	0.10	0.00	0.47	-0.36	0.47	-0.34	-0.36	-0.2738	0.0214	-7.9	0.9	-9.9	0.8	A-	B-
Reading	4	565462	1568	9	80	A.2.2.1	2	14282	0.68	0.19	0.68	0.06	0.07	0.00	0.44	-0.41	0.44	-0.34	-0.26	0.2154	0.0198	-5.7	1.0	-8.0	0.9	A-	A-
Reading	4	565465	1569	9	81	A.2.3.1	2	14282	0.74	0.74	0.04	0.18	0.04	0.00	0.44	0.44	-0.34	-0.34	-0.37	-0.1564	0.0210	-5.5	0.9	-7.9	0.9	A-	A-
Reading	4	565461	1570	9	82	A.2.4.1	1	14282	0.69	0.21	0.04	0.05	0.69	0.00	0.36	-0.22	-0.36	-0.39	0.36	0.1277	0.0200	4.0	1.0	3.9	1.1	A-	A-
Reading	4	565467	1571	9	83	B.3.1.1	2	14282	0.81	0.08	0.05	0.05	0.81	0.00	0.51	-0.40	-0.34	-0.36	0.51	-0.6393	0.0231	-9.9	0.9	-9.9	0.7	A+	A-
Reading	4	565460	1572	9	84	A.2.3.1	2	14282	0.35	0.49	0.04	0.35	0.12	0.00	0.26	-0.21	-0.46	0.26	-0.34	1.8896	0.0192	8.3	1.1	9.9	1.3	A-	A-
Reading	4	565516	1573	9	85	A.2.6.1	2	14282	0.76	0.76	0.07	0.13	0.04	0.00	0.40	0.40	-0.33	-0.28	-0.29	-0.2778	0.0214	-1.9	1.0	-2.0	1.0	A-	A-
Reading	4	565464	1574	9	86	B.3.3.3	2	14282	0.62	0.17	0.12	0.62	0.08	0.00	0.30	-0.18	-0.29	0.30	-0.28	0.5045	0.0192	9.9	1.1	9.3	1.1	A-	A-
Reading	4	565469	1575	9	87	A.2.3.1	2	14282	0.58	0.58	0.07	0.15	0.20	0.00	0.37	0.37	-0.38	-0.27	-0.32	0.7467	0.0188	3.3	1.0	2.7	1.0	A-	A-
Reading	4	555113	1536	9	89	A.1.2.2		57066	0.78	0.14	0.05	0.78	0.04	0.00	0.51	-0.41	-0.38	0.51	-0.34	-0.4282	0.0111	-9.9	0.9	-9.9	0.8		
Reading	4	555123	1537	9	91	A.1.3.1		57066	0.70	0.04	0.12	0.70	0.15	0.00	0.42	-0.34	-0.40	0.42	-0.27	0.1107	0.0100	-4.5	1.0	-8.5	0.9		
Reading	4	555121	1538	9	92	A.1.3.1		57066	0.65	0.65	0.22	0.08	0.05	0.00	0.39	0.39	-0.26	-0.41	-0.35	0.3658	0.0097	3.0	1.0	1.0	1.0		
Reading	4	555116	1539	9	93	A.1.4.1		57066	0.75	0.06	0.75	0.11	0.07	0.00	0.37	-0.34	0.37	-0.22	-0.29	-0.2238	0.0106	2.0	1.0	7.1	1.1		
Reading	4	555114	1540	9	94	B.1.1.1		57066	0.47	0.47	0.06	0.39	0.08	0.00	0.27	0.27	-0.36	-0.19	-0.38	1.3112	0.0093	9.9	1.1	9.9	1.2		
Reading	4	555118	1541	9	95	B.3.3.4		57066	0.67	0.67	0.08	0.10	0.15	0.00	0.49	0.49	-0.37	-0.38	-0.43	0.2713	0.0098	-9.9	0.9	-9.9	0.9		
Reading	4	555117	1542	9	96	A.2.6.1		57066	0.68	0.13	0.06	0.13	0.68	0.00	0.26	-0.22	-0.25	-0.16	0.26	0.2183	0.0099	9.9	1.2	9.9	1.3		
Reading	4	555115	1543	9	90	B.2.1.2		57066	0.63	0.06	0.20	0.63	0.11	0.00	0.37	-0.38	-0.24	0.37	-0.35	0.4966	0.0096	9.9	1.0	5.9	1.0		
Reading	5	555224	1577	0	27	A.1.4.1		128925	0.78	0.10	0.78	0.0															

Appendix I: Item Statistics Multiple Choice

Item Information							Classical												Rasch		Infit		Outfit		DIF		
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Reading	5	555220	1578	0	28	A.1.1.2		128925	0.74	0.11	0.74	0.12	0.03	0.00	0.39	-0.35	0.39	-0.25	-0.32	-0.0843	0.0070	0.6	1.0	-4.0	1.0		
Reading	5	555223	1579	0	29	A.1.4.1		128925	0.89	0.89	0.08	0.01	0.03	0.00	0.41	0.41	-0.30	-0.24	-0.31	-1.3075	0.0094	-9.9	0.9	-9.9	0.8		
Reading	5	555222	1580	0	30	A.1.3.1		128925	0.66	0.05	0.26	0.66	0.03	0.00	0.33	-0.39	-0.22	0.33	-0.38	0.3822	0.0065	9.9	1.1	9.9	1.1		
Reading	5	555227	1581	0	31	B.1.1.1		128925	0.91	0.91	0.02	0.06	0.01	0.00	0.30	0.30	-0.19	-0.20	-0.23	-1.5885	0.0103	-1.8	1.0	9.9	1.2		
Reading	5	555221	1582	0	32	A.1.2.1		128925	0.75	0.08	0.10	0.08	0.75	0.00	0.40	-0.23	-0.39	-0.26	0.40	-0.1315	0.0070	-1.8	1.0	-6.4	1.0		
Reading	5	555226	1583	0	33	A.1.6.1		128925	0.79	0.05	0.13	0.03	0.79	0.00	0.40	-0.36	-0.28	-0.26	0.40	-0.4588	0.0075	-5.6	1.0	-9.9	0.9		
Reading	5	555225	1584	0	34	A.1.4.1		128925	0.75	0.05	0.18	0.75	0.02	0.00	0.28	-0.26	-0.19	0.28	-0.25	-0.1409	0.0070	9.9	1.1	9.9	1.2		
Reading	5	555324	1585	0	35	A.2.3.1		128925	0.82	0.82	0.04	0.08	0.06	0.00	0.34	0.34	-0.30	-0.28	-0.15	-0.6263	0.0078	5.6	1.0	7.7	1.1		
Reading	5	555325	1586	0	36	B.3.1.1		128925	0.92	0.92	0.03	0.02	0.03	0.00	0.48	0.48	-0.30	-0.30	-0.35	-1.7415	0.0109	-9.9	0.8	-9.9	0.5		
Reading	5	555322	1587	0	37	A.2.3.2		128925	0.54	0.25	0.54	0.05	0.15	0.00	0.36	-0.38	0.36	-0.37	-0.22	0.9851	0.0062	1.2	1.0	7.1	1.0		
Reading	5	555321	1588	0	38	A.2.3.1		128925	0.75	0.16	0.75	0.06	0.03	0.00	0.40	-0.28	0.40	-0.38	-0.33	-0.1762	0.0071	-5.1	1.0	-3.1	1.0		
Reading	5	555317	1589	0	39	A.2.1.2		128925	0.82	0.04	0.07	0.07	0.82	0.00	0.54	-0.39	-0.42	-0.39	0.54	-0.6902	0.0079	-9.9	0.8	-9.9	0.7		
Reading	5	555327	1590	0	40	B.3.3.4		128925	0.78	0.10	0.06	0.78	0.06	0.00	0.51	-0.39	-0.44	0.51	-0.33	-0.3672	0.0074	-9.9	0.9	-9.9	0.8		
Reading	5	554800	1591	0	41	B.3.3.4		128925	0.59	0.08	0.10	0.59	0.23	0.00	0.28	-0.39	-0.32	0.28	-0.12	0.7274	0.0063	9.9	1.1	9.9	1.2		
Reading	5	555320	1592	0	42	B.3.3.3		128925	0.87	0.03	0.04	0.06	0.87	0.00	0.42	-0.29	-0.31	-0.28	0.42	-1.1464	0.0090	-9.9	0.9	-9.9	0.8		
Reading	5	555249	1594	0	44	A.2.2.1		128925	0.48	0.31	0.04	0.17	0.48	0.00	0.32	-0.28	-0.50	-0.29	0.32	1.3283	0.0061	9.9	1.0	9.9	1.1		
Reading	5	555251	1595	0	45	A.2.3.1		128925	0.87	0.04	0.03	0.07	0.87	0.00	0.41	-0.25	-0.33	-0.28	0.41	-1.1057	0.0089	-9.9	0.9	-9.9	0.9		
Reading	5	555250	1596	0	46	A.2.4.1		128925	0.72	0.05	0.72	0.16	0.07	0.00	0.41	-0.38	0.41	-0.28	-0.34	0.0183	0.0068	-7.7	1.0	-9.9	0.9		
Reading	5	555257	1597	0	47	B.2.1.2		128925	0.82	0.05	0.06	0.07	0.82	0.00	0.54	-0.35	-0.42	-0.41	0.54	-0.6577	0.0079	-9.9	0.8	-9.9	0.7		
Reading	5	555248	1598	0	48	A.2.1.2		128925	0.89	0.02	0.89	0.04	0.04	0.00	0.49	-0.32	0.49	-0.31	-0.37	-1.3978	0.0097	-9.9	0.8	-9.9	0.6		
Reading	5	555253	1599	0	49	B.3.3.2		128925	0.71	0.17	0.71	0.09	0.04	0.00	0.38	-0.22	0.38	-0.39	-0.36	0.1023	0.0067	3.2	1.0	6.0	1.0		
Reading	5	555252	1600	0	50	A.2.3.1		128925	0.65	0.65	0.11	0.16	0.07	0.00	0.35	0.35	-0.24	-0.29	-0.34	0.4287	0.0064	9.9	1.0	9.9	1.1		
Reading	5	555394	1602	0	121	A.1.4.1		128925	0.91	0.91	0.03	0.01	0.04	0.00	0.41	0.41	-0.26	-0.25	-0.29	-1.5579	0.0102	-9.9	0.9	-9.9	0.7		
Reading	5	555392	1603	0	122	A.1.4.1		128925	0.86	0.04	0.07	0.86	0.03	0.00	0.51	-0.32	-0.44	0.51	-0.28	-0.9896	0.0086	-9.9	0.9	-9.9	0.6		
Reading	5	555390	1604	0	123	A.1.3.1		128925	0.59	0.59	0.34	0.03	0.04	0.00	0.35	0.35	-0.28	-0.41	-0.40	0.7267	0.0063	9.9	1.0	9.9	1.0		
Reading	5	555395	1605	0	124	B.1.1.1		128925	0.83	0.83	0.07	0.06	0.03	0.00	0.32	0.32	-0.15	-0.27	-0.28	-0.7671	0.0081	5.2	1.0	9.9	1.3		
Reading	5	555397	1606	0	125	B.2.1.3		128925	0.81	0.06	0.07	0.81	0.07	0.00	0.48	-0.36	-0.35	0.48	-0.35	-0.5659	0.0077	-9.9	0.9	-9.9	0.8		
Reading	5	555398	1607	0	126	B.2.2.1		128925	0.52	0.09	0.26	0.12	0.52	0.00	0.46	-0.56	-0.38	-0.40	0.46	1.0807	0.0061	-9.9	0.9	-9.9	0.9		
Reading	5	555388	1608	0	127	A.1.2.1		128925	0.40	0.11	0.35	0.14	0.40	0.00	0.27	-0.42	-0.17	-0.36	0.27	1.6894	0.0062	9.9	1.1	9.9	1.2		
Reading	5	555389	1609	0	128	B.2.1.2		128925	0.70	0.05	0.21	0.70	0.04	0.00	0.35	-0.42	-0.20	0.35	-0.39	0.1723	0.0067	9.9	1.1	9.9	1.1		
Reading	5	555396	1610	0	129	B.1.1.1		128925	0.69	0.10	0.69	0.03	0.17	0.00	0.42	-0.40	0.42	-0.38	-0.29	0.1989	0.0066	-9.4	1.0	-7.0	1.0		
Reading	5	555362	1612	0	131	A.1.3.1		128925	0.80	0.13	0.80	0.02	0.05	0.00	0.35	-0.30	0.35	-0.21	-0.22	-0.5205	0.0076	5.1	1.0	-0.6	1.0		
Reading	5	555360	1613	0	132	A.1.4.1		128925	0.62	0.13	0.09	0.62	0.16	0.00	0.29	-0.32	-0.34	0.29	-0.09	0.6198	0.0063	9.9	1.1	9.9	1.2		
Reading	5	555363	1614	0	133	A.1.3.1		128925	0.71	0.08	0.71	0.13	0.08	0.00	0.32	-0.28	0.32	-0.27	-0.17	0.1057	0.0067	9.9	1.1	9.9	1.2		
Reading	5	555361	1615	0	134	A.1.4.1		128925	0.69	0.04	0.11	0.15	0.69	0.00	0.36	-0.30	-0.33	-0.25	0.36	0.2227	0.0066	9.9	1.0	9.9	1.1		
Reading	5	555364	1616	0	135	A.1.1.2		128925	0.55	0.26	0.07	0.55	0.12	0.00	0.28	-0.20	-0.35	0.28	-0.24	0.9490	0.0062	9.9	1.1	9.9	1.2		
Reading	5	555368	1617	0	136	B.2.1.3		128925	0.65	0.06	0.65	0.16	0.13	0.00	0.36	-0.34	0.36	-0.31	-0.24	0.4527	0.0064	9.9	1.0	9.9	1.0		
Reading	5	555366	1618	0	137	B.1.1.1		128925	0.71	0.71	0.07	0.08	0.14	0.00	0.36	0.36	-0.36	-0.32	-0.21	0.0978	0.0067	9.5	1.0	4.0	1.0		
Reading	5	555370	1619	0	138	B.1.2.1		128925	0.75	0.06	0.13	0.05	0.75	0.00	0.44	-0.33	-0.32	-0.37	0.44	-0.1666	0.0071	-9.9	1.0	-9.9	0.9		
Reading	5	565995	1621	1	77	A.1.4.1	1	14602	0.67	0.15	0.13	0.67	0.05	0.00	0.32	-0.31	-0.20	0.32	-0.22	0.2501	0.0195	9.9	1.1	5.6	1.1	A-	A-
Reading	5	566067	1622	1	78	A.1.3.1	2	14602	0.65	0.11	0.20	0.65	0.03	0.00	0.26	-0.22	-0.20	0.26	-0.24	0.3476	0.0193	9.9	1.2	9.9	1.2	A-	A-
Reading	5	565996	1623	1	79	A.1.4.1	1	14602	0.93	0.03	0.03	0.02	0.93	0.00	0.42	-0.29	-0.28	-0.26	0.42	-1.8872	0.0332	-5.4	0.9	-9.9	0.5	A-	C-
Reading	5	565947	1624	1	80	B.1.1.1	2	14602	0.68	0.05	0.68	0.22	0.05	0.00	0.43	-0.33	0.43	-0.37	-0.35	0.1761	0.0197	-4.8	1.0	-6.0	0.9	A-	A-
Reading	5	565994	1625	1	81	B.1.1.1	2	14602	0.39	0.39	0.21	0.22	0.17	0.00	0.16	0.16	-0.10	-0.14	-0.25	1.6734	0.0186	9.9	1.2	9.9	1.4	A-	A-
Reading	5	565949	1626	1	82	A.1.3.1	2	14602	0.73	0.73	0.08	0.06	0.13	0.00	0.30	0.30	-0.32	-0.26	-0.15	-0.0723	0.0205	9.3	1.1	9.4	1.2	A-	A-
Reading	5	565946	1627	1	83	B.1.1.1	2	14602	0.88	0.03	0.05	0.88	0.04	0.00	0.44	-0.33	-0.30	0.44	-0.28	-1.3008	0.0274	-7.1	0.9	-5.5	0.8	A+	A-
Reading	5	565993	1628	1	84	B.1.1.1	3	14602	0.76	0.76	0.10	0.05	0.09	0.00	0.46	0.46	-0.30	-0.42	-0.36	-0.2678	0.0212	-6.7	0.9	-7.4	0.9	A+	A-
Reading	5	565944	1629	1	85	A.1.6.1	3	14602	0.41	0.07	0.21	0.31	0.41	0.00	0.35	-0.49	-0.31	-0.32	0.35	1.5949	0.0185	-2.2	1.0	6.6	1.1	A+	A-
Reading	5	565945	1630	1	86	B.2.1.2	2	14602	0.61	0.27	0.61	0.05	0.06	0.00	0.33	-0.21	0.33	-0.36	-0.37	0.5566	0.0189	9.3	1.1	7.8	1.1	A-	A-
Reading	5	555335	1632	1	88	A.2.4.1		71823	0.83	0.03	0.83	0.10	0.04	0.00	0.48	-0.36	0.48	-0.38	-0.29	-0.7624	0.0108	-9.9	0.9	-9.9	0.7		
Reading	5	555334	1633	1	89	A.2.2.1		71823	0.89	0.05	0.04	0.89	0.0														

## Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Reading	5	555333	1634	1	90	A.2.6.2		71823	0.43	0.30	0.19	0.07	0.43	0.00	0.27	-0.26	-0.21	-0.34	0.27	1.5209	0.0083	9.9	1.1	9.9	1.2		
Reading	5	555339	1635	1	91	A.2.4.1		71823	0.65	0.26	0.65	0.04	0.05	0.00	0.45	-0.36	0.45	-0.39	-0.45	0.4168	0.0086	-9.9	0.9	-9.9	0.9		
Reading	5	555337	1636	1	92	A.2.2.2		71823	0.52	0.52	0.12	0.11	0.25	0.00	0.37	0.37	-0.47	-0.45	-0.19	1.0796	0.0082	-5.3	1.0	5.7	1.0		
Reading	5	555338	1637	1	93	A.2.4.1		71823	0.79	0.07	0.08	0.79	0.06	0.00	0.53	-0.41	-0.41	0.53	-0.37	-0.4406	0.0100	-9.9	0.9	-9.9	0.7		
Reading	5	555340	1638	1	94	B.1.2.1		71823	0.48	0.10	0.18	0.48	0.23	0.00	0.35	-0.34	-0.38	0.35	-0.29	1.2969	0.0082	-4.8	1.0	9.9	1.1		
Reading	5	555341	1639	1	95	B.1.2.1		71823	0.45	0.09	0.45	0.27	0.19	0.00	0.26	-0.36	0.26	-0.16	-0.29	1.4357	0.0082	9.9	1.1	9.9	1.2		
Reading	5	565973	1640	2	77	A.1.4.1	1	14314	0.42	0.54	0.02	0.01	0.42	0.00	0.29	-0.27	-0.37	-0.33	0.29	1.5502	0.0185	9.1	1.1	9.9	1.1	A-	A-
Reading	5	565962	1641	2	78	A.1.1.2	1	14314	0.64	0.14	0.64	0.08	0.14	0.00	0.38	-0.37	0.38	-0.37	-0.21	0.4581	0.0192	0.2	1.0	-1.8	1.0	A-	A-
Reading	5	565970	1642	2	79	A.1.3.1	2	14314	0.89	0.02	0.05	0.89	0.04	0.00	0.43	-0.20	-0.33	0.43	-0.32	-1.3492	0.0286	-5.7	0.9	-9.9	0.7	A+	A-
Reading	5	565974	1643	2	80	A.1.3.1	2	14314	0.72	0.72	0.15	0.09	0.04	0.00	0.28	0.28	-0.19	-0.16	-0.35	0.0155	0.0205	9.9	1.1	9.9	1.2	A+	A-
Reading	5	566066	1644	2	81	A.1.3.1	2	14314	0.60	0.16	0.60	0.07	0.17	0.00	0.32	-0.36	0.32	-0.35	-0.15	0.6808	0.0188	7.6	1.1	7.4	1.1	A-	A+
Reading	5	566064	1645	2	82	B.1.1.1	2	14314	0.32	0.38	0.05	0.25	0.32	0.00	0.04	0.04	-0.27	-0.08	0.04	2.0915	0.0194	9.9	1.3	9.9	1.7	A-	A+
Reading	5	566071	1646	2	83	A.1.4.1	2	14314	0.67	0.16	0.06	0.67	0.11	0.00	0.29	-0.18	-0.28	0.29	-0.24	0.3129	0.0196	9.9	1.1	8.7	1.1	A-	A-
Reading	5	565971	1647	2	84	A.1.3.1	2	14314	0.85	0.05	0.06	0.85	0.04	0.00	0.46	-0.32	-0.32	0.46	-0.33	-0.9111	0.0252	-7.3	0.9	-9.9	0.7	A+	A-
Reading	5	565965	1648	2	85	B.2.1.3	2	14314	0.70	0.70	0.06	0.04	0.21	0.00	0.29	0.29	-0.33	-0.33	-0.15	0.1313	0.0201	9.9	1.1	8.5	1.1	A+	A+
Reading	5	565975	1649	2	86	B.1.1.1	3	14314	0.71	0.71	0.07	0.06	0.15	0.00	0.42	0.42	-0.34	-0.39	-0.30	0.0582	0.0203	-3.4	1.0	-0.1	1.0	A-	A-
Reading	5	555335	1632	2	88	A.2.4.1		71823	0.83	0.03	0.83	0.10	0.04	0.00	0.48	-0.36	0.48	-0.38	-0.29	-0.7624	0.0108	-9.9	0.9	-9.9	0.7		
Reading	5	555334	1633	2	89	A.2.2.1		71823	0.89	0.05	0.04	0.89	0.03	0.00	0.44	-0.30	-0.29	0.44	-0.31	-1.3211	0.0126	-9.9	0.9	-9.9	0.7		
Reading	5	555333	1634	2	90	A.2.6.2		71823	0.43	0.30	0.19	0.07	0.43	0.00	0.27	-0.26	-0.21	-0.34	0.27	1.5209	0.0083	9.9	1.1	9.9	1.2		
Reading	5	555339	1635	2	91	A.2.4.1		71823	0.65	0.26	0.65	0.04	0.05	0.00	0.45	-0.36	0.45	-0.39	-0.45	0.4168	0.0086	-9.9	0.9	-9.9	0.9		
Reading	5	555337	1636	2	92	A.2.2.2		71823	0.52	0.52	0.12	0.11	0.25	0.00	0.37	0.37	-0.47	-0.45	-0.19	1.0796	0.0082	-5.3	1.0	5.7	1.0		
Reading	5	555338	1637	2	93	A.2.4.1		71823	0.79	0.07	0.08	0.79	0.06	0.00	0.53	-0.41	-0.41	0.53	-0.37	-0.4406	0.0100	-9.9	0.9	-9.9	0.7		
Reading	5	555340	1638	2	94	B.1.2.1		71823	0.48	0.10	0.18	0.48	0.23	0.00	0.35	-0.34	-0.38	0.35	-0.29	1.2969	0.0082	-4.8	1.0	9.9	1.1		
Reading	5	555341	1639	2	95	B.1.2.1		71823	0.45	0.09	0.45	0.27	0.19	0.00	0.26	-0.36	0.26	-0.16	-0.29	1.4357	0.0082	9.9	1.1	9.9	1.2		
Reading	5	566032	1651	3	77	B.1.1.1	2	14292	0.39	0.53	0.06	0.02	0.39	0.00	0.17	-0.14	-0.23	-0.32	0.17	1.7074	0.0187	9.9	1.2	9.9	1.3	A-	A-
Reading	5	566035	1652	3	78	A.1.2.2	2	14292	0.87	0.05	0.06	0.87	0.02	0.00	0.37	-0.23	-0.35	0.37	-0.13	-1.1162	0.0266	-2.6	1.0	-1.2	1.0	A-	B-
Reading	5	566026	1653	3	79	B.1.1.1	2	14292	0.84	0.09	0.04	0.84	0.04	0.00	0.31	-0.13	-0.32	-0.26	0.31	-0.7991	0.0244	1.7	1.0	5.1	1.1	A+	B-
Reading	5	566020	1654	3	80	B.2.1.2	2	14292	0.76	0.76	0.06	0.05	0.13	0.00	0.41	0.41	-0.38	-0.38	-0.23	-0.2687	0.0215	-2.9	1.0	-4.9	0.9	A+	A-
Reading	5	566027	1655	3	81	B.1.1.1	2	14292	0.63	0.20	0.63	0.13	0.05	0.00	0.34	-0.24	0.34	-0.32	-0.33	0.5226	0.0191	5.6	1.1	5.4	1.1	A-	B-
Reading	5	566024	1656	3	82	A.1.6.2	3	14292	0.69	0.10	0.09	0.69	0.12	0.00	0.37	-0.30	-0.32	0.37	-0.26	0.1829	0.0199	7.3	1.0	0.6	1.0	A+	B-
Reading	5	566057	1657	3	83	A.1.3.1	2	14292	0.17	0.17	0.20	0.13	0.50	0.00	0.06	0.06	-0.22	-0.26	0.03	3.0451	0.0236	1.6	1.1	9.9	2.1	A+	A+
Reading	5	566023	1658	3	84	A.1.4.1	2	14292	0.60	0.12	0.60	0.14	0.14	0.00	0.33	-0.23	0.33	-0.30	-0.28	0.6562	0.0188	6.4	1.1	6.2	1.1	A-	A-
Reading	5	566033	1659	3	85	A.1.3.2	3	14292	0.41	0.35	0.17	0.41	0.07	0.00	0.21	-0.15	-0.30	0.21	-0.27	1.6029	0.0186	9.9	1.1	9.9	1.3	A-	A-
Reading	5	566022	1660	3	86	B.2.2.1	2	14292	0.33	0.28	0.33	0.05	0.33	0.00	0.24	-0.13	-0.31	-0.50	0.24	2.0003	0.0192	7.8	1.1	9.9	1.3	A-	A-
Reading	5	555335	1632	3	88	A.2.4.1		71823	0.83	0.03	0.83	0.10	0.04	0.00	0.48	-0.36	0.48	-0.38	-0.29	-0.7624	0.0108	-9.9	0.9	-9.9	0.7		
Reading	5	555334	1633	3	89	A.2.2.1		71823	0.89	0.05	0.04	0.89	0.03	0.00	0.44	-0.30	-0.29	0.44	-0.31	-1.3211	0.0126	-9.9	0.9	-9.9	0.7		
Reading	5	555333	1634	3	90	A.2.6.2		71823	0.43	0.30	0.19	0.07	0.43	0.00	0.27	-0.26	-0.21	-0.34	0.27	1.5209	0.0083	9.9	1.1	9.9	1.2		
Reading	5	555339	1635	3	91	A.2.4.1		71823	0.65	0.26	0.65	0.04	0.05	0.00	0.45	-0.36	0.45	-0.39	-0.45	0.4168	0.0086	-9.9	0.9	-9.9	0.9		
Reading	5	555337	1636	3	92	A.2.2.2		71823	0.52	0.52	0.12	0.11	0.25	0.00	0.37	0.37	-0.47	-0.45	-0.19	1.0796	0.0082	-5.3	1.0	5.7	1.0		
Reading	5	555338	1637	3	93	A.2.4.1		71823	0.79	0.07	0.08	0.79	0.06	0.00	0.53	-0.41	-0.41	0.53	-0.37	-0.4406	0.0100	-9.9	0.9	-9.9	0.7		
Reading	5	555340	1638	3	94	B.1.2.1		71823	0.48	0.10	0.18	0.48	0.23	0.00	0.35	-0.34	-0.38	0.35	-0.29	1.2969	0.0082	-4.8	1.0	9.9	1.1		
Reading	5	555341	1639	3	95	B.1.2.1		71823	0.45	0.09	0.45	0.27	0.19	0.00	0.26	-0.36	0.26	-0.16	-0.29	1.4357	0.0082	9.9	1.1	9.9	1.2		
Reading	5	566059	1662	4	77	B.1.1.1	2	14284	0.64	0.64	0.13	0.05	0.18	0.00	0.25	0.25	-0.22	-0.20	-0.19	0.5097	0.0192	9.9	1.1	9.9	1.2	A-	A+
Reading	5	565953	1663	4	78	B.1.1.1	2	14284	0.86	0.01	0.05	0.86	0.07	0.00	0.35	-0.27	-0.33	0.35	-0.16	-1.0483	0.0263	-1.5	1.0	1.5	1.1	A+	A-
Reading	5	565951	1664	4	79	A.1.4.1	1	14284	0.85	0.06	0.85	0.02	0.07	0.00	0.43	-0.32	0.43	-0.26	-0.31	-0.9356	0.0255	-5.1	0.9	-8.0	0.8	A+	B-
Reading	5	565957	1665	4	80	B.2.1.1	2	14284	0.76	0.09	0.76	0.07	0.07	0.00	0.44	-0.39	0.44	-0.29	-0.31	-0.2334	0.0216	-5.0	0.9	-6.3	0.9	A+	A-
Reading	5	566007	1666	4	81	A.1.4.1	1	14284	0.72	0.72	0.04	0.04	0.20	0.00	0.27	0.27	-0.26	-0.32	-0.15	0.0307	0.0205	9.9	1.1	9.9	1.2	A-	A-
Reading	5	565942	1667	4	82	A.1.3.1	3	14284	0.69	0.69	0.07	0.06	0.18	0.00	0.36	0.36	-0.35	-0.36	-0.23	0.2183	0.0199	2.7	1.0	2.7	1.0	A+	A-
Reading	5	566008	1668	4	83	B.1.1.1	2	14284	0.78	0.09	0.10	0.78	0.03	0.00	0.31	-0.21	-0.24	0.31	-0.26	-0.3779	0.0222	4.4	1.1	4.2	1.1	A+	A-
Reading	5	565969	1669	4	84	B.1.1.1	2	14284	0.87	0.06	0.04	0.87	0.03	0.00	0.47	-0.32	-0.35	-0.33	0.47	-1.1113	0.0268	-8.7	0.9	-9.9	0.7	A+	A-
Reading	5	565954	1670	4	85	A.1.3.1	2	14284	0.92	0.02																	

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Reading	5	565956	1671	4	86	A.1.6.2	3	14284	0.51	0.05	0.29	0.51	0.14	0.00	0.24	-0.30	-0.17	0.24	-0.27	1.1377	0.0184	9.9	1.1	9.9	1.2	A+	A-
Reading	5	555335	1632	4	88	A.2.4.1		71823	0.83	0.03	0.83	0.10	0.04	0.00	0.48	-0.36	0.48	-0.38	-0.29	-0.7624	0.0108	-9.9	0.9	-9.9	0.7		
Reading	5	555334	1633	4	89	A.2.2.1		71823	0.89	0.05	0.04	0.89	0.03	0.00	0.44	-0.30	-0.29	0.44	-0.31	-1.3211	0.0126	-9.9	0.9	-9.9	0.7		
Reading	5	555333	1634	4	90	A.2.6.2		71823	0.43	0.30	0.19	0.07	0.43	0.00	0.27	-0.26	-0.21	-0.34	0.27	1.5209	0.0083	9.9	1.1	9.9	1.2		
Reading	5	555339	1635	4	91	A.2.4.1		71823	0.65	0.26	0.65	0.04	0.05	0.00	0.45	-0.36	0.45	-0.39	-0.45	0.4168	0.0086	-9.9	0.9	-9.9	0.9		
Reading	5	555337	1636	4	92	A.2.2.2		71823	0.52	0.52	0.12	0.11	0.25	0.00	0.37	0.37	-0.47	-0.45	-0.19	1.0796	0.0082	-5.3	1.0	5.7	1.0		
Reading	5	555338	1637	4	93	A.2.4.1		71823	0.79	0.07	0.08	0.79	0.06	0.00	0.53	-0.41	-0.41	0.53	-0.37	-0.4406	0.0100	-9.9	0.9	-9.9	0.7		
Reading	5	555340	1638	4	94	B.1.2.1		71823	0.48	0.10	0.18	0.48	0.23	0.00	0.35	-0.34	-0.38	0.35	-0.29	1.2969	0.0082	-4.8	1.0	9.9	1.1		
Reading	5	555341	1639	4	95	B.1.2.1		71823	0.45	0.09	0.45	0.27	0.19	0.00	0.26	-0.36	0.26	-0.16	-0.29	1.4357	0.0082	9.9	1.1	9.9	1.2		
Reading	5	595839	1673	5	77	A.2.6.1	2	14331	0.33	0.45	0.33	0.08	0.15	0.00	0.00	0.08	0.00	-0.26	-0.04	2.0584	0.0193	9.9	1.3	9.9	1.8	A-	A-
Reading	5	595834	1674	5	78	A.1.1.2	2	14331	0.63	0.21	0.63	0.10	0.06	0.00	0.27	-0.22	0.27	-0.26	-0.17	0.5590	0.0190	9.9	1.1	9.9	1.2	A-	A-
Reading	5	595830	1675	5	79	A.1.3.2	2	14331	0.60	0.22	0.13	0.60	0.05	0.00	0.39	-0.33	-0.33	0.39	-0.40	0.6978	0.0188	-2.8	1.0	-2.5	1.0	A-	A-
Reading	5	595836	1676	5	80	B.1.1.1	2	14331	0.59	0.23	0.14	0.59	0.04	0.00	0.19	-0.07	-0.21	0.19	-0.32	0.7438	0.0187	9.9	1.2	9.9	1.3	A+	A-
Reading	5	595844	1677	5	81	B.1.1.1	1	14331	0.93	0.02	0.03	0.93	0.02	0.00	0.39	-0.22	-0.27	0.39	-0.25	-1.8879	0.0345	-4.5	0.9	-8.0	0.7	B+	A-
Reading	5	595835	1678	5	82	B.1.1.1	2	14331	0.77	0.10	0.77	0.09	0.05	0.00	0.28	-0.18	0.28	-0.18	-0.27	-0.2488	0.0215	7.7	1.1	7.7	1.2	A-	A-
Reading	5	595833	1679	5	83	A.1.4.1	3	14331	0.36	0.20	0.33	0.11	0.36	0.00	0.12	-0.10	-0.14	-0.10	0.12	1.9005	0.0189	9.9	1.2	9.9	1.4	A+	A-
Reading	5	595852	1680	5	84	A.1.5.1	2	14331	0.77	0.77	0.06	0.07	0.10	0.00	0.42	0.42	-0.34	-0.33	-0.28	-0.3026	0.0218	-3.9	1.0	-4.0	0.9	A+	A-
Reading	5	595831	1681	5	85	B.2.2.1	2	14331	0.36	0.24	0.26	0.14	0.36	0.00	0.30	-0.43	-0.18	-0.34	0.30	1.8735	0.0189	3.5	1.0	9.8	1.1	A-	A-
Reading	5	595832	1682	5	86	B.2.1.2	2	14331	0.86	0.03	0.06	0.04	0.86	0.00	0.47	-0.34	-0.33	-0.33	0.47	-1.0107	0.0260	-7.2	0.9	-9.9	0.7	A+	A-
Reading	5	555335	1632	5	88	A.2.4.1		71823	0.83	0.03	0.83	0.10	0.04	0.00	0.48	-0.36	0.48	-0.38	-0.29	-0.7624	0.0108	-9.9	0.9	-9.9	0.7		
Reading	5	555334	1633	5	89	A.2.2.1		71823	0.89	0.05	0.04	0.89	0.03	0.00	0.44	-0.30	-0.29	0.44	-0.31	-1.3211	0.0126	-9.9	0.9	-9.9	0.7		
Reading	5	555333	1634	5	90	A.2.6.2		71823	0.43	0.30	0.19	0.07	0.43	0.00	0.27	-0.26	-0.21	-0.34	0.27	1.5209	0.0083	9.9	1.1	9.9	1.2		
Reading	5	555339	1635	5	91	A.2.4.1		71823	0.65	0.26	0.65	0.04	0.05	0.00	0.45	-0.36	0.45	-0.39	-0.45	0.4168	0.0086	-9.9	0.9	-9.9	0.9		
Reading	5	555337	1636	5	92	A.2.2.2		71823	0.52	0.52	0.12	0.11	0.25	0.00	0.37	0.37	-0.47	-0.45	-0.19	1.0796	0.0082	-5.3	1.0	5.7	1.0		
Reading	5	555338	1637	5	93	A.2.4.1		71823	0.79	0.07	0.08	0.79	0.06	0.00	0.53	-0.41	-0.41	0.53	-0.37	-0.4406	0.0100	-9.9	0.9	-9.9	0.7		
Reading	5	555340	1638	5	94	B.1.2.1		71823	0.48	0.10	0.18	0.48	0.23	0.00	0.35	-0.34	-0.38	0.35	-0.29	1.2969	0.0082	-4.8	1.0	9.9	1.1		
Reading	5	555341	1639	5	95	B.1.2.1		71823	0.45	0.09	0.45	0.27	0.19	0.00	0.26	-0.36	0.26	-0.16	-0.29	1.4357	0.0082	9.9	1.1	9.9	1.2		
Reading	5	565966	1684	6	77	A.2.3.1	2	14258	0.54	0.20	0.22	0.05	0.54	0.00	0.38	-0.35	-0.39	-0.23	0.38	1.0426	0.0185	-3.4	1.0	-2.1	1.0	A-	A-
Reading	5	565977	1685	6	78	B.3.2.2	2	14258	0.56	0.24	0.56	0.08	0.12	0.00	0.26	-0.15	0.26	-0.35	-0.27	0.9237	0.0186	9.9	1.1	9.9	1.2	A-	A-
Reading	5	565964	1686	6	79	A.2.4.1	1	14258	0.90	0.02	0.03	0.05	0.90	0.00	0.44	-0.27	-0.29	-0.33	0.44	-1.4054	0.0296	-6.0	0.9	-9.9	0.6	A-	B-
Reading	5	565976	1687	6	80	A.2.3.1	3	14258	0.56	0.17	0.22	0.06	0.56	0.00	0.36	-0.23	-0.37	-0.42	0.36	0.9411	0.0186	0.9	1.0	3.8	1.0	A-	B-
Reading	5	565968	1688	6	81	A.2.3.2	2	14258	0.52	0.24	0.21	0.52	0.02	0.00	0.42	-0.33	-0.46	0.42	-0.38	1.1119	0.0184	-8.9	0.9	-4.7	1.0	A-	A-
Reading	5	565958	1689	6	82	A.2.6.2	2	14258	0.61	0.16	0.61	0.08	0.15	0.00	0.31	-0.25	0.31	-0.38	-0.18	0.6742	0.0189	9.9	1.1	9.9	1.1	A-	A-
Reading	5	565961	1690	6	83	B.3.3.1	2	14258	0.51	0.18	0.29	0.51	0.02	0.00	0.31	-0.29	-0.27	0.31	-0.40	1.1752	0.0184	7.8	1.1	9.7	1.1	A-	A-
Reading	5	565960	1691	6	84	B.3.1.1	2	14258	0.86	0.86	0.04	0.06	0.03	0.00	0.44	0.44	-0.32	-0.29	-0.32	-0.9957	0.0261	-6.1	0.9	-8.3	0.8	A+	B-
Reading	5	565978	1692	6	85	B.3.3.3	2	14258	0.59	0.21	0.59	0.06	0.13	0.00	0.26	-0.15	0.26	-0.32	-0.25	0.7540	0.0188	9.9	1.1	9.9	1.2	A-	A-
Reading	5	599524	1693	6	86	B.3.3.3	3	14258	0.66	0.08	0.66	0.19	0.07	0.00	0.40	-0.37	0.40	-0.29	-0.37	0.4167	0.0195	-1.5	1.0	-2.9	1.0	A-	A-
Reading	5	557612	1695	6	88	B.1.1.1		57102	0.89	0.04	0.03	0.89	0.04	0.00	0.43	-0.33	-0.28	0.43	-0.25	-1.2935	0.0142	-9.9	0.9	-9.9	0.7		
Reading	5	557613	1696	6	89	A.1.4.1		57102	0.78	0.10	0.78	0.06	0.06	0.00	0.45	-0.37	0.45	-0.34	-0.30	-0.3666	0.0111	-9.9	0.9	-9.9	0.8		
Reading	5	557614	1697	6	90	A.1.4.1		57102	0.85	0.07	0.02	0.06	0.85	0.00	0.31	-0.19	-0.27	-0.21	0.31	-0.8575	0.0125	3.0	1.0	7.0	1.1		
Reading	5	557615	1698	6	91	A.1.4.1		57102	0.89	0.03	0.04	0.89	0.04	0.00	0.44	-0.33	-0.27	0.44	-0.30	-1.3097	0.0143	-9.9	0.9	-9.9	0.7		
Reading	5	557617	1699	6	92	A.1.3.1		57102	0.73	0.04	0.01	0.73	0.21	0.00	0.35	-0.23	-0.26	0.35	-0.30	-0.0196	0.0104	6.9	1.0	1.2	1.0		
Reading	5	557618	1700	6	93	A.1.3.1		57102	0.78	0.03	0.12	0.06	0.78	0.00	0.37	-0.31	-0.27	-0.27	0.37	-0.3557	0.0111	-0.7	1.0	-6.6	0.9		
Reading	5	557620	1701	6	94	B.1.1.1		57102	0.66	0.17	0.66	0.14	0.02	0.00	0.48	-0.40	0.48	-0.42	-0.39	0.3919	0.0098	-9.9	0.9	-9.9	0.8		
Reading	5	557619	1702	6	95	B.1.1.1		57102	0.60	0.60	0.20	0.15	0.05	0.00	0.28	0.28	-0.31	-0.12	-0.27	0.7327	0.0094	9.9	1.1	9.9	1.2		
Reading	5	565990	1703	7	77	A.2.3.1	2	14276	0.60	0.18	0.60	0.07	0.15	0.00	0.20	-0.15	0.20	-0.21	-0.15	0.7185	0.0188	9.9	1.2	9.9	1.3	A+	A-
Reading	5	565986	1704	7	78	A.2.1.1	2	14276	0.64	0.16	0.13	0.64	0.06	0.00	0.24	-0.21	-0.12	0.24	-0.28	0.4640	0.0192	9.9	1.2	9.9	1.2	A+	A-
Reading	5	565983	1705	7	79	A.2.4.1	1	14276	0.78	0.78	0.09	0.05	0.09	0.00	0.40	0.40	-0.29	-0.28	-0.32	-0.3203	0.0219	-3.4	1.0	-6.0	0.9	A-	A-
Reading	5	565988	1706	7	80	A.2.4.1	1	14276	0.33	0.04	0.33	0.45	0.17	0.00	0.14	-0.32	0.14	-0.12	-0.12	2.0239	0.0193	9.9	1.2	9.9	1.5	A-	B-
Reading	5	565984	1707	7	81	B.3.1.1	2	14276	0.81	0.05	0.07	0.07	0.81	0.00	0.50	-0.38	-0.37	-0.35	0.50	-0.5787	0.0232	-9.9	0.9	-9.9	0.7	A+	B-
Reading	5	565985	1708	7	82	A.2.3.1	2	14276	0.74	0.06	0.06	0.															

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Reading	5	565987	1709	7	83	A.2.3.1	2	14276	0.35	0.33	0.35	0.22	0.10	0.00	0.28	-0.16	0.28	-0.40	-0.44	1.9302	0.0191	2.2	1.0	9.9	1.2	A-	A-
Reading	5	565989	1710	7	84	B.2.1.1	2	14276	0.69	0.10	0.14	0.07	0.69	0.00	0.45	-0.35	-0.36	-0.37	0.45	0.1941	0.0199	-7.4	0.9	-7.1	0.9	A+	A-
Reading	5	565991	1711	7	85	B.3.1.1	2	14276	0.40	0.11	0.40	0.36	0.13	0.00	0.26	-0.39	0.26	-0.19	-0.27	1.6546	0.0186	7.6	1.1	9.9	1.2	A-	A-
Reading	5	566068	1712	7	86	A.2.3.1	2	14276	0.48	0.11	0.24	0.16	0.48	0.00	0.32	-0.41	-0.23	-0.30	0.32	1.2638	0.0184	4.0	1.0	8.1	1.1	A-	A-
Reading	5	557612	1695	7	88	B.1.1.1		57102	0.89	0.04	0.03	0.89	0.04	0.00	0.43	-0.33	-0.28	0.43	-0.25	-1.2935	0.0142	-9.9	0.9	-9.9	0.7		
Reading	5	557613	1696	7	89	A.1.4.1		57102	0.78	0.10	0.78	0.06	0.06	0.00	0.45	-0.37	0.45	-0.34	-0.30	-0.3666	0.0111	-9.9	0.9	-9.9	0.8		
Reading	5	557614	1697	7	90	A.1.4.1		57102	0.85	0.07	0.02	0.06	0.85	0.00	0.31	-0.19	-0.27	-0.21	0.31	-0.8575	0.0125	3.0	1.0	7.0	1.1		
Reading	5	557615	1698	7	91	A.1.4.1		57102	0.89	0.03	0.04	0.89	0.04	0.00	0.44	-0.33	-0.27	0.44	-0.30	-1.3097	0.0143	-9.9	0.9	-9.9	0.7		
Reading	5	557617	1699	7	92	A.1.3.1		57102	0.73	0.04	0.01	0.73	0.21	0.00	0.35	-0.23	-0.26	0.35	-0.30	-0.0196	0.0104	6.9	1.0	1.2	1.0		
Reading	5	557618	1700	7	93	A.1.3.1		57102	0.78	0.03	0.12	0.06	0.78	0.00	0.37	-0.31	-0.27	-0.27	0.37	-0.3557	0.0111	-0.7	1.0	-6.6	0.9		
Reading	5	557620	1701	7	94	B.1.1.1		57102	0.66	0.17	0.66	0.14	0.02	0.00	0.48	-0.40	0.48	-0.42	-0.39	0.3919	0.0098	-9.9	0.9	-9.9	0.8		
Reading	5	557619	1702	7	95	B.1.1.1		57102	0.60	0.60	0.20	0.15	0.05	0.00	0.28	0.28	-0.31	-0.12	-0.27	0.7327	0.0094	9.9	1.1	9.9	1.2		
Reading	5	595775	1714	8	77	A.2.1.2	2	14285	0.58	0.14	0.18	0.10	0.58	0.00	0.42	-0.37	-0.40	-0.31	0.42	0.8275	0.0187	-7.6	0.9	-7.4	0.9	A-	A-
Reading	5	595793	1715	8	78	B.1.1.1	2	14285	0.88	0.06	0.04	0.88	0.03	0.00	0.32	-0.28	-0.23	0.32	-0.12	-1.1492	0.0272	-0.1	1.0	1.7	1.1	A+	A-
Reading	5	595795	1716	8	79	A.2.3.1	2	14285	0.59	0.09	0.06	0.59	0.25	0.00	0.48	-0.34	-0.38	0.48	-0.48	0.7534	0.0188	-9.9	0.9	-9.9	0.8	A-	C-
Reading	5	595779	1717	8	80	B.3.3.2	2	14285	0.62	0.62	0.30	0.04	0.03	0.00	0.35	0.35	-0.27	-0.42	-0.37	0.5908	0.0191	3.6	1.0	2.7	1.0	A-	A-
Reading	5	595792	1718	8	81	B.3.3.1	3	14285	0.58	0.11	0.58	0.11	0.19	0.00	0.33	-0.34	0.33	-0.34	-0.20	0.7953	0.0188	6.3	1.1	5.8	1.1	A+	A+
Reading	5	595782	1719	8	82	B.3.2.1	2	14285	0.69	0.11	0.13	0.07	0.69	0.00	0.50	-0.39	-0.37	-0.51	0.50	0.2084	0.0200	-9.9	0.9	-9.9	0.8	A+	A-
Reading	5	595789	1720	8	83	B.3.1.1	2	14285	0.69	0.08	0.69	0.08	0.15	0.00	0.37	-0.34	0.37	-0.33	-0.24	0.2337	0.0200	2.4	1.0	1.3	1.0	A+	A-
Reading	5	595790	1721	8	84	A.2.4.1	2	14285	0.33	0.05	0.33	0.58	0.03	0.00	0.20	-0.36	0.20	-0.16	-0.43	2.0436	0.0193	9.9	1.1	9.9	1.4	A+	A-
Reading	5	595794	1722	8	85	A.2.3.2	2	14285	0.69	0.07	0.17	0.07	0.69	0.00	0.41	-0.32	-0.32	-0.36	0.41	0.2345	0.0200	-3.3	1.0	-5.9	0.9	A+	A-
Reading	5	595791	1723	8	86	B.1.2.1	2	14285	0.79	0.79	0.06	0.10	0.05	0.00	0.47	0.47	-0.32	-0.37	-0.35	-0.3774	0.0223	-7.6	0.9	-9.9	0.8	A+	A-
Reading	5	557612	1695	8	88	B.1.1.1		57102	0.89	0.04	0.03	0.89	0.04	0.00	0.43	-0.33	-0.28	0.43	-0.25	-1.2935	0.0142	-9.9	0.9	-9.9	0.7		
Reading	5	557613	1696	8	89	A.1.4.1		57102	0.78	0.10	0.78	0.06	0.06	0.00	0.45	-0.37	0.45	-0.34	-0.30	-0.3666	0.0111	-9.9	0.9	-9.9	0.8		
Reading	5	557614	1697	8	90	A.1.4.1		57102	0.85	0.07	0.02	0.06	0.85	0.00	0.31	-0.19	-0.27	-0.21	0.31	-0.8575	0.0125	3.0	1.0	7.0	1.1		
Reading	5	557615	1698	8	91	A.1.4.1		57102	0.89	0.03	0.04	0.89	0.04	0.00	0.44	-0.33	-0.27	0.44	-0.30	-1.3097	0.0143	-9.9	0.9	-9.9	0.7		
Reading	5	557617	1699	8	92	A.1.3.1		57102	0.73	0.04	0.01	0.73	0.21	0.00	0.35	-0.23	-0.26	0.35	-0.30	-0.0196	0.0104	6.9	1.0	1.2	1.0		
Reading	5	557618	1700	8	93	A.1.3.1		57102	0.78	0.03	0.12	0.06	0.78	0.00	0.37	-0.31	-0.27	-0.27	0.37	-0.3557	0.0111	-0.7	1.0	-6.6	0.9		
Reading	5	557620	1701	8	94	B.1.1.1		57102	0.66	0.17	0.66	0.14	0.02	0.00	0.48	-0.40	0.48	-0.42	-0.39	0.3919	0.0098	-9.9	0.9	-9.9	0.8		
Reading	5	557619	1702	8	95	B.1.1.1		57102	0.60	0.60	0.20	0.15	0.05	0.00	0.28	0.28	-0.31	-0.12	-0.27	0.7327	0.0094	9.9	1.1	9.9	1.2		
Reading	5	595868	1725	9	77	A.2.4.1	1	14283	0.75	0.11	0.03	0.10	0.75	0.00	0.44	-0.43	-0.33	-0.24	0.44	-0.1709	0.0214	-5.0	0.9	-7.5	0.9	A+	A-
Reading	5	595864	1726	9	78	A.2.3.1	2	14283	0.32	0.41	0.08	0.32	0.18	0.00	0.17	-0.08	-0.33	0.17	-0.30	2.1005	0.0195	9.9	1.1	9.9	1.4	A-	A-
Reading	5	595865	1727	9	79	A.2.4.1	1	14283	0.74	0.05	0.12	0.09	0.74	0.00	0.46	-0.24	-0.41	-0.36	0.46	-0.0834	0.0210	-7.8	0.9	-9.9	0.8	A-	B-
Reading	5	595867	1728	9	80	A.2.3.1	3	14283	0.63	0.21	0.06	0.63	0.10	0.00	0.36	-0.28	-0.40	0.36	-0.26	0.5652	0.0192	2.2	1.0	1.5	1.0	A+	A-
Reading	5	595858	1729	9	81	B.3.1.1	2	14283	0.76	0.07	0.76	0.10	0.07	0.00	0.43	-0.39	0.43	-0.32	-0.28	-0.2256	0.0216	-5.1	0.9	-6.0	0.9	A+	A-
Reading	5	595866	1730	9	82	A.2.3.1	2	14283	0.41	0.14	0.16	0.41	0.28	0.00	0.26	-0.26	-0.30	0.26	-0.23	1.6450	0.0187	9.9	1.1	9.9	1.2	A+	A-
Reading	5	595857	1731	9	83	B.3.1.1	2	14283	0.85	0.05	0.85	0.05	0.04	0.00	0.49	-0.37	0.49	-0.34	-0.33	-0.9343	0.0255	-9.2	0.9	-9.9	0.7	A+	B-
Reading	5	595862	1732	9	84	B.3.3.1	3	14283	0.69	0.09	0.08	0.15	0.69	0.00	0.40	-0.37	-0.38	-0.24	0.40	0.2395	0.0199	-1.7	1.0	-4.0	0.9	A+	A-
Reading	5	595861	1733	9	85	A.2.3.2	2	14283	0.62	0.17	0.62	0.10	0.11	0.00	0.45	-0.40	0.45	-0.43	-0.30	0.6275	0.0190	-9.9	0.9	-9.9	0.9	A+	B-
Reading	5	595859	1734	9	86	A.2.6.2	2	14283	0.56	0.56	0.20	0.08	0.15	0.00	0.30	0.30	-0.18	-0.32	-0.33	0.8901	0.0187	9.9	1.1	9.9	1.1	A+	A-
Reading	5	557612	1695	9	88	B.1.1.1		57102	0.89	0.04	0.03	0.89	0.04	0.00	0.43	-0.33	-0.28	0.43	-0.25	-1.2935	0.0142	-9.9	0.9	-9.9	0.7		
Reading	5	557613	1696	9	89	A.1.4.1		57102	0.78	0.10	0.78	0.06	0.06	0.00	0.45	-0.37	0.45	-0.34	-0.30	-0.3666	0.0111	-9.9	0.9	-9.9	0.8		
Reading	5	557614	1697	9	90	A.1.4.1		57102	0.85	0.07	0.02	0.06	0.85	0.00	0.31	-0.19	-0.27	-0.21	0.31	-0.8575	0.0125	3.0	1.0	7.0	1.1		
Reading	5	557615	1698	9	91	A.1.4.1		57102	0.89	0.03	0.04	0.89	0.04	0.00	0.44	-0.33	-0.27	0.44	-0.30	-1.3097	0.0143	-9.9	0.9	-9.9	0.7		
Reading	5	557617	1699	9	92	A.1.3.1		57102	0.73	0.04	0.01	0.73	0.21	0.00	0.35	-0.23	-0.26	0.35	-0.30	-0.0196	0.0104	6.9	1.0	1.2	1.0		
Reading	5	557618	1700	9	93	A.1.3.1		57102	0.78	0.03	0.12	0.06	0.78	0.00	0.37	-0.31	-0.27	-0.27	0.37	-0.3557	0.0111	-0.7	1.0	-6.6	0.9		
Reading	5	557620	1701	9	94	B.1.1.1		57102	0.66	0.17	0.66	0.14	0.02	0.00	0.48	-0.40	0.48	-0.42	-0.39	0.3919	0.0098	-9.9	0.9	-9.9	0.8		
Reading	5	557619	1702	9	95	B.1.1.1		57102	0.60	0.60	0.20	0.15	0.05	0.00	0.28	0.28	-0.31	-0.12	-0.27	0.7327	0.0094	9.9	1.1	9.9	1.2		
Reading	6	553053	1736	0	27	A.2.4.1		128893	0.81	0.09	0.05	0.81	0.05	0.00	0.47	-0.41	-0.36	0.47	-0.23	-0.7301	0.0077	-9.9	0.9	-9.9	0.8		
Reading	6	553052	1737	0	28	A.2.3.2		128893	0.84	0.05	0.84	0.03	0.08	0.00	0.39	-0.28	0.39	-0.27	-0.28	-0.9788	0.0082	-3.6	1.0	-9.9	0.9		
Reading	6	553050	1738	0	29	A.2.3.1		128893	0.81	0.81	0.05	0.03															

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Reading	6	553059	1739	0	30	A.2.3.1		128893	0.67	0.67	0.11	0.10	0.12	0.00	0.40	0.40	-0.37	-0.31	-0.28	0.1370	0.0066	5.2	1.0	-1.0	1.0		
Reading	6	553046	1740	0	31	A.2.3.1		128893	0.67	0.67	0.08	0.15	0.10	0.00	0.39	0.39	-0.36	-0.26	-0.34	0.1433	0.0066	8.8	1.0	1.0	1.0		
Reading	6	553057	1741	0	32	B.3.1.1		128893	0.88	0.03	0.88	0.04	0.05	0.00	0.50	-0.35	0.50	-0.33	-0.35	-1.4078	0.0092	-9.9	0.8	-9.9	0.6		
Reading	6	553056	1742	0	33	B.2.2.2		128893	0.60	0.17	0.60	0.08	0.15	0.00	0.43	-0.39	0.43	-0.40	-0.32	0.5214	0.0064	-9.9	1.0	-9.9	1.0		
Reading	6	557394	1743	0	34	A.1.4.1		128893	0.80	0.80	0.05	0.14	0.02	0.00	0.37	0.37	-0.32	-0.26	-0.29	-0.6983	0.0077	2.6	1.0	4.7	1.0		
Reading	6	557390	1744	0	35	A.1.3.1		128893	0.86	0.04	0.05	0.06	0.86	0.00	0.45	-0.31	-0.34	-0.29	0.45	-1.1866	0.0087	-9.9	0.9	-9.9	0.8		
Reading	6	557388	1745	0	36	A.1.2.2		128893	0.82	0.82	0.03	0.12	0.02	0.00	0.42	0.42	-0.29	-0.32	-0.32	-0.8580	0.0080	-9.9	1.0	-9.9	0.8		
Reading	6	557392	1746	0	37	B.2.1.2		128893	0.87	0.06	0.87	0.04	0.03	0.00	0.47	-0.34	0.47	-0.31	-0.33	-1.2971	0.0089	-9.9	0.9	-9.9	0.7		
Reading	6	557393	1747	0	38	A.1.5.1		128893	0.67	0.11	0.12	0.09	0.67	0.00	0.39	-0.34	-0.30	-0.30	0.39	0.1489	0.0066	7.9	1.0	2.3	1.0		
Reading	6	557395	1748	0	39	B.1.1.1		128893	0.67	0.67	0.08	0.09	0.16	0.00	0.39	0.39	-0.37	-0.31	-0.27	0.1677	0.0066	9.2	1.0	6.4	1.0		
Reading	6	557389	1749	0	40	A.1.2.1		128893	0.92	0.03	0.04	0.92	0.02	0.00	0.47	-0.30	-0.35	0.47	-0.28	-1.8589	0.0107	-9.9	0.8	-9.9	0.6		
Reading	6	557397	1750	0	41	A.1.3.1		128893	0.67	0.20	0.04	0.08	0.67	0.00	0.28	-0.21	-0.30	-0.22	0.28	0.1411	0.0066	9.9	1.2	9.9	1.3		
Reading	6	557416	1752	0	43	A.2.1.1		128893	0.85	0.85	0.06	0.06	0.02	0.00	0.46	0.46	-0.37	-0.31	-0.25	-1.1413	0.0086	-9.9	0.9	-9.9	0.8		
Reading	6	557420	1753	0	44	A.2.4.1		128893	0.68	0.12	0.08	0.11	0.68	0.00	0.34	-0.19	-0.43	-0.20	0.34	0.0743	0.0067	9.9	1.1	9.9	1.2		
Reading	6	557421	1754	0	45	A.2.4.1		128893	0.64	0.10	0.64	0.07	0.19	0.00	0.35	-0.35	0.35	-0.42	-0.16	0.3258	0.0065	9.9	1.1	9.9	1.1		
Reading	6	557424	1755	0	46	B.3.2.1		128893	0.62	0.19	0.07	0.11	0.62	0.00	0.41	-0.25	-0.42	-0.41	0.41	0.4270	0.0064	1.7	1.0	4.7	1.0		
Reading	6	557418	1756	0	47	A.2.3.1		128893	0.74	0.74	0.08	0.09	0.09	0.00	0.44	0.44	-0.34	-0.32	-0.33	-0.2500	0.0070	-8.7	1.0	-9.9	0.9		
Reading	6	557427	1757	0	48	B.1.2.1		128893	0.53	0.13	0.53	0.16	0.18	0.00	0.31	-0.33	0.31	-0.25	-0.26	0.9213	0.0062	9.9	1.1	9.9	1.2		
Reading	6	557431	1759	0	119	A.1.1.2		128893	0.56	0.07	0.56	0.29	0.07	0.00	0.39	-0.43	0.39	-0.31	-0.36	0.7495	0.0063	1.8	1.0	3.2	1.0		
Reading	6	557430	1760	0	120	A.1.1.1		128893	0.83	0.05	0.03	0.83	0.08	0.00	0.49	-0.42	-0.37	0.49	-0.29	-0.9126	0.0081	-9.9	0.9	-9.9	0.8		
Reading	6	557433	1761	0	121	A.1.3.1		128893	0.76	0.09	0.76	0.05	0.10	0.00	0.43	-0.26	0.43	-0.31	-0.39	-0.4057	0.0072	-9.0	1.0	-4.0	1.0		
Reading	6	557437	1762	0	122	B.1.1.1		128893	0.80	0.09	0.80	0.09	0.03	0.00	0.38	-0.25	0.38	-0.28	-0.33	-0.6517	0.0076	1.9	1.0	-0.1	1.0		
Reading	6	557439	1763	0	123	B.2.1.2		128893	0.79	0.79	0.03	0.05	0.13	0.00	0.38	0.38	-0.33	-0.37	-0.21	-0.6280	0.0075	3.4	1.0	9.9	1.1		
Reading	6	557596	1765	0	125	A.1.4.1		128893	0.79	0.10	0.05	0.79	0.05	0.00	0.39	-0.35	-0.21	0.39	-0.21	-0.6308	0.0076	2.2	1.0	-7.3	0.9		
Reading	6	557598	1766	0	126	B.2.1.3		128893	0.67	0.10	0.19	0.04	0.67	0.00	0.39	-0.26	-0.33	-0.38	0.39	0.1584	0.0066	9.9	1.0	6.9	1.0		
Reading	6	557601	1767	0	127	A.1.4.1		128893	0.58	0.58	0.13	0.08	0.22	0.00	0.47	0.47	-0.47	-0.45	-0.36	0.6578	0.0063	-9.9	0.9	-9.9	0.9		
Reading	6	557602	1768	0	128	A.1.4.1		128893	0.62	0.09	0.62	0.12	0.17	0.00	0.34	-0.30	0.34	-0.36	-0.21	0.4386	0.0064	9.9	1.1	9.9	1.1		
Reading	6	557600	1769	0	129	B.1.1.1		128893	0.54	0.13	0.18	0.54	0.15	0.00	0.32	-0.39	-0.24	0.32	-0.22	0.8601	0.0062	9.9	1.1	9.9	1.1		
Reading	6	557604	1770	0	130	B.1.2.1		128893	0.62	0.21	0.13	0.04	0.62	0.00	0.33	-0.24	-0.26	-0.37	0.33	0.4661	0.0064	9.9	1.1	9.9	1.1		
Reading	6	557607	1771	0	131	B.1.2.1		128893	0.75	0.10	0.08	0.75	0.07	0.00	0.44	-0.34	-0.30	0.44	-0.35	-0.3034	0.0071	-8.4	1.0	-9.9	0.9		
Reading	6	557516	1772	0	132	A.2.3.1		128893	0.73	0.73	0.11	0.13	0.03	0.00	0.45	0.45	-0.42	-0.31	-0.29	-0.2230	0.0070	-9.9	1.0	-9.9	0.9		
Reading	6	557524	1773	0	133	B.3.3.2		128893	0.68	0.07	0.16	0.68	0.10	0.00	0.49	-0.39	-0.39	0.49	-0.40	0.1105	0.0066	-9.9	0.9	-9.9	0.9		
Reading	6	557522	1774	0	134	A.2.4.1		128893	0.62	0.27	0.06	0.62	0.04	0.00	0.49	-0.41	-0.47	0.49	-0.40	0.4151	0.0064	-9.9	0.9	-9.9	0.9		
Reading	6	557521	1775	0	135	A.2.4.1		128893	0.50	0.50	0.08	0.25	0.18	0.00	0.36	0.36	-0.30	-0.28	-0.40	1.0745	0.0062	9.9	1.0	9.9	1.1		
Reading	6	557518	1776	0	136	A.2.5.1		128893	0.74	0.07	0.74	0.13	0.06	0.00	0.46	-0.35	0.46	-0.37	-0.33	-0.2818	0.0070	-9.9	0.9	-9.9	0.9		
Reading	6	557960	1777	0	137	A.2.3.2		128893	0.68	0.12	0.15	0.68	0.05	0.00	0.42	-0.31	-0.33	0.42	-0.41	0.0900	0.0067	-3.5	1.0	-2.9	1.0		
Reading	6	557519	1778	0	138	A.2.4.1		128893	0.72	0.05	0.10	0.13	0.72	0.00	0.44	-0.41	-0.28	-0.35	0.44	-0.1499	0.0069	-8.8	1.0	-4.7	1.0		
Reading	6	592991	1780	1	75	A.2.1.1	2	14604	0.76	0.06	0.07	0.76	0.11	0.00	0.35	-0.33	-0.30	0.35	-0.18	-0.4213	0.0214	5.2	1.1	7.6	1.2	A+	A-
Reading	6	592951	1781	1	76	A.2.4.1	2	14604	0.79	0.79	0.06	0.12	0.02	0.00	0.42	0.42	-0.34	-0.32	-0.23	-0.6733	0.0225	-2.1	1.0	-5.5	0.9	A+	A-
Reading	6	592950	1782	1	77	A.2.4.1	1	14604	0.84	0.07	0.84	0.04	0.06	0.00	0.44	-0.30	0.44	-0.32	-0.32	-1.0437	0.0245	-6.0	0.9	-6.3	0.8	A+	A-
Reading	6	592936	1783	1	78	A.2.3.1	2	14604	0.36	0.20	0.36	0.16	0.27	0.00	0.28	-0.33	0.28	-0.29	-0.26	1.7073	0.0190	7.4	1.1	9.9	1.3	A-	A+
Reading	6	592934	1784	1	79	B.3.1.1	2	14604	0.79	0.79	0.06	0.10	0.05	0.00	0.42	0.42	-0.22	-0.37	-0.32	-0.6459	0.0224	-2.7	1.0	2.2	1.1	A+	B-
Reading	6	592932	1785	1	80	B.3.3.1	3	14604	0.46	0.05	0.08	0.41	0.46	0.00	0.31	-0.42	-0.50	-0.22	0.31	1.2021	0.0185	9.9	1.1	9.9	1.2	A+	A-
Reading	6	592931	1786	1	81	B.3.3.2	2	14604	0.59	0.31	0.07	0.59	0.03	0.00	0.24	-0.11	-0.37	0.24	-0.38	0.5604	0.0188	9.9	1.2	9.9	1.3	A+	A+
Reading	6	592935	1787	1	82	A.2.6.1	3	14604	0.84	0.03	0.11	0.03	0.84	0.00	0.45	-0.34	-0.32	-0.34	0.45	-1.0443	0.0245	-6.5	0.9	-8.2	0.8	A+	A+
Reading	6	592952	1788	1	83	A.2.3.1	3	14604	0.70	0.16	0.70	0.08	0.06	0.00	0.40	-0.25	0.40	-0.44	-0.31	-0.0514	0.0201	1.2	1.0	0.6	1.0	A+	A-
Reading	6	592992	1789	1	84	B.3.3.3	1	14604	0.53	0.53	0.09	0.20	0.18	0.00	0.39	0.39	-0.37	-0.30	-0.38	0.8575	0.0185	1.5	1.0	3.3	1.0	A-	A-
Reading	6	557502	1791	1	86	A.2.3.1		71787	0.75	0.12	0.05	0.08	0.75	0.00	0.52	-0.43	-0.40	-0.38	0.52	-0.3207	0.0095	-9.9	0.9	-9.9	0.8		
Reading	6	557506	1792	1	87	B.1.1.1		71787	0.80	0.10	0.05	0.80	0.04	0.00	0.47	-0.31	-0.39	0.47	-0.33	-0.6865	0.0102	-9.9	0.9	-9.9	0.8		
Reading	6	557503	1793	1	88	A.2.3.1		71787	0.78	0.04	0.07	0.78	0.10	0.00	0.41	-0.31	-0.34	0.41	-0.26	-0.5769	0.0100	-6.2	1.0	-8.1	0.9		
Reading	6	557512	1794	1	89	B.1.1.1		71787	0.59	0.11	0.10	0.20	0.5														

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Reading	6	557510	1795	1	90	B.3.1.1		71787	0.69	0.12	0.69	0.05	0.15	0.00	0.35	-0.22	0.35	-0.41	-0.26	0.0595	0.0089	9.9	1.1	9.9	1.1		
Reading	6	557504	1796	1	91	A.2.4.1		71787	0.70	0.11	0.08	0.12	0.70	0.00	0.43	-0.39	-0.45	-0.22	0.43	0.0052	0.0090	-9.4	1.0	-1.4	1.0		
Reading	6	557509	1797	1	92	B.2.1.2		71787	0.84	0.04	0.84	0.05	0.07	0.00	0.50	-0.37	0.50	-0.38	-0.32	-1.0084	0.0110	-9.9	0.9	-9.9	0.7		
Reading	6	557508	1798	1	93	B.1.1.1		71787	0.67	0.13	0.11	0.09	0.67	0.00	0.43	-0.32	-0.32	-0.40	0.43	0.1687	0.0088	-6.2	1.0	-4.6	1.0		
Reading	6	592903	1799	2	75	B.1.1.1	1	14323	0.87	0.87	0.07	0.05	0.01	0.00	0.34	0.34	-0.28	-0.21	-0.16	-1.3012	0.0268	0.0	1.0	-1.4	1.0	A+	A-
Reading	6	592877	1800	2	76	B.1.1.1	2	14323	0.70	0.06	0.11	0.13	0.70	0.00	0.38	-0.20	-0.33	-0.34	0.38	-0.0423	0.0204	2.3	1.0	5.4	1.1	A+	A-
Reading	6	592878	1801	2	77	A.1.4.1	2	14323	0.58	0.23	0.58	0.14	0.05	0.00	0.35	-0.20	0.35	-0.38	-0.44	0.6648	0.0189	8.4	1.1	8.1	1.1	A-	A-
Reading	6	592864	1802	2	78	A.1.3.1	2	14323	0.76	0.04	0.76	0.06	0.14	0.00	0.48	-0.36	0.48	-0.37	-0.37	-0.4150	0.0217	-8.7	0.9	-9.9	0.8	A+	A-
Reading	6	592869	1803	2	79	A.1.3.1	2	14323	0.64	0.64	0.11	0.09	0.16	0.00	0.37	0.37	-0.25	-0.33	-0.31	0.3089	0.0195	5.4	1.1	2.3	1.0	A+	A-
Reading	6	592881	1804	2	80	B.1.1.1	2	14323	0.60	0.19	0.12	0.60	0.09	0.00	0.43	-0.40	-0.38	0.43	-0.30	0.5304	0.0191	-4.2	1.0	-3.9	1.0	A+	A-
Reading	6	592902	1805	2	81	A.1.2.1	2	14323	0.49	0.49	0.15	0.20	0.16	0.00	0.33	0.33	-0.30	-0.31	-0.27	1.0853	0.0187	9.9	1.1	9.9	1.2	A-	A-
Reading	6	592879	1806	2	82	A.1.3.1	3	14323	0.63	0.07	0.16	0.13	0.63	0.00	0.41	-0.38	-0.26	-0.41	0.41	0.3646	0.0194	-0.9	1.0	-1.5	1.0	A+	A-
Reading	6	592880	1807	2	83	A.1.6.2	2	14323	0.60	0.11	0.21	0.60	0.08	0.00	0.35	-0.29	-0.33	0.35	-0.23	0.5260	0.0191	7.0	1.1	6.4	1.1	A+	A-
Reading	6	592979	1808	2	84	B.2.2.1	2	14323	0.55	0.15	0.10	0.55	0.20	0.00	0.38	-0.39	-0.42	0.38	-0.24	0.7758	0.0188	5.8	1.0	5.8	1.1	A+	A-
Reading	6	557502	1791	2	86	A.2.3.1		71787	0.75	0.12	0.05	0.08	0.75	0.00	0.52	-0.43	-0.40	-0.38	0.52	-0.3207	0.0095	-9.9	0.9	-9.9	0.8		
Reading	6	557506	1792	2	87	B.1.1.1		71787	0.80	0.10	0.05	0.80	0.04	0.00	0.47	-0.31	-0.39	0.47	-0.33	-0.6865	0.0102	-9.9	0.9	-9.9	0.8		
Reading	6	557503	1793	2	88	A.2.3.1		71787	0.78	0.04	0.07	0.78	0.10	0.00	0.41	-0.31	-0.34	0.41	-0.26	-0.5769	0.0100	-6.2	1.0	-8.1	0.9		
Reading	6	557512	1794	2	89	B.1.1.1		71787	0.59	0.11	0.10	0.20	0.59	0.00	0.31	-0.29	-0.41	-0.16	0.31	0.5716	0.0085	9.9	1.1	9.9	1.2		
Reading	6	557510	1795	2	90	B.3.1.1		71787	0.69	0.12	0.69	0.05	0.15	0.00	0.35	-0.22	0.35	-0.41	-0.26	0.0595	0.0089	9.9	1.1	9.9	1.1		
Reading	6	557504	1796	2	91	A.2.4.1		71787	0.70	0.11	0.08	0.12	0.70	0.00	0.43	-0.39	-0.45	-0.22	0.43	0.0052	0.0090	-9.4	1.0	-1.4	1.0		
Reading	6	557509	1797	2	92	B.2.1.2		71787	0.84	0.04	0.84	0.05	0.07	0.00	0.50	-0.37	0.50	-0.38	-0.32	-1.0084	0.0110	-9.9	0.9	-9.9	0.7		
Reading	6	557508	1798	2	93	B.1.1.1		71787	0.67	0.13	0.11	0.09	0.67	0.00	0.43	-0.32	-0.32	-0.40	0.43	0.1687	0.0088	-6.2	1.0	-4.6	1.0		
Reading	6	592882	1810	3	75	A.1.2.1	2	14334	0.34	0.08	0.02	0.34	0.56	0.00	0.30	-0.53	-0.44	0.30	-0.25	1.8545	0.0193	2.5	1.0	9.9	1.2	A-	A+
Reading	6	592887	1811	3	76	A.1.4.1	1	14334	0.74	0.04	0.74	0.16	0.06	0.00	0.34	-0.34	0.34	-0.18	-0.34	-0.2762	0.0211	4.7	1.1	7.1	1.1	A-	A-
Reading	6	592894	1812	3	77	A.1.3.1	2	14334	0.78	0.09	0.08	0.05	0.78	0.00	0.38	-0.29	-0.24	-0.30	0.38	-0.5233	0.0221	-0.6	1.0	2.2	1.1	C-	C-
Reading	6	592889	1813	3	78	B.1.1.1	2	14334	0.74	0.03	0.08	0.74	0.15	0.00	0.42	-0.30	-0.31	0.42	-0.35	-0.2460	0.0210	-2.8	1.0	-3.4	0.9	A-	A-
Reading	6	592884	1814	3	79	B.2.2.2	3	14334	0.73	0.73	0.11	0.09	0.07	0.00	0.48	0.48	-0.39	-0.31	-0.41	-0.1800	0.0207	-8.1	0.9	-7.9	0.9	A+	A-
Reading	6	592937	1815	3	80	A.1.3.1	2	14334	0.40	0.40	0.08	0.10	0.41	0.00	0.18	0.18	-0.31	-0.30	-0.08	1.5144	0.0187	9.9	1.2	9.9	1.4	A-	A-
Reading	6	592891	1816	3	81	B.1.1.1	2	14334	0.41	0.33	0.04	0.22	0.41	0.00	0.21	-0.09	-0.47	-0.28	0.21	1.5055	0.0187	9.9	1.2	9.9	1.3	A+	A+
Reading	6	592888	1817	3	82	B.1.1.1	2	14334	0.82	0.07	0.03	0.09	0.82	0.00	0.31	-0.20	-0.26	-0.22	0.31	-0.8165	0.0236	2.8	1.0	8.4	1.2	A-	A-
Reading	6	592883	1818	3	83	B.2.1.2	2	14334	0.74	0.09	0.74	0.03	0.13	0.00	0.44	-0.40	0.44	-0.30	-0.32	-0.2279	0.0209	-4.7	1.0	-5.4	0.9	A+	A-
Reading	6	592886	1819	3	84	A.1.6.2	3	14334	0.36	0.35	0.12	0.36	0.16	0.00	0.11	-0.01	-0.23	0.11	-0.20	1.7356	0.0191	9.9	1.3	9.9	1.6	A+	A-
Reading	6	557502	1791	3	86	A.2.3.1		71787	0.75	0.12	0.05	0.08	0.75	0.00	0.52	-0.43	-0.40	-0.38	0.52	-0.3207	0.0095	-9.9	0.9	-9.9	0.8		
Reading	6	557506	1792	3	87	B.1.1.1		71787	0.80	0.10	0.05	0.80	0.04	0.00	0.47	-0.31	-0.39	0.47	-0.33	-0.6865	0.0102	-9.9	0.9	-9.9	0.8		
Reading	6	557503	1793	3	88	A.2.3.1		71787	0.78	0.04	0.07	0.78	0.10	0.00	0.41	-0.31	-0.34	0.41	-0.26	-0.5769	0.0100	-6.2	1.0	-8.1	0.9		
Reading	6	557512	1794	3	89	B.1.1.1		71787	0.59	0.11	0.10	0.20	0.59	0.00	0.31	-0.29	-0.41	-0.16	0.31	0.5716	0.0085	9.9	1.1	9.9	1.2		
Reading	6	557510	1795	3	90	B.3.1.1		71787	0.69	0.12	0.69	0.05	0.15	0.00	0.35	-0.22	0.35	-0.41	-0.26	0.0595	0.0089	9.9	1.1	9.9	1.1		
Reading	6	557504	1796	3	91	A.2.4.1		71787	0.70	0.11	0.08	0.12	0.70	0.00	0.43	-0.39	-0.45	-0.22	0.43	0.0052	0.0090	-9.4	1.0	-1.4	1.0		
Reading	6	557509	1797	3	92	B.2.1.2		71787	0.84	0.04	0.84	0.05	0.07	0.00	0.50	-0.37	0.50	-0.38	-0.32	-1.0084	0.0110	-9.9	0.9	-9.9	0.7		
Reading	6	557508	1798	3	93	B.1.1.1		71787	0.67	0.13	0.11	0.09	0.67	0.00	0.43	-0.32	-0.32	-0.40	0.43	0.1687	0.0088	-6.2	1.0	-4.6	1.0		
Reading	6	592870	1821	4	75	A.1.4.1	3	14258	0.77	0.17	0.04	0.02	0.77	0.00	0.55	-0.50	-0.35	-0.31	0.55	-0.4433	0.0219	-9.9	0.8	-9.9	0.7	A-	C-
Reading	6	592866	1822	4	76	A.1.1.2	1	14258	0.65	0.08	0.06	0.65	0.21	0.00	0.34	-0.33	-0.31	0.34	-0.23	0.2599	0.0196	8.9	1.1	5.5	1.1	A-	A-
Reading	6	592873	1823	4	77	A.1.3.1	2	14258	0.36	0.22	0.36	0.17	0.26	0.00	0.23	-0.26	0.23	-0.31	-0.17	1.7706	0.0193	9.9	1.1	9.9	1.4	A-	A-
Reading	6	592868	1824	4	78	B.1.1.1	2	14258	0.66	0.66	0.20	0.04	0.09	0.00	0.36	0.36	-0.31	-0.30	-0.25	0.2237	0.0197	7.2	1.1	6.1	1.1	A+	A-
Reading	6	592978	1825	4	79	B.2.1.2	3	14258	0.64	0.14	0.11	0.64	0.10	0.00	0.31	-0.32	-0.14	0.31	-0.27	0.3191	0.0195	9.9	1.1	9.9	1.2	A-	A-
Reading	6	592901	1826	4	80	B.2.1.4	3	14258	0.57	0.16	0.17	0.57	0.10	0.00	0.39	-0.30	-0.36	0.39	-0.33	0.6658	0.0189	3.0	1.0	2.6	1.0	A-	A-
Reading	6	592874	1827	4	81	B.2.1.1	2	14258	0.63	0.19	0.63	0.06	0.11	0.00	0.30	-0.20	0.30	-0.28	-0.30	0.3636	0.0194	9.9	1.1	9.9	1.3	A-	A-
Reading	6	592867	1828	4	82	A.1.3.2	3	14258	0.75	0.09	0.07	0.08	0.75	0.00	0.52	-0.42	-0.39	-0.38	0.52	-0.3188	0.0214	-9.9	0.9	-9.9	0.7	A-	A-
Reading	6	592872	1829	4	83	A.1.3.1	2	14258	0.79	0.79	0.12	0.05	0.04	0.00	0.43	0.43	-0.32	-0.37	-0.26	-0.5949	0.0225	-4.2	1.0	-2.5	0.9	A-	A-
Reading	6	592900	1830	4	84	B.2.1.3	2	14258	0.64	0.64	0.11	0.15	0.10	0.00	0.43	0.43	-0.27	-0.39	-0.39	0.3343	0.0195	0.0	1.0	-1.9	1.0	A+	A-
Reading	6	557502	1791	4	86	A.2.3.1		71787	0.75	0.12																	

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Reading	6	557506	1792	4	87	B.1.1.1		71787	0.80	0.10	0.05	0.80	0.04	0.00	0.47	-0.31	-0.39	0.47	-0.33	-0.6865	0.0102	-9.9	0.9	-9.9	0.8		
Reading	6	557503	1793	4	88	A.2.3.1		71787	0.78	0.04	0.07	0.78	0.10	0.00	0.41	-0.31	-0.34	0.41	-0.26	-0.5769	0.0100	-6.2	1.0	-8.1	0.9		
Reading	6	557512	1794	4	89	B.1.1.1		71787	0.59	0.11	0.10	0.20	0.59	0.00	0.31	-0.29	-0.41	-0.16	0.31	0.5716	0.0085	9.9	1.1	9.9	1.2		
Reading	6	557510	1795	4	90	B.3.1.1		71787	0.69	0.12	0.69	0.05	0.15	0.00	0.35	-0.22	0.35	-0.41	-0.26	0.0595	0.0089	9.9	1.1	9.9	1.1		
Reading	6	557504	1796	4	91	A.2.4.1		71787	0.70	0.11	0.08	0.12	0.70	0.00	0.43	-0.39	-0.45	-0.22	0.43	0.0052	0.0090	-9.4	1.0	-1.4	1.0		
Reading	6	557509	1797	4	92	B.2.1.2		71787	0.84	0.04	0.84	0.05	0.07	0.00	0.50	-0.37	0.50	-0.38	-0.32	-1.0084	0.0110	-9.9	0.9	-9.9	0.7		
Reading	6	557508	1798	4	93	B.1.1.1		71787	0.67	0.13	0.11	0.09	0.67	0.00	0.43	-0.32	-0.32	-0.40	0.43	0.1687	0.0088	-6.2	1.0	-4.6	1.0		
Reading	6	592918	1832	5	75	B.1.1.1	2	14268	0.70	0.14	0.09	0.70	0.07	0.00	0.30	-0.31	-0.21	0.30	-0.12	-0.0198	0.0202	9.9	1.1	9.9	1.2	A+	A+
Reading	6	592923	1833	5	76	A.1.3.1	2	14268	0.40	0.33	0.24	0.40	0.03	0.00	0.19	-0.19	-0.16	0.19	-0.28	1.5108	0.0188	9.9	1.2	9.9	1.4	A+	A-
Reading	6	592964	1834	5	77	A.1.4.1	1	14268	0.72	0.12	0.13	0.02	0.72	0.00	0.42	-0.31	-0.36	-0.31	0.42	-0.1337	0.0206	-2.7	1.0	-4.9	0.9	A+	A-
Reading	6	592925	1835	5	78	A.1.4.1	1	14268	0.74	0.13	0.74	0.11	0.01	0.00	0.37	-0.40	0.37	-0.16	-0.29	-0.2930	0.0211	1.2	1.0	1.1	1.0	A+	A-
Reading	6	592920	1836	5	79	A.1.1.1	2	14268	0.80	0.07	0.80	0.05	0.08	0.00	0.39	-0.32	0.39	-0.27	-0.25	-0.7076	0.0230	-1.6	1.0	-2.8	0.9	A+	A+
Reading	6	592919	1837	5	80	B.1.1.1	2	14268	0.69	0.69	0.13	0.06	0.12	0.00	0.28	0.28	-0.33	-0.23	-0.09	0.0452	0.0200	9.9	1.1	9.9	1.2	A+	A-
Reading	6	592962	1838	5	81	B.2.2.2	3	14268	0.57	0.57	0.10	0.13	0.21	0.00	0.25	0.25	-0.31	-0.28	-0.12	0.6881	0.0187	9.9	1.2	9.9	1.3	A-	A+
Reading	6	592917	1839	5	82	B.1.1.1	2	14268	0.80	0.08	0.04	0.80	0.08	0.00	0.33	-0.16	-0.28	0.33	-0.29	-0.6785	0.0229	2.3	1.0	5.1	1.1	A+	A+
Reading	6	592924	1840	5	83	B.1.1.1	3	14268	0.36	0.14	0.15	0.35	0.36	0.00	0.08	-0.16	-0.18	0.01	0.08	1.7137	0.0191	9.9	1.3	9.9	1.6	A-	A-
Reading	6	592922	1841	5	84	A.1.4.1	3	14268	0.47	0.47	0.11	0.34	0.08	0.00	0.32	0.32	-0.43	-0.23	-0.37	1.1976	0.0185	8.2	1.1	9.9	1.1	A-	A-
Reading	6	557502	1791	5	86	A.2.3.1		71787	0.75	0.12	0.05	0.08	0.75	0.00	0.52	-0.43	-0.40	-0.38	0.52	-0.3207	0.0095	9.9	0.9	-9.9	0.8		
Reading	6	557506	1792	5	87	B.1.1.1		71787	0.80	0.10	0.05	0.80	0.04	0.00	0.47	-0.31	-0.39	0.47	-0.33	-0.6865	0.0102	-9.9	0.9	-9.9	0.8		
Reading	6	557503	1793	5	88	A.2.3.1		71787	0.78	0.04	0.07	0.78	0.10	0.00	0.41	-0.31	-0.34	0.41	-0.26	-0.5769	0.0100	-6.2	1.0	-8.1	0.9		
Reading	6	557512	1794	5	89	B.1.1.1		71787	0.59	0.11	0.10	0.20	0.59	0.00	0.31	-0.29	-0.41	-0.16	0.31	0.5716	0.0085	9.9	1.1	9.9	1.2		
Reading	6	557510	1795	5	90	B.3.1.1		71787	0.69	0.12	0.69	0.05	0.15	0.00	0.35	-0.22	0.35	-0.41	-0.26	0.0595	0.0089	9.9	1.1	9.9	1.1		
Reading	6	557504	1796	5	91	A.2.4.1		71787	0.70	0.11	0.08	0.12	0.70	0.00	0.43	-0.39	-0.45	-0.22	0.43	0.0052	0.0090	-9.4	1.0	-1.4	1.0		
Reading	6	557509	1797	5	92	B.2.1.2		71787	0.84	0.04	0.84	0.05	0.07	0.00	0.50	-0.37	0.50	-0.38	-0.32	-1.0084	0.0110	-9.9	0.9	-9.9	0.7		
Reading	6	557508	1798	5	93	B.1.1.1		71787	0.67	0.13	0.11	0.09	0.67	0.00	0.43	-0.32	-0.32	-0.40	0.43	0.1687	0.0088	-6.2	1.0	-4.6	1.0		
Reading	6	596712	1843	6	75	A.2.4.1	1	14302	0.60	0.07	0.31	0.02	0.60	0.00	0.30	-0.34	-0.23	-0.28	0.30	0.5707	0.0191	9.9	1.1	9.9	1.2	A+	A-
Reading	6	596661	1844	6	76	A.2.2.2	2	14302	0.88	0.88	0.02	0.02	0.08	0.00	0.44	0.44	-0.21	-0.29	-0.36	-1.3786	0.0276	-6.3	0.9	-8.7	0.7	A-	C-
Reading	6	596660	1845	6	77	B.3.3.3	2	14302	0.58	0.19	0.06	0.16	0.58	0.00	0.35	-0.32	-0.35	-0.27	0.35	0.6543	0.0190	9.9	1.1	9.9	1.1	A+	A-
Reading	6	596664	1846	6	78	A.2.4.1	1	14302	0.72	0.72	0.13	0.03	0.13	0.00	0.44	0.44	-0.34	-0.34	-0.37	-0.0973	0.0207	-3.9	1.0	-5.1	0.9	A+	A-
Reading	6	596663	1847	6	79	A.2.2.1	2	14302	0.84	0.02	0.06	0.84	0.09	0.00	0.42	-0.31	-0.32	0.42	-0.29	-0.9504	0.0246	-3.9	0.9	-4.2	0.9	A-	A-
Reading	6	596662	1848	6	80	A.2.4.1	1	14302	0.78	0.03	0.78	0.11	0.07	0.00	0.39	-0.30	0.39	-0.27	-0.29	-0.5468	0.0224	1.1	1.0	-3.5	0.9	A+	A-
Reading	6	596656	1849	6	81	A.2.4.1	1	14302	0.60	0.60	0.04	0.05	0.31	0.00	0.16	0.16	-0.32	-0.30	-0.04	0.5817	0.0191	9.9	1.3	9.9	1.5	A+	A-
Reading	6	596659	1850	6	82	B.3.3.3	2	14302	0.72	0.11	0.72	0.08	0.09	0.00	0.42	-0.30	0.42	-0.36	-0.32	-0.1335	0.0208	-2.1	1.0	-3.3	0.9	A+	A-
Reading	6	596657	1851	6	83	B.3.3.3	2	14302	0.69	0.22	0.05	0.04	0.69	0.00	0.46	-0.39	-0.37	-0.36	0.46	0.0398	0.0203	-6.0	0.9	-7.4	0.9	A-	A-
Reading	6	596654	1852	6	84	B.3.2.1	2	14302	0.83	0.07	0.05	0.83	0.05	0.00	0.52	-0.35	-0.41	0.52	-0.36	-0.8947	0.0242	-9.9	0.9	-9.9	0.7	A+	A-
Reading	6	553037	1854	6	86	A.1.4.1		57106	0.62	0.17	0.62	0.15	0.06	0.00	0.40	-0.36	0.40	-0.31	-0.32	0.4710	0.0096	1.7	1.0	-3.7	1.0		
Reading	6	553028	1855	6	87	A.1.1.1		57106	0.74	0.08	0.13	0.74	0.06	0.00	0.43	-0.34	-0.33	0.43	-0.30	-0.2223	0.0105	-4.7	1.0	-6.5	0.9		
Reading	6	553032	1856	6	88	A.1.3.1		57106	0.60	0.60	0.17	0.07	0.16	0.00	0.52	0.52	-0.45	-0.48	-0.44	0.5849	0.0095	-9.9	0.9	-9.9	0.8		
Reading	6	553033	1857	6	89	B.2.1.4		57106	0.80	0.05	0.07	0.80	0.08	0.00	0.52	-0.39	-0.40	0.52	-0.36	-0.6555	0.0114	-9.9	0.9	-9.9	0.7		
Reading	6	553036	1858	6	90	A.1.6.1		57106	0.79	0.08	0.08	0.05	0.79	0.00	0.53	-0.41	-0.35	-0.44	0.53	-0.5928	0.0113	-9.9	0.8	-9.9	0.7		
Reading	6	553034	1859	6	91	A.1.4.1		57106	0.56	0.56	0.10	0.20	0.14	0.00	0.36	0.36	-0.31	-0.35	-0.29	0.7630	0.0094	9.5	1.0	9.9	1.1		
Reading	6	553035	1860	6	92	A.1.5.1		57106	0.69	0.05	0.12	0.13	0.69	0.00	0.54	-0.47	-0.44	-0.44	0.54	0.0308	0.0101	-9.9	0.8	-9.9	0.8		
Reading	6	553039	1861	6	93	A.1.3.1		57106	0.61	0.14	0.12	0.61	0.13	0.00	0.46	-0.37	-0.40	0.46	-0.38	0.5215	0.0096	-9.9	0.9	-9.9	0.9		
Reading	6	592913	1862	7	75	A.2.4.1	1	14295	0.27	0.07	0.30	0.27	0.36	0.00	0.26	-0.53	-0.21	0.26	-0.30	2.2874	0.0206	3.7	1.0	9.9	1.3	A-	B-
Reading	6	592912	1863	7	76	A.2.4.1	1	14295	0.80	0.02	0.03	0.15	0.80	0.00	0.36	-0.26	-0.37	-0.24	0.36	-0.6505	0.0228	1.8	1.0	2.2	1.1	A-	A+
Reading	6	592914	1864	7	77	A.2.3.1	2	14295	0.85	0.85	0.08	0.03	0.04	0.00	0.44	0.44	-0.37	-0.28	-0.25	-1.1251	0.0255	-6.7	0.9	-8.8	0.8	A-	C-
Reading	6	592915	1865	7	78	A.2.3.1	3	14295	0.92	0.02	0.03	0.03	0.92	0.00	0.42	-0.23	-0.28	-0.29	0.42	-1.8653	0.0320	-5.5	0.9	-9.9	0.6	A+	A-
Reading	6	592911	1866	7	79	A.2.4.1	3	14295	0.56	0.05	0.27	0.12	0.56	0.00	0.35	-0.41	-0.28	-0.30	0.35	0.7300	0.0188	9.7	1.1	9.5	1.1	A+	A-
Reading	6	592909	1867	7	80	B.3.1.1	2	14295	0.75	0.03	0.13	0.75	0.08	0.00	0.37	-0.39	-0.20	0.37	-0.32	-0.3478	0.0214	2.3	1.0	4.7	1.1	A-	A-
Reading	6	592907	1868	7	81	B.2.1.1	2	14295	0.65	0.15	0.65	0.09	0.10	0.00	0.34	-0.25	0.34	-0.31	-0.27	0.2424	0.0196	8.6	1.1	9.5	1.1	A-	A-
Reading	6	592906	1869	7	82	B.3.3.2	2	14295	0.50	0.38	0.07																

## Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Reading	6	592926	1870	7	83	B.3.3.3	2	14295	0.66	0.24	0.66	0.06	0.04	0.00	0.33	-0.25	0.33	-0.29	-0.34	0.2249	0.0196	9.8	1.1	7.1	1.1	A-	A-
Reading	6	592910	1871	7	84	A.2.6.2	3	14295	0.44	0.16	0.44	0.29	0.10	0.00	0.19	-0.21	0.19	-0.10	-0.31	1.3284	0.0187	9.9	1.3	9.9	1.4	A+	A-
Reading	6	553037	1854	7	86	A.1.4.1		57106	0.62	0.17	0.62	0.15	0.06	0.00	0.40	-0.36	0.40	-0.31	-0.32	0.4710	0.0096	1.7	1.0	-3.7	1.0		
Reading	6	553028	1855	7	87	A.1.1.1		57106	0.74	0.08	0.13	0.74	0.06	0.00	0.43	-0.34	-0.33	0.43	-0.30	-0.2223	0.0105	-4.7	1.0	-6.5	0.9		
Reading	6	553032	1856	7	88	A.1.3.1		57106	0.60	0.60	0.17	0.07	0.16	0.00	0.52	0.52	-0.45	-0.48	-0.44	0.5849	0.0095	-9.9	0.9	-9.9	0.8		
Reading	6	553033	1857	7	89	B.2.1.4		57106	0.80	0.05	0.07	0.80	0.08	0.00	0.52	-0.39	-0.40	0.52	-0.36	-0.6555	0.0114	-9.9	0.9	-9.9	0.7		
Reading	6	553036	1858	7	90	A.1.6.1		57106	0.79	0.08	0.08	0.05	0.79	0.00	0.53	-0.41	-0.35	-0.44	0.53	-0.5928	0.0113	-9.9	0.8	-9.9	0.7		
Reading	6	553034	1859	7	91	A.1.4.1		57106	0.56	0.56	0.10	0.20	0.14	0.00	0.36	0.36	-0.31	-0.35	-0.29	0.7630	0.0094	9.5	1.0	9.9	1.1		
Reading	6	553035	1860	7	92	A.1.5.1		57106	0.69	0.05	0.12	0.13	0.69	0.00	0.54	-0.47	-0.44	-0.44	0.54	0.0308	0.0101	-9.9	0.8	-9.9	0.8		
Reading	6	553039	1861	7	93	A.1.3.1		57106	0.61	0.14	0.12	0.61	0.13	0.00	0.46	-0.37	-0.40	0.46	-0.38	0.5215	0.0096	-9.9	0.9	-9.9	0.9		
Reading	6	592957	1873	8	75	A.2.4.1	1	14250	0.87	0.04	0.87	0.04	0.06	0.00	0.40	-0.24	0.40	-0.28	-0.28	-1.2573	0.0267	-3.6	0.9	-7.5	0.8	A-	A-
Reading	6	592947	1874	8	76	A.2.4.1	2	14250	0.78	0.06	0.10	0.06	0.78	0.00	0.39	-0.29	-0.25	-0.33	0.39	-0.4795	0.0220	-0.8	1.0	-3.2	0.9	A+	B-
Reading	6	592961	1875	8	77	A.2.4.1	2	14250	0.70	0.07	0.10	0.70	0.14	0.00	0.38	-0.29	-0.25	0.38	-0.33	0.0244	0.0202	2.2	1.0	-1.2	1.0	A-	A-
Reading	6	592977	1876	8	78	A.2.1.2	2	14250	0.64	0.05	0.64	0.24	0.06	0.00	0.39	-0.38	0.39	-0.29	-0.37	0.3268	0.0195	1.6	1.0	0.8	1.0	A-	A-
Reading	6	592981	1877	8	79	A.1.3.1	2	14250	0.34	0.22	0.26	0.18	0.34	0.00	0.13	-0.11	-0.05	-0.26	0.13	1.8639	0.0194	9.9	1.2	9.9	1.6	A+	A-
Reading	6	592941	1878	8	80	B.3.3.2	2	14250	0.69	0.69	0.07	0.18	0.06	0.00	0.35	0.35	-0.35	-0.21	-0.34	0.0607	0.0201	6.2	1.1	6.9	1.1	A-	A-
Reading	6	592942	1879	8	81	B.3.3.3	2	14250	0.52	0.52	0.21	0.19	0.09	0.00	0.28	0.28	-0.22	-0.25	-0.29	0.9784	0.0187	9.9	1.1	9.9	1.2	A+	A-
Reading	6	592943	1880	8	82	A.2.6.2	3	14250	0.35	0.08	0.26	0.35	0.31	0.00	0.15	-0.25	-0.18	0.15	-0.10	1.8250	0.0194	9.9	1.2	9.9	1.5	A+	A-
Reading	6	592938	1881	8	83	A.2.2.1	2	14250	0.82	0.03	0.11	0.04	0.82	0.00	0.42	-0.29	-0.31	-0.30	0.42	-0.7847	0.0236	-3.4	1.0	-6.3	0.8	A-	A+
Reading	6	592940	1882	8	84	B.3.1.1	2	14250	0.83	0.83	0.09	0.05	0.03	0.00	0.49	0.49	-0.34	-0.36	-0.37	-0.9066	0.0243	-9.7	0.9	-9.9	0.7	A+	B-
Reading	6	553037	1854	8	86	A.1.4.1		57106	0.62	0.17	0.62	0.15	0.06	0.00	0.40	-0.36	0.40	-0.31	-0.32	0.4710	0.0096	1.7	1.0	-3.7	1.0		
Reading	6	553028	1855	8	87	A.1.1.1		57106	0.74	0.08	0.13	0.74	0.06	0.00	0.43	-0.34	-0.33	0.43	-0.30	-0.2223	0.0105	-4.7	1.0	-6.5	0.9		
Reading	6	553032	1856	8	88	A.1.3.1		57106	0.60	0.60	0.17	0.07	0.16	0.00	0.52	0.52	-0.45	-0.48	-0.44	0.5849	0.0095	-9.9	0.9	-9.9	0.8		
Reading	6	553033	1857	8	89	B.2.1.4		57106	0.80	0.05	0.07	0.80	0.08	0.00	0.52	-0.39	-0.40	0.52	-0.36	-0.6555	0.0114	-9.9	0.9	-9.9	0.7		
Reading	6	553036	1858	8	90	A.1.6.1		57106	0.79	0.08	0.08	0.05	0.79	0.00	0.53	-0.41	-0.35	-0.44	0.53	-0.5928	0.0113	-9.9	0.8	-9.9	0.7		
Reading	6	553034	1859	8	91	A.1.4.1		57106	0.56	0.56	0.10	0.20	0.14	0.00	0.36	0.36	-0.31	-0.35	-0.29	0.7630	0.0094	9.5	1.0	9.9	1.1		
Reading	6	553035	1860	8	92	A.1.5.1		57106	0.69	0.05	0.12	0.13	0.69	0.00	0.54	-0.47	-0.44	-0.44	0.54	0.0308	0.0101	-9.9	0.8	-9.9	0.8		
Reading	6	553039	1861	8	93	A.1.3.1		57106	0.61	0.14	0.12	0.61	0.13	0.00	0.46	-0.37	-0.40	0.46	-0.38	0.5215	0.0096	-9.9	0.9	-9.9	0.9		
Reading	6	592971	1884	9	75	A.2.2.2	2	14259	0.63	0.23	0.08	0.63	0.07	0.00	0.34	-0.30	-0.22	0.34	-0.30	0.4175	0.0192	6.9	1.1	4.0	1.1	A-	A-
Reading	6	592975	1885	9	76	A.2.4.1	1	14259	0.66	0.08	0.11	0.16	0.66	0.00	0.40	-0.31	-0.36	-0.30	0.40	0.2439	0.0196	-0.4	1.0	-3.1	1.0	A-	B-
Reading	6	592976	1886	9	77	A.2.3.1	2	14259	0.18	0.18	0.04	0.76	0.02	0.00	0.02	0.02	-0.35	0.01	-0.38	2.8437	0.0231	9.9	1.2	9.9	2.1	B-	A-
Reading	6	592972	1887	9	78	A.2.1.1	2	14259	0.59	0.59	0.06	0.17	0.18	0.00	0.25	0.25	-0.35	-0.15	-0.19	0.6212	0.0189	9.9	1.2	9.9	1.2	A+	A-
Reading	6	592982	1888	9	79	A.2.3.1	2	14259	0.60	0.19	0.60	0.10	0.11	0.00	0.31	-0.21	0.31	-0.32	-0.24	0.5379	0.0190	9.9	1.1	7.8	1.1	A-	A-
Reading	6	592969	1889	9	80	B.2.1.2	3	14259	0.75	0.75	0.10	0.12	0.03	0.00	0.39	0.39	-0.35	-0.23	-0.36	-0.3086	0.0213	-0.6	1.0	1.6	1.0	A+	A-
Reading	6	592973	1890	9	81	A.2.4.1	2	14259	0.15	0.53	0.24	0.07	0.15	0.00	-0.10	0.14	0.18	-0.22	-0.10	3.0669	0.0245	9.9	1.3	9.9	2.9	A-	A+
Reading	6	592968	1891	9	82	B.3.3.1	2	14259	0.62	0.08	0.07	0.22	0.62	0.00	0.39	-0.39	-0.43	-0.25	0.39	0.4445	0.0192	1.4	1.0	1.9	1.0	A+	A-
Reading	6	592970	1892	9	83	B.3.1.1	2	14259	0.84	0.05	0.05	0.05	0.84	0.00	0.52	-0.36	-0.39	-0.35	0.52	-0.9843	0.0247	-9.9	0.8	-9.9	0.7	A+	B-
Reading	6	592974	1893	9	84	A.2.6.2	3	14259	0.24	0.09	0.13	0.24	0.54	0.00	0.06	-0.21	-0.17	0.06	-0.01	2.4494	0.0212	9.9	1.2	9.9	1.8	A+	A-
Reading	6	553037	1854	9	86	A.1.4.1		57106	0.62	0.17	0.62	0.15	0.06	0.00	0.40	-0.36	0.40	-0.31	-0.32	0.4710	0.0096	1.7	1.0	-3.7	1.0		
Reading	6	553028	1855	9	87	A.1.1.1		57106	0.74	0.08	0.13	0.74	0.06	0.00	0.43	-0.34	-0.33	0.43	-0.30	-0.2223	0.0105	-4.7	1.0	-6.5	0.9		
Reading	6	553032	1856	9	88	A.1.3.1		57106	0.60	0.60	0.17	0.07	0.16	0.00	0.52	0.52	-0.45	-0.48	-0.44	0.5849	0.0095	-9.9	0.9	-9.9	0.8		
Reading	6	553033	1857	9	89	B.2.1.4		57106	0.80	0.05	0.07	0.80	0.08	0.00	0.52	-0.39	-0.40	0.52	-0.36	-0.6555	0.0114	-9.9	0.9	-9.9	0.7		
Reading	6	553036	1858	9	90	A.1.6.1		57106	0.79	0.08	0.08	0.05	0.79	0.00	0.53	-0.41	-0.35	-0.44	0.53	-0.5928	0.0113	-9.9	0.8	-9.9	0.7		
Reading	6	553034	1859	9	91	A.1.4.1		57106	0.56	0.56	0.10	0.20	0.14	0.00	0.36	0.36	-0.31	-0.35	-0.29	0.7630	0.0094	9.5	1.0	9.9	1.1		
Reading	6	553035	1860	9	92	A.1.5.1		57106	0.69	0.05	0.12	0.13	0.69	0.00	0.54	-0.47	-0.44	-0.44	0.54	0.0308	0.0101	-9.9	0.8	-9.9	0.8		
Reading	6	553039	1861	9	93	A.1.3.1		57106	0.61	0.14	0.12	0.61	0.13	0.00	0.46	-0.37	-0.40	0.46	-0.38	0.5215	0.0096	-9.9	0.9	-9.9	0.9		
Reading	7	555444	1895	0	27	A.2.3.1		130337	0.77	0.04	0.07	0.12	0.77	0.00	0.45	-0.32	-0.31	-0.36	0.45	-0.3539	0.0071	-9.9	0.9	-9.9	0.8		
Reading	7	555449	1896	0	28	A.2.3.1		130337	0.45	0.45	0.25	0.09	0.21	0.00	0.27	0.27	-0.23	-0.34	-0.23	1.3490	0.0061	9.9	1.1	9.9	1.2		
Reading	7	555445	1897	0	29	B.1.1.1		130337	0.73	0.07	0.13	0.73	0.07	0.00	0.24	-0.11	-0.18	0.24	-0.24	-0.1329	0.0068	9.9	1.1	9.9	1.3		
Reading	7	555450	1898	0	30	B.1.1.1		130337	0.60	0.60	0.27	0.12	0.02	0.00	0.23	0.23	-0.15	-0.24	-0.30	0.6242	0.0062	9.9	1.2	9.9	1.2		
Reading	7	555453	1899	0	31	A.2.3.1		130337	0.45	0.09	0.45	0.25															

Appendix I: Item Statistics Multiple Choice

Item Information								Classical											Rasch		Infit		Outfit		DIF		
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Reading	7	555451	1900	0	32	B.2.1.1		130337	0.66	0.14	0.10	0.66	0.09	0.00	0.43	-0.40	-0.28	0.43	-0.36	0.2927	0.0064	-9.9	1.0	-9.9	0.9		
Reading	7	555591	1901	0	33	A.2.4.1		130337	0.76	0.03	0.19	0.02	0.76	0.00	0.34	-0.24	-0.29	-0.24	0.34	-0.3396	0.0071	5.1	1.0	5.9	1.0		
Reading	7	555594	1902	0	34	B.3.2.1		130337	0.67	0.05	0.24	0.67	0.03	0.00	0.38	-0.37	-0.31	0.38	-0.22	0.2213	0.0065	1.6	1.0	-7.5	1.0		
Reading	7	555587	1903	0	35	A.2.3.1		130337	0.68	0.17	0.07	0.07	0.68	0.00	0.30	-0.29	-0.18	-0.19	0.30	0.1649	0.0065	9.9	1.1	9.9	1.1		
Reading	7	555588	1904	0	36	A.2.3.1		130337	0.89	0.89	0.03	0.03	0.04	0.00	0.47	0.47	-0.29	-0.32	-0.34	-1.4521	0.0095	-9.9	0.9	-9.9	0.6		
Reading	7	555593	1905	0	37	B.3.1.1		130337	0.79	0.06	0.79	0.03	0.12	0.00	0.38	-0.30	0.38	-0.30	-0.25	-0.5300	0.0074	-5.8	1.0	3.5	1.0		
Reading	7	555592	1906	0	38	B.1.2.1		130337	0.66	0.66	0.11	0.08	0.15	0.00	0.34	0.34	-0.22	-0.31	-0.29	0.3090	0.0064	9.9	1.0	4.5	1.0		
Reading	7	555424	1908	0	40	B.1.1.1		130337	0.88	0.04	0.88	0.03	0.05	0.00	0.37	-0.29	0.37	-0.24	-0.22	-1.2832	0.0090	-9.9	0.9	-7.4	0.9		
Reading	7	555417	1909	0	41	A.1.3.1		130337	0.74	0.17	0.03	0.74	0.06	0.00	0.43	-0.31	-0.33	0.43	-0.38	-0.1925	0.0069	-9.9	0.9	-9.9	0.9		
Reading	7	555416	1910	0	42	A.1.2.2		130337	0.77	0.77	0.10	0.04	0.08	0.00	0.47	0.47	-0.35	-0.36	-0.34	-0.3849	0.0072	-9.9	0.9	-9.9	0.8		
Reading	7	555419	1911	0	43	B.2.1.1		130337	0.77	0.77	0.10	0.07	0.05	0.00	0.49	0.49	-0.42	-0.35	-0.31	-0.3941	0.0072	-9.9	0.9	-9.9	0.8		
Reading	7	555415	1912	0	44	A.1.1.2		130337	0.60	0.25	0.08	0.60	0.07	0.00	0.35	-0.29	-0.27	0.35	-0.32	0.6024	0.0062	9.9	1.0	9.9	1.1		
Reading	7	555426	1913	0	45	B.2.1.1		130337	0.86	0.03	0.86	0.08	0.02	0.00	0.44	-0.35	0.44	-0.28	-0.32	-1.0846	0.0085	-9.9	0.9	-9.9	0.9		
Reading	7	555423	1914	0	46	B.1.1.1		130337	0.65	0.65	0.10	0.04	0.20	0.00	0.32	0.32	-0.31	-0.37	-0.18	0.3277	0.0064	9.9	1.1	9.9	1.1		
Reading	7	555551	1916	0	117	B.3.1.1		130337	0.71	0.13	0.05	0.71	0.10	0.00	0.40	-0.35	-0.35	0.40	-0.24	-0.0179	0.0067	-7.1	1.0	-8.8	1.0		
Reading	7	555545	1917	0	118	A.2.2.1		130337	0.45	0.45	0.18	0.23	0.14	0.00	0.26	0.26	-0.33	-0.16	-0.27	1.3467	0.0061	9.9	1.1	9.9	1.2		
Reading	7	555546	1918	0	119	A.2.4.1		130337	0.71	0.04	0.71	0.23	0.02	0.00	0.40	-0.38	0.40	-0.32	-0.28	-0.0062	0.0067	-6.1	1.0	-9.9	1.0		
Reading	7	555544	1919	0	120	A.2.3.1		130337	0.79	0.04	0.09	0.09	0.79	0.00	0.47	-0.31	-0.35	-0.35	0.47	-0.4939	0.0073	-9.9	0.9	-9.9	0.8		
Reading	7	555553	1920	0	121	B.3.3.2		130337	0.61	0.15	0.61	0.19	0.06	0.00	0.32	-0.29	0.32	-0.22	-0.32	0.5558	0.0062	9.9	1.1	9.9	1.1		
Reading	7	555549	1921	0	122	A.2.6.1		130337	0.87	0.03	0.02	0.08	0.87	0.00	0.42	-0.29	-0.30	-0.29	0.42	-1.1937	0.0088	-9.9	0.9	-9.9	0.8		
Reading	7	555554	1922	0	123	A.2.4.1		130337	0.80	0.80	0.10	0.05	0.05	0.00	0.39	0.39	-0.25	-0.33	-0.27	-0.5726	0.0074	-6.9	1.0	-9.9	0.9		
Reading	7	555550	1923	0	124	B.2.1.2		130337	0.71	0.10	0.71	0.09	0.09	0.00	0.48	-0.31	0.48	-0.42	-0.41	-0.0133	0.0067	-9.9	0.9	-9.9	0.8		
Reading	7	553419	1925	0	126	A.1.3.1		130337	0.73	0.73	0.10	0.06	0.10	0.00	0.38	0.38	-0.32	-0.20	-0.31	-0.1209	0.0068	-1.4	1.0	3.0	1.0		
Reading	7	553416	1926	0	127	A.1.4.1	2	130337	0.69	0.07	0.10	0.13	0.69	0.00	0.42	-0.24	-0.37	-0.37	0.42	0.1011	0.0066	-9.9	1.0	-9.9	0.9		
Reading	7	553423	1927	0	128	A.1.6.1	2	130337	0.66	0.08	0.66	0.07	0.19	0.00	0.47	-0.41	0.47	-0.37	-0.36	0.2651	0.0064	-9.9	0.9	-9.9	0.9		
Reading	7	553424	1928	0	129	B.1.1.1	3	130337	0.77	0.16	0.77	0.03	0.04	0.00	0.37	-0.24	0.37	-0.34	-0.35	-0.4008	0.0072	-4.3	1.0	3.1	1.0		
Reading	7	553425	1929	0	130	B.1.1.1	3	130337	0.82	0.10	0.05	0.82	0.03	0.00	0.47	-0.30	-0.40	0.47	-0.35	-0.7375	0.0077	-9.9	0.9	-9.9	0.8		
Reading	7	553418	1930	0	131	A.1.3.1		130337	0.61	0.09	0.13	0.61	0.18	0.00	0.37	-0.41	-0.30	0.37	-0.26	0.5719	0.0062	2.8	1.0	3.5	1.0		
Reading	7	555459	1931	0	132	A.1.3.1		130337	0.77	0.06	0.77	0.05	0.11	0.00	0.34	-0.36	0.34	-0.25	-0.17	-0.4009	0.0072	5.1	1.0	9.9	1.1		
Reading	7	555467	1932	0	133	B.2.2.2		130337	0.59	0.24	0.08	0.59	0.09	0.00	0.32	-0.24	-0.29	0.32	-0.28	0.6637	0.0062	9.9	1.1	9.9	1.1		
Reading	7	555458	1933	0	134	A.1.3.1		130337	0.68	0.14	0.11	0.07	0.68	0.00	0.31	-0.21	-0.23	-0.31	0.31	0.1725	0.0065	9.9	1.1	9.9	1.1		
Reading	7	555461	1934	0	135	B.1.1.1		130337	0.77	0.09	0.77	0.04	0.09	0.00	0.40	-0.30	0.40	-0.34	-0.24	-0.3957	0.0072	-8.0	1.0	-6.1	1.0		
Reading	7	555466	1935	0	136	B.2.1.1		130337	0.61	0.19	0.04	0.15	0.61	0.00	0.48	-0.40	-0.48	-0.39	0.48	0.5498	0.0062	-9.9	0.9	-9.9	0.9		
Reading	7	555463	1936	0	137	B.1.1.1		130337	0.68	0.68	0.16	0.10	0.06	0.00	0.32	0.32	-0.16	-0.36	-0.28	0.1646	0.0065	9.9	1.1	9.9	1.1		
Reading	7	555468	1937	0	138	B.1.2.1		130337	0.46	0.08	0.30	0.46	0.16	0.00	0.27	-0.37	-0.19	0.27	-0.26	1.2958	0.0061	9.9	1.1	9.9	1.2		
Reading	7	594138	1939	1	73	A.2.2.2	2	14730	0.84	0.84	0.11	0.03	0.02	0.00	0.38	0.38	-0.27	-0.28	-0.26	-0.9823	0.0243	-2.9	1.0	-5.4	0.9	A-	A-
Reading	7	599552	1940	1	74	A.2.4.1	1	14730	0.91	0.05	0.91	0.02	0.01	0.00	0.42	-0.34	0.42	-0.25	-0.21	-1.7151	0.0304	-6.4	0.9	-9.9	0.6	A+	A-
Reading	7	594137	1941	1	75	B.3.2.1	2	14730	0.46	0.12	0.08	0.34	0.46	0.00	0.35	-0.33	-0.26	-0.35	0.35	1.2061	0.0181	2.6	1.0	5.7	1.1	A+	A-
Reading	7	594164	1942	1	76	A.2.4.1	2	14730	0.50	0.50	0.06	0.42	0.02	0.00	0.15	0.15	-0.39	-0.04	-0.33	1.0515	0.0181	9.9	1.3	9.9	1.3	A+	A+
Reading	7	594144	1943	1	77	A.2.3.1	2	14730	0.48	0.15	0.25	0.11	0.48	0.00	0.28	-0.25	-0.23	-0.31	0.28	1.1086	0.0181	9.9	1.1	9.9	1.1	A+	A-
Reading	7	594140	1944	1	78	A.2.6.2	2	14730	0.25	0.25	0.57	0.03	0.15	0.00	0.25	0.25	-0.23	-0.52	-0.31	2.3680	0.0205	2.6	1.0	9.9	1.3	A+	A-
Reading	7	594142	1945	1	79	A.2.3.1	2	14730	0.72	0.72	0.18	0.03	0.06	0.00	0.44	0.44	-0.32	-0.37	-0.40	-0.1301	0.0201	-7.0	0.9	-6.4	0.9	A+	A+
Reading	7	594139	1946	1	80	B.3.1.1	2	14730	0.32	0.23	0.06	0.32	0.39	0.00	-0.08	-0.04	-0.23	-0.08	0.23	1.9422	0.0192	9.9	1.4	9.9	1.9	A+	A+
Reading	7	594141	1947	1	81	A.2.5.1	2	14730	0.34	0.29	0.34	0.21	0.15	0.00	0.20	-0.21	0.20	-0.17	-0.24	1.8250	0.0189	9.9	1.1	9.9	1.4	A-	A+
Reading	7	594163	1948	1	82	B.3.3.1	3	14730	0.50	0.12	0.50	0.14	0.24	0.00	0.27	-0.34	0.27	-0.26	-0.19	1.0495	0.0181	9.9	1.1	9.9	1.2	A+	A+
Reading	7	547995	1950	1	84	A.1.4.1		72495	0.58	0.19	0.58	0.21	0.02	0.00	0.28	-0.25	0.28	-0.23	-0.22	0.7242	0.0083	9.9	1.1	9.9	1.1		
Reading	7	547985	1951	1	85	A.1.3.1		72495	0.62	0.08	0.62	0.25	0.06	0.00	0.32	-0.39	0.32	-0.17	-0.35	0.5073	0.0084	9.9	1.1	9.9	1.1		
Reading	7	547983	1952	1	86	A.1.3.1		72495	0.75	0.08	0.09	0.75	0.08	0.00	0.36	-0.24	-0.34	0.36	-0.22	-0.2460	0.0093	-1.8	1.0	3.3	1.0		
Reading	7	547986	1953	1	87	A.1.4.1		72495	0.79	0.03	0.79	0.10	0.08	0.00	0.50	-0.35	0.50	-0.43	-0.31	-0.5139	0.0098	-9.9	0.9	-9.9	0.7		
Reading	7	547987	1954	1	88	B.2.1.1		72495	0.87	0.87	0.05	0.03	0.04	0.00	0.45	0.45	-0.32	-0.33	-0.28	-1.2449	0.0119	-9.9	0.9	-9.9	0.7		
Reading	7	547993	1955	1	89	B.1.1.1		72495	0.75	0.10	0.05	0.10															

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF		
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B	
Reading	7	547988	1956	1	90	B.2.2.1		72495	0.88	0.05	0.04	0.03	0.88	0.00	0.45	-0.30	-0.31	-0.29	0.45	-1.3257	0.0122	-9.9	0.9	-9.9	0.6			
Reading	7	547989	1957	1	91	A.1.6.1		72495	0.75	0.05	0.14	0.07	0.75	0.00	0.44	-0.34	-0.35	-0.31	0.44	-0.2298	0.0093	-9.9	0.9	-9.9	0.9			
Reading	7	594110	1958	2	73	A.2.3.1	2	14451	0.54	0.54	0.06	0.09	0.30	0.00	0.28	0.28	-0.34	-0.36	-0.16	0.8789	0.0183	9.9	1.1	9.9	1.1	A-	A-	
Reading	7	594131	1959	2	74	A.2.2.2	2	14451	0.73	0.20	0.03	0.05	0.73	0.00	0.38	-0.26	-0.34	-0.37	0.38	-0.0883	0.0203	-0.6	1.0	-0.1	1.0	B-	A-	
Reading	7	594107	1960	2	75	A.2.3.1	2	14451	0.49	0.24	0.12	0.15	0.49	0.00	0.37	-0.35	-0.32	-0.35	0.37	1.1525	0.0183	-1.1	1.0	1.4	1.0	A+	A+	
Reading	7	594133	1961	2	76	A.2.4.1	1	14451	0.64	0.02	0.64	0.10	0.24	0.00	0.28	-0.25	0.28	-0.33	-0.17	0.3677	0.0190	9.9	1.1	9.9	1.1	A+	A+	
Reading	7	594106	1962	2	77	B.2.1.1	2	14451	0.51	0.14	0.10	0.26	0.51	0.00	0.27	-0.25	-0.29	-0.21	0.27	1.0498	0.0183	9.9	1.1	9.9	1.1	A-	A+	
Reading	7	594108	1963	2	78	A.2.4.1	3	14451	0.55	0.16	0.17	0.55	0.11	0.00	0.21	-0.16	-0.21	0.21	-0.17	0.8620	0.0184	9.9	1.2	9.9	1.2	A+	A+	
Reading	7	594104	1964	2	79	A.2.4.1	2	14451	0.68	0.68	0.08	0.11	0.13	0.00	0.39	0.39	-0.35	-0.37	-0.23	0.1688	0.0195	-1.3	1.0	-0.2	1.0	A-	A-	
Reading	7	594112	1965	2	80	A.2.5.1	2	14451	0.61	0.61	0.18	0.12	0.09	0.00	0.29	0.29	-0.22	-0.21	-0.30	0.5308	0.0187	9.9	1.1	9.9	1.1	A+	A+	
Reading	7	594135	1966	2	81	A.2.6.2	2	14451	0.59	0.16	0.12	0.59	0.12	0.00	0.34	-0.27	-0.30	0.34	-0.28	0.6355	0.0186	4.9	1.0	3.6	1.0	A+	A-	
Reading	7	594105	1967	2	82	B.3.3.1	3	14451	0.39	0.12	0.30	0.19	0.39	0.00	0.21	-0.35	-0.11	-0.23	0.21	1.6387	0.0186	9.9	1.1	9.9	1.3	A+	A-	
Reading	7	547995	1950	2	84	A.1.4.1		72495	0.58	0.19	0.58	0.21	0.02	0.00	0.28	-0.25	0.28	-0.23	-0.22	0.7242	0.0083	9.9	1.1	9.9	1.1			
Reading	7	547985	1951	2	85	A.1.3.1		72495	0.62	0.08	0.62	0.25	0.06	0.00	0.32	-0.39	0.32	-0.17	-0.35	0.5073	0.0084	9.9	1.1	9.9	1.1			
Reading	7	547983	1952	2	86	A.1.3.1		72495	0.75	0.08	0.09	0.75	0.08	0.00	0.36	-0.24	-0.34	0.36	-0.22	-0.2460	0.0093	-1.8	1.0	3.3	1.0			
Reading	7	547986	1953	2	87	A.1.4.1		72495	0.79	0.03	0.79	0.10	0.08	0.00	0.50	-0.35	0.50	-0.43	-0.31	-0.5139	0.0098	-9.9	0.9	-9.9	0.7			
Reading	7	547987	1954	2	88	B.2.1.1		72495	0.87	0.87	0.05	0.03	0.04	0.00	0.45	0.45	-0.32	-0.33	-0.28	-1.2449	0.0119	-9.9	0.9	-9.9	0.7			
Reading	7	547993	1955	2	89	B.1.1.1		72495	0.75	0.10	0.05	0.10	0.75	0.00	0.48	-0.35	-0.39	-0.38	0.48	-0.2290	0.0093	-9.9	0.9	-9.9	0.8			
Reading	7	547988	1956	2	90	B.2.2.1		72495	0.88	0.05	0.04	0.03	0.88	0.00	0.45	-0.30	-0.31	-0.29	0.45	-1.3257	0.0122	-9.9	0.9	-9.9	0.6			
Reading	7	547989	1957	2	91	A.1.6.1		72495	0.75	0.05	0.14	0.07	0.75	0.00	0.44	-0.34	-0.35	-0.31	0.44	-0.2298	0.0093	-9.9	0.9	-9.9	0.9			
Reading	7	594121	1969	3	73	A.2.4.1	1	14469	0.56	0.27	0.56	0.10	0.07	0.00	0.23	-0.13	0.23	-0.26	-0.26	0.7920	0.0183	9.9	1.1	9.9	1.2	A-	A-	
Reading	7	594113	1970	3	74	A.2.2.2	2	14469	0.78	0.09	0.78	0.09	0.04	0.00	0.42	-0.28	0.42	-0.35	-0.26	-0.4202	0.0216	-4.7	1.0	-8.5	0.8	A-	A-	
Reading	7	594120	1971	3	75	A.2.4.1	1	14469	0.47	0.47	0.10	0.27	0.15	0.00	0.31	0.31	-0.35	-0.22	-0.35	1.2041	0.0182	4.3	1.0	6.6	1.1	A-	A-	
Reading	7	594117	1972	3	76	B.3.3.1	3	14469	0.41	0.18	0.14	0.41	0.28	0.00	0.25	-0.31	-0.26	0.25	-0.18	1.5311	0.0184	9.9	1.1	9.9	1.2	A-	A-	
Reading	7	594122	1973	3	77	A.2.3.1	2	14469	0.46	0.20	0.06	0.46	0.27	0.00	0.09	-0.02	-0.33	0.09	-0.05	1.2546	0.0182	9.9	1.3	9.9	1.4	A-	A-	
Reading	7	594116	1974	3	78	B.3.1.1	3	14469	0.14	0.38	0.33	0.14	0.15	0.00	0.01	0.05	-0.01	0.01	-0.16	3.1926	0.0251	8.4	1.1	9.9	2.3	A-	A+	
Reading	7	594123	1975	3	79	A.2.3.1	2	14469	0.25	0.25	0.11	0.17	0.46	0.00	0.03	0.03	-0.27	-0.23	0.10	2.3685	0.0205	9.9	1.3	9.9	1.7	B-	A-	
Reading	7	594115	1976	3	80	A.2.6.2	2	14469	0.51	0.14	0.25	0.10	0.51	0.00	0.34	-0.30	-0.26	-0.38	0.34	1.0254	0.0182	3.6	1.0	3.4	1.0	A+	A-	
Reading	7	594161	1977	3	81	A.2.4.1	2	14469	0.35	0.34	0.09	0.22	0.35	0.00	0.24	-0.23	-0.32	-0.22	0.24	1.8317	0.0189	9.9	1.1	9.9	1.2	A+	A-	
Reading	7	594119	1978	3	82	B.3.3.3	2	14469	0.47	0.47	0.25	0.10	0.17	0.00	0.32	0.32	-0.23	-0.38	-0.33	1.2078	0.0182	5.1	1.0	6.7	1.1	A-	A-	
Reading	7	547995	1950	3	84	A.1.4.1		72495	0.58	0.19	0.58	0.21	0.02	0.00	0.28	-0.25	0.28	-0.23	-0.22	0.7242	0.0083	9.9	1.1	9.9	1.1			
Reading	7	547985	1951	3	85	A.1.3.1		72495	0.62	0.08	0.62	0.25	0.06	0.00	0.32	-0.39	0.32	-0.17	-0.35	0.5073	0.0084	9.9	1.1	9.9	1.1			
Reading	7	547983	1952	3	86	A.1.3.1		72495	0.75	0.08	0.09	0.75	0.08	0.00	0.36	-0.24	-0.34	0.36	-0.22	-0.2460	0.0093	-1.8	1.0	3.3	1.0			
Reading	7	547986	1953	3	87	A.1.4.1		72495	0.79	0.03	0.79	0.10	0.08	0.00	0.50	-0.35	0.50	-0.43	-0.31	-0.5139	0.0098	-9.9	0.9	-9.9	0.7			
Reading	7	547987	1954	3	88	B.2.1.1		72495	0.87	0.87	0.05	0.03	0.04	0.00	0.45	0.45	-0.32	-0.33	-0.28	-1.2449	0.0119	-9.9	0.9	-9.9	0.7			
Reading	7	547993	1955	3	89	B.1.1.1		72495	0.75	0.10	0.05	0.10	0.75	0.00	0.48	-0.35	-0.39	-0.38	0.48	-0.2290	0.0093	-9.9	0.9	-9.9	0.8			
Reading	7	547988	1956	3	90	B.2.2.1		72495	0.88	0.05	0.04	0.03	0.88	0.00	0.45	-0.30	-0.31	-0.29	0.45	-1.3257	0.0122	-9.9	0.9	-9.9	0.6			
Reading	7	547989	1957	3	91	A.1.6.1		72495	0.75	0.05	0.14	0.07	0.75	0.00	0.44	-0.34	-0.35	-0.31	0.44	-0.2298	0.0093	-9.9	0.9	-9.9	0.9			
Reading	7	594180	1980	4	73	A.2.2.1	2	14423	0.48	0.14	0.48	0.29	0.09	0.00	0.26	-0.42	0.26	-0.12	-0.24	1.1686	0.0184	9.9	1.1	9.9	1.2	A-	A-	
Reading	7	594146	1981	4	74	A.2.4.1	2	14423	0.63	0.03	0.63	0.29	0.05	0.00	0.19	-0.18	0.19	-0.13	-0.19	0.4585	0.0190	9.9	1.2	9.9	1.3	A+	A-	
Reading	7	594179	1982	4	75	A.2.1.1	2	14423	0.58	0.36	0.04	0.02	0.58	0.00	0.32	-0.28	-0.30	-0.29	0.32	0.6867	0.0187	9.6	1.1	6.9	1.1	A-	A+	
Reading	7	594147	1983	4	76	A.2.3.1	2	14423	0.66	0.08	0.15	0.66	0.10	0.00	0.47	-0.35	-0.42	0.47	-0.35	0.2672	0.0194	-9.9	0.9	-9.9	0.9	B-	B-	
Reading	7	594148	1984	4	77	A.2.6.2	2	14423	0.71	0.03	0.11	0.15	0.71	0.00	0.39	-0.29	-0.29	-0.33	0.39	0.0035	0.0201	-0.7	1.0	1.5	1.0	A+	A-	
Reading	7	594145	1985	4	78	A.2.3.1	2	14423	0.60	0.60	0.06	0.09	0.24	0.00	0.42	0.42	-0.36	-0.41	-0.33	0.5848	0.0188	-4.4	1.0	-4.4	1.0	A-	A-	
Reading	7	594182	1986	4	79	A.2.3.1	2	14423	0.65	0.18	0.12	0.65	0.05	0.00	0.43	-0.35	-0.37	0.43	-0.34	0.3537	0.0192	-5.1	1.0	-5.0	0.9	A-	A-	
Reading	7	594186	1987	4	80	B.2.1.2	2	14423	0.67	0.67	0.03	0.06	0.23	0.00	0.41	0.41	-0.36	-0.37	-0.31	0.2101	0.0195	-2.8	1.0	-3.1	1.0	A-	A-	
Reading	7	594150	1988	4	81	B.3.1.1	3	14423	0.59	0.09	0.19	0.12	0.59	0.00	0.46	-0.35	-0.40	-0.40	0.46	0.6216	0.0187	-9.9	0.9	-9.9	0.9	A+	B-	
Reading	7	594181	1989	4	82	A.2.3.2	2	14423	0.54	0.23	0.16	0.54	0.07	0.00	0.33	-0.22	-0.33	0.33	-0.37	0.9104	0.0185	8.0	1.1	9.9	1.1	A-	A-	
Reading	7	547995	1950	4	84	A.1.4.1		72495	0.58	0.19	0.58	0.21	0.02	0.00	0.28	-0.25	0.28	-0.23	-0.22	0.7242	0.0083	9.9	1.1	9.9	1.1			
Reading	7	547985	1951	4	85	A.1.3.1		72495	0.62	0.08	0.62	0.25	0.06	0.00	0													

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Reading	7	547986	1953	4	87	A.1.4.1		72495	0.79	0.03	0.79	0.10	0.08	0.00	0.50	-0.35	0.50	-0.43	-0.31	-0.5139	0.0098	-9.9	0.9	-9.9	0.7		
Reading	7	547987	1954	4	88	B.2.1.1		72495	0.87	0.87	0.05	0.03	0.04	0.00	0.45	0.45	-0.32	-0.33	-0.28	-1.2449	0.0119	-9.9	0.9	-9.9	0.7		
Reading	7	547993	1955	4	89	B.1.1.1		72495	0.75	0.10	0.05	0.10	0.75	0.00	0.48	-0.35	-0.39	-0.38	0.48	-0.2290	0.0093	-9.9	0.9	-9.9	0.8		
Reading	7	547988	1956	4	90	B.2.2.1		72495	0.88	0.05	0.04	0.03	0.88	0.00	0.45	-0.30	-0.31	-0.29	0.45	-1.3257	0.0122	-9.9	0.9	-9.9	0.6		
Reading	7	547989	1957	4	91	A.1.6.1		72495	0.75	0.05	0.14	0.07	0.75	0.00	0.44	-0.34	-0.35	-0.31	0.44	-0.2298	0.0093	-9.9	0.9	-9.9	0.9		
Reading	7	594183	1991	5	73	A.2.4.1	1	14422	0.71	0.12	0.09	0.08	0.71	0.00	0.43	-0.23	-0.45	-0.34	0.43	-0.0267	0.0201	-5.8	0.9	-6.2	0.9	A-	A+
Reading	7	594157	1992	5	74	B.3.2.1	2	14422	0.59	0.59	0.08	0.04	0.29	0.00	0.32	0.32	-0.26	-0.36	-0.26	0.6319	0.0186	8.6	1.1	7.8	1.1	B-	B-
Reading	7	594159	1993	5	75	A.2.3.1	2	14422	0.74	0.74	0.07	0.12	0.07	0.00	0.34	0.34	-0.27	-0.24	-0.26	-0.1894	0.0207	2.9	1.0	1.6	1.0	A-	A-
Reading	7	594158	1994	5	76	A.1.3.1	2	14422	0.36	0.16	0.36	0.10	0.39	0.00	0.25	-0.35	0.25	-0.42	-0.15	1.7846	0.0189	9.8	1.1	9.9	1.2	A-	A-
Reading	7	594187	1995	5	77	A.2.6.2	3	14422	0.47	0.47	0.22	0.15	0.16	0.00	0.15	0.15	-0.05	-0.16	-0.23	1.2502	0.0183	9.9	1.2	9.9	1.3	A-	A-
Reading	7	594156	1996	5	78	A.2.6.2	2	14422	0.43	0.12	0.14	0.43	0.32	0.00	0.34	-0.31	-0.45	0.34	-0.26	1.4302	0.0184	0.9	1.0	6.9	1.1	A-	A-
Reading	7	594160	1997	5	79	A.2.3.1	2	14422	0.62	0.19	0.07	0.12	0.62	0.00	0.16	-0.05	-0.22	-0.15	0.16	0.4945	0.0189	9.9	1.2	9.9	1.3	A+	A-
Reading	7	594162	1998	5	80	A.2.3.2	2	14422	0.26	0.20	0.06	0.48	0.26	0.00	0.21	-0.21	-0.49	-0.19	0.21	2.3481	0.0205	6.6	1.1	9.9	1.4	C-	A-
Reading	7	594155	1999	5	81	B.1.2.1	3	14422	0.83	0.04	0.10	0.83	0.03	0.00	0.51	-0.36	-0.39	0.51	-0.32	-0.8349	0.0239	-9.9	0.8	-9.9	0.6	A+	A-
Reading	7	594154	2000	5	82	B.1.2.1	3	14422	0.68	0.68	0.14	0.10	0.08	0.00	0.42	0.42	-0.33	-0.28	-0.41	0.1693	0.0196	-5.2	1.0	-5.4	0.9	A+	A-
Reading	7	547995	1950	5	84	A.1.4.1		72495	0.58	0.19	0.58	0.21	0.02	0.00	0.28	-0.25	0.28	-0.23	-0.22	0.7242	0.0083	9.9	1.1	9.9	1.1		
Reading	7	547985	1951	5	85	A.1.3.1		72495	0.62	0.08	0.62	0.25	0.06	0.00	0.32	-0.39	0.32	-0.17	-0.35	0.5073	0.0084	9.9	1.1	9.9	1.1		
Reading	7	547983	1952	5	86	A.1.3.1		72495	0.75	0.08	0.09	0.75	0.08	0.00	0.36	-0.24	-0.34	0.36	-0.22	-0.2460	0.0093	-1.8	1.0	3.3	1.0		
Reading	7	547986	1953	5	87	A.1.4.1		72495	0.79	0.03	0.79	0.10	0.08	0.00	0.50	-0.35	0.50	-0.43	-0.31	-0.5139	0.0098	-9.9	0.9	-9.9	0.7		
Reading	7	547987	1954	5	88	B.2.1.1		72495	0.87	0.87	0.05	0.03	0.04	0.00	0.45	0.45	-0.32	-0.33	-0.28	-1.2449	0.0119	-9.9	0.9	-9.9	0.7		
Reading	7	547993	1955	5	89	B.1.1.1		72495	0.75	0.10	0.05	0.10	0.75	0.00	0.48	-0.35	-0.39	-0.38	0.48	-0.2290	0.0093	-9.9	0.9	-9.9	0.8		
Reading	7	547988	1956	5	90	B.2.2.1		72495	0.88	0.05	0.04	0.03	0.88	0.00	0.45	-0.30	-0.31	-0.29	0.45	-1.3257	0.0122	-9.9	0.9	-9.9	0.6		
Reading	7	547989	1957	5	91	A.1.6.1		72495	0.75	0.05	0.14	0.07	0.75	0.00	0.44	-0.34	-0.35	-0.31	0.44	-0.2298	0.0093	-9.9	0.9	-9.9	0.9		
Reading	7	594061	2002	6	73	B.1.1.1	3	14449	0.39	0.15	0.29	0.16	0.39	0.00	0.25	-0.24	-0.29	-0.21	0.25	1.5941	0.0186	9.9	1.1	9.9	1.2	A-	A-
Reading	7	594066	2003	6	74	B.1.1.1	3	14449	0.67	0.05	0.67	0.13	0.15	0.00	0.40	-0.26	0.40	-0.35	-0.33	0.2118	0.0194	-3.1	1.0	-3.5	1.0	A-	A-
Reading	7	594060	2004	6	75	A.1.1.2	1	14449	0.91	0.91	0.03	0.03	0.03	0.00	0.39	0.39	-0.26	-0.26	-0.24	-1.5696	0.0297	-5.0	0.9	-7.8	0.7	A-	A-
Reading	7	594071	2005	6	76	A.2.3.1	3	14449	0.77	0.07	0.06	0.11	0.77	0.00	0.31	-0.23	-0.22	-0.22	0.31	-0.3561	0.0213	3.2	1.0	4.5	1.1	A-	A+
Reading	7	594070	2006	6	77	B.1.1.1	2	14449	0.46	0.39	0.09	0.46	0.07	0.00	0.35	-0.31	-0.40	0.35	-0.33	1.2906	0.0183	0.4	1.0	4.8	1.1	A-	A-
Reading	7	594069	2007	6	78	A.2.3.1	2	14449	0.70	0.02	0.03	0.24	0.70	0.00	0.42	-0.34	-0.37	-0.35	0.42	0.0268	0.0199	-6.5	0.9	-5.4	0.9	A-	A-
Reading	7	594067	2008	6	79	A.2.3.1	2	14449	0.57	0.13	0.21	0.57	0.09	0.00	0.36	-0.29	-0.30	0.36	-0.35	0.7600	0.0184	1.2	1.0	0.7	1.0	A+	A-
Reading	7	594063	2009	6	80	B.1.1.1	3	14449	0.49	0.04	0.49	0.29	0.17	0.00	0.28	-0.33	0.28	-0.27	-0.21	1.1035	0.0183	9.9	1.1	9.9	1.2	A+	A-
Reading	7	594068	2010	6	81	A.2.3.1	2	14449	0.57	0.18	0.23	0.57	0.03	0.00	0.19	-0.07	-0.19	0.19	-0.35	0.7596	0.0184	9.9	1.2	9.9	1.3	A-	A-
Reading	7	594065	2011	6	82	B.1.1.1	2	14449	0.48	0.08	0.48	0.19	0.26	0.00	0.26	-0.33	0.26	-0.10	-0.32	1.1990	0.0183	9.9	1.1	9.9	1.2	A+	A-
Reading	7	555573	2013	6	84	B.2.1.1		57842	0.74	0.08	0.74	0.10	0.08	0.00	0.35	-0.36	0.35	-0.25	-0.15	-0.1726	0.0103	3.9	1.0	3.4	1.0		
Reading	7	555580	2014	6	85	B.2.1.2		57842	0.49	0.14	0.27	0.09	0.49	0.00	0.30	-0.26	-0.23	-0.38	0.30	1.1263	0.0091	9.9	1.1	9.9	1.1		
Reading	7	555571	2015	6	86	A.2.2.1		57842	0.76	0.07	0.03	0.76	0.14	0.00	0.44	-0.37	-0.34	0.44	-0.30	-0.3267	0.0106	-9.9	0.9	-9.9	0.8		
Reading	7	555581	2016	6	87	B.2.2.1		57842	0.71	0.20	0.04	0.04	0.71	0.00	0.44	-0.32	-0.42	-0.41	0.44	-0.0131	0.0100	-9.9	0.9	-9.2	0.9		
Reading	7	555575	2017	6	88	A.2.5.1		57842	0.66	0.19	0.66	0.09	0.05	0.00	0.47	-0.38	0.47	-0.39	-0.37	0.2615	0.0097	-9.9	0.9	-9.9	0.9		
Reading	7	555576	2018	6	89	A.2.6.1		57842	0.52	0.52	0.13	0.17	0.18	0.00	0.36	0.36	-0.41	-0.30	-0.26	1.0065	0.0092	1.4	1.0	2.7	1.0		
Reading	7	555578	2019	6	90	B.1.1.1		57842	0.56	0.25	0.07	0.12	0.56	0.00	0.34	-0.25	-0.40	-0.31	0.34	0.8124	0.0092	9.8	1.0	9.6	1.1		
Reading	7	555572	2020	6	91	A.2.4.1		57842	0.59	0.09	0.23	0.59	0.08	0.00	0.32	-0.31	-0.20	0.32	-0.35	0.6387	0.0093	9.9	1.1	9.9	1.1		
Reading	7	594130	2021	7	73	A.1.3.1	2	14496	0.68	0.11	0.68	0.04	0.17	0.00	0.21	-0.24	0.21	-0.25	-0.08	0.1897	0.0195	9.9	1.2	9.9	1.4	A+	B-
Reading	7	594084	2022	7	74	A.1.6.1	2	14496	0.85	0.04	0.03	0.08	0.85	0.00	0.44	-0.31	-0.33	-0.29	0.44	-0.9835	0.0249	-7.4	0.9	-9.4	0.8	A+	A-
Reading	7	594089	2023	7	75	A.1.4.1	1	14496	0.68	0.68	0.09	0.16	0.07	0.00	0.44	0.44	-0.38	-0.34	-0.33	0.1812	0.0196	-6.2	1.0	-8.1	0.9	C-	B-
Reading	7	594132	2024	7	76	A.1.3.1	2	14496	0.76	0.06	0.09	0.76	0.09	0.00	0.39	-0.29	-0.26	0.39	-0.31	-0.2972	0.0212	-2.8	1.0	-1.7	1.0	A-	A-
Reading	7	594129	2025	7	77	B.1.1.1	2	14496	0.55	0.05	0.18	0.55	0.22	0.00	0.32	-0.34	-0.26	0.32	-0.27	0.8331	0.0184	9.9	1.1	9.9	1.1	A-	A-
Reading	7	594126	2026	7	78	A.1.1.2	1	14496	0.86	0.06	0.86	0.03	0.05	0.00	0.44	-0.32	0.44	-0.31	-0.29	-1.0469	0.0253	-7.9	0.9	-9.5	0.7	A+	B-
Reading	7	594086	2027	7	79	B.1.1.1	2	14496	0.79	0.15	0.02	0.79	0.03	0.00	0.36	-0.25	-0.30	0.36	-0.30	-0.5392	0.0223	-1.1	1.0	2.2	1.1	A+	A-
Reading	7	594085	2028	7	80	B.2.1.1	2	14496	0.77	0.06	0.07	0.10	0.77	0.00	0.47	-0.29	-0.30	-0.42	0.47	-0.3737	0.0215	-9.7	0.9	-8.5	0.8	A+	A-
Reading	7	594091	2029	7	81	A.1.3.1	2	14496	0.89	0.89	0.04	0.02	0.05	0.00	0.39	0.39	-0.30	-0.28	-0.22	-1.3524	0.0277	-5.4	0.9	-5.7	0.8	A+	B-
Reading	7	594088	2030	7	82	B.1.1.1	3	14496	0.65	0.05																	

## Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF		
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B	
Reading	7	555573	2013	7	84	B.2.1.1		57842	0.74	0.08	0.74	0.10	0.08	0.00	0.35	-0.36	0.35	-0.25	-0.15	-0.1726	0.0103	3.9	1.0	3.4	1.0			
Reading	7	555580	2014	7	85	B.2.1.2		57842	0.49	0.14	0.27	0.09	0.49	0.00	0.30	-0.26	-0.23	-0.38	0.30	1.1263	0.0091	9.9	1.1	9.9	1.1			
Reading	7	555571	2015	7	86	A.2.2.1		57842	0.76	0.07	0.03	0.76	0.14	0.00	0.44	-0.37	-0.34	0.44	-0.30	-0.3267	0.0106	-9.9	0.9	-9.9	0.8			
Reading	7	555581	2016	7	87	B.2.2.1		57842	0.71	0.20	0.04	0.04	0.71	0.00	0.44	-0.32	-0.42	-0.41	0.44	-0.0131	0.0100	-9.9	0.9	-9.2	0.9			
Reading	7	555575	2017	7	88	A.2.5.1		57842	0.66	0.19	0.66	0.09	0.05	0.00	0.47	-0.38	0.47	-0.39	-0.37	0.2615	0.0097	-9.9	0.9	-9.9	0.9			
Reading	7	555576	2018	7	89	A.2.6.1		57842	0.52	0.52	0.13	0.17	0.18	0.00	0.36	0.36	-0.41	-0.30	-0.26	1.0065	0.0092	1.4	1.0	2.7	1.0			
Reading	7	555578	2019	7	90	B.1.1.1		57842	0.56	0.25	0.07	0.12	0.56	0.00	0.34	-0.25	-0.40	-0.31	0.34	0.8124	0.0092	9.8	1.0	9.6	1.1			
Reading	7	555572	2020	7	91	A.2.4.1		57842	0.59	0.09	0.23	0.59	0.08	0.00	0.32	-0.31	-0.20	0.32	-0.35	0.6387	0.0093	9.9	1.1	9.9	1.1			
Reading	7	594097	2032	8	73	B.1.1.1	2	14438	0.46	0.33	0.09	0.12	0.46	0.00	0.28	-0.30	-0.18	-0.24	0.28	1.2984	0.0183	9.9	1.1	9.9	1.1	A-	A-	
Reading	7	594127	2033	8	74	B.2.1.1	2	14438	0.81	0.04	0.05	0.81	0.10	0.00	0.27	-0.25	-0.22	0.27	-0.13	-0.6620	0.0229	3.8	1.1	7.8	1.2	A+	A-	
Reading	7	594102	2034	8	75	A.1.3.1	2	14438	0.75	0.06	0.16	0.04	0.75	0.00	0.51	-0.43	-0.38	-0.40	0.51	-0.1891	0.0207	-9.9	0.9	-9.9	0.8	A-	A-	
Reading	7	594100	2035	8	76	A.1.3.1	2	14438	0.37	0.32	0.15	0.16	0.37	0.00	0.26	-0.10	-0.41	-0.39	0.26	1.7415	0.0188	9.9	1.1	9.9	1.2	A+	A-	
Reading	7	594101	2036	8	77	A.1.3.1	2	14438	0.53	0.10	0.53	0.28	0.09	0.00	0.26	-0.32	0.26	-0.13	-0.36	0.9438	0.0183	9.9	1.1	9.9	1.2	A-	A-	
Reading	7	594098	2037	8	78	A.1.6.2	3	14438	0.44	0.09	0.12	0.44	0.35	0.00	0.18	-0.28	-0.15	0.18	-0.13	1.4025	0.0184	9.9	1.2	9.9	1.3	A+	A-	
Reading	7	594092	2038	8	79	A.1.1.2	2	14438	0.60	0.60	0.17	0.09	0.14	0.00	0.42	0.42	-0.30	-0.32	-0.43	0.6031	0.0186	-5.9	1.0	-6.7	0.9	A-	A-	
Reading	7	594093	2039	8	80	B.2.1.2	3	14438	0.59	0.59	0.17	0.10	0.13	0.00	0.34	0.34	-0.30	-0.28	-0.26	0.6474	0.0186	5.4	1.0	4.0	1.0	A-	A-	
Reading	7	594184	2040	8	81	B.1.2.1	3	14438	0.45	0.09	0.24	0.45	0.23	0.00	0.22	-0.36	-0.18	0.22	-0.16	1.3670	0.0183	9.9	1.1	9.9	1.2	A-	A-	
Reading	7	594095	2041	8	82	B.1.2.1	3	14438	0.63	0.63	0.04	0.24	0.09	0.00	0.31	0.31	-0.32	-0.23	-0.25	0.4750	0.0189	9.6	1.1	6.1	1.1	A-	A-	
Reading	7	555573	2013	8	84	B.2.1.1		57842	0.74	0.08	0.74	0.10	0.08	0.00	0.35	-0.36	0.35	-0.25	-0.15	-0.1726	0.0103	3.9	1.0	3.4	1.0			
Reading	7	555580	2014	8	85	B.2.1.2		57842	0.49	0.14	0.27	0.09	0.49	0.00	0.30	-0.26	-0.23	-0.38	0.30	1.1263	0.0091	9.9	1.1	9.9	1.1			
Reading	7	555571	2015	8	86	A.2.2.1		57842	0.76	0.07	0.03	0.76	0.14	0.00	0.44	-0.37	-0.34	0.44	-0.30	-0.3267	0.0106	-9.9	0.9	-9.9	0.8			
Reading	7	555581	2016	8	87	B.2.2.1		57842	0.71	0.20	0.04	0.04	0.71	0.00	0.44	-0.32	-0.42	-0.41	0.44	-0.0131	0.0100	-9.9	0.9	-9.2	0.9			
Reading	7	555575	2017	8	88	A.2.5.1		57842	0.66	0.19	0.66	0.09	0.05	0.00	0.47	-0.38	0.47	-0.39	-0.37	0.2615	0.0097	-9.9	0.9	-9.9	0.9			
Reading	7	555576	2018	8	89	A.2.6.1		57842	0.52	0.52	0.13	0.17	0.18	0.00	0.36	0.36	-0.41	-0.30	-0.26	1.0065	0.0092	1.4	1.0	2.7	1.0			
Reading	7	555578	2019	8	90	B.1.1.1		57842	0.56	0.25	0.07	0.12	0.56	0.00	0.34	-0.25	-0.40	-0.31	0.34	0.8124	0.0092	9.8	1.0	9.6	1.1			
Reading	7	555572	2020	8	91	A.2.4.1		57842	0.59	0.09	0.23	0.59	0.08	0.00	0.32	-0.31	-0.20	0.32	-0.35	0.6387	0.0093	9.9	1.1	9.9	1.1			
Reading	7	594072	2043	9	73	A.1.1.1	2	14459	0.85	0.05	0.03	0.07	0.85	0.00	0.40	-0.26	-0.32	-0.26	0.40	-0.9822	0.0249	-5.8	0.9	-5.4	0.9	A-	A-	
Reading	7	594083	2044	9	74	A.1.3.1	2	14459	0.71	0.20	0.04	0.71	0.05	0.00	0.44	-0.36	-0.36	0.44	-0.34	0.0038	0.0201	-7.0	0.9	-7.6	0.9	A+	A-	
Reading	7	594073	2045	9	75	B.2.2.1	2	14459	0.63	0.23	0.63	0.05	0.09	0.00	0.31	-0.25	0.31	-0.37	-0.19	0.4589	0.0189	9.0	1.1	5.7	1.1	A+	A-	
Reading	7	594074	2046	9	76	B.2.1.1	2	14459	0.72	0.16	0.07	0.05	0.72	0.00	0.45	-0.33	-0.35	-0.40	0.45	-0.0683	0.0203	-7.4	0.9	-8.7	0.9	A-	C-	
Reading	7	594077	2047	9	77	B.1.1.1	3	14459	0.71	0.10	0.07	0.71	0.12	0.00	0.32	-0.25	-0.29	0.32	-0.20	0.0139	0.0200	5.9	1.1	5.2	1.1	A-	A-	
Reading	7	594076	2048	9	78	B.1.1.1	3	14459	0.82	0.05	0.82	0.11	0.02	0.00	0.25	-0.27	0.25	-0.09	-0.24	-0.6962	0.0231	5.3	1.1	9.9	1.3	A-	A-	
Reading	7	594075	2049	9	79	B.1.1.1	3	14459	0.49	0.11	0.30	0.10	0.49	0.00	0.38	-0.38	-0.34	-0.34	0.38	1.1638	0.0183	-3.5	1.0	-0.5	1.0	A+	A+	
Reading	7	594080	2050	9	80	B.2.1.1	2	14459	0.86	0.05	0.86	0.06	0.03	0.00	0.43	-0.29	0.43	-0.30	-0.31	-1.0585	0.0254	-7.4	0.9	-8.0	0.8	A+	A-	
Reading	7	594078	2051	9	81	B.1.1.1	3	14459	0.29	0.38	0.29	0.09	0.24	0.00	0.04	0.05	0.04	-0.40	0.00	2.1807	0.0199	9.9	1.3	9.9	1.7	A+	A+	
Reading	7	594082	2052	9	82	A.1.4.1	3	14459	0.80	0.80	0.06	0.05	0.09	0.00	0.39	0.39	-0.35	-0.34	-0.18	-0.5572	0.0223	-3.8	1.0	1.6	1.0	A+	A-	
Reading	7	555573	2013	9	84	B.2.1.1		57842	0.74	0.08	0.74	0.10	0.08	0.00	0.35	-0.36	0.35	-0.25	-0.15	-0.1726	0.0103	3.9	1.0	3.4	1.0			
Reading	7	555580	2014	9	85	B.2.1.2		57842	0.49	0.14	0.27	0.09	0.49	0.00	0.30	-0.26	-0.23	-0.38	0.30	1.1263	0.0091	9.9	1.1	9.9	1.1			
Reading	7	555571	2015	9	86	A.2.2.1		57842	0.76	0.07	0.03	0.76	0.14	0.00	0.44	-0.37	-0.34	0.44	-0.30	-0.3267	0.0106	-9.9	0.9	-9.9	0.8			
Reading	7	555581	2016	9	87	B.2.2.1		57842	0.71	0.20	0.04	0.04	0.71	0.00	0.44	-0.32	-0.42	-0.41	0.44	-0.0131	0.0100	-9.9	0.9	-9.2	0.9			
Reading	7	555575	2017	9	88	A.2.5.1		57842	0.66	0.19	0.66	0.09	0.05	0.00	0.47	-0.38	0.47	-0.39	-0.37	0.2615	0.0097	-9.9	0.9	-9.9	0.9			
Reading	7	555576	2018	9	89	A.2.6.1		57842	0.52	0.52	0.13	0.17	0.18	0.00	0.36	0.36	-0.41	-0.30	-0.26	1.0065	0.0092	1.4	1.0	2.7	1.0			
Reading	7	555578	2019	9	90	B.1.1.1		57842	0.56	0.25	0.07	0.12	0.56	0.00	0.34	-0.25	-0.40	-0.31	0.34	0.8124	0.0092	9.8	1.0	9.6	1.1			
Reading	7	555572	2020	9	91	A.2.4.1		57842	0.59	0.09	0.23	0.59	0.08	0.00	0.32	-0.31	-0.20	0.32	-0.35	0.6387	0.0093	9.9	1.1	9.9	1.1			
Reading	8	555686	2054	0	27	A.1.3.1		132866	0.74	0.04	0.14	0.08	0.74	0.00	0.35	-0.28	-0.22	-0.32	0.35	0.3362	0.0068	4.4	1.0	9.4	1.1			
Reading	8	555677	2055	0	28	A.1.1.1		132866	0.58	0.13	0.12	0.17	0.58	0.00	0.34	-0.26	-0.27	-0.33	0.34	1.2338	0.0061	9.9	1.0	8.2	1.0			
Reading	8	555679	2056	0	29	A.1.4.1		132866	0.86	0.04	0.06	0.86	0.04	0.00	0.35	-0.26	-0.27	0.35	-0.17	-0.5334	0.0084	-5.2	1.0	-9.9	0.9			
Reading	8	555684	2057	0	30	B.1.1.1		132866	0.78	0.07	0.78	0.06	0.09	0.00	0.40	-0.24	0.40	-0.30	-0.34	0.1221	0.0071	-9.9	1.0	-9.9	0.9			
Reading	8	555680	2058	0	31	B.1.1.1		132866	0.85	0.11	0.02	0.85	0.01	0.00	0.42	-0.35	-0.27	0.42	-0.25	-0.4847	0.0083	-9.9	0.9	-9.9	0.7			
Reading	8	555683	2059	0	32	B.2.1.1		132866	0.83	0.09	0.83	0.05	0.02	0.00	0.43	-0.35	0.43	-										

Appendix I: Item Statistics Multiple Choice

Item Information							Classical												Rasch		Infit		Outfit		DIF		
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Reading	8	548061	2062	0	35	A.2.3.1		132866	0.76	0.07	0.12	0.76	0.06	0.00	0.42	-0.32	-0.33	0.42	-0.29	0.2293	0.0070	-9.9	0.9	-9.9	0.9		
Reading	8	548065	2063	0	36	A.2.1.1		132866	0.78	0.08	0.78	0.08	0.05	0.00	0.40	-0.23	0.40	-0.35	-0.30	0.0985	0.0071	-9.9	1.0	-9.9	0.9		
Reading	8	548063	2064	0	37	A.2.3.1		132866	0.70	0.08	0.13	0.08	0.70	0.00	0.42	-0.31	-0.30	-0.38	0.42	0.5806	0.0065	-9.9	1.0	-9.9	0.9		
Reading	8	548064	2065	0	38	A.2.4.1		132866	0.70	0.12	0.70	0.11	0.06	0.00	0.39	-0.36	0.39	-0.27	-0.27	0.5833	0.0065	-4.7	1.0	-8.0	1.0		
Reading	8	548071	2066	0	39	A.2.4.1		132866	0.65	0.14	0.14	0.65	0.07	0.00	0.32	-0.18	-0.29	0.32	-0.29	0.8495	0.0063	9.9	1.1	9.9	1.1		
Reading	8	548075	2067	0	40	A.2.4.1		132866	0.56	0.56	0.08	0.15	0.21	0.00	0.30	0.30	-0.33	-0.27	-0.21	1.3276	0.0061	9.9	1.1	9.9	1.1		
Reading	8	555870	2068	0	41	B.3.3.4		132866	0.84	0.03	0.08	0.04	0.84	0.00	0.36	-0.33	-0.20	-0.26	0.36	-0.3779	0.0080	-8.0	1.0	-5.3	1.0		
Reading	8	555865	2069	0	42	A.2.2.2		132866	0.85	0.07	0.85	0.03	0.05	0.00	0.38	-0.27	0.38	-0.29	-0.24	-0.4890	0.0083	-9.9	0.9	-9.9	0.9		
Reading	8	555868	2070	0	43	A.2.6.2		132866	0.60	0.16	0.09	0.60	0.15	0.00	0.26	-0.29	-0.21	0.26	-0.14	1.1308	0.0061	9.9	1.1	9.9	1.2		
Reading	8	555871	2071	0	44	A.2.4.1		132866	0.87	0.05	0.06	0.02	0.87	0.00	0.48	-0.36	-0.33	-0.31	0.48	-0.6165	0.0086	-9.9	0.9	-9.9	0.6		
Reading	8	555874	2072	0	45	B.3.3.4		132866	0.64	0.14	0.04	0.64	0.18	0.00	0.31	-0.25	-0.39	0.31	-0.20	0.9306	0.0062	9.9	1.1	9.9	1.1		
Reading	8	555876	2073	0	46	B.1.2.1		132866	0.70	0.70	0.11	0.08	0.10	0.00	0.35	0.35	-0.29	-0.32	-0.18	0.5653	0.0066	8.5	1.0	5.0	1.0		
Reading	8	555877	2074	0	47	B.1.2.1		132866	0.55	0.55	0.04	0.31	0.10	0.00	0.28	0.28	-0.39	-0.16	-0.35	1.3791	0.0060	9.9	1.1	9.9	1.1		
Reading	8	555838	2076	0	118	A.1.4.1		132866	0.80	0.08	0.04	0.80	0.09	0.00	0.46	-0.36	-0.32	0.46	-0.32	-0.0266	0.0074	-9.9	0.9	-9.9	0.8		
Reading	8	555837	2077	0	119	A.1.2.2		132866	0.82	0.82	0.04	0.13	0.01	0.00	0.42	0.42	-0.31	-0.33	-0.23	-0.2018	0.0077	-9.9	0.9	-9.9	0.8		
Reading	8	555845	2078	0	120	B.2.2.1		132866	0.59	0.17	0.21	0.59	0.03	0.00	0.34	-0.34	-0.25	0.34	-0.34	1.1899	0.0061	9.9	1.0	9.9	1.1		
Reading	8	555846	2079	0	121	B.2.1.2		132866	0.69	0.17	0.08	0.07	0.69	0.00	0.34	-0.27	-0.26	-0.26	0.34	0.6406	0.0065	9.4	1.0	7.9	1.0		
Reading	8	555844	2080	0	122	B.1.1.1		132866	0.49	0.45	0.49	0.02	0.03	0.00	0.15	-0.08	0.15	-0.38	-0.34	1.6441	0.0060	9.9	1.3	9.9	1.4		
Reading	8	555840	2081	0	123	A.1.6.1		132866	0.84	0.07	0.84	0.05	0.04	0.00	0.46	-0.34	0.46	-0.33	-0.31	-0.3642	0.0080	-9.9	0.9	-9.9	0.7		
Reading	8	555847	2082	0	124	A.1.5.1		132866	0.82	0.07	0.07	0.05	0.82	0.00	0.48	-0.39	-0.31	-0.34	0.48	-0.1704	0.0076	-9.9	0.9	-9.9	0.7		
Reading	8	555926	2084	0	126	B.2.1.1		132866	0.75	0.75	0.11	0.08	0.05	0.00	0.34	0.34	-0.23	-0.28	-0.24	0.2689	0.0069	6.1	1.0	4.5	1.0		
Reading	8	555931	2085	0	127	B.2.1.1		132866	0.73	0.14	0.04	0.10	0.73	0.00	0.43	-0.36	-0.41	-0.25	0.43	0.4290	0.0067	-9.9	0.9	-9.9	0.9		
Reading	8	555929	2086	0	128	B.1.1.1		132866	0.48	0.37	0.11	0.48	0.05	0.00	0.20	-0.07	-0.37	0.20	-0.34	1.7170	0.0060	9.9	1.2	9.9	1.3		
Reading	8	555928	2087	0	129	A.1.4.1		132866	0.75	0.16	0.75	0.05	0.04	0.00	0.42	-0.30	0.42	-0.37	-0.32	0.3146	0.0068	-9.9	1.0	-9.9	0.9		
Reading	8	555933	2088	0	130	B.1.2.1		132866	0.62	0.11	0.11	0.62	0.16	0.00	0.30	-0.22	-0.25	0.30	-0.26	1.0314	0.0062	9.9	1.1	9.9	1.1		
Reading	8	555934	2089	0	131	B.1.2.1		132866	0.70	0.11	0.09	0.09	0.70	0.00	0.41	-0.34	-0.29	-0.33	0.41	0.5623	0.0066	-9.9	1.0	-9.9	1.0		
Reading	8	555694	2090	0	132	B.3.1.1		132866	0.69	0.69	0.07	0.12	0.12	0.00	0.32	0.32	-0.33	-0.26	-0.16	0.6616	0.0065	9.9	1.1	9.9	1.1		
Reading	8	555698	2091	0	133	A.2.3.1		132866	0.71	0.10	0.12	0.71	0.08	0.00	0.33	-0.23	-0.22	0.33	-0.31	0.5595	0.0066	9.9	1.0	9.9	1.1		
Reading	8	555692	2092	0	134	A.2.3.2		132866	0.54	0.06	0.28	0.54	0.12	0.00	0.36	-0.43	-0.30	0.36	-0.27	1.4136	0.0060	1.2	1.0	6.1	1.0		
Reading	8	555691	2093	0	135	B.3.3.1		132866	0.66	0.66	0.12	0.09	0.13	0.00	0.44	0.44	-0.35	-0.43	-0.31	0.8077	0.0063	-9.9	0.9	-9.9	0.9		
Reading	8	555696	2094	0	136	B.3.2.1		132866	0.33	0.33	0.29	0.17	0.20	0.00	0.21	0.21	-0.07	-0.35	-0.29	2.4482	0.0063	9.9	1.1	9.9	1.3		
Reading	8	555702	2095	0	137	B.1.2.1		132866	0.63	0.08	0.17	0.12	0.63	0.00	0.34	-0.29	-0.23	-0.30	0.34	0.9695	0.0062	9.9	1.0	8.6	1.0		
Reading	8	555700	2096	0	138	B.1.2.1		132866	0.55	0.28	0.10	0.07	0.55	0.00	0.30	-0.15	-0.36	-0.45	0.30	1.3660	0.0060	9.9	1.1	9.9	1.1		
Reading	8	594921	2098	1	74	B.2.2.1	2	15044	0.87	0.87	0.07	0.04	0.01	0.00	0.36	0.36	-0.23	-0.32	-0.18	-0.7252	0.0259	-3.3	1.0	-5.1	0.9	A-	A-
Reading	8	594877	2099	1	75	B.1.1.1	2	15044	0.63	0.17	0.12	0.63	0.08	0.00	0.26	-0.12	-0.26	0.26	-0.26	0.9377	0.0185	9.9	1.1	9.9	1.2	A+	A-
Reading	8	599550	2100	1	76	A.1.2.2	2	15044	0.59	0.09	0.16	0.59	0.17	0.00	0.42	-0.34	-0.38	0.42	-0.36	1.1383	0.0182	-9.1	0.9	-9.1	0.9	C-	C-
Reading	8	594919	2101	1	77	A.1.3.1	2	15044	0.42	0.16	0.23	0.42	0.19	0.00	0.27	-0.27	-0.22	0.27	-0.31	1.9355	0.0181	9.7	1.1	9.9	1.2	A+	A-
Reading	8	594875	2102	1	78	B.1.1.1	3	15044	0.59	0.11	0.10	0.20	0.59	0.00	0.40	-0.36	-0.32	-0.35	0.40	1.1388	0.0182	-5.5	1.0	-6.1	0.9	A-	A-
Reading	8	594920	2103	1	79	B.2.1.2	2	15044	0.60	0.16	0.60	0.16	0.08	0.00	0.29	-0.16	0.29	-0.26	-0.37	1.0776	0.0183	9.9	1.1	9.9	1.1	A+	A-
Reading	8	594881	2104	1	80	B.2.1.2	3	15044	0.78	0.07	0.06	0.09	0.78	0.00	0.46	-0.26	-0.41	-0.35	0.46	0.0449	0.0212	-9.4	0.9	-9.9	0.8	A+	A-
Reading	8	594873	2105	1	81	A.1.3.1	3	15044	0.44	0.06	0.44	0.16	0.34	0.00	0.17	-0.41	0.17	-0.23	-0.05	1.8543	0.0180	9.9	1.2	9.9	1.3	A-	A-
Reading	8	594876	2106	1	82	B.1.1.1	3	15044	0.63	0.05	0.63	0.20	0.13	0.00	0.32	-0.27	0.32	-0.35	-0.13	0.9324	0.0185	7.8	1.1	9.0	1.1	A+	A-
Reading	8	594874	2107	1	83	A.1.3.1	2	15044	0.52	0.52	0.18	0.14	0.16	0.00	0.31	0.31	-0.24	-0.22	-0.35	1.4796	0.0179	6.9	1.1	8.0	1.1	B-	A-
Reading	8	555673	2109	1	85	A.2.1.2		74043	0.70	0.11	0.15	0.70	0.04	0.00	0.40	-0.38	-0.30	0.40	-0.20	0.5690	0.0088	-7.8	1.0	-9.9	0.9		
Reading	8	555667	2110	1	86	B.2.1.1		74043	0.59	0.59	0.16	0.11	0.14	0.00	0.42	0.42	-0.34	-0.45	-0.30	1.1669	0.0082	-9.9	0.9	-9.9	0.9		
Reading	8	555663	2111	1	87	B.2.1.1		74043	0.53	0.09	0.12	0.53	0.26	0.00	0.35	-0.40	-0.38	0.35	-0.23	1.4674	0.0081	4.7	1.0	8.4	1.0		
Reading	8	555669	2112	1	88	A.2.3.1		74043	0.56	0.17	0.08	0.56	0.18	0.00	0.36	-0.39	-0.34	0.36	-0.20	1.2854	0.0081	1.9	1.0	5.2	1.0		
Reading	8	555664	2113	1	89	A.2.2.2		74043	0.75	0.12	0.75	0.07	0.07	0.00	0.40	-0.31	0.40	-0.31	-0.26	0.2943	0.0092	-8.8	1.0	-9.9	0.9		
Reading	8	555668	2114	1	90	B.3.3.1		74043	0.45	0.23	0.10	0.21	0.45	0.00	0.30	-0.26	-0.34	-0.28	0.30	1.8225	0.0081	9.9	1.0	9.9	1.1		
Reading	8	555665	2115	1	91	B.2.1.1		74043	0.74	0.06	0.07	0.12	0.74	0.00	0.53	-0.41	-0.42	-0.39	0.53	0.3271	0.0091	-9.9	0.8	-9.9	0.7		
Reading	8	555666	2116	1	92	A.2.6.1		74043	0.81	0.04	0.81	0.07	0.07														

## Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Reading	8	594871	2117	2	74	A.1.3.1	2	14713	0.50	0.50	0.11	0.37	0.02	0.00	0.18	0.18	-0.19	-0.14	-0.19	1.6195	0.0181	9.9	1.2	9.9	1.3	A+	A-
Reading	8	594869	2118	2	75	B.1.1.1	2	14713	0.42	0.36	0.15	0.42	0.08	0.00	0.05	-0.03	-0.06	0.05	-0.07	2.0026	0.0182	9.9	1.3	9.9	1.5	A+	A-
Reading	8	594969	2119	2	76	A.1.3.1	2	14713	0.78	0.78	0.08	0.08	0.07	0.00	0.45	0.45	-0.28	-0.35	-0.37	0.0943	0.0215	-9.0	0.9	-9.9	0.8	A-	A-
Reading	8	594923	2120	2	77	B.2.1.1	3	14713	0.77	0.06	0.77	0.09	0.08	0.00	0.42	-0.34	0.42	-0.33	-0.25	0.1605	0.0212	-5.7	0.9	-7.9	0.9	A-	A-
Reading	8	594922	2121	2	78	B.1.1.1	2	14713	0.73	0.14	0.10	0.73	0.03	0.00	0.35	-0.28	-0.25	0.35	-0.29	0.4442	0.0201	0.5	1.0	-1.0	1.0	B+	A-
Reading	8	594865	2122	2	79	A.1.6.1	2	14713	0.56	0.08	0.24	0.56	0.12	0.00	0.34	-0.28	-0.30	0.34	-0.29	1.3103	0.0182	4.6	1.0	4.9	1.1	A+	A-
Reading	8	594870	2123	2	80	B.1.1.1	2	14713	0.63	0.15	0.07	0.14	0.63	0.00	0.26	-0.12	-0.31	-0.24	0.26	0.9572	0.0187	9.9	1.1	9.9	1.2	A+	A-
Reading	8	594970	2124	2	81	B.1.1.1	1	14713	0.82	0.09	0.05	0.04	0.82	0.00	0.49	-0.37	-0.38	-0.31	0.49	-0.2034	0.0230	-9.9	0.9	-9.9	0.7	A+	A-
Reading	8	594864	2125	2	82	B.2.1.2	3	14713	0.88	0.03	0.88	0.05	0.03	0.00	0.46	-0.33	0.46	-0.31	-0.30	-0.7196	0.0266	-8.8	0.9	-9.9	0.7	A+	A-
Reading	8	594867	2126	2	83	B.1.1.1	2	14713	0.56	0.16	0.56	0.20	0.09	0.00	0.39	-0.41	0.39	-0.33	-0.24	1.3377	0.0182	-3.1	1.0	-2.4	1.0	A+	A-
Reading	8	555673	2109	2	85	A.2.1.2		74043	0.70	0.11	0.15	0.70	0.04	0.00	0.40	-0.38	-0.30	0.40	-0.20	0.5690	0.0088	-7.8	1.0	-9.9	0.9		
Reading	8	555667	2110	2	86	B.2.1.1		74043	0.59	0.59	0.16	0.11	0.14	0.00	0.42	0.42	-0.34	-0.45	-0.30	1.1669	0.0082	-9.9	0.9	-9.9	0.9		
Reading	8	555663	2111	2	87	B.2.1.1		74043	0.53	0.09	0.12	0.53	0.26	0.00	0.35	-0.40	-0.38	0.35	-0.23	1.4674	0.0081	4.7	1.0	8.4	1.0		
Reading	8	555669	2112	2	88	A.2.3.1		74043	0.56	0.17	0.08	0.56	0.18	0.00	0.36	-0.39	-0.34	0.36	-0.20	1.2854	0.0081	1.9	1.0	5.2	1.0		
Reading	8	555664	2113	2	89	A.2.2.2		74043	0.75	0.12	0.75	0.07	0.07	0.00	0.40	-0.31	0.40	-0.31	-0.26	0.2943	0.0092	-8.8	1.0	-9.9	0.9		
Reading	8	555668	2114	2	90	B.3.3.1		74043	0.45	0.23	0.10	0.21	0.45	0.00	0.30	-0.26	-0.34	-0.28	0.30	1.8225	0.0081	9.9	1.0	9.9	1.1		
Reading	8	555665	2115	2	91	B.2.1.1		74043	0.74	0.06	0.07	0.12	0.74	0.00	0.53	-0.41	-0.42	-0.39	0.53	0.3271	0.0091	-9.9	0.8	-9.9	0.7		
Reading	8	555666	2116	2	92	A.2.6.1		74043	0.81	0.04	0.81	0.07	0.07	0.00	0.45	-0.33	0.45	-0.28	-0.36	-0.1352	0.0101	-9.9	0.9	-9.9	0.8		
Reading	8	594853	2128	3	74	A.1.3.1	2	14765	0.68	0.06	0.12	0.14	0.68	0.00	0.43	-0.38	-0.38	-0.29	0.43	0.6887	0.0193	-7.2	0.9	-8.5	0.9	A-	A-
Reading	8	594850	2129	3	75	B.1.1.1	2	14765	0.72	0.09	0.08	0.11	0.72	0.00	0.27	-0.19	-0.20	-0.21	0.27	0.4881	0.0198	9.4	1.1	9.9	1.2	A+	A-
Reading	8	594843	2130	3	76	A.1.1.1	2	14765	0.59	0.07	0.59	0.29	0.05	0.00	0.35	-0.42	0.35	-0.23	-0.36	1.1661	0.0183	2.6	1.0	1.6	1.0	A-	A-
Reading	8	594894	2131	3	77	A.1.3.1	2	14765	0.60	0.11	0.09	0.60	0.20	0.00	0.38	-0.33	-0.37	0.38	-0.29	1.0967	0.0184	-1.9	1.0	-1.8	1.0	A-	A-
Reading	8	594852	2132	3	78	A.1.3.1	2	14765	0.66	0.66	0.12	0.14	0.88	0.00	0.34	0.34	-0.23	-0.27	-0.32	0.8224	0.0189	3.5	1.0	3.3	1.0	A-	C-
Reading	8	594846	2133	3	79	B.2.1.1	3	14765	0.50	0.50	0.33	0.14	0.03	0.00	0.19	0.19	-0.09	-0.28	-0.34	1.6125	0.0180	9.9	1.2	9.9	1.3	A-	A-
Reading	8	594848	2134	3	80	A.1.4.1	2	14765	0.54	0.54	0.17	0.20	0.09	0.00	0.31	0.31	-0.26	-0.29	-0.27	1.4161	0.0181	8.4	1.1	9.1	1.1	A-	A-
Reading	8	594845	2135	3	81	B.2.2.2	3	14765	0.73	0.06	0.15	0.73	0.06	0.00	0.37	-0.30	-0.24	0.37	-0.35	0.4114	0.0201	-1.8	1.0	0.9	1.0	A-	A-
Reading	8	594847	2136	3	82	A.1.5.1	2	14765	0.70	0.06	0.11	0.13	0.70	0.00	0.42	-0.31	-0.38	-0.29	0.42	0.5749	0.0196	-6.5	0.9	-8.4	0.9	A-	A-
Reading	8	594851	2137	3	83	B.1.1.1	2	14765	0.44	0.27	0.44	0.12	0.17	0.00	0.21	-0.15	0.21	-0.18	-0.29	1.8846	0.0181	9.9	1.1	9.9	1.2	A-	A+
Reading	8	555673	2109	3	85	A.2.1.2		74043	0.70	0.11	0.15	0.70	0.04	0.00	0.40	-0.38	-0.30	0.40	-0.20	0.5690	0.0088	-7.8	1.0	-9.9	0.9		
Reading	8	555667	2110	3	86	B.2.1.1		74043	0.59	0.59	0.16	0.11	0.14	0.00	0.42	0.42	-0.34	-0.45	-0.30	1.1669	0.0082	-9.9	0.9	-9.9	0.9		
Reading	8	555663	2111	3	87	B.2.1.1		74043	0.53	0.09	0.12	0.53	0.26	0.00	0.35	-0.40	-0.38	0.35	-0.23	1.4674	0.0081	4.7	1.0	8.4	1.0		
Reading	8	555669	2112	3	88	A.2.3.1		74043	0.56	0.17	0.08	0.56	0.18	0.00	0.36	-0.39	-0.34	0.36	-0.20	1.2854	0.0081	1.9	1.0	5.2	1.0		
Reading	8	555664	2113	3	89	A.2.2.2		74043	0.75	0.12	0.75	0.07	0.07	0.00	0.40	-0.31	0.40	-0.31	-0.26	0.2943	0.0092	-8.8	1.0	-9.9	0.9		
Reading	8	555668	2114	3	90	B.3.3.1		74043	0.45	0.23	0.10	0.21	0.45	0.00	0.30	-0.26	-0.34	-0.28	0.30	1.8225	0.0081	9.9	1.0	9.9	1.1		
Reading	8	555665	2115	3	91	B.2.1.1		74043	0.74	0.06	0.07	0.12	0.74	0.00	0.53	-0.41	-0.42	-0.39	0.53	0.3271	0.0091	-9.9	0.8	-9.9	0.7		
Reading	8	555666	2116	3	92	A.2.6.1		74043	0.81	0.04	0.81	0.07	0.07	0.00	0.45	-0.33	0.45	-0.28	-0.36	-0.1352	0.0101	-9.9	0.9	-9.9	0.8		
Reading	8	594862	2139	4	74	A.1.4.1	1	14802	0.77	0.77	0.02	0.19	0.02	0.00	0.31	0.31	-0.28	-0.25	-0.20	0.1259	0.0213	3.8	1.0	4.6	1.1	A+	A-
Reading	8	594861	2140	4	75	A.1.4.1	2	14802	0.83	0.12	0.83	0.02	0.02	0.00	0.37	-0.29	0.37	-0.24	-0.25	-0.3310	0.0238	-2.7	1.0	-5.2	0.9	A-	A-
Reading	8	594968	2141	4	76	B.2.1.1	2	14802	0.88	0.05	0.05	0.88	0.02	0.00	0.35	-0.24	-0.25	0.35	-0.21	-0.7537	0.0268	-2.9	1.0	-4.6	0.9	A-	C-
Reading	8	594967	2142	4	77	B.2.2.2	3	14802	0.85	0.03	0.09	0.85	0.02	0.00	0.43	-0.32	-0.30	0.43	-0.28	-0.4981	0.0249	-6.7	0.9	-6.7	0.8	A-	A-
Reading	8	594858	2143	4	78	A.1.2.2	2	14802	0.81	0.03	0.09	0.81	0.81	0.00	0.34	-0.27	-0.25	-0.22	0.34	-0.1130	0.0225	0.7	1.0	-1.8	1.0	A+	A-
Reading	8	594860	2144	4	79	B.1.1.1	2	14802	0.82	0.04	0.82	0.02	0.11	0.00	0.32	-0.21	0.32	-0.27	-0.23	-0.2479	0.0233	-0.3	1.0	2.1	1.1	A-	A-
Reading	8	594856	2145	4	80	B.1.1.1	2	14802	0.83	0.09	0.03	0.05	0.83	0.00	0.36	-0.27	-0.28	-0.22	0.36	-0.2709	0.0234	-2.2	1.0	-2.3	0.9	A+	A-
Reading	8	594859	2146	4	81	A.1.6.2	3	14802	0.83	0.03	0.05	0.08	0.83	0.00	0.39	-0.31	-0.33	-0.22	0.39	-0.2771	0.0234	-4.7	0.9	-0.4	1.0	A+	A-
Reading	8	594909	2147	4	82	A.1.3.1	2	14802	0.79	0.79	0.05	0.06	0.09	0.00	0.45	0.45	-0.30	-0.39	-0.31	0.0086	0.0219	-8.6	0.9	-9.8	0.8	A+	A-
Reading	8	594855	2148	4	83	B.2.1.1	2	14802	0.65	0.13	0.06	0.15	0.65	0.00	0.39	-0.34	-0.38	-0.27	0.39	0.8531	0.0189	-1.3	1.0	-1.3	1.0	A+	A-
Reading	8	555673	2109	4	85	A.2.1.2		74043	0.70	0.11	0.15	0.70	0.04	0.00	0.40	-0.38	-0.30	0.40	-0.20	0.5690	0.0088	-7.8	1.0	-9.9	0.9		
Reading	8	555667	2110	4	86	B.2.1.1		74043	0.59	0.59	0.16	0.11	0.14	0.00	0.42	0.42	-0.34	-0.45	-0.30	1.1669	0.0082	-9.9	0.9	-9.9	0.9		
Reading	8	555663	2111	4	87	B.2.1.1		74043	0.53	0.09	0.12	0.53	0.26	0.00	0.35	-0.40	-0.38	0.35	-0.23	1.4674	0.0081	4.7	1.0	8.4	1.0		
Reading	8	555669	2112	4	88	A.2.3.1		74043	0.56	0.17	0.08	0.56	0.18	0.00	0.36	-0.39	-0.34	0.36	-0.20	1.2854	0.0081	1.9	1.0	5.2	1.0		
Reading	8	555664	2113	4	89	A.2.2.2		74043	0.75																		

## Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Reading	8	555668	2114	4	90	B.3.3.1		74043	0.45	0.23	0.10	0.21	0.45	0.00	0.30	-0.26	-0.34	-0.28	0.30	1.8225	0.0081	9.9	1.0	9.9	1.1		
Reading	8	555665	2115	4	91	B.2.1.1		74043	0.74	0.06	0.07	0.12	0.74	0.00	0.53	-0.41	-0.42	-0.39	0.53	0.3271	0.0091	-9.9	0.8	-9.9	0.7		
Reading	8	555666	2116	4	92	A.2.6.1		74043	0.81	0.04	0.81	0.07	0.07	0.00	0.45	-0.33	0.45	-0.28	-0.36	-0.1352	0.0101	-9.9	0.9	-9.9	0.8		
Reading	8	594907	2150	5	74	A.2.3.1	2	14719	0.64	0.04	0.21	0.11	0.64	0.00	0.40	-0.33	-0.33	-0.32	0.40	0.9109	0.0188	-3.0	1.0	-6.0	0.9	A+	A-
Reading	8	594900	2151	5	75	B.2.1.1	3	14719	0.57	0.11	0.25	0.07	0.57	0.00	0.28	-0.27	-0.19	-0.32	0.28	1.2530	0.0183	9.9	1.1	9.9	1.2	A-	A-
Reading	8	594901	2152	5	76	B.3.3.1	3	14719	0.41	0.32	0.41	0.18	0.08	0.00	0.20	-0.15	0.20	-0.19	-0.32	2.0511	0.0183	9.9	1.2	9.9	1.3	A+	A+
Reading	8	594903	2153	5	77	B.3.1.1	2	14719	0.82	0.12	0.02	0.82	0.03	0.00	0.40	-0.29	-0.32	0.40	-0.31	-0.2365	0.0232	-5.5	0.9	-5.5	0.9	A+	A-
Reading	8	594898	2154	5	78	A.2.6.2	2	14719	0.53	0.12	0.53	0.12	0.23	0.00	0.40	-0.34	0.40	-0.46	-0.29	1.4656	0.0181	-6.5	1.0	-4.1	1.0	A+	A-
Reading	8	594896	2155	5	79	A.2.1.1	2	14719	0.84	0.02	0.84	0.10	0.04	0.00	0.41	-0.31	0.41	-0.30	-0.25	-0.3215	0.0238	-5.4	0.9	-6.2	0.9	A-	A-
Reading	8	594905	2156	5	80	A.2.4.1	1	14719	0.82	0.82	0.04	0.09	0.05	0.00	0.45	0.45	-0.35	-0.36	-0.24	-0.2293	0.0232	-8.0	0.9	-9.9	0.8	A+	A+
Reading	8	594902	2157	5	81	B.2.1.2	2	14719	0.63	0.14	0.08	0.16	0.63	0.00	0.44	-0.36	-0.41	-0.34	0.44	0.9546	0.0188	-9.6	0.9	-9.0	0.9	A-	A-
Reading	8	594906	2158	5	82	A.2.5.1	2	14719	0.35	0.09	0.35	0.42	0.13	0.00	0.12	-0.23	0.12	-0.03	-0.25	2.3391	0.0187	9.9	1.2	9.9	1.5	A-	A-
Reading	8	594904	2159	5	83	A.2.4.1	3	14719	0.64	0.64	0.03	0.06	0.26	0.00	0.49	0.49	-0.37	-0.42	-0.43	0.9113	0.0188	-9.9	0.9	-9.9	0.8	A-	A-
Reading	8	555673	2109	5	85	A.2.1.2		74043	0.70	0.11	0.15	0.70	0.04	0.00	0.40	-0.38	-0.30	0.40	-0.20	0.5690	0.0088	-7.8	1.0	-9.9	0.9		
Reading	8	555667	2110	5	86	B.2.1.1		74043	0.59	0.59	0.16	0.11	0.14	0.00	0.42	0.42	-0.34	-0.45	-0.30	1.1669	0.0082	-9.9	0.9	-9.9	0.9		
Reading	8	555663	2111	5	87	B.2.1.1		74043	0.53	0.09	0.12	0.53	0.26	0.00	0.35	-0.40	-0.38	0.35	-0.23	1.4674	0.0081	4.7	1.0	8.4	1.0		
Reading	8	555669	2112	5	88	A.2.3.1		74043	0.56	0.17	0.08	0.56	0.18	0.00	0.36	-0.39	-0.34	0.36	-0.20	1.2854	0.0081	1.9	1.0	5.2	1.0		
Reading	8	555664	2113	5	89	A.2.2.2		74043	0.75	0.12	0.75	0.07	0.07	0.00	0.40	-0.31	0.40	-0.31	-0.26	0.2943	0.0092	-8.8	1.0	-9.9	0.9		
Reading	8	555668	2114	5	90	B.3.3.1		74043	0.45	0.23	0.10	0.21	0.45	0.00	0.30	-0.26	-0.34	-0.28	0.30	1.8225	0.0081	9.9	1.0	9.9	1.1		
Reading	8	555665	2115	5	91	B.2.1.1		74043	0.74	0.06	0.07	0.12	0.74	0.00	0.53	-0.41	-0.42	-0.39	0.53	0.3271	0.0091	-9.9	0.8	-9.9	0.7		
Reading	8	555666	2116	5	92	A.2.6.1		74043	0.81	0.04	0.81	0.07	0.07	0.00	0.45	-0.33	0.45	-0.28	-0.36	-0.1352	0.0101	-9.9	0.9	-9.9	0.8		
Reading	8	594937	2161	6	74	A.2.1.1	2	14725	0.66	0.66	0.21	0.08	0.05	0.00	0.33	0.33	-0.23	-0.29	-0.30	0.8191	0.0190	6.2	1.1	5.8	1.1	A-	A-
Reading	8	594949	2162	6	75	A.2.4.1	1	14725	0.59	0.59	0.22	0.05	0.14	0.00	0.42	0.42	-0.35	-0.45	-0.32	1.1746	0.0184	-6.6	1.0	-6.1	0.9	A-	A+
Reading	8	594941	2163	6	76	A.2.2.1	1	14725	0.82	0.05	0.08	0.05	0.82	0.00	0.41	-0.33	-0.29	-0.25	0.41	-0.2244	0.0233	-5.8	0.9	-6.7	0.9	A-	A-
Reading	8	594946	2164	6	77	A.2.3.2	2	14725	0.65	0.17	0.65	0.12	0.07	0.00	0.38	-0.29	0.38	-0.29	-0.38	0.8918	0.0189	-0.7	1.0	-0.9	1.0	A+	A-
Reading	8	594948	2165	6	78	A.2.4.1	1	14725	0.81	0.06	0.81	0.07	0.05	0.00	0.44	-0.33	0.44	-0.31	-0.29	-0.1518	0.0228	-7.5	0.9	-9.9	0.8	A-	A-
Reading	8	594945	2166	6	79	A.2.3.1	2	14725	0.77	0.03	0.10	0.77	0.10	0.00	0.38	-0.32	-0.30	0.38	-0.24	0.1390	0.0214	-2.3	1.0	-3.5	0.9	A-	A-
Reading	8	594947	2167	6	80	B.2.1.1	2	14725	0.49	0.41	0.05	0.05	0.49	0.00	0.25	-0.15	-0.46	-0.42	0.25	1.6861	0.0180	9.9	1.1	9.9	1.2	A-	A-
Reading	8	594940	2168	6	81	A.2.6.1	2	14725	0.83	0.07	0.06	0.83	0.04	0.00	0.41	-0.25	-0.32	0.41	-0.29	-0.2444	0.0234	-5.2	0.9	-4.9	0.9	A+	A-
Reading	8	594943	2169	6	82	B.3.3.3	3	14725	0.82	0.09	0.05	0.82	0.03	0.00	0.46	-0.35	-0.32	0.46	-0.30	-0.1814	0.0230	-8.8	0.9	-9.9	0.8	A-	A-
Reading	8	594942	2170	6	83	B.3.3.3	2	14725	0.61	0.61	0.03	0.32	0.03	0.00	0.13	0.13	-0.30	-0.03	-0.28	1.1019	0.0185	9.9	1.3	9.9	1.4	A-	A-
Reading	8	555906	2172	6	85	A.1.3.1		58823	0.71	0.16	0.09	0.03	0.71	0.00	0.50	-0.45	-0.36	-0.34	0.50	0.5228	0.0099	-9.9	0.9	-9.9	0.8		
Reading	8	555900	2173	6	86	A.1.3.1		58823	0.79	0.79	0.06	0.06	0.09	0.00	0.34	0.34	-0.21	-0.30	-0.23	0.0720	0.0108	-2.6	1.0	3.1	1.0		
Reading	8	555905	2174	6	87	A.1.3.1		58823	0.73	0.07	0.13	0.73	0.08	0.00	0.32	-0.26	-0.25	0.32	-0.20	0.4578	0.0100	7.6	1.0	2.7	1.0		
Reading	8	555904	2175	6	88	B.2.1.1		58823	0.83	0.07	0.83	0.06	0.04	0.00	0.41	-0.26	0.41	-0.30	-0.29	-0.2341	0.0117	-9.9	0.9	-9.9	0.9		
Reading	8	555899	2176	6	89	A.1.4.1		58823	0.47	0.42	0.03	0.47	0.08	0.00	0.25	-0.16	-0.39	0.25	-0.44	1.7806	0.0090	9.9	1.1	9.9	1.2		
Reading	8	555898	2177	6	90	A.1.2.1		58823	0.88	0.88	0.04	0.06	0.02	0.00	0.42	0.42	-0.31	-0.26	-0.29	-0.7392	0.0135	-9.9	0.9	-9.9	0.7		
Reading	8	555901	2178	6	91	B.2.1.2		58823	0.55	0.55	0.20	0.06	0.19	0.00	0.30	0.30	-0.19	-0.46	-0.25	1.4014	0.0091	9.9	1.1	9.9	1.1		
Reading	8	555902	2179	6	92	B.1.1.1		58823	0.71	0.05	0.71	0.06	0.18	0.00	0.30	-0.33	0.30	-0.32	-0.15	0.5538	0.0099	9.9	1.1	9.9	1.2		
Reading	8	594914	2180	7	74	B.2.1.1	3	14714	0.67	0.14	0.12	0.67	0.07	0.00	0.39	-0.34	-0.28	0.39	-0.32	0.7729	0.0191	-3.6	1.0	-4.7	0.9	A+	A-
Reading	8	594951	2181	7	75	A.2.4.1	1	14714	0.76	0.04	0.76	0.08	0.12	0.00	0.37	-0.27	0.37	-0.30	-0.26	0.2412	0.0209	-1.7	1.0	-6.8	0.9	A-	A-
Reading	8	594912	2182	7	76	A.2.3.1	2	14714	0.61	0.22	0.09	0.08	0.61	0.00	0.34	-0.29	-0.21	-0.34	0.34	1.0621	0.0185	2.1	1.0	2.6	1.0	A+	A-
Reading	8	594915	2183	7	77	B.3.3.3	3	14714	0.71	0.71	0.06	0.17	0.05	0.00	0.37	0.37	-0.29	-0.28	-0.28	0.5347	0.0198	-1.1	1.0	-5.6	0.9	A-	A-
Reading	8	594913	2184	7	78	B.3.3.1	3	14714	0.67	0.67	0.06	0.12	0.15	0.00	0.40	0.40	-0.44	-0.34	-0.25	0.7883	0.0191	-4.3	1.0	-3.5	1.0	A-	A-
Reading	8	594950	2185	7	79	A.2.1.1	2	14714	0.69	0.05	0.09	0.69	0.16	0.00	0.40	-0.34	-0.35	0.40	-0.29	0.6701	0.0194	-4.0	1.0	-4.7	0.9	A+	A+
Reading	8	594918	2186	7	80	A.2.6.2	2	14714	0.46	0.03	0.46	0.03	0.49	0.00	0.13	-0.34	0.13	-0.39	-0.06	1.8387	0.0180	9.9	1.2	9.9	1.3	A-	A-
Reading	8	595949	2187	7	81	B.3.1.1	2	14714	0.81	0.81	0.06	0.03	0.09	0.00	0.43	0.43	-0.30	-0.38	-0.29	-0.1368	0.0228	-8.0	0.9	-7.8	0.8	A+	A-
Reading	8	594916	2188	7	82	B.3.3.3	2	14714	0.67	0.05	0.15	0.67	0.13	0.00	0.34	-0.38	-0.31	0.34	-0.17	0.7938	0.0190	2.1	1.0	1.2	1.0	A-	A-
Reading	8	594952	2189	7	83	B.3.3.3	2	14714	0.67	0.04	0.13	0.17	0.67	0.00	0.27	-0.32	-0.19	-0.21	0.27	0.7787	0.0191	9.9	1.1	9.9	1.2	A-	A-
Reading	8	555906	2172	7	85	A.1.3.1		58823	0.71	0.16	0.09	0.03	0.71	0.00	0.50	-0.45	-0.36	-0.34	0.50	0.5228	0.0099	-9.9	0.9	-9.9	0.8		
Reading	8	555900	2173	7	86	A.1.3.1		58823	0.79																		

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Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Reading	8	555905	2174	7	87	A.1.3.1		58823	0.73	0.07	0.13	0.73	0.08	0.00	0.32	-0.26	-0.25	0.32	-0.20	0.4578	0.0100	7.6	1.0	2.7	1.0		
Reading	8	555904	2175	7	88	B.2.1.1		58823	0.83	0.07	0.83	0.06	0.04	0.00	0.41	-0.26	0.41	-0.30	-0.29	-0.2341	0.0117	-9.9	0.9	-9.9	0.9		
Reading	8	555899	2176	7	89	A.1.4.1		58823	0.47	0.42	0.03	0.47	0.08	0.00	0.25	-0.16	-0.39	0.25	-0.44	1.7806	0.0090	9.9	1.1	9.9	1.2		
Reading	8	555898	2177	7	90	A.1.2.1		58823	0.88	0.88	0.04	0.06	0.02	0.00	0.42	0.42	-0.31	-0.26	-0.29	-0.7392	0.0135	-9.9	0.9	-9.9	0.7		
Reading	8	555901	2178	7	91	B.2.1.2		58823	0.55	0.55	0.20	0.06	0.19	0.00	0.30	0.30	-0.19	-0.46	-0.25	1.4014	0.0091	9.9	1.1	9.9	1.1		
Reading	8	555902	2179	7	92	B.1.1.1		58823	0.71	0.05	0.71	0.06	0.18	0.00	0.30	-0.33	0.30	-0.32	-0.15	0.5538	0.0099	9.9	1.1	9.9	1.2		
Reading	8	594933	2191	8	74	A.2.4.1	1	14714	0.79	0.06	0.79	0.04	0.11	0.00	0.37	-0.29	0.37	-0.22	-0.28	0.0250	0.0219	-2.3	1.0	-4.4	0.9	A-	A-
Reading	8	594925	2192	8	75	A.2.2.1	1	14714	0.88	0.03	0.07	0.02	0.88	0.00	0.37	-0.23	-0.27	-0.25	0.37	-0.7487	0.0271	-4.0	0.9	-6.2	0.8	A-	B-
Reading	8	594932	2193	8	76	A.2.4.1	2	14714	0.58	0.58	0.21	0.05	0.15	0.00	0.11	0.11	-0.16	-0.21	0.05	1.2317	0.0182	9.9	1.3	9.9	1.4	A+	A-
Reading	8	594972	2194	8	77	A.2.3.1	2	14714	0.61	0.07	0.11	0.21	0.61	0.00	0.39	-0.37	-0.30	-0.33	0.39	1.1117	0.0184	-4.7	1.0	-4.8	1.0	A-	A-
Reading	8	594926	2195	8	78	A.2.2.2	2	14714	0.72	0.72	0.11	0.11	0.06	0.00	0.44	0.44	-0.34	-0.38	-0.28	0.5207	0.0198	-8.7	0.9	-9.9	0.9	A-	B-
Reading	8	594931	2196	8	79	A.2.3.1	3	14714	0.56	0.09	0.56	0.08	0.27	0.00	0.23	-0.34	0.23	-0.27	-0.10	1.3523	0.0181	9.9	1.1	9.9	1.2	A-	A-
Reading	8	594928	2197	8	80	B.3.2.1	2	14714	0.60	0.60	0.11	0.16	0.12	0.00	0.47	0.47	-0.44	-0.36	-0.40	1.1372	0.0184	-9.9	0.9	-9.9	0.9	A-	A-
Reading	8	594929	2198	8	81	B.3.1.1	2	14714	0.76	0.16	0.76	0.05	0.04	0.00	0.43	-0.33	0.43	-0.35	-0.31	0.2726	0.0208	-7.8	0.9	-9.2	0.9	A-	B-
Reading	8	594935	2199	8	82	A.2.3.2	2	14714	0.68	0.23	0.04	0.68	0.05	0.00	0.23	-0.08	-0.36	0.23	-0.35	0.7315	0.0192	9.9	1.1	9.9	1.3	A+	A-
Reading	8	594927	2200	8	83	B.3.3.1	3	14714	0.49	0.23	0.17	0.49	0.10	0.00	0.29	-0.19	-0.29	0.29	-0.37	1.6666	0.0180	8.9	1.1	9.9	1.1	A-	A-
Reading	8	555906	2172	8	85	A.1.3.1		58823	0.71	0.16	0.09	0.03	0.71	0.00	0.50	-0.45	-0.36	-0.34	0.50	0.5228	0.0099	-9.9	0.9	-9.9	0.8		
Reading	8	555900	2173	8	86	A.1.3.1		58823	0.79	0.79	0.06	0.06	0.09	0.00	0.34	0.34	-0.21	-0.30	-0.23	0.0720	0.0108	-2.6	1.0	3.1	1.0		
Reading	8	555905	2174	8	87	A.1.3.1		58823	0.73	0.07	0.13	0.73	0.08	0.00	0.32	-0.26	-0.25	0.32	-0.20	0.4578	0.0100	7.6	1.0	2.7	1.0		
Reading	8	555904	2175	8	88	B.2.1.1		58823	0.83	0.07	0.83	0.06	0.04	0.00	0.41	-0.26	0.41	-0.30	-0.29	-0.2341	0.0117	-9.9	0.9	-9.9	0.9		
Reading	8	555899	2176	8	89	A.1.4.1		58823	0.47	0.42	0.03	0.47	0.08	0.00	0.25	-0.16	-0.39	0.25	-0.44	1.7806	0.0090	9.9	1.1	9.9	1.2		
Reading	8	555898	2177	8	90	A.1.2.1		58823	0.88	0.88	0.04	0.06	0.02	0.00	0.42	0.42	-0.31	-0.26	-0.29	-0.7392	0.0135	-9.9	0.9	-9.9	0.7		
Reading	8	555901	2178	8	91	B.2.1.2		58823	0.55	0.55	0.20	0.06	0.19	0.00	0.30	0.30	-0.19	-0.46	-0.25	1.4014	0.0091	9.9	1.1	9.9	1.1		
Reading	8	555902	2179	8	92	B.1.1.1		58823	0.71	0.05	0.71	0.06	0.18	0.00	0.30	-0.33	0.30	-0.32	-0.15	0.5538	0.0099	9.9	1.1	9.9	1.2		
Reading	8	596300	2202	9	74	A.2.6.1	2	14670	0.74	0.05	0.74	0.17	0.03	0.00	0.38	-0.37	0.38	-0.27	-0.25	0.3548	0.0205	-1.3	1.0	-1.5	1.0	A+	A-
Reading	8	596295	2203	9	75	A.2.2.2	2	14670	0.44	0.15	0.44	0.26	0.15	0.00	0.30	-0.32	0.30	-0.33	-0.16	1.9233	0.0182	5.2	1.0	9.9	1.1	A-	A+
Reading	8	596301	2204	9	76	A.2.4.1	1	14670	0.79	0.08	0.79	0.09	0.04	0.00	0.48	-0.34	0.48	-0.34	-0.39	0.0587	0.0218	-9.9	0.9	-9.9	0.8	A-	A-
Reading	8	596296	2205	9	77	A.2.6.2	2	14670	0.55	0.06	0.08	0.31	0.55	0.00	0.26	-0.28	-0.39	-0.15	0.26	1.3938	0.0182	9.9	1.1	9.9	1.2	A-	A-
Reading	8	596302	2206	9	78	A.2.4.1	1	14670	0.52	0.15	0.21	0.52	0.12	0.00	0.28	-0.15	-0.36	0.28	-0.18	1.5546	0.0181	9.9	1.1	9.9	1.1	A-	A-
Reading	8	596305	2207	9	79	A.2.3.1	2	14670	0.52	0.20	0.06	0.21	0.52	0.00	0.34	-0.25	-0.40	-0.33	0.34	1.5425	0.0181	1.0	1.0	3.4	1.0	B-	B-
Reading	8	596299	2208	9	80	B.3.1.1	2	14670	0.76	0.76	0.05	0.08	0.10	0.00	0.46	0.46	-0.39	-0.38	-0.29	0.2390	0.0210	-9.9	0.9	-9.9	0.8	B-	C-
Reading	8	596304	2209	9	81	A.2.3.1	2	14670	0.50	0.50	0.09	0.34	0.07	0.00	0.40	0.40	-0.29	-0.39	-0.37	1.6221	0.0181	-8.9	0.9	-5.9	1.0	C-	C-
Reading	8	596307	2210	9	82	A.2.3.1	2	14670	0.60	0.60	0.07	0.22	0.10	0.00	0.36	0.36	-0.41	-0.23	-0.35	1.1519	0.0184	0.5	1.0	0.0	1.0	A-	A-
Reading	8	596303	2211	9	83	B.3.3.3	3	14670	0.38	0.20	0.26	0.38	0.16	0.00	0.21	-0.19	-0.22	0.21	-0.22	2.2127	0.0185	9.9	1.1	9.9	1.3	A-	A-
Reading	8	555906	2172	9	85	A.1.3.1		58823	0.71	0.16	0.09	0.03	0.71	0.00	0.50	-0.45	-0.36	-0.34	0.50	0.5228	0.0099	-9.9	0.9	-9.9	0.8		
Reading	8	555900	2173	9	86	A.1.3.1		58823	0.79	0.79	0.06	0.06	0.09	0.00	0.34	0.34	-0.21	-0.30	-0.23	0.0720	0.0108	-2.6	1.0	3.1	1.0		
Reading	8	555905	2174	9	87	A.1.3.1		58823	0.73	0.07	0.13	0.73	0.08	0.00	0.32	-0.26	-0.25	0.32	-0.20	0.4578	0.0100	7.6	1.0	2.7	1.0		
Reading	8	555904	2175	9	88	B.2.1.1		58823	0.83	0.07	0.83	0.06	0.04	0.00	0.41	-0.26	0.41	-0.30	-0.29	-0.2341	0.0117	-9.9	0.9	-9.9	0.9		
Reading	8	555899	2176	9	89	A.1.4.1		58823	0.47	0.42	0.03	0.47	0.08	0.00	0.25	-0.16	-0.39	0.25	-0.44	1.7806	0.0090	9.9	1.1	9.9	1.2		
Reading	8	555898	2177	9	90	A.1.2.1		58823	0.88	0.88	0.04	0.06	0.02	0.00	0.42	0.42	-0.31	-0.26	-0.29	-0.7392	0.0135	-9.9	0.9	-9.9	0.7		
Reading	8	555901	2178	9	91	B.2.1.2		58823	0.55	0.55	0.20	0.06	0.19	0.00	0.30	0.30	-0.19	-0.46	-0.25	1.4014	0.0091	9.9	1.1	9.9	1.1		
Reading	8	555902	2179	9	92	B.1.1.1		58823	0.71	0.05	0.71	0.06	0.18	0.00	0.30	-0.33	0.30	-0.32	-0.15	0.5538	0.0099	9.9	1.1	9.9	1.2		
Reading	11	555965	2213	0	27	A.2.3.1		133248	0.78	0.78	0.17	0.02	0.03	0.00	0.48	0.48	-0.45	-0.27	-0.23	-0.5445	0.0072	-9.9	0.9	-9.9	0.8		
Reading	11	555967	2214	0	28	A.2.6.1		133248	0.90	0.02	0.90	0.02	0.06	0.00	0.41	-0.25	0.41	-0.23	-0.32	-1.6180	0.0096	-9.9	0.9	-9.9	0.7		
Reading	11	557934	2215	0	29	B.2.1.2		133248	0.89	0.07	0.02	0.02	0.89	0.00	0.37	-0.27	-0.22	-0.25	0.37	-1.5706	0.0095	-9.9	0.9	-9.9	0.9		
Reading	11	555964	2216	0	30	A.2.2.2		133248	0.83	0.83	0.07	0.05	0.05	0.00	0.45	0.45	-0.40	-0.27	-0.24	-0.9367	0.0079	-9.9	0.9	-9.9	0.8		
Reading	11	555968	2217	0	31	B.2.1.1		133248	0.61	0.61	0.05	0.30	0.04	0.00	0.35	0.35	-0.35	-0.28	-0.28	0.4336	0.0062	9.9	1.1	9.9	1.1		
Reading	11	555969	2218	0	32	B.1.1.1		133248	0.39	0.05	0.49	0.07	0.39	0.00	0.20	-0.20	-0.20	-0.17	0.20	1.5659	0.0062	9.9	1.2	9.9	1.3		
Reading	11	555974	2219	0	33	B.1.2.1		133248	0.80	0.03	0.07	0.80	0.11	0.00	0.22	-0.30	-0.09	0.22	-0.15	-0.6532	0.0074	9.9	1.1	9.9	1.3		
Reading	11	556211	2221	0	35	B.3.3.2		133248	0.80	0.07	0.80	0.08	0.04	0.00	0.39	-0.30	0.39	-0.32	-0.18	-0.7122	0.0075	-5.3	1.0	-8.0	0.9		
Reading	11	556207	2222	0	36	A.2.4.1		133248	0.81	0.07	0.06	0.															

Appendix I: Item Statistics Multiple Choice

Item Information							Classical												Rasch		Infit		Outfit		DIF		
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Reading	11	556212	2223	0	37	B.3.1.1		133248	0.88	0.04	0.88	0.03	0.05	0.00	0.41	-0.26	0.41	-0.31	-0.27	-1.3875	0.0089	-9.9	0.9	-9.9	0.9		
Reading	11	556202	2224	0	38	A.2.1.1		133248	0.54	0.14	0.12	0.20	0.54	0.00	0.27	-0.34	-0.28	-0.13	0.27	0.7872	0.0061	9.9	1.1	9.9	1.2		
Reading	11	556210	2225	0	39	B.3.3.2		133248	0.76	0.76	0.06	0.16	0.03	0.00	0.50	0.50	-0.34	-0.43	-0.36	-0.3964	0.0070	-9.9	0.9	-9.9	0.8		
Reading	11	556206	2226	0	40	A.2.4.1		133248	0.80	0.07	0.10	0.80	0.03	0.00	0.34	-0.27	-0.21	0.34	-0.25	-0.6691	0.0074	-5.7	1.0	9.9	1.1		
Reading	11	556205	2227	0	41	A.2.3.1		133248	0.76	0.11	0.09	0.03	0.76	0.00	0.37	-0.24	-0.30	-0.31	0.37	-0.4452	0.0070	0.6	1.0	-4.0	1.0		
Reading	11	556105	2228	0	42	B.3.2.1		133248	0.70	0.08	0.10	0.70	0.11	0.00	0.34	-0.34	-0.24	0.34	-0.20	-0.0504	0.0066	9.9	1.1	9.9	1.1		
Reading	11	556106	2229	0	43	B.3.3.2		133248	0.59	0.24	0.14	0.59	0.02	0.00	0.38	-0.37	-0.24	0.38	-0.31	0.5408	0.0062	2.6	1.0	-2.9	1.0		
Reading	11	556096	2230	0	44	A.2.2.2		133248	0.67	0.67	0.15	0.07	0.11	0.00	0.49	0.49	-0.47	-0.33	-0.34	0.1084	0.0064	-9.9	0.9	-9.9	0.8		
Reading	11	556100	2231	0	45	B.1.1.1		133248	0.68	0.68	0.19	0.03	0.10	0.00	0.49	0.49	-0.40	-0.41	-0.38	0.0426	0.0065	-9.9	0.9	-9.9	0.8		
Reading	11	556107	2232	0	46	B.2.1.1		133248	0.59	0.08	0.10	0.22	0.59	0.00	0.40	-0.36	-0.35	-0.33	0.40	0.5585	0.0061	-0.2	1.0	-2.6	1.0		
Reading	11	556102	2233	0	47	A.2.4.1		133248	0.84	0.06	0.04	0.84	0.05	0.00	0.45	-0.29	-0.32	0.45	-0.34	-1.0532	0.0081	-9.9	0.9	-9.9	0.8		
Reading	11	556104	2234	0	48	A.2.4.1		133248	0.79	0.79	0.06	0.08	0.06	0.00	0.48	0.48	-0.37	-0.41	-0.26	-0.6514	0.0074	-9.9	0.9	-9.9	0.8		
Reading	11	556101	2235	0	49	A.2.3.1		133248	0.79	0.08	0.79	0.06	0.06	0.00	0.46	-0.32	0.46	-0.36	-0.32	-0.6618	0.0074	-9.9	0.9	-9.9	0.8		
Reading	11	556097	2236	0	50	A.2.3.1		133248	0.81	0.10	0.81	0.05	0.04	0.00	0.50	-0.34	0.50	-0.41	-0.35	-0.7661	0.0076	-9.9	0.9	-9.9	0.8		
Reading	11	556188	2238	0	121	A.1.1.1		133248	0.60	0.08	0.28	0.60	0.04	0.00	0.28	-0.30	-0.19	0.28	-0.33	0.4966	0.0062	9.9	1.1	9.9	1.2		
Reading	11	556199	2239	0	122	B.2.1.2		133248	0.74	0.03	0.17	0.05	0.74	0.00	0.38	-0.26	-0.27	-0.38	0.38	-0.3129	0.0069	-1.2	1.0	9.9	1.1		
Reading	11	556197	2240	0	123	A.1.4.1		133248	0.84	0.06	0.04	0.06	0.84	0.00	0.44	-0.27	-0.33	-0.32	0.44	-1.0552	0.0081	-9.9	0.9	-9.9	0.8		
Reading	11	556193	2241	0	124	B.1.1.1		133248	0.47	0.02	0.47	0.28	0.24	0.00	0.32	-0.35	0.32	-0.37	-0.22	1.1613	0.0060	9.9	1.1	9.9	1.1		
Reading	11	556189	2242	0	125	A.1.2.1		133248	0.58	0.21	0.13	0.08	0.58	0.00	0.38	-0.33	-0.30	-0.33	0.38	0.6175	0.0061	3.6	1.0	1.5	1.0		
Reading	11	556192	2243	0	126	A.1.3.1		133248	0.40	0.29	0.40	0.20	0.11	0.00	0.27	-0.18	0.27	-0.38	-0.26	1.5085	0.0061	9.9	1.1	9.9	1.2		
Reading	11	556194	2244	0	127	B.2.2.1		133248	0.60	0.60	0.11	0.16	0.12	0.00	0.38	0.38	-0.39	-0.28	-0.31	0.4968	0.0062	3.5	1.0	0.3	1.0		
Reading	11	556190	2245	0	128	A.1.4.1		133248	0.76	0.10	0.03	0.76	0.12	0.00	0.44	-0.34	-0.35	0.44	-0.31	-0.3874	0.0070	-9.9	1.0	-9.9	0.9		
Reading	11	556196	2246	0	129	B.2.1.1		133248	0.61	0.09	0.61	0.11	0.18	0.00	0.39	-0.31	0.39	-0.43	-0.27	0.4692	0.0062	0.0	1.0	5.6	1.0		
Reading	11	556177	2248	0	131	A.2.3.1		133248	0.61	0.04	0.03	0.32	0.61	0.00	0.30	-0.39	-0.39	-0.20	0.30	0.4349	0.0062	9.9	1.1	9.9	1.1		
Reading	11	556176	2249	0	132	A.2.1.1		133248	0.75	0.19	0.75	0.02	0.04	0.00	0.33	-0.20	0.33	-0.31	-0.36	-0.3217	0.0069	9.9	1.1	6.9	1.0		
Reading	11	556183	2250	0	133	B.2.1.1		133248	0.55	0.31	0.06	0.55	0.07	0.00	0.38	-0.27	-0.46	0.38	-0.39	0.7404	0.0061	3.5	1.0	7.1	1.0		
Reading	11	556179	2251	0	134	A.2.3.1		133248	0.68	0.05	0.68	0.20	0.06	0.00	0.38	-0.34	0.38	-0.23	-0.43	0.0427	0.0065	4.8	1.0	7.8	1.0		
Reading	11	556182	2252	0	135	B.3.2.1		133248	0.88	0.04	0.88	0.03	0.05	0.00	0.41	-0.23	0.41	-0.31	-0.28	-1.4103	0.0090	-9.9	0.9	-9.9	0.8		
Reading	11	556181	2253	0	136	A.2.6.2		133248	0.57	0.04	0.28	0.57	0.10	0.00	0.38	-0.38	-0.25	0.38	-0.46	0.6401	0.0061	4.8	1.0	9.9	1.0		
Reading	11	556184	2254	0	137	B.1.2.1		133248	0.56	0.56	0.06	0.21	0.17	0.00	0.44	0.44	-0.45	-0.41	-0.33	0.7173	0.0061	-9.9	0.9	-9.9	0.9		
Reading	11	556186	2255	0	138	B.1.2.1		133248	0.56	0.07	0.56	0.21	0.16	0.00	0.40	-0.26	0.40	-0.29	-0.46	0.7191	0.0061	-5.4	1.0	-1.8	1.0		
Reading	11	595780	2257	1	77	A.2.3.1	2	15031	0.81	0.03	0.14	0.81	0.02	0.00	0.47	-0.32	-0.40	0.47	-0.22	-0.7910	0.0226	-7.7	0.9	-9.9	0.8	A-	C-
Reading	11	595785	2258	1	78	A.2.4.1	1	15031	0.82	0.07	0.04	0.07	0.82	0.00	0.43	-0.33	-0.28	-0.30	0.43	-0.9153	0.0233	-5.7	0.9	-7.8	0.8	A+	A-
Reading	11	595812	2259	1	79	A.2.1.1	2	15031	0.84	0.02	0.84	0.08	0.05	0.00	0.40	-0.28	0.40	-0.23	-0.35	-1.0592	0.0241	-3.5	1.0	-4.0	0.9	A-	A-
Reading	11	595816	2260	1	80	A.2.3.1	2	15031	0.55	0.55	0.23	0.03	0.19	0.00	0.36	0.36	-0.33	-0.35	-0.30	0.7279	0.0183	6.6	1.1	6.0	1.1	A+	B-
Reading	11	595813	2261	1	81	B.3.3.2	2	15031	0.63	0.63	0.06	0.09	0.23	0.00	0.40	0.40	-0.37	-0.38	-0.29	0.3478	0.0188	1.8	1.0	-0.8	1.0	A-	A-
Reading	11	595777	2262	1	82	A.2.3.2	2	15031	0.78	0.06	0.78	0.03	0.13	0.00	0.44	-0.38	0.44	-0.33	-0.30	-0.5915	0.0217	-5.1	0.9	-7.4	0.9	A-	A-
Reading	11	595786	2263	1	83	A.2.6.2	2	15031	0.59	0.05	0.09	0.59	0.26	0.00	0.26	-0.24	-0.32	0.26	-0.16	0.5215	0.0185	9.9	1.2	9.9	1.3	A+	A+
Reading	11	595781	2264	1	84	B.3.3.1	3	15031	0.77	0.09	0.08	0.77	0.06	0.00	0.46	-0.35	-0.36	0.46	-0.31	-0.4951	0.0213	-7.2	0.9	-8.3	0.8	A+	A-
Reading	11	595783	2265	1	85	B.3.1.1	2	15031	0.84	0.84	0.07	0.05	0.04	0.00	0.50	0.50	-0.38	-0.33	-0.35	-1.0447	0.0240	-9.9	0.9	-9.9	0.7	A+	B-
Reading	11	595815	2266	1	86	A.2.3.1	2	15031	0.78	0.11	0.78	0.05	0.06	0.00	0.47	-0.37	0.47	-0.34	-0.32	-0.5787	0.0216	-7.8	0.9	-8.8	0.8	A+	A-
Reading	11	555979	2268	1	88	A.1.3.1		74210	0.78	0.16	0.03	0.03	0.78	0.00	0.48	-0.40	-0.36	-0.32	0.48	-0.5952	0.0097	-9.9	0.9	-9.9	0.8		
Reading	11	555977	2269	1	89	A.1.1.2		74210	0.36	0.24	0.30	0.10	0.36	0.00	0.32	-0.31	-0.30	-0.44	0.32	1.7056	0.0084	1.4	1.0	9.9	1.1		
Reading	11	555987	2270	1	90	B.2.1.2		74210	0.65	0.65	0.29	0.03	0.03	0.00	0.35	0.35	-0.26	-0.39	-0.33	0.2354	0.0085	9.9	1.1	9.9	1.1		
Reading	11	555983	2271	1	91	B.1.1.1		74210	0.62	0.62	0.10	0.20	0.07	0.00	0.23	0.23	-0.05	-0.20	-0.32	0.3760	0.0084	9.9	1.2	9.9	1.3		
Reading	11	555980	2272	1	92	A.1.4.1		74210	0.58	0.11	0.28	0.58	0.02	0.00	0.30	-0.34	-0.21	0.30	-0.29	0.5906	0.0082	9.9	1.1	9.9	1.1		
Reading	11	555988	2273	1	93	B.2.2.1		74210	0.71	0.06	0.71	0.14	0.08	0.00	0.42	-0.31	0.42	-0.32	-0.35	-0.1355	0.0089	-9.9	1.0	-9.9	0.9		
Reading	11	555978	2274	1	94	A.1.3.1		74210	0.72	0.07	0.72	0.10	0.10	0.00	0.33	-0.23	0.33	-0.22	-0.29	-0.1399	0.0089	9.9	1.1	7.1	1.1		
Reading	11	555985	2275	1	95	B.1.1.1		74210	0.67	0.11	0.67	0.12	0.10	0.00	0.39	-0.37	0.39	-0.29	-0.27	0.1359	0.0086	1.0	1.0	0.7	1.0		
Reading	11	595886	2276	2	77	A.2.3.1	2	14778	0.91	0.91	0.03	0.03	0.03	0.00	0.40	0.40	-0.32	-0.25	-0.21	-1.6998	0.0297	-5.6	0.9	-9.6	0.7	A+	B-
Reading	11	595891	2277	2	78	A.2.2.2	2																				

## Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Reading	11	595894	2278	2	79	A.2.4.1	2	14778	0.80	0.11	0.03	0.80	0.06	0.00	0.45	-0.35	-0.28	0.45	-0.32	-0.7073	0.0224	-6.7	0.9	-8.7	0.8	A-	A-
Reading	11	595890	2279	2	80	B.2.1.1	2	14778	0.76	0.05	0.76	0.13	0.06	0.00	0.17	-0.26	0.17	-0.02	-0.15	-0.4027	0.0210	9.9	1.2	9.9	1.6	A+	A-
Reading	11	595887	2280	2	81	A.2.3.1	2	14778	0.65	0.30	0.03	0.65	0.02	0.00	0.07	0.02	-0.26	0.07	-0.23	0.2284	0.0190	9.9	1.3	9.9	1.6	A-	A+
Reading	11	595895	2281	2	82	B.3.3.1	2	14778	0.93	0.93	0.03	0.02	0.02	0.00	0.42	0.42	-0.28	-0.27	-0.26	-2.1012	0.0342	-6.7	0.8	-9.9	0.6	B+	B-
Reading	11	595888	2282	2	83	A.2.5.1	3	14778	0.47	0.21	0.11	0.47	0.20	0.00	0.17	-0.08	-0.23	0.17	-0.17	1.1397	0.0181	9.9	1.2	9.9	1.4	A+	A-
Reading	11	595889	2283	2	84	A.2.6.1	2	14778	0.65	0.02	0.65	0.03	0.30	0.00	0.30	-0.28	0.30	-0.32	-0.24	0.2171	0.0190	9.9	1.1	8.5	1.1	A-	A+
Reading	11	595893	2284	2	85	B.3.3.1	2	14778	0.88	0.04	0.88	0.05	0.04	0.00	0.44	-0.33	0.44	-0.30	-0.26	-1.3891	0.0269	-7.2	0.9	-9.9	0.7	A+	B-
Reading	11	595885	2285	2	86	A.2.3.2	2	14778	0.87	0.02	0.04	0.07	0.87	0.00	0.43	-0.29	-0.33	-0.28	0.43	-1.2991	0.0262	-6.8	0.9	-8.2	0.8	A+	B-
Reading	11	555979	2268	2	88	A.1.3.1		74210	0.78	0.16	0.03	0.03	0.78	0.00	0.48	-0.40	-0.36	-0.32	0.48	-0.5952	0.0097	-9.9	0.9	-9.9	0.8		
Reading	11	555977	2269	2	89	A.1.1.2		74210	0.36	0.24	0.30	0.10	0.36	0.00	0.32	-0.31	-0.30	-0.44	0.32	1.7056	0.0084	1.4	1.0	9.9	1.1		
Reading	11	555987	2270	2	90	B.2.1.2		74210	0.65	0.65	0.29	0.03	0.03	0.00	0.35	0.35	-0.26	-0.39	-0.33	0.2354	0.0085	9.9	1.1	9.9	1.1		
Reading	11	555983	2271	2	91	B.1.1.1		74210	0.62	0.62	0.10	0.20	0.07	0.00	0.23	0.23	-0.05	-0.20	-0.32	0.3760	0.0084	9.9	1.2	9.9	1.3		
Reading	11	555980	2272	2	92	A.1.4.1		74210	0.58	0.11	0.28	0.58	0.02	0.00	0.30	-0.34	-0.21	0.30	-0.29	0.5906	0.0082	9.9	1.1	9.9	1.1		
Reading	11	555988	2273	2	93	B.2.2.1		74210	0.71	0.06	0.71	0.14	0.08	0.00	0.42	-0.31	0.42	-0.32	-0.35	-0.1355	0.0089	-9.9	1.0	-9.9	0.9		
Reading	11	555978	2274	2	94	A.1.3.1		74210	0.72	0.07	0.72	0.10	0.10	0.00	0.33	-0.23	0.33	-0.22	-0.29	-0.1399	0.0089	9.9	1.1	7.1	1.1		
Reading	11	555985	2275	2	95	B.1.1.1		74210	0.67	0.11	0.67	0.12	0.10	0.00	0.39	-0.37	0.39	-0.29	-0.27	0.1359	0.0086	1.0	1.0	0.7	1.0		
Reading	11	595900	2287	3	77	A.2.4.1	2	14794	0.80	0.11	0.03	0.06	0.80	0.00	0.34	-0.22	-0.29	-0.26	0.34	-0.7045	0.0224	0.3	1.0	1.5	1.0	A-	C-
Reading	11	595904	2288	3	78	B.3.3.2	3	14794	0.64	0.15	0.16	0.06	0.64	0.00	0.21	-0.04	-0.27	-0.22	0.21	0.3102	0.0188	9.9	1.2	9.9	1.3	A+	A-
Reading	11	595903	2289	3	79	B.3.1.1	2	14794	0.80	0.02	0.80	0.11	0.07	0.00	0.17	-0.23	0.17	-0.08	-0.11	-0.6880	0.0223	9.9	1.2	9.9	1.5	A-	A-
Reading	11	595901	2290	3	80	A.2.2.2	2	14794	0.43	0.43	0.25	0.16	0.17	0.00	0.27	0.27	-0.19	-0.40	-0.19	1.3434	0.0182	9.9	1.1	9.9	1.2	A+	A-
Reading	11	595902	2291	3	81	A.2.3.1	2	14794	0.81	0.03	0.04	0.81	0.12	0.00	0.39	-0.31	-0.29	0.39	-0.28	-0.7596	0.0227	-3.7	1.0	-5.9	0.9	A-	C-
Reading	11	595906	2292	3	82	A.2.4.1	1	14794	0.79	0.02	0.79	0.08	0.11	0.00	0.52	-0.30	0.52	-0.35	-0.47	-0.5993	0.0218	-9.9	0.8	-9.9	0.7	A-	A-
Reading	11	595905	2293	3	83	B.3.2.1	2	14794	0.24	0.14	0.50	0.24	0.11	0.00	0.11	-0.30	-0.08	0.11	-0.12	2.3613	0.0207	9.9	1.2	9.9	1.7	A+	B+
Reading	11	595899	2294	3	84	B.2.1.2	2	14794	0.49	0.29	0.49	0.05	0.18	0.00	0.19	-0.23	0.19	-0.34	-0.03	1.0541	0.0181	9.9	1.2	9.9	1.3	A-	A-
Reading	11	595896	2295	3	85	A.2.3.2	2	14794	0.72	0.09	0.08	0.72	0.11	0.00	0.40	-0.35	-0.38	0.40	-0.19	-0.1446	0.0200	-1.9	1.0	-3.3	1.0	A-	A-
Reading	11	595907	2296	3	86	A.2.4.1	1	14794	0.69	0.14	0.11	0.69	0.05	0.00	0.42	-0.30	-0.38	0.42	-0.32	0.0075	0.0195	-4.5	1.0	-5.6	0.9	A-	B-
Reading	11	555979	2268	3	88	A.1.3.1		74210	0.78	0.16	0.03	0.03	0.78	0.00	0.48	-0.40	-0.36	-0.32	0.48	-0.5952	0.0097	-9.9	0.9	-9.9	0.8		
Reading	11	555977	2269	3	89	A.1.1.2		74210	0.36	0.24	0.30	0.10	0.36	0.00	0.32	-0.31	-0.30	-0.44	0.32	1.7056	0.0084	1.4	1.0	9.9	1.1		
Reading	11	555987	2270	3	90	B.2.1.2		74210	0.65	0.65	0.29	0.03	0.03	0.00	0.35	0.35	-0.26	-0.39	-0.33	0.2354	0.0085	9.9	1.1	9.9	1.1		
Reading	11	555983	2271	3	91	B.1.1.1		74210	0.62	0.62	0.10	0.20	0.07	0.00	0.23	0.23	-0.05	-0.20	-0.32	0.3760	0.0084	9.9	1.2	9.9	1.3		
Reading	11	555980	2272	3	92	A.1.4.1		74210	0.58	0.11	0.28	0.58	0.02	0.00	0.30	-0.34	-0.21	0.30	-0.29	0.5906	0.0082	9.9	1.1	9.9	1.1		
Reading	11	555988	2273	3	93	B.2.2.1		74210	0.71	0.06	0.71	0.14	0.08	0.00	0.42	-0.31	0.42	-0.32	-0.35	-0.1355	0.0089	-9.9	1.0	-9.9	0.9		
Reading	11	555978	2274	3	94	A.1.3.1		74210	0.72	0.07	0.72	0.10	0.10	0.00	0.33	-0.23	0.33	-0.22	-0.29	-0.1399	0.0089	9.9	1.1	7.1	1.1		
Reading	11	555985	2275	3	95	B.1.1.1		74210	0.67	0.11	0.67	0.12	0.10	0.00	0.39	-0.37	0.39	-0.29	-0.27	0.1359	0.0086	1.0	1.0	0.7	1.0		
Reading	11	595876	2298	4	77	A.2.4.1	1	14782	0.76	0.08	0.07	0.09	0.76	0.00	0.45	-0.38	-0.33	-0.31	0.45	-0.4257	0.0210	-7.8	0.9	-8.6	0.8	A+	A-
Reading	11	595878	2299	4	78	A.2.3.1	2	14782	0.45	0.06	0.40	0.09	0.45	0.00	0.28	-0.39	-0.20	-0.39	0.28	1.2166	0.0182	9.9	1.1	9.9	1.2	A-	A-
Reading	11	595871	2300	4	79	B.2.1.1	2	14782	0.60	0.06	0.31	0.60	0.02	0.00	0.17	-0.26	-0.08	0.17	-0.27	0.4853	0.0185	9.9	1.2	9.9	1.3	A-	A-
Reading	11	595873	2301	4	80	A.2.2.2	2	14782	0.87	0.87	0.05	0.06	0.03	0.00	0.44	0.44	-0.27	-0.33	-0.33	-1.2839	0.0260	-7.9	0.9	-9.2	0.7	A-	B-
Reading	11	595860	2302	4	81	B.3.1.1	2	14782	0.45	0.45	0.05	0.39	0.11	0.00	0.40	0.40	-0.45	-0.38	-0.36	1.2355	0.0182	-9.1	0.9	-1.6	1.0	A-	A-
Reading	11	595877	2303	4	82	A.2.3.1	2	14782	0.57	0.30	0.04	0.09	0.57	0.00	0.33	-0.26	-0.41	-0.26	0.33	0.6421	0.0183	7.9	1.1	5.3	1.1	A-	A-
Reading	11	595872	2304	4	83	A.2.6.2	2	14782	0.47	0.29	0.47	0.09	0.14	0.00	0.15	-0.03	0.15	-0.30	-0.20	1.1095	0.0181	9.9	1.3	9.9	1.4	A+	A-
Reading	11	595870	2305	4	84	B.3.3.2	3	14782	0.53	0.13	0.09	0.53	0.25	0.00	0.31	-0.28	-0.40	0.31	-0.21	0.8255	0.0182	8.0	1.1	8.1	1.1	A-	A-
Reading	11	595879	2306	4	85	A.2.3.2	2	14782	0.58	0.11	0.58	0.22	0.09	0.00	0.27	-0.30	0.27	-0.16	-0.24	0.5948	0.0184	9.9	1.1	9.9	1.2	A-	A-
Reading	11	595869	2307	4	86	A.2.3.1	2	14782	0.58	0.58	0.30	0.04	0.07	0.00	0.40	0.40	-0.32	-0.36	-0.42	0.5798	0.0184	-2.2	1.0	-0.9	1.0	A-	B-
Reading	11	555979	2268	4	88	A.1.3.1		74210	0.78	0.16	0.03	0.03	0.78	0.00	0.48	-0.40	-0.36	-0.32	0.48	-0.5952	0.0097	-9.9	0.9	-9.9	0.8		
Reading	11	555977	2269	4	89	A.1.1.2		74210	0.36	0.24	0.30	0.10	0.36	0.00	0.32	-0.31	-0.30	-0.44	0.32	1.7056	0.0084	1.4	1.0	9.9	1.1		
Reading	11	555987	2270	4	90	B.2.1.2		74210	0.65	0.65	0.29	0.03	0.03	0.00	0.35	0.35	-0.26	-0.39	-0.33	0.2354	0.0085	9.9	1.1	9.9	1.1		
Reading	11	555983	2271	4	91	B.1.1.1		74210	0.62	0.62	0.10	0.20	0.07	0.00	0.23	0.23	-0.05	-0.20	-0.32	0.3760	0.0084	9.9	1.2	9.9	1.3		
Reading	11	555980	2272	4	92	A.1.4.1		74210	0.58	0.11	0.28	0.58	0.02	0.00	0.30	-0.34	-0.21	0.30	-0.29	0.5906	0.0082	9.9	1.1	9.9	1.1		
Reading	11	555988	2273	4	93	B.2.2.1		74210	0.71	0.06	0.71	0.14	0.08	0.00	0.42	-0.31	0.42	-0.32	-0.35	-0.1355	0.0089	-9.9	1.0	-9.9	0.9		
Reading	11	555978	2274	4</																							

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Reading	11	555985	2275	4	95	B.1.1.1		74210	0.67	0.11	0.67	0.12	0.10	0.00	0.39	-0.37	0.39	-0.29	-0.27	0.1359	0.0086	1.0	1.0	0.7	1.0		
Reading	11	595900	2287	5	77	A.2.4.1	2	14825	0.80	0.11	0.03	0.06	0.80	0.00	0.35	-0.23	-0.30	-0.26	0.35	-0.7160	0.0224	-0.1	1.0	1.0	1.0	A-	C-
Reading	11	595904	2288	5	78	B.3.3.2	3	14825	0.62	0.15	0.17	0.06	0.62	0.00	0.19	-0.02	-0.27	-0.18	0.19	0.3714	0.0187	9.9	1.2	9.9	1.3	A+	A-
Reading	11	595903	2289	5	79	B.3.1.1	2	14825	0.80	0.02	0.80	0.12	0.06	0.00	0.16	-0.23	0.16	-0.07	-0.10	-0.6873	0.0223	9.9	1.2	9.9	1.5	A+	B-
Reading	11	595898	2309	5	80	A.2.3.1	2	14825	0.81	0.81	0.03	0.05	0.11	0.00	0.41	0.41	-0.30	-0.32	-0.29	-0.7316	0.0225	-4.6	0.9	-5.1	0.9	A-	A-
Reading	11	595908	2310	5	81	A.2.2.1	1	14825	0.89	0.05	0.04	0.02	0.89	0.00	0.36	-0.24	-0.21	-0.27	0.36	-1.5212	0.0280	-3.5	0.9	-3.9	0.9	A-	A-
Reading	11	595906	2292	5	82	A.2.4.1	1	14825	0.79	0.02	0.79	0.08	0.11	0.00	0.51	-0.31	0.51	-0.34	-0.45	-0.6302	0.0220	-9.9	0.9	-9.9	0.7	A-	A-
Reading	11	595905	2293	5	83	B.3.2.1	2	14825	0.25	0.13	0.52	0.25	0.10	0.00	0.08	-0.25	-0.04	0.08	-0.09	2.3229	0.0205	9.9	1.2	9.9	1.8	A-	B+
Reading	11	595899	2294	5	84	B.2.1.2	2	14825	0.50	0.26	0.50	0.06	0.18	0.00	0.19	-0.23	0.19	-0.33	-0.03	0.9970	0.0181	9.9	1.2	9.9	1.3	A-	A-
Reading	11	595896	2295	5	85	A.2.3.2	2	14825	0.75	0.08	0.08	0.75	0.09	0.00	0.39	-0.31	-0.38	0.39	-0.18	-0.3374	0.0207	-0.6	1.0	-2.0	1.0	A-	B-
Reading	11	595907	2296	5	86	A.2.4.1	1	14825	0.71	0.13	0.11	0.71	0.05	0.00	0.43	-0.29	-0.39	0.43	-0.33	-0.0807	0.0198	-4.9	1.0	-5.8	0.9	A-	B-
Reading	11	555979	2268	5	88	A.1.3.1		74210	0.78	0.16	0.03	0.03	0.78	0.00	0.48	-0.40	-0.36	-0.32	0.48	-0.5952	0.0097	-9.9	0.9	-9.9	0.8		
Reading	11	555977	2269	5	89	A.1.1.2		74210	0.36	0.24	0.30	0.10	0.36	0.00	0.32	-0.31	-0.30	-0.44	0.32	1.7056	0.0084	1.4	1.0	9.9	1.1		
Reading	11	555987	2270	5	90	B.2.1.2		74210	0.65	0.65	0.29	0.03	0.03	0.00	0.35	0.35	-0.26	-0.39	-0.33	0.2354	0.0085	9.9	1.1	9.9	1.1		
Reading	11	555983	2271	5	91	B.1.1.1		74210	0.62	0.62	0.10	0.20	0.07	0.00	0.23	0.23	-0.05	-0.20	-0.32	0.3760	0.0084	9.9	1.2	9.9	1.3		
Reading	11	555980	2272	5	92	A.1.4.1		74210	0.58	0.11	0.28	0.58	0.02	0.00	0.30	-0.34	-0.21	0.30	-0.29	0.5906	0.0082	9.9	1.1	9.9	1.1		
Reading	11	555988	2273	5	93	B.2.2.1		74210	0.71	0.06	0.71	0.14	0.08	0.00	0.42	-0.31	0.42	-0.32	-0.35	-0.1355	0.0089	-9.9	1.0	-9.9	0.9		
Reading	11	555978	2274	5	94	A.1.3.1		74210	0.72	0.07	0.72	0.10	0.10	0.00	0.33	-0.23	0.33	-0.22	-0.29	-0.1399	0.0089	9.9	1.1	7.1	1.1		
Reading	11	555985	2275	5	95	B.1.1.1		74210	0.67	0.11	0.67	0.12	0.10	0.00	0.39	-0.37	0.39	-0.29	-0.27	0.1359	0.0086	1.0	1.0	0.7	1.0		
Reading	11	595840	2312	6	77	A.1.3.1	2	14765	0.58	0.06	0.58	0.15	0.20	0.00	0.28	-0.32	0.28	-0.21	-0.23	0.5891	0.0184	9.9	1.1	9.9	1.2	A+	A+
Reading	11	595760	2313	6	78	A.1.1.2	2	14765	0.45	0.17	0.34	0.04	0.45	0.00	0.22	-0.10	-0.22	-0.37	0.22	1.2617	0.0182	9.9	1.1	9.9	1.3	A-	A-
Reading	11	595762	2314	6	79	B.2.1.2	2	14765	0.92	0.03	0.02	0.92	0.03	0.00	0.35	-0.26	-0.24	0.35	-0.18	-1.8257	0.0312	-4.0	0.9	-2.3	0.9	B-	B-
Reading	11	595764	2315	6	80	B.1.1.1	1	14765	0.93	0.02	0.01	0.04	0.93	0.00	0.34	-0.18	-0.24	-0.24	0.34	-2.1067	0.0345	-4.0	0.9	-3.2	0.9	A+	A-
Reading	11	595761	2316	6	81	B.1.1.1	2	14765	0.84	0.84	0.06	0.08	0.02	0.00	0.31	0.31	-0.28	-0.15	-0.24	-0.9997	0.0242	1.0	1.0	4.2	1.1	A+	A-
Reading	11	595765	2317	6	82	B.1.1.1	2	14765	0.92	0.01	0.03	0.92	0.03	0.00	0.32	-0.13	-0.24	0.32	-0.22	-1.8395	0.0314	-2.3	1.0	-3.3	0.9	A+	A-
Reading	11	595838	2318	6	83	B.1.1.1	2	14765	0.47	0.33	0.47	0.14	0.06	0.00	0.20	-0.09	0.20	-0.32	-0.26	1.1669	0.0181	9.9	1.2	9.9	1.3	A+	A+
Reading	11	595809	2319	6	84	B.2.2.2	2	14765	0.47	0.07	0.47	0.06	0.39	0.00	0.24	-0.29	0.24	-0.34	-0.16	1.1412	0.0181	9.9	1.1	9.9	1.2	A-	A-
Reading	11	595808	2320	6	85	A.1.3.1	2	14765	0.83	0.83	0.05	0.03	0.09	0.00	0.36	0.36	-0.29	-0.28	-0.23	-0.9212	0.0237	-2.3	1.0	-1.3	1.0	A+	A-
Reading	11	595913	2321	6	86	B.1.1.1	2	14765	0.45	0.25	0.45	0.16	0.14	0.00	0.07	-0.01	0.07	-0.04	-0.16	1.2597	0.0182	9.9	1.3	9.9	1.5	A-	A+
Reading	11	556249	2323	6	88	B.3.3.2		59038	0.69	0.69	0.15	0.02	0.14	0.00	0.40	0.40	-0.34	-0.32	-0.30	0.0317	0.0097	-4.2	1.0	-5.7	1.0		
Reading	11	556243	2324	6	89	A.2.1.2		59038	0.69	0.17	0.08	0.69	0.06	0.00	0.46	-0.34	-0.44	0.46	-0.30	0.0366	0.0097	-9.9	0.9	-9.9	0.9		
Reading	11	556247	2325	6	90	A.2.4.1		59038	0.90	0.02	0.90	0.04	0.04	0.00	0.42	-0.27	0.42	-0.28	-0.27	-1.6739	0.0148	-9.9	0.9	-9.9	0.7		
Reading	11	556245	2326	6	91	A.2.4.1		59038	0.64	0.64	0.06	0.16	0.13	0.00	0.34	0.34	-0.37	-0.34	-0.14	0.2729	0.0095	9.9	1.1	9.9	1.1		
Reading	11	556250	2327	6	92	B.2.1.1		59038	0.60	0.02	0.60	0.12	0.25	0.00	0.41	-0.35	0.41	-0.39	-0.33	0.4854	0.0093	-8.3	1.0	-8.2	1.0		
Reading	11	556244	2328	6	93	A.2.3.1		59038	0.68	0.19	0.06	0.68	0.08	0.00	0.24	-0.13	-0.32	0.24	-0.17	0.1009	0.0097	9.9	1.2	9.9	1.2		
Reading	11	556252	2329	6	94	A.2.3.1		59038	0.64	0.13	0.64	0.18	0.04	0.00	0.44	-0.50	0.44	-0.26	-0.34	0.2679	0.0095	-9.9	0.9	-9.9	0.9		
Reading	11	556251	2330	6	95	B.3.3.2		59038	0.58	0.58	0.07	0.09	0.25	0.00	0.28	0.28	-0.29	-0.41	-0.14	0.5850	0.0092	9.9	1.1	9.9	1.1		
Reading	11	595814	2331	7	77	A.1.4.1	1	14806	0.73	0.11	0.06	0.73	0.09	0.00	0.33	-0.27	-0.23	0.33	-0.22	-0.2493	0.0203	4.3	1.1	2.5	1.0	A-	A-
Reading	11	595799	2332	7	78	B.2.1.1	2	14806	0.61	0.09	0.61	0.22	0.09	0.00	0.23	-0.05	0.23	-0.21	-0.28	0.4443	0.0185	9.9	1.2	9.9	1.3	A-	A-
Reading	11	595772	2333	7	79	B.1.1.1	2	14806	0.58	0.58	0.12	0.17	0.12	0.00	0.31	0.31	-0.31	-0.30	-0.17	0.5599	0.0184	9.9	1.1	9.9	1.1	A+	B-
Reading	11	595810	2334	7	80	A.1.3.1	2	14806	0.73	0.10	0.08	0.73	0.09	0.00	0.49	-0.42	-0.43	0.49	-0.28	-0.2548	0.0203	-9.9	0.9	-9.9	0.8	A+	B-
Reading	11	595770	2335	7	81	B.2.1.2	2	14806	0.89	0.89	0.05	0.02	0.04	0.00	0.39	0.39	-0.28	-0.30	-0.22	-1.5116	0.0278	-5.7	0.9	-5.6	0.8	A+	B-
Reading	11	595771	2336	7	82	B.1.1.1	3	14806	0.70	0.18	0.02	0.10	0.70	0.00	0.23	-0.03	-0.29	-0.34	0.23	-0.0416	0.0196	9.9	1.2	9.9	1.3	A+	A-
Reading	11	595773	2337	7	83	B.1.1.1	3	14806	0.66	0.11	0.66	0.20	0.03	0.00	0.22	-0.13	0.22	-0.17	-0.32	0.1853	0.0190	9.9	1.2	9.9	1.4	B+	A-
Reading	11	595800	2338	7	84	A.1.3.1	2	14806	0.67	0.67	0.22	0.04	0.07	0.00	0.28	0.28	-0.16	-0.33	-0.29	0.1095	0.0192	9.9	1.1	9.9	1.2	A-	B-
Reading	11	595769	2339	7	85	B.1.1.1	2	14806	0.87	0.04	0.87	0.07	0.02	0.00	0.45	-0.31	0.45	-0.34	-0.28	-1.2526	0.0257	-8.5	0.9	-9.9	0.7	A+	A-
Reading	11	595811	2340	7	86	A.1.3.1	2	14806	0.59	0.02	0.18	0.21	0.59	0.00	0.03	-0.26	0.04	-0.02	0.03	0.5583	0.0184	9.9	1.4	9.9	1.6	A+	B+
Reading	11	556249	2323	7	88	B.3.3.2		59038	0.69	0.69	0.15	0.02	0.14	0.00	0.40	0.40	-0.34	-0.32	-0.30	0.0317	0.0097	-4.2	1.0	-5.7	1.0		
Reading	11	556243	2324	7	89	A.2.1.2		59038	0.69	0.17	0.08	0.69	0.06	0.00	0.46	-0.34	-0.44	0.46	-0.30	0.0366	0.0097	-9.9	0.9	-9.9	0.9		
Reading	11	556247	2325	7	90	A.2.4.1		59038	0.90	0.02	0.90	0.04	0.04	0.00	0.42	-0.27	0.42	-0.28	-0.27	-1.6739	0.0148	-9.9	0.9	-9.9	0.7		
Reading	11	556245	2326	7</																							

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Reading	11	556250	2327	7	92	B.2.1.1		59038	0.60	0.02	0.60	0.12	0.25	0.00	0.41	-0.35	0.41	-0.39	-0.33	0.4854	0.0093	-8.3	1.0	-8.2	1.0		
Reading	11	556244	2328	7	93	A.2.3.1		59038	0.68	0.19	0.06	0.68	0.08	0.00	0.24	-0.13	-0.32	0.24	-0.17	0.1009	0.0097	9.9	1.2	9.9	1.2		
Reading	11	556252	2329	7	94	A.2.3.1		59038	0.64	0.13	0.64	0.18	0.04	0.00	0.44	-0.50	0.44	-0.26	-0.34	0.2679	0.0095	-9.9	0.9	-9.9	0.9		
Reading	11	556251	2330	7	95	B.3.3.2		59038	0.58	0.58	0.07	0.09	0.25	0.00	0.28	0.28	-0.29	-0.41	-0.14	0.5850	0.0092	9.9	1.1	9.9	1.1		
Reading	11	595849	2342	8	77	A.1.3.1	2	14725	0.88	0.01	0.04	0.88	0.07	0.00	0.28	-0.22	-0.17	0.28	-0.20	-1.4012	0.0271	0.4	1.0	4.2	1.2	A-	A-
Reading	11	595848	2343	8	78	B.2.1.1	2	14725	0.72	0.03	0.01	0.72	0.24	0.00	0.18	-0.25	-0.26	0.18	-0.10	-0.1577	0.0201	9.9	1.2	9.9	1.4	A+	A+
Reading	11	595881	2344	8	79	A.1.1.2	2	14725	0.45	0.31	0.07	0.45	0.17	0.00	0.38	-0.33	-0.49	0.38	-0.34	1.2353	0.0182	-4.6	1.0	0.8	1.0	A-	A-
Reading	11	595851	2345	8	80	B.1.1.1	2	14725	0.63	0.08	0.63	0.03	0.26	0.00	0.35	-0.26	0.35	-0.34	-0.30	0.3636	0.0188	5.0	1.0	3.4	1.0	A-	A-
Reading	11	595845	2346	8	81	A.1.4.1	3	14725	0.74	0.08	0.74	0.13	0.05	0.00	0.21	-0.15	0.21	-0.18	-0.12	-0.2777	0.0206	9.9	1.2	9.9	1.4	A-	A-
Reading	11	595850	2347	8	82	A.1.4.1		14725	0.74	0.06	0.09	0.11	0.74	0.00	0.40	-0.26	-0.34	-0.28	0.40	-0.2660	0.0205	-1.9	1.0	-2.9	1.0	A-	A-
Reading	11	595843	2348	8	83	A.1.3.2	2	14725	0.79	0.79	0.04	0.13	0.04	0.00	0.43	0.43	-0.35	-0.31	-0.31	-0.6247	0.0221	-5.8	0.9	-8.4	0.8	A-	A-
Reading	11	595847	2349	8	84	B.1.1.1	2	14725	0.65	0.02	0.04	0.29	0.65	0.00	0.38	-0.38	-0.37	-0.30	0.38	0.2404	0.0190	0.0	1.0	-1.5	1.0	A+	A-
Reading	11	595882	2350	8	85	B.2.1.1	2	14725	0.69	0.01	0.26	0.03	0.69	0.00	0.35	-0.27	-0.27	-0.37	0.35	0.0444	0.0195	3.0	1.0	2.1	1.0	A+	A-
Reading	11	595883	2351	8	86	A.1.3.1	2	14725	0.33	0.03	0.60	0.33	0.03	0.00	-0.03	-0.35	0.11	-0.03	-0.32	1.8455	0.0191	9.9	1.4	9.9	1.8	A-	A+
Reading	11	556249	2323	8	88	B.3.3.2		59038	0.69	0.69	0.15	0.02	0.14	0.00	0.40	0.40	-0.34	-0.32	-0.30	0.0317	0.0097	-4.2	1.0	-5.7	1.0		
Reading	11	556243	2324	8	89	A.2.1.2		59038	0.69	0.17	0.08	0.69	0.06	0.00	0.46	-0.34	-0.44	0.46	-0.30	0.0366	0.0097	-9.9	0.9	-9.9	0.9		
Reading	11	556247	2325	8	90	A.2.4.1		59038	0.90	0.02	0.90	0.04	0.04	0.00	0.42	-0.27	0.42	-0.28	-0.27	-1.6739	0.0148	-9.9	0.9	-9.9	0.7		
Reading	11	556245	2326	8	91	A.2.4.1		59038	0.64	0.64	0.06	0.16	0.13	0.00	0.34	0.34	-0.37	-0.34	-0.14	0.2729	0.0095	9.9	1.1	9.9	1.1		
Reading	11	556250	2327	8	92	B.2.1.1		59038	0.60	0.02	0.60	0.12	0.25	0.00	0.41	-0.35	0.41	-0.39	-0.33	0.4854	0.0093	-8.3	1.0	-8.2	1.0		
Reading	11	556244	2328	8	93	A.2.3.1		59038	0.68	0.19	0.06	0.68	0.08	0.00	0.24	-0.13	-0.32	0.24	-0.17	0.1009	0.0097	9.9	1.2	9.9	1.2		
Reading	11	556252	2329	8	94	A.2.3.1		59038	0.64	0.13	0.64	0.18	0.04	0.00	0.44	-0.50	0.44	-0.26	-0.34	0.2679	0.0095	-9.9	0.9	-9.9	0.9		
Reading	11	556251	2330	8	95	B.3.3.2		59038	0.58	0.58	0.07	0.09	0.25	0.00	0.28	0.28	-0.29	-0.41	-0.14	0.5850	0.0092	9.9	1.1	9.9	1.1		
Reading	11	601583	2353	9	77	A.1.4.1	2	14742	0.96	0.02	0.01	0.01	0.96	0.00	0.33	-0.19	-0.23	-0.19	0.33	-2.6050	0.0418	-3.2	0.9	-7.9	0.6	A+	C-
Reading	11	595797	2354	9	78	A.2.3.1	2	14742	0.59	0.10	0.11	0.59	0.19	0.00	0.24	-0.23	-0.25	0.24	-0.14	0.5444	0.0185	9.9	1.2	9.9	1.2	A-	A-
Reading	11	595916	2355	9	79	A.2.2.1	1	14742	0.63	0.10	0.15	0.63	0.12	0.00	0.38	-0.42	-0.30	0.38	-0.23	0.3424	0.0188	0.7	1.0	-0.8	1.0	B-	A-
Reading	11	595798	2356	9	80	B.2.1.1	2	14742	0.65	0.12	0.65	0.08	0.15	0.00	0.39	-0.33	0.39	-0.37	-0.27	0.2174	0.0191	-0.5	1.0	0.2	1.0	A+	A-
Reading	11	595752	2357	9	81	A.2.6.1	2	14742	0.59	0.37	0.02	0.59	0.02	0.00	0.15	-0.10	-0.28	0.15	-0.21	0.5619	0.0185	9.9	1.3	9.9	1.3	A+	A+
Reading	11	595757	2358	9	82	B.1.1.1	3	14742	0.80	0.09	0.09	0.01	0.80	0.00	0.06	0.02	-0.06	-0.16	0.06	-0.7094	0.0224	9.9	1.3	9.9	1.8	A+	A-
Reading	11	595753	2359	9	83	A.2.4.1	1	14742	0.90	0.05	0.02	0.02	0.90	0.00	0.42	-0.30	-0.26	-0.27	0.42	-1.6318	0.0291	-6.2	0.9	-9.9	0.7	A+	B-
Reading	11	601584	2360	9	84	A.1.4.1	2	14742	0.77	0.77	0.07	0.03	0.12	0.00	0.35	0.35	-0.21	-0.30	-0.27	-0.4770	0.0213	2.2	1.0	-0.5	1.0	A+	A-
Reading	11	595756	2361	9	85	B.1.1.1	2	14742	0.56	0.56	0.02	0.30	0.12	0.00	0.30	0.30	-0.32	-0.26	-0.26	0.6859	0.0183	9.9	1.1	9.9	1.2	A+	A-
Reading	11	595754	2362	9	86	B.1.1.1	3	14742	0.35	0.35	0.22	0.31	0.11	0.00	0.09	0.09	-0.17	-0.04	-0.10	1.7299	0.0188	9.9	1.3	9.9	1.5	A-	A+
Reading	11	556249	2323	9	88	B.3.3.2		59038	0.69	0.69	0.15	0.02	0.14	0.00	0.40	0.40	-0.34	-0.32	-0.30	0.0317	0.0097	-4.2	1.0	-5.7	1.0		
Reading	11	556243	2324	9	89	A.2.1.2		59038	0.69	0.17	0.08	0.69	0.06	0.00	0.46	-0.34	-0.44	0.46	-0.30	0.0366	0.0097	-9.9	0.9	-9.9	0.9		
Reading	11	556247	2325	9	90	A.2.4.1		59038	0.90	0.02	0.90	0.04	0.04	0.00	0.42	-0.27	0.42	-0.28	-0.27	-1.6739	0.0148	-9.9	0.9	-9.9	0.7		
Reading	11	556245	2326	9	91	A.2.4.1		59038	0.64	0.64	0.06	0.16	0.13	0.00	0.34	0.34	-0.37	-0.34	-0.14	0.2729	0.0095	9.9	1.1	9.9	1.1		
Reading	11	556250	2327	9	92	B.2.1.1		59038	0.60	0.02	0.60	0.12	0.25	0.00	0.41	-0.35	0.41	-0.39	-0.33	0.4854	0.0093	-8.3	1.0	-8.2	1.0		
Reading	11	556244	2328	9	93	A.2.3.1		59038	0.68	0.19	0.06	0.68	0.08	0.00	0.24	-0.13	-0.32	0.24	-0.17	0.1009	0.0097	9.9	1.2	9.9	1.2		
Reading	11	556252	2329	9	94	A.2.3.1		59038	0.64	0.13	0.64	0.18	0.04	0.00	0.44	-0.50	0.44	-0.26	-0.34	0.2679	0.0095	-9.9	0.9	-9.9	0.9		
Reading	11	556251	2330	9	95	B.3.3.2		59038	0.58	0.58	0.07	0.09	0.25	0.00	0.28	0.28	-0.29	-0.41	-0.14	0.5850	0.0092	9.9	1.1	9.9	1.1		
Science	4	559994	2364	0	1	A.1.3.3	2	128564	0.85	0.07	0.05	0.04	0.85	0.00	0.41	-0.32	-0.28	-0.25	0.41	-0.8184	0.0084	-9.6	1.0	-9.9	0.9		
Science	4	559936	2365	0	2	C.1.1.1	2	128564	0.76	0.76	0.10	0.02	0.12	0.00	0.46	0.46	-0.40	-0.30	-0.33	-0.1656	0.0072	-9.9	0.9	-9.9	0.8		
Science	4	558248	2366	0	3	D.3.1.1		128564	0.49	0.15	0.23	0.13	0.49	0.00	0.39	-0.41	-0.37	-0.30	0.39	1.3764	0.0062	-5.7	1.0	3.5	1.0		
Science	4	560079	2367	0	4	D.3.1.2	2	128564	0.63	0.10	0.11	0.16	0.63	0.00	0.41	-0.37	-0.31	-0.34	0.41	0.6446	0.0064	-3.3	1.0	-9.9	1.0		
Science	4	558232	2368	0	5	A.3.3.1		128564	0.73	0.04	0.11	0.73	0.11	0.00	0.46	-0.30	-0.33	0.46	-0.41	0.0347	0.0069	-9.9	0.9	-9.9	0.9		
Science	4	554104	2369	0	6	A.2.2.1		128564	0.68	0.17	0.68	0.06	0.08	0.00	0.42	-0.35	0.42	-0.33	-0.32	0.3254	0.0066	-4.9	1.0	-8.9	1.0		
Science	4	559709	2370	0	7	B.1.1.3	2	128564	0.68	0.07	0.03	0.22	0.68	0.00	0.40	-0.43	-0.36	-0.28	0.40	0.3512	0.0066	1.4	1.0	-4.4	1.0		
Science	4	559935	2371	0	8	A.1.1.2	2	128564	0.77	0.02	0.77	0.16	0.05	0.00	0.40	-0.29	0.40	-0.35	-0.23	-0.2304	0.0073	-2.8	1.0	-3.8	1.0		
Science	4	559862	2372	0	9	D.1.1.1	2	128564	0.52	0.12	0.52	0.11	0.25	0.00	0.32	-0.38	0.32	-0.29	-0.22	1.2049	0.0062	9.9	1.1	9.9	1.1		
Science	4	560031	2373	0	10	A.3.2.1	2	128564	0.65	0.16	0.08	0.65	0.11	0.00	0.37	-0.31	-0.28	0.37	-0.30	0.5031	0.0065	9.9	1.0	9.9	1.1		
Science	4	554192	2374	0	11	A.2.1.2		128564	0																		

Appendix I: Item Statistics Multiple Choice

Item Information							Classical												Rasch		Infit		Outfit		DIF		
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Science	4	554207	2375	0	12	B.1.1.5		128564	0.90	0.90	0.04	0.03	0.03	0.00	0.45	0.45	-0.29	-0.32	-0.30	-1.3647	0.0099	-9.9	0.9	-9.9	0.7		
Science	4	559773	2376	0	13	A.3.3.1	1	128564	0.76	0.76	0.09	0.08	0.08	0.00	0.42	0.42	-0.31	-0.35	-0.27	-0.1154	0.0071	-5.9	1.0	-9.9	0.9		
Science	4	558277	2377	0	14	A.1.1.1		128564	0.78	0.03	0.10	0.78	0.08	0.00	0.42	-0.29	-0.31	0.42	-0.31	-0.2946	0.0074	-6.4	1.0	-9.9	0.9		
Science	4	558233	2378	0	15	C.1.1.1		128564	0.66	0.13	0.66	0.10	0.11	0.00	0.49	-0.39	0.49	-0.40	-0.39	0.4533	0.0065	-9.9	0.9	-9.9	0.9		
Science	4	553975	2379	0	16	A.1.3.1		128564	0.75	0.05	0.05	0.75	0.16	0.00	0.43	-0.35	-0.37	0.43	-0.30	-0.0502	0.0070	-8.7	1.0	-9.9	0.9		
Science	4	560039	2380	0	17	C.1.1.2	2	128564	0.56	0.56	0.10	0.21	0.13	0.00	0.38	0.38	-0.40	-0.30	-0.30	0.9989	0.0062	7.5	1.0	5.3	1.0		
Science	4	560084	2381	0	18	A.1.3.5	2	128564	0.67	0.10	0.67	0.20	0.04	0.00	0.30	-0.28	0.30	-0.19	-0.32	0.4378	0.0065	9.9	1.1	9.9	1.2		
Science	4	554183	2382	0	19	D.1.2.1		128564	0.91	0.91	0.03	0.03	0.03	0.00	0.45	0.45	-0.29	-0.30	-0.29	-1.5042	0.0103	-9.9	0.9	-9.9	0.7		
Science	4	559996	2383	0	20	A.2.2.1	2	128564	0.86	0.06	0.04	0.04	0.86	0.00	0.49	-0.33	-0.34	-0.36	0.49	-0.9268	0.0086	-9.9	0.9	-9.9	0.7		
Science	4	559870	2384	0	21	B.2.1.2	2	128564	0.37	0.11	0.37	0.29	0.22	0.00	0.34	-0.34	0.34	-0.35	-0.34	1.9721	0.0064	-0.5	1.0	9.9	1.2		
Science	4	560034	2385	0	22	A.3.2.2	2	128564	0.47	0.47	0.23	0.26	0.04	0.00	0.33	0.33	-0.42	-0.17	-0.38	1.4699	0.0062	9.9	1.1	9.9	1.1		
Science	4	558202	2386	0	23	B.3.1.1		128564	0.82	0.08	0.05	0.82	0.05	0.00	0.48	-0.32	-0.35	0.48	-0.35	-0.5817	0.0079	-9.9	0.9	-9.9	0.8		
Science	4	559937	2387	0	24	C.2.1.1	2	128564	0.66	0.66	0.21	0.05	0.09	0.00	0.38	0.38	-0.35	-0.32	-0.23	0.4869	0.0065	7.8	1.0	2.2	1.0		
Science	4	558279	2388	0	25	B.2.2.1		128564	0.59	0.16	0.14	0.11	0.59	0.00	0.39	-0.27	-0.36	-0.39	0.39	0.8638	0.0063	7.5	1.0	8.7	1.0		
Science	4	558242	2389	0	26	C.2.1.4		128564	0.86	0.86	0.07	0.03	0.04	0.00	0.47	0.47	-0.33	-0.34	-0.30	-0.9270	0.0086	-9.9	0.9	-9.9	0.8		
Science	4	553959	2390	0	27	A.2.1.4		128564	0.86	0.03	0.86	0.07	0.04	0.00	0.48	-0.29	0.48	-0.38	-0.30	-0.9572	0.0087	-9.9	0.9	-9.9	0.8		
Science	4	559982	2391	0	28	A.3.1.2	2	128564	0.72	0.06	0.14	0.07	0.72	0.00	0.46	-0.33	-0.36	-0.38	0.46	0.1000	0.0069	-9.9	0.9	-9.9	0.9		
Science	4	559893	2392	0	29	D.1.3.1	2	128564	0.46	0.06	0.46	0.24	0.24	0.00	0.37	-0.32	0.37	-0.22	-0.47	1.5277	0.0062	5.3	1.0	9.9	1.1		
Science	4	554091	2396	0	38	D.2.1.2		128564	0.51	0.08	0.08	0.33	0.51	0.00	0.32	-0.34	-0.16	-0.33	0.32	1.2784	0.0062	9.9	1.1	9.9	1.1		
Science	4	559998	2397	0	39	A.3.1.1	2	128564	0.68	0.07	0.68	0.08	0.16	0.00	0.45	-0.33	0.45	-0.25	-0.44	0.3731	0.0066	-9.9	1.0	-9.9	0.9		
Science	4	559989	2398	0	40	C.2.1.4	1	128564	0.76	0.12	0.04	0.08	0.76	0.00	0.44	-0.36	-0.31	-0.31	0.44	-0.1738	0.0072	-9.9	1.0	-9.9	0.9		
Science	4	554263	2399	0	41	A.3.1.4		128564	0.79	0.09	0.05	0.07	0.79	0.00	0.47	-0.32	-0.37	-0.37	0.47	-0.3370	0.0075	-9.9	0.9	-9.9	0.8		
Science	4	559925	2400	0	42	B.3.1.1	2	128564	0.85	0.05	0.85	0.05	0.04	0.00	0.41	-0.30	0.41	-0.25	-0.29	-0.8554	0.0085	-9.0	1.0	-8.8	0.9		
Science	4	553980	2401	0	43	A.1.3.1		128564	0.89	0.04	0.89	0.04	0.02	0.00	0.37	-0.19	0.37	-0.30	-0.26	-1.2637	0.0096	-6.6	1.0	-2.2	1.0		
Science	4	554129	2402	0	44	A.1.3.5		128564	0.84	0.06	0.84	0.06	0.03	0.00	0.43	-0.31	0.43	-0.28	-0.31	-0.7747	0.0083	-9.9	0.9	-9.9	0.9		
Science	4	559981	2403	0	45	A.3.1.1	2	128564	0.82	0.08	0.04	0.82	0.06	0.00	0.51	-0.41	-0.31	0.51	-0.36	-0.5828	0.0079	-9.9	0.9	-9.9	0.7		
Science	4	560038	2404	0	46	B.3.1.2	2	128564	0.67	0.67	0.14	0.12	0.07	0.00	0.34	0.34	-0.18	-0.32	-0.32	0.3844	0.0066	9.9	1.1	9.9	1.1		
Science	4	559705	2405	0	47	A.2.1.1	2	128564	0.59	0.08	0.17	0.59	0.16	0.00	0.31	-0.32	-0.16	0.31	-0.32	0.8383	0.0063	9.9	1.1	9.9	1.2		
Science	4	558241	2406	0	48	B.2.1.1		128564	0.87	0.05	0.05	0.87	0.03	0.00	0.46	-0.30	-0.35	0.46	-0.30	-1.0470	0.0089	-9.9	0.9	-9.9	0.7		
Science	4	559874	2407	0	49	C.3.1.1	2	128564	0.84	0.03	0.03	0.09	0.84	0.00	0.41	-0.32	-0.33	-0.24	0.41	-0.7970	0.0083	-9.9	1.0	-4.6	1.0		
Science	4	560025	2408	0	50	A.1.3.1	2	128564	0.89	0.05	0.04	0.89	0.03	0.00	0.47	-0.33	-0.33	0.47	-1.2375	0.0095	-9.9	0.9	-9.9	0.7			
Science	4	560044	2409	0	51	D.3.1.1	2	128564	0.62	0.13	0.62	0.07	0.18	0.00	0.33	-0.29	0.33	-0.34	-0.21	0.6943	0.0064	9.9	1.1	9.9	1.1		
Science	4	559985	2410	0	52	A.3.1.4	2	128564	0.92	0.92	0.04	0.03	0.02	0.00	0.44	0.44	-0.30	-0.28	-0.29	-1.6097	0.0107	-9.9	0.9	-9.9	0.7		
Science	4	559901	2411	0	53	B.3.2.1	2	128564	0.80	0.04	0.13	0.80	0.02	0.00	0.45	-0.31	-0.36	0.45	-0.32	-0.4280	0.0076	-9.9	0.9	-9.9	0.8		
Science	4	559992	2412	0	54	A.1.1.1	2	128564	0.73	0.73	0.05	0.05	0.17	0.00	0.44	0.44	-0.33	-0.34	-0.36	0.0384	0.0069	-9.9	1.0	-9.9	0.9		
Science	4	559875	2413	0	55	C.3.1.2	2	128564	0.87	0.06	0.02	0.04	0.87	0.00	0.47	-0.36	-0.29	-0.32	0.47	-1.0712	0.0090	-9.9	0.9	-9.9	0.7		
Science	4	559851	2414	0	56	A.3.1.3	1	128564	0.69	0.69	0.25	0.03	0.03	0.00	0.32	0.32	-0.23	-0.31	-0.29	0.2912	0.0067	9.9	1.1	9.9	1.1		
Science	4	558284	2415	0	57	D.3.1.2		128564	0.63	0.22	0.06	0.63	0.08	0.00	0.37	-0.27	-0.35	0.37	-0.34	0.6504	0.0064	9.9	1.0	-0.1	1.0		
Science	4	553998	2416	0	58	A.3.3.2		128564	0.93	0.02	0.02	0.93	0.02	0.00	0.37	-0.22	-0.23	0.37	-0.24	-1.8516	0.0117	-6.7	0.9	-9.9	0.7		
Science	4	558240	2417	0	59	A.2.1.4		128564	0.69	0.12	0.10	0.69	0.08	0.00	0.44	-0.30	-0.39	0.44	-0.36	0.2668	0.0067	-9.9	1.0	-9.9	0.9		
Science	4	554018	2418	0	60	C.2.1.3		128564	0.82	0.06	0.06	0.07	0.82	0.00	0.36	-0.27	-0.22	-0.27	0.36	-0.5871	0.0079	3.2	1.0	-3.9	1.0		
Science	4	560080	2419	0	61	B.3.3.1	2	128564	0.68	0.19	0.06	0.06	0.68	0.00	0.48	-0.37	-0.45	-0.37	0.48	0.3243	0.0066	-9.9	0.9	-9.9	0.9		
Science	4	558286	2420	0	62	C.3.1.2		128564	0.71	0.12	0.08	0.71	0.09	0.00	0.41	-0.35	-0.31	0.41	-0.29	0.1979	0.0068	-1.8	1.0	-7.5	1.0		
Science	4	558197	2421	0	63	C.3.1.3		128564	0.56	0.16	0.22	0.06	0.56	0.00	0.36	-0.25	-0.36	-0.35	0.36	1.0118	0.0062	9.9	1.0	9.9	1.1		
Science	4	559896	2422	0	64	A.2.1.2	2	128564	0.70	0.70	0.07	0.13	0.10	0.00	0.42	0.42	-0.39	-0.32	-0.30	0.2270	0.0067	-6.2	1.0	-3.5	1.0		
Science	4	558252	2423	0	65	D.1.2.1		128564	0.79	0.14	0.04	0.79	0.03	0.00	0.36	-0.21	-0.36	0.36	-0.30	-0.3684	0.0075	4.9	1.0	9.9	1.1		
Science	4	554078	2424	0	66	A.3.2.3		128564	0.79	0.05	0.13	0.79	0.02	0.00	0.38	-0.27	-0.31	0.38	-0.20	-0.3857	0.0075	2.7	1.0	-6.1	1.0		
Science	4	565209	2427	1	31	B.1.1.3	2	11089	0.75	0.07	0.05	0.75	0.13	0.00	0.41	-0.30	-0.31	0.41	-0.31	-0.1658	0.0243	-1.3	1.0	-2.6	0.9	A+	A-
Science	4	565568	2428	1	32	B.1.1.2	2	11089	0.79	0.13	0.79	0.04	0.04	0.00	0.44	-0.33	0.44	-0.31	-0.36	-0.4243	0.0256	-4.5	0.9	-5.0	0.9	A-	A-
Science	4	565557	2429	1	33	A.1.1.1	2	11089	0.85	0.04	0.85	0.05	0.05	0.00	0.51	-0.34	0.51	-0.37	-0.36	-0.9024	0.0287	-9.3	0.8	-9.9	0.7	B+	A-
Science	4	565393	2430	1	34	C.2.1.2	2	11089	0.49	0.15	0.49	0.31															

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Science	4	565573	2431	1	68	B.1.1.3	2	11089	0.86	0.86	0.08	0.03	0.02	0.00	0.41	0.41	-0.31	-0.26	-0.25	-1.0194	0.0296	-3.4	0.9	-5.7	0.8	A+	C-
Science	4	566091	2432	1	69	B.3.2.1	2	11089	0.55	0.33	0.55	0.08	0.05	0.00	0.23	-0.10	0.23	-0.33	-0.42	0.9882	0.0213	9.9	1.2	9.9	1.3	A-	A-
Science	4	565583	2433	1	70	C.2.1.3	3	11089	0.23	0.48	0.12	0.23	0.16	0.00	0.09	-0.01	-0.27	0.09	-0.21	2.6922	0.0244	9.9	1.2	9.9	1.9	A+	A-
Science	4	565563	2434	1	71	A.3.1.2	2	11089	0.57	0.18	0.19	0.07	0.57	0.00	0.37	-0.28	-0.29	-0.42	0.37	0.8988	0.0214	4.4	1.0	3.9	1.1	A+	A-
Science	4	554248	2436	1	67	C.3.1.1		11089	0.57	0.20	0.12	0.57	0.11	0.00	0.24	-0.17	-0.25	0.24	-0.21	0.8697	0.0214	9.9	1.2	9.9	1.2		
Science	4	549576	2437	1	30	C.3.1.2		11089	0.76	0.09	0.76	0.08	0.07	0.00	0.48	-0.39	0.48	-0.37	-0.34	-0.1925	0.0244	-7.3	0.9	-7.4	0.8		
Science	4	565570	2438	2	30	A.1.3.3	2	10682	0.81	0.09	0.03	0.07	0.81	0.00	0.46	-0.25	-0.37	-0.42	0.46	-0.5029	0.0269	-6.8	0.9	-2.8	0.9	A+	B-
Science	4	566092	2439	2	31	B.3.2.1	2	10682	0.71	0.14	0.71	0.10	0.05	0.00	0.35	-0.21	0.35	-0.28	-0.34	0.1607	0.0236	4.8	1.1	3.9	1.1	A-	A-
Science	4	564848	2440	2	33	A.2.1.1	2	10682	0.70	0.70	0.13	0.07	0.10	0.00	0.46	0.46	-0.34	-0.41	-0.36	0.2621	0.0232	-5.4	0.9	-5.1	0.9	A+	A-
Science	4	565384	2441	2	34	A.3.2.2	2	10682	0.36	0.35	0.15	0.36	0.13	0.01	0.15	-0.06	-0.24	0.15	-0.31	1.9915	0.0221	9.9	1.2	9.9	1.4	A-	A-
Science	4	565579	2442	2	67	B.3.3.5	2	10682	0.77	0.08	0.11	0.77	0.04	0.00	0.45	-0.36	-0.33	0.45	-0.33	-0.1833	0.0251	-4.8	0.9	-4.3	0.9	A+	A-
Science	4	565582	2443	2	68	C.2.1.2	2	10682	0.27	0.30	0.27	0.08	0.34	0.00	0.15	-0.20	0.15	-0.33	-0.08	2.4828	0.0236	9.9	1.2	9.9	1.6	A-	A-
Science	4	566280	2444	2	69	B.3.3.5	2	10682	0.35	0.08	0.22	0.35	0.34	0.00	0.09	-0.30	-0.19	0.09	0.04	2.0728	0.0223	9.9	1.3	9.9	1.6	A-	A+
Science	4	565389	2445	2	71	A.2.1.3	3	10682	0.55	0.10	0.18	0.17	0.55	0.00	0.39	-0.39	-0.36	-0.28	0.39	1.0550	0.0216	0.7	1.0	2.2	1.0	B-	A-
Science	4	559995	2447	2	70	A.1.3.4	2	10682	0.53	0.33	0.53	0.07	0.06	0.00	0.23	-0.13	0.23	-0.27	-0.36	1.1579	0.0215	9.9	1.2	9.9	1.3		
Science	4	559873	2448	2	32	B.3.1.2	2	10682	0.61	0.08	0.11	0.19	0.61	0.00	0.42	-0.39	-0.35	-0.33	0.42	0.7434	0.0220	-2.2	1.0	-4.1	1.0		
Science	4	565218	2449	3	30	A.1.1.1	2	10724	0.66	0.08	0.12	0.66	0.14	0.00	0.32	-0.29	-0.30	0.32	-0.17	0.4667	0.0226	9.7	1.1	8.3	1.1	A+	A+
Science	4	566274	2450	3	31	B.1.1.3	2	10724	0.62	0.07	0.62	0.18	0.13	0.00	0.35	-0.38	0.35	-0.20	-0.34	0.6917	0.0221	6.9	1.1	6.8	1.1	A+	A-
Science	4	595921	2451	3	32	B.3.2.1	2	10724	0.49	0.49	0.10	0.13	0.28	0.00	0.27	0.27	-0.36	-0.33	-0.15	1.3507	0.0215	9.9	1.1	9.9	1.2	A+	A-
Science	4	564842	2452	3	34	B.2.1.2	2	10724	0.75	0.75	0.09	0.07	0.09	0.00	0.27	0.27	-0.16	-0.19	-0.23	-0.0507	0.0244	9.9	1.1	8.4	1.2	A-	A-
Science	4	564837	2453	3	67	C.2.1.2	2	10724	0.51	0.05	0.51	0.25	0.18	0.00	0.31	-0.35	0.31	-0.20	-0.36	1.2240	0.0215	9.9	1.1	9.9	1.1	A-	A-
Science	4	565392	2454	3	68	C.1.1.2	2	10724	0.78	0.07	0.10	0.78	0.05	0.00	0.44	-0.33	-0.34	0.44	-0.31	-0.2873	0.0255	-4.5	0.9	-6.4	0.9	A+	A-
Science	4	566285	2455	3	70	D.1.1.3	2	10724	0.36	0.27	0.36	0.11	0.25	0.00	0.15	-0.02	0.15	-0.40	-0.17	1.9813	0.0222	9.9	1.3	9.9	1.5	A+	A-
Science	4	564846	2456	3	71	A.3.3.1	2	10724	0.76	0.08	0.06	0.76	0.09	0.00	0.45	-0.36	-0.36	0.45	-0.29	-0.1485	0.0248	-4.6	0.9	-4.2	0.9	A+	A-
Science	4	554044	2458	3	69	D.3.1.1		10724	0.58	0.16	0.17	0.58	0.08	0.00	0.40	-0.38	-0.28	0.40	-0.40	0.8703	0.0218	-0.3	1.0	-1.7	1.0		
Science	4	560027	2459	3	33	A.1.3.4	2	10724	0.74	0.16	0.04	0.74	0.05	0.00	0.49	-0.41	-0.37	0.49	-0.35	-0.0429	0.0243	-8.0	0.9	-9.3	0.8		
Science	4	565379	2460	4	30	A.1.1.2	2	10709	0.69	0.17	0.05	0.69	0.08	0.00	0.45	-0.34	-0.41	0.45	-0.34	0.2701	0.0231	-5.5	0.9	-8.8	0.9	A-	A-
Science	4	565390	2461	4	31	B.1.1.4	2	10709	0.56	0.33	0.05	0.06	0.56	0.00	0.35	-0.24	-0.45	-0.41	0.35	0.9795	0.0216	6.8	1.1	7.1	1.1	A+	A-
Science	4	566277	2462	4	32	B.3.2.1	2	10709	0.59	0.24	0.10	0.59	0.07	0.00	0.29	-0.13	-0.37	0.29	-0.37	0.8257	0.0218	9.9	1.1	9.9	1.2	A-	A-
Science	4	565584	2463	4	34	C.2.1.4	2	10709	0.34	0.28	0.15	0.23	0.34	0.00	0.14	-0.02	-0.27	-0.22	0.14	2.0995	0.0224	9.9	1.2	9.9	1.5	B-	A-
Science	4	565224	2464	4	68	A.2.2.1	2	10709	0.43	0.31	0.43	0.19	0.07	0.00	0.22	-0.16	0.22	-0.18	-0.44	1.6104	0.0215	9.9	1.2	9.9	1.3	A-	A-
Science	4	564845	2465	4	69	C.2.1.4	2	10709	0.71	0.17	0.06	0.06	0.71	0.00	0.49	-0.42	-0.36	-0.37	0.49	0.1849	0.0234	-9.4	0.9	-9.7	0.8	A-	A-
Science	4	566262	2466	4	70	D.1.3.3	3	10709	0.32	0.25	0.24	0.32	0.19	0.00	0.06	0.02	-0.12	0.06	-0.12	2.2063	0.0227	9.9	1.3	9.9	1.7	A-	A-
Science	4	565569	2467	4	71	A.1.3.1	2	10709	0.68	0.68	0.14	0.08	0.08	0.00	0.39	0.39	-0.30	-0.31	-0.33	0.3222	0.0229	0.6	1.0	1.3	1.0	A-	A-
Science	4	558207	2469	4	67	C.2.1.3		10709	0.64	0.64	0.09	0.06	0.21	0.00	0.21	0.21	-0.22	-0.22	-0.12	0.5795	0.0222	9.9	1.2	9.9	1.3		
Science	4	559772	2470	4	33	A.3.1.1	1	10709	0.79	0.08	0.10	0.03	0.79	0.00	0.48	-0.36	-0.39	-0.28	0.48	-0.3510	0.0259	-6.6	0.9	-9.8	0.8		
Science	4	565561	2471	5	30	A.1.3.5	2	10700	0.55	0.13	0.16	0.16	0.55	0.00	0.38	-0.29	-0.30	-0.40	0.38	1.0465	0.0217	3.2	1.0	2.9	1.0	A-	A-
Science	4	564841	2472	5	31	B.1.1.4	2	10700	0.72	0.07	0.07	0.13	0.72	0.00	0.43	-0.40	-0.35	-0.26	0.43	0.1085	0.0238	-2.3	1.0	-1.9	1.0	A+	A-
Science	4	564843	2473	5	32	B.3.2.2	2	10700	0.79	0.06	0.79	0.08	0.07	0.00	0.43	-0.26	0.43	-0.38	-0.30	-0.3747	0.0261	-4.4	0.9	-1.5	1.0	A+	A-
Science	4	565396	2474	5	34	D.1.3.2	2	10700	0.44	0.26	0.22	0.44	0.07	0.00	0.16	-0.06	-0.17	0.16	-0.35	1.5743	0.0216	9.9	1.3	9.9	1.4	A-	A-
Science	4	565387	2475	5	67	B.1.1.1	2	10700	0.35	0.17	0.11	0.35	0.36	0.00	0.29	-0.45	-0.38	0.29	-0.18	2.0298	0.0223	4.2	1.0	9.9	1.3	A-	A+
Science	4	565214	2476	5	68	C.2.1.4	1	10700	0.80	0.80	0.10	0.06	0.03	0.00	0.47	0.47	-0.35	-0.33	-0.33	-0.4556	0.0265	-6.1	0.9	-7.5	0.8	A+	A-
Science	4	566260	2477	5	70	D.1.2.3	2	10700	0.57	0.04	0.19	0.57	0.20	0.00	0.27	-0.33	-0.18	0.27	-0.26	0.9281	0.0218	9.9	1.2	9.9	1.3	A+	A-
Science	4	565564	2478	5	71	A.3.2.1	2	10700	0.57	0.21	0.13	0.57	0.09	0.00	0.39	-0.27	-0.39	0.39	-0.43	0.9533	0.0217	1.4	1.0	2.4	1.0	A-	A-
Science	4	560026	2480	5	69	A.1.3.2	2	10700	0.66	0.05	0.66	0.16	0.13	0.00	0.39	-0.31	0.39	-0.27	-0.36	0.4730	0.0226	1.9	1.0	1.0	1.0		
Science	4	559868	2481	5	33	B.1.1.3	2	10700	0.64	0.05	0.09	0.64	0.22	0.00	0.31	-0.34	-0.33	0.31	-0.18	0.5615	0.0224	9.9	1.1	9.9	1.2		
Science	4	564850	2482	6	31	A.3.1.2	1	10675	0.50	0.19	0.08	0.23	0.50	0.00	0.27	-0.27	-0.40	-0.16	0.27	1.2943	0.0215	9.9	1.2	9.9	1.2	A+	A-
Science	4	595918	2483	6	32	B.2.1.2	2	10675	0.85	0.04	0.06	0.85	0.05	0.00	0.52	-0.37	-0.39	0.52	-0.35	-0.8229	0.0292	-9.9	0.8	-9.9	0.6	A-	A-
Science	4	566278	2484	6	33	B.3.3.2	2	10675	0.83	0.04	0.07	0.06	0.83	0.00	0.41	-0.28	-0.29	-0.30	0.41	-0.6124	0.0276	-3.4	1.0	-3.7	0.9	A+	A-
Science	4	565219	2485	6	34	A.1.3.4	2	10675	0.48	0.07	0.48	0.38	0.07	0.01	0.21	-0.33	0.21	-0.13	-0.30	1.4166	0.0216	9.9	1.2	9.9	1.3	A+	A-
Science	4	564839	2486	6																							

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Science	4	566273	2487	6	68	B.1.1.1	2	10675	0.24	0.48	0.14	0.13	0.24	0.00	0.14	-0.13	-0.23	-0.19	0.14	2.6982	0.0246	9.9	1.2	9.9	1.7	A-	A-
Science	4	566096	2488	6	70	D.1.2.3	2	10675	0.74	0.14	0.74	0.07	0.06	0.00	0.37	-0.22	0.37	-0.32	-0.34	0.0109	0.0242	2.1	1.0	1.0	1.0	A+	A+
Science	4	565558	2489	6	71	A.1.1.2	2	10675	0.48	0.08	0.19	0.48	0.24	0.00	0.29	-0.34	-0.25	0.29	-0.25	1.3820	0.0215	9.9	1.1	9.9	1.2	A+	A-
Science	4	559923	2491	6	69	B.3.3.2	2	10675	0.65	0.14	0.10	0.65	0.11	0.00	0.36	-0.28	-0.33	0.36	-0.26	0.5558	0.0225	5.6	1.1	5.1	1.1		
Science	4	559847	2492	6	30	A.3.1.4	2	10675	0.63	0.14	0.07	0.63	0.16	0.00	0.43	-0.40	-0.43	0.43	-0.28	0.6360	0.0223	-3.4	1.0	-3.6	1.0		
Science	4	564849	2493	7	30	A.1.3.2	2	10627	0.91	0.03	0.03	0.91	0.03	0.00	0.40	-0.29	-0.30	0.40	-0.20	-1.5344	0.0364	-4.4	0.9	-6.3	0.7	A+	B-
Science	4	564844	2494	7	31	B.3.1.2	2	10627	0.66	0.06	0.21	0.66	0.07	0.00	0.45	-0.35	-0.39	0.45	-0.31	0.4984	0.0227	-4.5	1.0	-6.5	0.9	A-	A+
Science	4	565576	2495	7	32	B.3.2.3	2	10627	0.80	0.80	0.05	0.05	0.10	0.00	0.42	0.42	-0.31	-0.36	-0.26	-0.4276	0.0265	-3.6	1.0	-2.1	0.9	A+	A-
Science	4	565378	2496	7	34	A.2.2.1	1	10627	0.86	0.05	0.06	0.03	0.86	0.00	0.42	-0.29	-0.28	-0.30	0.42	-0.8873	0.0298	-4.2	0.9	-4.4	0.9	A+	B-
Science	4	565397	2497	7	67	D.2.1.3	1	10627	0.56	0.56	0.05	0.25	0.14	0.00	0.42	0.42	-0.43	-0.30	-0.46	1.0082	0.0217	-2.3	1.0	-1.1	1.0	A-	B-
Science	4	565215	2498	7	68	D.1.1.1	2	10627	0.18	0.27	0.26	0.29	0.18	0.00	0.01	-0.08	0.01	0.04	0.01	3.1742	0.0274	9.9	1.3	9.9	2.3	A-	A+
Science	4	565383	2499	7	70	A.3.1.2	2	10627	0.77	0.77	0.06	0.04	0.13	0.00	0.42	0.42	-0.35	-0.32	-0.30	-0.1678	0.0251	-2.6	1.0	-2.6	1.0	A+	A-
Science	4	564838	2500	7	71	D.1.1.2	1	10627	0.62	0.11	0.11	0.15	0.62	0.00	0.36	-0.31	-0.26	-0.30	0.36	0.6979	0.0222	5.6	1.1	2.7	0.9	A+	A-
Science	4	559987	2502	7	69	A.3.3.1	2	10627	0.64	0.08	0.09	0.18	0.64	0.00	0.31	-0.31	-0.28	-0.20	0.31	0.5793	0.0225	9.9	1.1	9.8	1.2		
Science	4	559899	2503	7	33	B.3.1.1	2	10627	0.59	0.03	0.59	0.13	0.25	0.00	0.27	-0.27	0.27	-0.21	-0.22	0.8651	0.0219	9.9	1.2	9.9	1.2		
Science	4	565229	2504	8	30	A.3.3.2	2	10652	0.66	0.08	0.66	0.06	0.20	0.00	0.38	-0.22	0.38	-0.34	-0.34	0.4852	0.0225	1.8	1.0	1.6	1.0	A-	A-
Science	4	566279	2505	8	32	B.3.3.4	1	10652	0.36	0.38	0.36	0.15	0.11	0.00	0.18	-0.17	0.18	-0.18	-0.21	1.9963	0.0221	9.9	1.2	9.9	1.4	A-	A+
Science	4	564855	2506	8	33	A.1.3.1	2	10652	0.61	0.61	0.08	0.29	0.02	0.00	0.47	0.47	-0.49	-0.40	-0.34	0.7208	0.0220	-8.8	0.9	-7.6	0.9	A-	B-
Science	4	565089	2507	8	34	B.3.1.2	2	10652	0.24	0.42	0.20	0.14	0.24	0.00	0.16	-0.09	-0.30	-0.28	0.16	2.7033	0.0246	7.1	1.1	9.9	1.6	A-	A+
Science	4	564854	2508	8	67	A.1.1.1	2	10652	0.79	0.06	0.09	0.79	0.06	0.00	0.46	-0.33	-0.36	0.46	-0.34	-0.3124	0.0258	-6.6	0.9	-6.6	0.8	A+	A-
Science	4	566282	2509	8	68	D.1.1.2	2	10652	0.17	0.17	0.47	0.29	0.07	0.00	0.04	0.04	0.02	-0.10	-0.29	3.1726	0.0274	9.9	1.2	9.9	2.1	A-	A+
Science	4	565217	2510	8	69	D.1.3.3	2	10652	0.25	0.36	0.20	0.25	0.20	0.00	0.05	-0.02	-0.07	0.05	-0.11	2.6379	0.0243	9.9	1.2	9.9	1.8	A+	A-
Science	4	565394	2511	8	70	C.2.1.3	2	10652	0.60	0.15	0.60	0.12	0.13	0.00	0.30	-0.20	0.30	-0.25	-0.30	0.8063	0.0218	9.9	1.1	8.9	1.1	A-	A-
Science	4	559997	2513	8	71	A.2.2.1	1	10652	0.63	0.12	0.14	0.63	0.10	0.00	0.34	-0.34	-0.13	0.34	-0.39	0.6448	0.0221	6.4	1.1	7.5	1.1		
Science	4	559882	2514	8	31	D.1.2.1	2	10652	0.65	0.08	0.20	0.65	0.07	0.00	0.35	-0.33	-0.22	0.35	-0.34	0.5506	0.0223	5.0	1.1	2.5	1.0		
Science	4	565223	2515	9	31	A.2.1.1	2	10665	0.41	0.12	0.34	0.13	0.41	0.00	0.32	-0.40	-0.25	-0.39	0.32	1.7621	0.0217	3.3	1.0	8.7	1.1	A+	A-
Science	4	595920	2516	9	32	B.3.1.2	1	10665	0.57	0.05	0.28	0.57	0.09	0.00	0.24	-0.34	-0.14	0.24	-0.26	0.9527	0.0216	9.9	1.2	9.9	1.2	A-	A-
Science	4	566281	2517	9	33	B.3.3.5	2	10665	0.47	0.15	0.47	0.24	0.13	0.00	0.37	-0.36	0.37	-0.30	-0.41	1.4378	0.0214	-1.6	1.0	3.3	1.0	A-	A-
Science	4	564851	2518	9	34	A.2.2.1	1	10665	0.80	0.03	0.03	0.13	0.80	0.00	0.27	-0.16	-0.08	-0.25	0.27	-0.4182	0.0265	5.3	1.1	5.4	1.2	A-	A-
Science	4	566284	2519	9	67	D.1.1.3	2	10665	0.29	0.34	0.21	0.16	0.29	0.00	0.06	-0.02	-0.13	-0.04	0.06	2.4083	0.0232	9.9	1.3	9.9	1.7	A-	A+
Science	4	566098	2520	9	69	D.1.3.3	1	10665	0.34	0.26	0.25	0.15	0.34	0.00	0.10	-0.05	-0.07	-0.21	0.10	2.0909	0.0223	9.9	1.3	9.9	1.5	A+	A-
Science	4	566093	2521	9	70	B.3.3.5	2	10665	0.75	0.15	0.75	0.05	0.05	0.00	0.44	-0.30	0.44	-0.39	-0.39	-0.0254	0.0244	-4.6	0.9	-3.0	0.9	A+	B-
Science	4	565559	2522	9	71	A.1.3.2	2	10665	0.67	0.25	0.03	0.67	0.05	0.00	0.20	-0.06	-0.33	0.20	-0.34	0.4591	0.0226	9.9	1.2	9.9	1.4	A+	A-
Science	4	560028	2524	9	68	A.2.2.1	1	10665	0.71	0.18	0.07	0.71	0.03	0.00	0.41	-0.32	-0.32	0.41	-0.34	0.1909	0.0235	-1.9	1.0	-1.7	1.0		
Science	4	554038	2525	9	30	D.1.2.2	2	10665	0.50	0.19	0.50	0.10	0.21	0.00	0.24	-0.22	0.24	-0.28	-0.17	1.3312	0.0214	9.9	1.2	9.9	1.3		
Science	4	565213	2526	10	30	A.2.2.1	2	10648	0.53	0.33	0.07	0.53	0.07	0.00	0.44	-0.42	-0.37	0.44	-0.38	1.1475	0.0215	-8.0	0.9	-3.6	1.0	A+	A-
Science	4	594839	2527	10	31	B.3.1.2	2	10648	0.47	0.47	0.14	0.30	0.10	0.00	0.38	0.38	-0.41	-0.33	-0.33	1.4631	0.0215	-1.7	1.0	2.3	1.0	A+	A+
Science	4	566286	2528	10	33	B.3.3.4	1	10648	0.42	0.13	0.42	0.30	0.14	0.00	0.22	-0.28	0.22	-0.16	-0.23	1.6830	0.0217	9.9	1.2	9.9	1.3	A+	A+
Science	4	564853	2529	10	34	A.3.2.1	2	10648	0.83	0.83	0.05	0.08	0.04	0.00	0.38	0.38	-0.25	-0.26	-0.30	-0.6028	0.0277	-1.3	1.0	0.4	1.0	A+	B-
Science	4	565386	2530	10	67	A.3.3.2	2	10648	0.47	0.19	0.47	0.23	0.11	0.00	0.04	-0.04	0.04	0.02	-0.10	1.4566	0.0215	9.9	1.4	9.9	1.6	A+	A-
Science	4	566259	2531	10	69	D.1.2.2	2	10648	0.48	0.16	0.21	0.14	0.48	0.00	0.33	-0.33	-0.32	-0.28	0.33	1.3958	0.0215	7.2	1.1	9.2	1.1	A+	A-
Science	4	565228	2532	10	70	A.3.3.2	2	10648	0.44	0.30	0.09	0.17	0.44	0.00	0.26	-0.13	-0.40	-0.33	0.26	1.6194	0.0216	9.9	1.1	9.9	1.2	A+	A-
Science	4	565565	2533	10	71	A.3.2.3	2	10648	0.67	0.08	0.07	0.67	0.18	0.00	0.35	-0.37	-0.36	0.35	-0.20	0.4546	0.0227	4.8	1.1	7.3	1.1	A+	A-
Science	4	559983	2535	10	68	A.3.1.3	2	10648	0.62	0.17	0.13	0.62	0.09	0.00	0.43	-0.37	-0.33	0.43	-0.37	0.7225	0.0221	-3.3	1.0	-4.5	0.9		
Science	4	559848	2536	10	32	A.3.1.1	1	10648	0.78	0.04	0.09	0.78	0.09	0.00	0.53	-0.37	-0.44	0.53	-0.40	-0.2508	0.0255	-9.9	0.9	-9.9	0.7		
Science	4	565230	2537	11	30	A.3.1.2	2	10681	0.31	0.19	0.37	0.14	0.31	0.00	0.20	-0.27	-0.16	-0.27	0.20	2.2736	0.0228	9.9	1.1	9.9	1.4	A-	A-
Science	4	594841	2538	11	32	B.3.3.4	1	10681	0.47	0.16	0.18	0.47	0.18	0.00	0.29	-0.22	-0.33	0.29	-0.27	1.4497	0.0214	9.9	1.1	9.9	1.2	A+	A-
Science	4	566094	2539	11	33	B.3.3.5	2	10681	0.31	0.31	0.22	0.38	0.09	0.00	0.14	0.14	-0.23	-0.05	-0.32	2.2688	0.0228	9.9	1.2	9.9	1.5	A-	A+
Science	4	565381	2540	11	34	A.1.3.3	2	10681	0.82	0.82	0.10	0.05	0.02	0.00	0.22	0.22	-0.07	-0.24	-0.21	-0.5769	0.0274	7.6	1.1	9.9	1.3	A+	A-
Science	4	565575	2541	11	68	B.2.1.2	2	10681	0.84	0.03	0.07	0.84	0.06	0.00	0.51	-0.36	-0.40	0.51	-0.33	-0.7369	0.0286	-9.2	0.9	-9.9	0.7	A+	B-
Science	4																										

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Science	4	566097	2543	11	70	D.1.3.3	2	10681	0.36	0.36	0.18	0.10	0.36	0.00	0.20	0.20	-0.24	-0.37	-0.12	1.9795	0.0220	9.9	1.2	9.9	1.4	A-	A-
Science	4	566283	2544	11	71	D.1.1.2	2	10681	0.36	0.34	0.15	0.36	0.14	0.00	0.09	-0.02	-0.22	0.09	-0.14	2.0084	0.0221	9.9	1.3	9.9	1.5	A+	A-
Science	4	554241	2546	11	67	B.3.3.1		10681	0.79	0.08	0.06	0.06	0.79	0.00	0.48	-0.33	-0.39	-0.34	0.48	-0.3673	0.0261	-6.7	0.9	-7.7	0.8		
Science	4	559774	2547	11	31	A.3.3.1	2	10681	0.88	0.88	0.04	0.05	0.03	0.00	0.43	0.43	-0.27	-0.29	-0.31	-1.1535	0.0322	-3.7	0.9	-5.2	0.8		
Science	4	565562	2548	12	31	A.2.1.1	2	10712	0.74	0.09	0.11	0.06	0.74	0.00	0.53	-0.40	-0.42	-0.43	0.53	0.0216	0.0242	-9.9	0.9	-9.9	0.7	A+	A-
Science	4	566275	2549	12	32	B.3.1.2	2	10712	0.41	0.19	0.14	0.26	0.41	0.00	0.28	-0.29	-0.28	-0.25	0.28	1.7385	0.0218	9.9	1.1	9.9	1.2	A-	A-
Science	4	595922	2550	12	33	B.3.3.4	1	10712	0.46	0.46	0.09	0.30	0.15	0.00	0.20	0.20	-0.36	-0.11	-0.20	1.5211	0.0216	9.9	1.2	9.9	1.4	A-	A+
Science	4	565225	2551	12	34	A.3.1.1	2	10712	0.73	0.73	0.06	0.16	0.05	0.01	0.45	0.45	-0.39	-0.33	-0.39	0.0861	0.0239	-4.8	0.9	-4.2	0.9	A-	A-
Science	4	566261	2552	12	67	D.1.2.3	2	10712	0.33	0.02	0.33	0.52	0.13	0.00	0.23	-0.34	0.23	-0.22	-0.25	2.1594	0.0227	9.4	1.1	9.9	1.4	B-	A-
Science	4	566095	2553	12	68	D.1.2.3	1	10712	0.72	0.13	0.06	0.72	0.09	0.00	0.49	-0.36	-0.41	0.49	-0.39	0.1459	0.0237	-7.7	0.9	-8.1	0.8	A+	A-
Science	4	565210	2554	12	69	B.1.1.5	2	10712	0.78	0.09	0.05	0.78	0.08	0.00	0.41	-0.28	-0.32	0.41	-0.30	-0.2433	0.0254	-1.6	1.0	-2.1	1.0	A+	A-
Science	4	564856	2555	12	70	A.2.1.3	3	10712	0.51	0.51	0.24	0.09	0.16	0.00	0.32	0.32	-0.20	-0.46	-0.28	1.2365	0.0216	9.9	1.1	9.9	1.1	A-	B-
Science	4	559894	2557	12	71	D.1.3.2	2	10712	0.72	0.14	0.06	0.08	0.72	0.00	0.48	-0.38	-0.41	-0.34	0.48	0.1418	0.0237	-7.3	0.9	-7.3	0.9		
Science	4	554211	2558	12	30	A.3.1.1		10712	0.81	0.10	0.04	0.81	0.04	0.00	0.56	-0.46	-0.41	0.56	-0.36	-0.5161	0.0269	-9.9	0.8	-9.9	0.6		
Science	8	549640	2559	0	1	A.3.3.2		132440	0.91	0.02	0.02	0.06	0.91	0.00	0.39	-0.20	-0.24	-0.30	0.39	-2.1545	0.0100	-9.9	0.9	-9.9	0.7		
Science	8	558312	2560	0	2	B.1.1.2		132440	0.63	0.12	0.63	0.07	0.18	0.00	0.33	-0.30	0.33	-0.33	-0.19	-0.0931	0.0063	9.9	1.1	9.9	1.1		
Science	8	559975	2561	0	3	C.2.1.3	2	132440	0.52	0.13	0.13	0.52	0.22	0.00	0.29	-0.26	-0.39	0.29	-0.14	0.4963	0.0061	9.9	1.1	9.9	1.2		
Science	8	559971	2562	0	4	B.3.2.1	2	132440	0.62	0.11	0.62	0.07	0.19	0.00	0.31	-0.24	0.31	-0.34	-0.21	-0.0291	0.0063	9.9	1.1	9.9	1.1		
Science	8	560092	2563	0	5	A.2.2.1	1	132440	0.67	0.08	0.11	0.14	0.67	0.00	0.41	-0.33	-0.33	-0.31	0.41	-0.3051	0.0064	-1.4	1.0	0.6	1.0		
Science	8	559965	2564	0	6	A.2.2.2	2	132440	0.84	0.84	0.10	0.02	0.04	0.00	0.41	0.41	-0.31	-0.23	-0.30	-1.4229	0.0080	-9.9	0.9	-9.9	0.9		
Science	8	558422	2565	0	7	A.1.3.2		132440	0.84	0.03	0.84	0.07	0.07	0.00	0.41	-0.22	0.41	-0.29	-0.31	-1.4028	0.0079	-9.9	0.9	-9.9	0.8		
Science	8	549686	2566	0	8	C.1.1.2		132440	0.64	0.07	0.21	0.64	0.08	0.00	0.39	-0.32	-0.30	0.39	-0.34	-0.1385	0.0063	7.5	1.0	0.4	1.0		
Science	8	558419	2567	0	9	A.1.2.4		132440	0.63	0.07	0.63	0.08	0.22	0.00	0.41	-0.40	0.41	-0.43	-0.25	-0.1030	0.0063	0.9	1.0	-1.0	1.0		
Science	8	549857	2568	0	10	C.3.1.3		132440	0.43	0.20	0.43	0.25	0.12	0.00	0.25	-0.35	0.25	-0.26	-0.05	0.9185	0.0062	9.9	1.2	9.9	1.3		
Science	8	549822	2569	0	11	A.3.2.2		132440	0.65	0.06	0.18	0.65	0.11	0.00	0.33	-0.39	-0.15	0.33	-0.33	-0.2053	0.0064	9.9	1.1	9.9	1.2		
Science	8	549708	2570	0	12	D.1.3.3		132440	0.62	0.07	0.17	0.14	0.62	0.00	0.41	-0.35	-0.35	-0.32	0.41	-0.0486	0.0063	-0.9	1.0	1.4	1.0		
Science	8	560324	2571	0	13	A.1.3.2	2	132440	0.48	0.30	0.48	0.13	0.08	0.00	0.37	-0.28	0.37	-0.42	-0.37	0.6616	0.0061	9.9	1.0	9.9	1.1		
Science	8	549861	2572	0	14	A.3.2.3		132440	0.61	0.12	0.16	0.11	0.61	0.00	0.43	-0.38	-0.33	-0.35	0.43	0.0028	0.0062	-9.7	1.0	-9.9	0.9		
Science	8	549823	2573	0	15	C.1.1.2		132440	0.66	0.06	0.66	0.09	0.19	0.00	0.37	-0.39	0.37	-0.36	-0.20	-0.2739	0.0064	9.9	1.0	9.9	1.1		
Science	8	558442	2574	0	16	B.1.1.4		132440	0.65	0.17	0.11	0.65	0.07	0.00	0.48	-0.36	-0.41	0.48	-0.39	-0.1845	0.0064	-9.9	0.9	-9.9	0.9		
Science	8	559906	2575	0	17	A.2.1.6	2	132440	0.42	0.09	0.42	0.28	0.21	0.00	0.27	-0.37	0.27	-0.17	-0.29	1.0108	0.0062	9.9	1.1	9.9	1.2		
Science	8	549713	2576	0	18	D.1.1.4		132440	0.82	0.82	0.09	0.05	0.05	0.00	0.50	0.50	-0.34	-0.39	-0.36	-1.2495	0.0076	-9.9	0.9	-9.9	0.7		
Science	8	558415	2577	0	19	B.1.1.4		132440	0.67	0.67	0.14	0.12	0.07	0.00	0.47	0.47	-0.36	-0.38	-0.33	-0.3216	0.0065	-9.9	0.9	-9.9	0.9		
Science	8	549738	2578	0	20	A.1.1.4		132440	0.61	0.11	0.61	0.13	0.15	0.00	0.36	-0.29	0.36	-0.35	-0.23	0.0440	0.0062	9.9	1.1	9.9	1.1		
Science	8	560009	2579	0	21	C.3.1.2	2	132440	0.59	0.24	0.08	0.08	0.59	0.00	0.33	-0.22	-0.33	-0.30	0.33	0.1048	0.0062	9.9	1.1	9.9	1.1		
Science	8	559969	2580	0	22	A.1.2.3	1	132440	0.66	0.66	0.07	0.16	0.11	0.00	0.49	0.49	-0.44	-0.35	-0.39	-0.2810	0.0064	-9.9	0.9	-9.9	0.9		
Science	8	559999	2581	0	23	D.1.3.1	1	132440	0.79	0.03	0.79	0.07	0.11	0.00	0.42	-0.31	0.42	-0.35	-0.27	-1.0646	0.0073	-9.9	0.9	-9.9	0.9		
Science	8	558350	2582	0	24	D.1.2.2		132440	0.60	0.60	0.14	0.11	0.14	0.00	0.52	0.52	-0.44	-0.48	-0.38	0.0479	0.0062	-9.9	0.9	-9.9	0.8		
Science	8	549831	2583	0	25	A.3.2.1		132440	0.64	0.11	0.11	0.15	0.64	0.00	0.53	-0.47	-0.45	-0.39	0.53	-0.1241	0.0063	-9.9	0.9	-9.9	0.8		
Science	8	558290	2584	0	26	C.3.1.2		132440	0.65	0.65	0.12	0.16	0.08	0.00	0.45	0.45	-0.35	-0.40	-0.32	-0.1781	0.0063	-9.9	1.0	-9.9	0.9		
Science	8	549837	2585	0	27	A.2.1.1		132440	0.69	0.09	0.15	0.69	0.07	0.00	0.51	-0.41	-0.39	0.51	-0.37	-0.4100	0.0065	-9.9	0.9	-9.9	0.8		
Science	8	559930	2589	0	39	A.3.1.3	2	132440	0.80	0.80	0.05	0.05	0.09	0.00	0.29	0.29	-0.21	-0.22	-0.18	-1.1638	0.0075	9.9	1.1	9.9	1.2		
Science	8	558439	2590	0	40	D.1.2.1		132440	0.75	0.04	0.09	0.12	0.75	0.00	0.45	-0.28	-0.34	-0.36	0.45	-0.7698	0.0069	-9.9	0.9	-9.9	0.9		
Science	8	559887	2591	0	41	B.2.1.1	2	132440	0.59	0.59	0.24	0.09	0.07	0.00	0.37	0.37	-0.26	-0.37	-0.34	0.1040	0.0062	9.9	1.1	9.9	1.1		
Science	8	549752	2592	0	42	C.2.2.2		132440	0.63	0.10	0.15	0.63	0.12	0.00	0.39	-0.33	-0.34	0.39	-0.27	-0.0785	0.0063	7.1	1.0	0.4	1.0		
Science	8	559960	2593	0	43	A.2.1.6	2	132440	0.72	0.08	0.10	0.10	0.72	0.00	0.39	-0.33	-0.26	-0.30	0.39	-0.5824	0.0067	-1.5	1.0	6.1	1.0		
Science	8	559890	2594	0	44	A.2.1.1	2	132440	0.67	0.13	0.14	0.05	0.67	0.00	0.41	-0.35	-0.25	-0.40	0.41	-0.3340	0.0065	-2.3	1.0	-2.7	1.0		
Science	8	560011	2595	0	45	D.1.1.3	1	132440	0.58	0.26	0.03	0.13	0.58	0.00	0.36	-0.26	-0.37	-0.36	0.36	0.1532	0.0062	9.9	1.1	9.9	1.1		
Science	8	560094	2596	0	46	A.2.2.3	1	132440	0.83	0.06	0.04	0.83	0.06	0.00	0.40	-0.30	-0.29	0.40	-0.24	-1.3606	0.0078	-9.9	0.9	-9.9	0.9		
Science	8	559895	2597	0	47	A.1.2.1	2	132440	0.65	0.65	0.16	0.11	0.09	0.00	0.49	0.49	-0.42	-0.38	-0.36	-0.1801	0.0064	-9.9	0.9	-9.9	0.9		
Science	8	559916	2598	0	48	A.2.1.6	2	132440	0.58	0.13																	

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Science	8	549820	2599	0	49	A.2.2.3		132440	0.61	0.17	0.08	0.61	0.14	0.00	0.39	-0.20	-0.41	0.39	-0.40	0.0407	0.0062	9.9	1.0	9.9	1.0		
Science	8	560226	2600	0	50	A.3.1.1	2	132440	0.70	0.09	0.10	0.70	0.11	0.00	0.38	-0.23	-0.34	0.38	-0.28	-0.4978	0.0066	4.8	1.0	3.8	1.0		
Science	8	558334	2601	0	51	B.2.1.4		132440	0.66	0.09	0.15	0.66	0.09	0.00	0.50	-0.40	-0.41	0.50	-0.39	-0.2673	0.0064	-9.9	0.9	-9.9	0.9		
Science	8	549582	2602	0	52	A.3.1.2		132440	0.68	0.68	0.14	0.12	0.06	0.00	0.49	0.49	-0.38	-0.40	-0.38	-0.3792	0.0065	-9.9	0.9	-9.9	0.9		
Science	8	558299	2603	0	53	A.2.2.2		132440	0.82	0.07	0.04	0.82	0.07	0.00	0.49	-0.33	-0.36	0.49	-0.35	-1.2914	0.0077	-9.9	0.9	-9.9	0.7		
Science	8	549743	2604	0	54	D.1.3.4		132440	0.64	0.64	0.12	0.12	0.12	0.00	0.49	0.49	-0.43	-0.39	-0.36	-0.1171	0.0063	-9.9	0.9	-9.9	0.9		
Science	8	559889	2605	0	55	A.1.3.3	2	132440	0.53	0.14	0.24	0.09	0.53	0.00	0.40	-0.33	-0.32	-0.45	0.40	0.4310	0.0061	3.9	1.0	2.1	1.0		
Science	8	549813	2606	0	56	A.3.1.4		132440	0.58	0.13	0.58	0.15	0.14	0.00	0.38	-0.32	0.38	-0.37	-0.27	0.1668	0.0062	9.9	1.0	9.9	1.1		
Science	8	549725	2607	0	57	A.2.2.1		132440	0.61	0.16	0.11	0.11	0.61	0.00	0.48	-0.40	-0.39	-0.39	0.48	-0.0094	0.0063	-9.9	0.9	-9.9	0.9		
Science	8	558403	2608	0	58	C.1.1.2		132440	0.80	0.80	0.11	0.06	0.04	0.00	0.49	0.49	-0.38	-0.35	-0.31	-1.1214	0.0074	-9.9	0.9	-9.9	0.8		
Science	8	560225	2609	0	59	C.3.1.1	2	132440	0.74	0.06	0.09	0.11	0.74	0.00	0.44	-0.34	-0.29	-0.35	0.44	-0.7319	0.0069	-9.9	0.9	-8.9	1.0		
Science	8	558301	2610	0	60	C.2.1.2		132440	0.79	0.06	0.79	0.12	0.03	0.00	0.33	-0.25	0.33	-0.21	-0.26	-1.0387	0.0073	7.4	1.0	9.8	1.1		
Science	8	559968	2611	0	61	A.1.2.1	2	132440	0.64	0.64	0.10	0.15	0.11	0.00	0.56	0.56	-0.47	-0.47	-0.43	-0.1351	0.0063	-9.9	0.8	-9.9	0.8		
Science	8	558395	2612	0	62	B.2.2.2		132440	0.74	0.16	0.05	0.74	0.05	0.00	0.34	-0.15	-0.38	0.34	-0.34	-0.7055	0.0068	9.5	1.0	9.9	1.2		
Science	8	549698	2613	0	63	A.1.1.1		132440	0.69	0.10	0.13	0.07	0.69	0.00	0.47	-0.35	-0.34	-0.42	0.47	-0.4391	0.0066	-9.9	0.9	-9.9	0.9		
Science	8	558362	2614	0	64	A.1.1.2		132440	0.77	0.77	0.07	0.10	0.06	0.00	0.48	0.48	-0.37	-0.33	-0.35	-0.9079	0.0071	-9.9	0.9	-9.9	0.8		
Science	8	559905	2615	0	65	A.2.1.4	2	132440	0.64	0.06	0.11	0.19	0.64	0.00	0.44	-0.43	-0.44	-0.27	0.44	-0.1469	0.0063	-9.9	1.0	-2.7	1.0		
Science	8	559551	2616	0	66	A.1.3.1	2	132440	0.69	0.16	0.69	0.09	0.06	0.00	0.49	-0.36	0.49	-0.43	-0.35	-0.3961	0.0065	-9.9	0.9	-9.9	0.8		
Science	8	559555	2617	0	67	C.3.1.1	2	132440	0.48	0.16	0.23	0.48	0.12	0.00	0.29	-0.29	-0.24	0.29	-0.27	0.6671	0.0061	9.9	1.1	9.9	1.2		
Science	8	559549	2618	0	68	C.1.1.1	2	132440	0.46	0.22	0.20	0.46	0.12	0.00	0.31	-0.24	-0.28	0.31	-0.36	0.7749	0.0061	9.9	1.1	9.9	1.1		
Science	8	559548	2619	0	69	A.3.3.2	1	132440	0.51	0.15	0.51	0.14	0.21	0.00	0.37	-0.37	0.37	-0.40	-0.22	0.5512	0.0061	9.9	1.0	9.9	1.1		
Science	8	560375	2622	1	28	A.1.3.2	2	11461	0.48	0.18	0.48	0.17	0.16	0.00	0.31	-0.30	0.31	-0.28	-0.26	0.6040	0.0209	9.9	1.1	9.9	1.2	A-	A-
Science	8	560371	2623	1	29	D.1.1.2	2	11461	0.28	0.13	0.28	0.18	0.41	0.00	0.19	-0.28	0.19	-0.30	-0.11	1.6455	0.0227	9.9	1.2	9.9	1.5	A-	A-
Science	8	560374	2624	1	30	D.1.1.1	2	11461	0.30	0.19	0.24	0.27	0.30	0.00	0.14	-0.14	-0.18	-0.13	0.14	1.5492	0.0224	9.9	1.2	9.9	1.5	A-	A-
Science	8	560370	2625	1	31	C.3.1.1	1	11461	0.32	0.32	0.26	0.26	0.16	0.00	0.27	0.27	-0.22	-0.34	-0.28	1.4152	0.0220	9.9	1.1	9.9	1.3	B-	A-
Science	8	566344	2626	1	32	C.2.1.2	2	11461	0.45	0.45	0.25	0.18	0.11	0.00	0.31	0.31	-0.21	-0.39	-0.30	0.7459	0.0210	9.9	1.1	9.9	1.2	A-	A-
Science	8	565251	2627	1	33	A.1.3.1	2	11461	0.58	0.10	0.58	0.11	0.20	0.00	0.35	-0.27	0.35	-0.31	-0.28	0.0774	0.0211	8.8	1.1	7.7	1.1	A-	A-
Science	8	566089	2628	1	35	A.2.1.5	2	11461	0.68	0.07	0.09	0.68	0.15	0.00	0.50	-0.43	-0.37	0.50	-0.39	-0.4367	0.0221	-9.9	0.9	-9.9	0.8	A+	A-
Science	8	565070	2629	1	70	C.1.1.1	1	11461	0.46	0.46	0.17	0.25	0.11	0.00	0.32	0.32	-0.32	-0.23	-0.35	0.6812	0.0209	9.9	1.1	9.9	1.2	A+	A+
Science	8	565410	2630	1	71	B.2.2.2	2	11461	0.71	0.11	0.71	0.09	0.09	0.00	0.52	-0.35	0.52	-0.45	-0.40	-0.5866	0.0226	-9.9	0.9	-9.9	0.8	A+	A-
Science	8	565084	2631	1	72	A.3.1.3	1	11461	0.64	0.09	0.12	0.14	0.64	0.00	0.47	-0.37	-0.40	-0.37	0.47	-0.2404	0.0217	-7.0	0.9	-7.2	0.9	A+	A-
Science	8	560014	2633	1	34	D.1.3.4	2	11461	0.60	0.60	0.12	0.13	0.15	0.00	0.46	0.46	-0.44	-0.38	-0.34	0.0071	0.0212	-5.7	1.0	-6.2	0.9		
Science	8	560305	2634	1	73	D.3.1.1	2	11461	0.54	0.12	0.25	0.09	0.54	0.00	0.37	-0.31	-0.28	-0.39	0.37	0.2934	0.0209	7.3	1.1	7.1	1.1		
Science	8	560372	2635	2	28	A.1.3.4	2	11008	0.40	0.13	0.40	0.12	0.35	0.00	0.14	-0.32	0.14	-0.36	0.05	1.0662	0.0215	9.9	1.3	9.9	1.4	A-	A-
Science	8	560376	2636	2	29	A.2.2.2	1	11008	0.48	0.15	0.13	0.24	0.48	0.00	0.36	-0.31	-0.34	-0.33	0.36	0.6503	0.0211	4.6	1.0	4.9	1.1	A-	A+
Science	8	560377	2637	2	30	A.2.2.3	2	11008	0.60	0.60	0.13	0.19	0.08	0.00	0.46	0.46	-0.40	-0.36	-0.39	0.0627	0.0215	-7.3	0.9	-7.7	0.9	A-	A-
Science	8	560368	2638	2	31	C.1.1.3	2	11008	0.44	0.14	0.26	0.16	0.44	0.00	0.33	-0.30	-0.29	-0.35	0.33	0.8359	0.0212	9.3	1.1	9.5	1.1	A+	A-
Science	8	565676	2639	2	32	C.2.1.2	2	11008	0.39	0.17	0.22	0.39	0.21	0.00	0.26	-0.27	-0.27	0.26	-0.22	1.0912	0.0215	9.9	1.1	9.9	1.2	A-	A-
Science	8	593312	2640	2	33	A.3.1.4	2	11008	0.45	0.13	0.20	0.21	0.45	0.00	0.36	-0.28	-0.34	-0.36	0.36	0.7818	0.0212	5.0	1.0	6.7	1.1	A+	A+
Science	8	566342	2641	2	35	B.3.1.3	2	11008	0.36	0.12	0.16	0.36	0.35	0.00	0.13	-0.32	-0.21	0.13	-0.01	1.2356	0.0218	9.9	1.3	9.9	1.5	A+	A+
Science	8	565677	2642	2	70	C.2.1.3	2	11008	0.32	0.32	0.41	0.13	0.13	0.00	0.13	0.13	-0.04	-0.32	-0.19	1.4622	0.0223	9.9	1.2	9.9	1.5	A-	A-
Science	8	565087	2643	2	71	B.2.1.1	2	11008	0.68	0.68	0.07	0.18	0.07	0.00	0.41	0.41	-0.38	-0.28	-0.33	-0.3697	0.0224	-1.8	1.0	-1.7	1.0	A-	A-
Science	8	565079	2644	2	72	D.3.1.1	2	11008	0.28	0.56	0.09	0.28	0.08	0.00	0.10	0.00	-0.39	0.10	-0.37	1.7268	0.0232	9.9	1.2	9.9	1.6	A-	A-
Science	8	559904	2646	2	34	A.2.1.4	3	11008	0.59	0.12	0.16	0.59	0.12	0.00	0.41	-0.36	-0.38	0.41	-0.27	0.0891	0.0214	-0.8	1.0	-0.8	1.0		
Science	8	560012	2647	2	73	D.1.3.1	2	11008	0.57	0.17	0.10	0.57	0.16	0.00	0.33	-0.21	-0.34	0.33	-0.28	0.2272	0.0213	9.6	1.1	7.2	1.1		
Science	8	560603	2648	3	28	A.1.1.2	2	11053	0.56	0.11	0.25	0.56	0.07	0.00	0.36	-0.36	-0.26	0.36	-0.33	0.2643	0.0213	6.8	1.1	6.2	1.1	A+	A+
Science	8	560609	2649	3	29	C.1.1.1	2	11053	0.46	0.13	0.22	0.19	0.46	0.00	0.26	-0.25	-0.20	-0.27	0.26	0.7558	0.0212	9.9	1.2	9.9	1.2	A+	A+
Science	8	560612	2650	3	30	C.2.2.2	2	11053	0.59	0.13	0.16	0.59	0.11	0.00	0.51	-0.41	-0.44	0.51	-0.43	0.1399	0.0215	-9.9	0.9	-9.9	0.8	A-	A-
Science	8	560610	2651	3	31	C.1.1.3	2	11053	0.53	0.09	0.13	0.25	0.53	0.00	0.53	-0.47	-0.49	-0.46	0.53	0.4400	0.0212	-9.9	0.9	-9.9	0.8	A-	A-
Science	8	565675	2652	3	32	C.2.1.1	1	11053	0.31	0.50	0.13	0.31	0.06	0.00	0.15	-0.08	-0.29	0.15	-0.35	1.5573	0.0226	9.9	1.2	9.9	1.5	A-	B-
Science	8	565399	2653	3	33	A.1.2.2	2</																				

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Science	8	565088	2654	3	34	B.2.2.1	1	11053	0.65	0.11	0.65	0.11	0.12	0.00	0.45	-0.38	0.45	-0.34	-0.36	-0.2022	0.0221	-5.6	1.0	-6.0	0.9	B+	A-
Science	8	594777	2655	3	70	D.1.2.1	2	11053	0.42	0.13	0.18	0.27	0.42	0.00	0.38	-0.42	-0.37	-0.32	0.38	0.9785	0.0214	1.2	1.0	4.2	1.1	A-	A-
Science	8	565082	2656	3	71	A.2.1.3	2	11053	0.45	0.45	0.23	0.17	0.15	0.00	0.32	0.32	-0.23	-0.37	-0.30	0.8080	0.0213	9.9	1.1	9.9	1.1	A-	A-
Science	8	565078	2657	3	73	D.2.1.3	2	11053	0.35	0.35	0.08	0.48	0.09	0.00	-0.10	-0.10	-0.21	0.22	-0.11	1.3323	0.0220	9.9	1.5	9.9	1.9	A+	A-
Science	8	559888	2659	3	35	A.1.3.2	2	11053	0.59	0.11	0.15	0.59	0.14	0.00	0.41	-0.33	-0.35	0.41	-0.33	0.1273	0.0215	0.3	1.0	-2.2	1.0		
Science	8	559891	2660	3	72	A.2.1.1	2	11053	0.68	0.68	0.11	0.12	0.08	0.00	0.57	0.57	-0.45	-0.46	-0.41	-0.3799	0.0225	-9.9	0.8	-9.9	0.7		
Science	8	560453	2661	4	28	A.1.1.3	2	11011	0.60	0.24	0.60	0.09	0.07	0.00	0.36	-0.23	0.36	-0.40	-0.32	0.0755	0.0216	5.7	1.1	2.6	1.0	A+	A+
Science	8	560461	2662	4	29	A.1.2.2	2	11011	0.54	0.09	0.20	0.18	0.54	0.00	0.32	-0.28	-0.34	-0.21	0.32	0.4228	0.0212	9.9	1.1	9.9	1.2	A+	A-
Science	8	560456	2663	4	30	B.1.1.3	1	11011	0.67	0.09	0.11	0.67	0.12	0.00	0.46	-0.39	-0.37	0.46	-0.31	-0.2862	0.0224	-6.5	0.9	-7.1	0.9	A+	A-
Science	8	560455	2664	4	31	D.1.1.4	2	11011	0.55	0.55	0.14	0.10	0.21	0.00	0.43	0.43	-0.37	-0.41	-0.34	0.3693	0.0213	-2.3	1.0	-2.5	1.0	A-	A-
Science	8	565407	2665	4	33	A.3.3.2	2	11011	0.57	0.57	0.15	0.15	0.13	0.00	0.40	0.40	-0.33	-0.38	-0.30	0.2387	0.0214	1.0	1.0	-0.8	1.0	A-	A-
Science	8	566343	2666	4	34	C.1.1.1	2	11011	0.24	0.24	0.37	0.25	0.14	0.00	0.05	0.05	-0.03	-0.02	-0.15	1.9737	0.0241	9.9	1.3	9.9	1.9	A-	A+
Science	8	565400	2667	4	35	A.1.2.3	2	11011	0.34	0.34	0.20	0.19	0.27	0.00	0.24	0.24	-0.23	-0.35	-0.18	1.4087	0.0222	9.9	1.1	9.9	1.3	A+	A-
Science	8	565239	2668	4	70	B.3.2.3	2	11011	0.54	0.28	0.09	0.54	0.09	0.00	0.22	-0.07	-0.35	0.22	-0.32	0.4016	0.0213	9.9	1.2	9.9	1.3	A+	A-
Science	8	567043	2669	4	71	D.3.1.3	2	11011	0.54	0.18	0.18	0.09	0.54	0.00	0.44	-0.35	-0.38	-0.45	0.44	0.3739	0.0213	-4.1	1.0	-3.7	1.0	A-	A-
Science	8	564902	2670	4	73	A.3.2.3	3	11011	0.64	0.10	0.14	0.64	0.12	0.00	0.42	-0.32	-0.34	0.42	-0.35	-0.0930	0.0219	-1.4	1.0	-2.4	1.0	A+	A+
Science	8	559915	2672	4	32	A.2.1.5	2	11011	0.57	0.09	0.15	0.57	0.18	0.00	0.39	-0.35	-0.34	0.39	-0.29	0.2379	0.0214	2.2	1.0	1.0	1.0		
Science	8	559976	2673	4	72	D.1.1.4	2	11011	0.67	0.15	0.07	0.67	0.11	0.00	0.47	-0.35	-0.44	0.47	-0.35	-0.2617	0.0223	-7.6	0.9	-8.0	0.9		
Science	8	560454	2674	5	28	A.1.3.2	2	11036	0.65	0.09	0.13	0.13	0.65	0.00	0.55	-0.40	-0.46	-0.47	0.55	-0.1651	0.0221	-9.9	0.9	-9.9	0.8	A+	A-
Science	8	560457	2675	5	29	B.2.1.2	2	11036	0.79	0.79	0.06	0.09	0.06	0.00	0.52	0.52	-0.40	-0.36	-0.36	-1.0215	0.0253	-9.9	0.8	-9.9	0.7	A+	B-
Science	8	560459	2676	5	30	B.2.2.2	2	11036	0.45	0.13	0.15	0.27	0.45	0.00	0.15	-0.12	-0.22	-0.10	0.15	0.8217	0.0213	9.9	1.3	9.9	1.4	A-	A+
Science	8	560460	2677	5	31	B.3.1.2	2	11036	0.45	0.21	0.19	0.45	0.15	0.00	0.32	-0.26	-0.31	0.32	-0.33	0.8578	0.0213	8.8	1.1	9.9	1.2	A+	A-
Science	8	565679	2678	5	32	C.2.2.3	1	11036	0.58	0.14	0.13	0.15	0.58	0.00	0.48	-0.40	-0.44	-0.38	0.48	0.2073	0.0215	-7.6	0.9	-8.3	0.9	B-	B-
Science	8	562071	2679	5	34	B.3.1.1	2	11036	0.53	0.53	0.06	0.33	0.08	0.00	0.33	0.33	-0.45	-0.20	-0.40	0.4428	0.0213	9.9	1.1	9.2	1.1	A-	A-
Science	8	564904	2680	5	35	A.2.2.3	2	11036	0.70	0.70	0.11	0.10	0.09	0.00	0.51	0.51	-0.43	-0.40	-0.35	-0.4608	0.0229	-9.9	0.9	-9.9	0.8	A+	A-
Science	8	562100	2681	5	70	D.2.1.1	2	11036	0.33	0.43	0.15	0.33	0.09	0.00	0.16	-0.05	-0.32	0.16	-0.33	1.4594	0.0223	9.9	1.2	9.9	1.5	A-	A-
Science	8	594780	2682	5	71	D.3.1.3	2	11036	0.68	0.07	0.68	0.15	0.10	0.00	0.49	-0.39	0.49	-0.42	-0.33	-0.3345	0.0225	-9.3	0.9	-9.4	0.9	A-	A-
Science	8	567026	2683	5	73	A.3.1.2	2	11036	0.61	0.08	0.13	0.17	0.61	0.00	0.43	-0.43	-0.28	-0.36	0.43	0.0057	0.0218	-1.0	1.0	-0.3	1.0	A+	A-
Science	8	560087	2685	5	33	A.1.2.1	2	11036	0.54	0.15	0.14	0.16	0.54	0.00	0.45	-0.34	-0.42	-0.42	0.45	0.3808	0.0213	-3.7	1.0	-1.7	1.0		
Science	8	559974	2686	5	72	C.2.1.2	2	11036	0.63	0.11	0.08	0.17	0.63	0.00	0.45	-0.38	-0.45	-0.31	0.45	-0.0904	0.0219	-4.4	1.0	-2.1	1.0		
Science	8	562095	2687	6	28	A.1.1.2	2	10978	0.66	0.66	0.14	0.12	0.07	0.00	0.52	0.52	-0.45	-0.39	-0.2631	0.0221	-9.9	0.9	-9.9	0.8	A+	A-	
Science	8	562098	2688	6	29	B.3.3.1	3	10978	0.35	0.35	0.30	0.27	0.08	0.00	0.21	0.21	-0.16	-0.19	-0.40	1.3117	0.0219	9.9	1.2	9.9	1.3	A-	A+
Science	8	562099	2689	6	30	C.2.1.1	3	10978	0.36	0.36	0.25	0.27	0.12	0.00	0.16	0.16	-0.15	-0.14	-0.24	1.2569	0.0218	9.9	1.2	9.9	1.4	A-	A-
Science	8	562091	2690	6	31	C.2.1.3	2	10978	0.57	0.21	0.10	0.57	0.12	0.00	0.41	-0.31	-0.41	0.41	-0.32	0.1958	0.0213	-1.0	1.0	-2.3	1.0	A-	A-
Science	8	567048	2691	6	33	D.1.2.1	2	10978	0.68	0.68	0.07	0.14	0.10	0.00	0.52	0.52	-0.43	-0.42	-0.37	-0.3883	0.0225	-9.9	0.9	-9.9	0.8	A-	B-
Science	8	593322	2692	6	34	B.3.3.2	2	10978	0.44	0.15	0.20	0.21	0.44	0.00	0.28	-0.33	-0.22	-0.26	0.28	0.8704	0.0212	9.9	1.1	9.9	1.2	A+	A-
Science	8	565678	2693	6	35	C.2.2.1	1	10978	0.80	0.80	0.04	0.08	0.08	0.00	0.27	0.27	-0.29	-0.17	-0.14	-1.1483	0.0258	2.2	1.0	9.9	1.3	C+	A-
Science	8	564906	2694	6	70	A.3.1.2	2	10978	0.40	0.40	0.05	0.15	0.39	0.00	0.24	0.24	-0.45	-0.37	-0.11	1.0352	0.0214	9.9	1.2	9.9	1.2	A+	A-
Science	8	565414	2695	6	71	D.1.1.1	2	10978	0.37	0.18	0.27	0.37	0.18	0.00	0.15	-0.23	-0.14	0.15	-0.08	1.1952	0.0217	9.9	1.2	9.9	1.4	A-	A-
Science	8	565398	2696	6	73	A.1.1.3	3	10978	0.52	0.28	0.52	0.13	0.07	0.00	0.26	-0.12	0.26	-0.32	-0.39	0.4747	0.0211	9.9	1.1	9.9	1.2	A+	A-
Science	8	549599	2698	6	32	C.1.1.2		10978	0.63	0.07	0.12	0.63	0.18	0.00	0.32	-0.32	-0.35	0.32	-0.13	-0.0819	0.0217	8.8	1.1	8.8	1.1		
Science	8	559940	2699	6	72	B.2.2.1	2	10978	0.38	0.38	0.13	0.19	0.30	0.00	0.22	0.22	-0.35	-0.23	-0.15	1.1812	0.0217	9.9	1.2	9.9	1.3		
Science	8	562093	2700	7	28	A.1.1.2	2	10988	0.66	0.10	0.17	0.66	0.07	0.00	0.41	-0.36	-0.31	0.41	-0.30	-0.2285	0.0222	-0.5	1.0	0.7	1.0	A+	A-
Science	8	562094	2701	7	29	A.1.2.1	2	10988	0.42	0.30	0.15	0.42	0.13	0.00	0.30	-0.21	-0.37	0.30	-0.33	0.9962	0.0214	9.5	1.1	9.9	1.2	A-	A-
Science	8	562097	2702	7	30	A.1.3.3	2	10988	0.74	0.07	0.74	0.08	0.11	0.00	0.50	-0.38	0.50	-0.41	-0.35	-0.6890	0.0237	-9.9	0.9	-9.9	0.8	A+	A-
Science	8	562092	2703	7	31	C.3.1.1	2	10988	0.42	0.21	0.17	0.19	0.42	0.00	0.30	-0.27	-0.29	-0.28	0.30	0.9640	0.0214	9.9	1.1	9.9	1.2	A-	A-
Science	8	593327	2704	7	33	D.2.1.2	2	10988	0.72	0.72	0.14	0.09	0.05	0.00	0.50	0.50	-0.38	-0.41	-0.36	-0.5655	0.0233	-9.9	0.9	-9.9	0.8	A-	B-
Science	8	565071	2705	7	34	C.1.1.3	2	10988	0.33	0.16	0.33	0.41	0.10	0.00	0.20	-0.30	0.20	-0.14	-0.27	1.4397	0.0223	9.9	1.2	9.9	1.4	A-	A-
Science	8	566644	2706	7	35	A.1.1.1	2	10988	0.54	0.16	0.22	0.54	0.07	0.00	0.23	-0.20	-0.12	0.23	-0.39	0.3613	0.0213	9.9	1.2	9.9	1.3	A+	A-
Science	8	565242	2707	7	71	C.2.2.2	2	10988	0.48	0.07	0.48	0.35	0.10	0.00	0.36	-0.44	0.36	-0.29	-0.34	0.6791	0.0212	3.9	1.0	4.5	1.1	B-	B-
Science	8	593319	2708																								

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Science	8	566643	2709	7	73	A.1.3.2	2	10988	0.41	0.15	0.16	0.41	0.28	0.00	0.20	-0.29	-0.19	0.20	-0.14	1.0517	0.0215	9.9	1.2	9.9	1.4	A+	A-
Science	8	558357	2711	7	32	C.3.1.3		10988	0.72	0.11	0.10	0.07	0.72	0.00	0.56	-0.44	-0.43	-0.41	0.56	-0.5908	0.0233	-9.9	0.8	-9.9	0.7		
Science	8	549655	2712	7	70	B.1.1.3		10988	0.43	0.14	0.27	0.17	0.43	0.00	0.29	-0.32	-0.24	-0.28	0.29	0.9774	0.0214	9.9	1.1	9.9	1.2		
Science	8	560604	2713	8	28	A.1.1.4	3	10979	0.74	0.07	0.12	0.74	0.06	0.00	0.51	-0.37	-0.41	0.51	-0.35	-0.7344	0.0239	-9.9	0.9	-9.9	0.7	A-	A-
Science	8	560605	2714	8	29	A.1.2.1	2	10979	0.37	0.23	0.12	0.37	0.27	0.00	0.30	-0.22	-0.46	0.30	-0.26	1.2315	0.0219	8.3	1.1	9.9	1.2	A-	A-
Science	8	560606	2715	8	30	A.1.3.2	2	10979	0.54	0.13	0.54	0.12	0.21	0.00	0.42	-0.40	0.42	-0.45	-0.28	0.3902	0.0214	-1.4	1.0	-2.1	1.0	A-	A+
Science	8	560611	2716	8	31	C.2.1.1	2	10979	0.63	0.63	0.13	0.12	0.11	0.00	0.42	0.42	-0.34	-0.39	-0.28	-0.0925	0.0220	-0.5	1.0	-1.6	1.0	A-	A-
Science	8	565245	2717	8	32	D.1.2.2	2	10979	0.55	0.55	0.15	0.16	0.13	0.00	0.40	0.40	-0.31	-0.39	-0.32	0.3286	0.0214	2.6	1.0	2.4	1.0	A-	A-
Science	8	565408	2718	8	33	B.1.1.2	2	10979	0.73	0.08	0.11	0.73	0.08	0.00	0.50	-0.40	-0.35	0.50	-0.39	-0.6349	0.0235	-9.9	0.9	-9.9	0.8	A+	A-
Science	8	566090	2719	8	34	A.2.2.2	2	10979	0.61	0.61	0.18	0.09	0.13	0.00	0.46	0.46	-0.38	-0.41	-0.37	0.0518	0.0217	-5.7	1.0	-5.7	0.9	A+	A-
Science	8	593329	2720	8	70	D.3.1.3	2	10979	0.43	0.43	0.10	0.34	0.13	0.00	0.30	0.30	-0.37	-0.18	-0.43	0.9589	0.0215	9.9	1.1	9.9	1.2	A-	A-
Science	8	566348	2721	8	72	D.1.3.2	2	10979	0.70	0.70	0.08	0.15	0.07	0.00	0.51	0.51	-0.44	-0.37	-0.38	-0.4430	0.0229	-9.9	0.9	-9.9	0.8	A+	A-
Science	8	565086	2722	8	73	B.1.1.3	2	10979	0.19	0.24	0.18	0.39	0.19	0.00	0.01	-0.04	-0.08	0.04	0.01	2.3561	0.0262	9.9	1.3	9.9	2.2	A-	A-
Science	8	560002	2724	8	35	C.2.1.2	2	10979	0.72	0.06	0.11	0.72	0.11	0.00	0.37	-0.31	-0.24	0.37	-0.29	-0.5703	0.0233	2.0	1.0	6.8	1.1		
Science	8	559964	2725	8	71	A.2.2.3	2	10979	0.46	0.46	0.10	0.19	0.24	0.00	0.27	0.27	-0.42	-0.20	-0.19	0.7748	0.0213	9.9	1.2	9.9	1.2		
Science	8	562193	2726	9	28	A.1.1.3	2	10968	0.27	0.51	0.12	0.10	0.27	0.00	0.25	-0.16	-0.45	-0.52	0.25	1.7960	0.0234	6.9	1.1	9.9	1.3	A-	A+
Science	8	562202	2727	9	29	A.1.3.3	3	10968	0.29	0.29	0.13	0.17	0.40	0.00	0.21	0.21	-0.39	-0.43	-0.05	1.6324	0.0228	9.9	1.1	9.9	1.4	A+	A+
Science	8	562194	2728	9	30	A.1.2.2	2	10968	0.56	0.56	0.14	0.22	0.08	0.00	0.51	0.51	-0.49	-0.41	-0.42	0.2833	0.0213	-9.9	0.9	-9.9	0.9	A-	A-
Science	8	562198	2729	9	31	B.3.1.2	2	10968	0.43	0.19	0.43	0.24	0.14	0.00	0.30	-0.23	0.30	-0.28	-0.33	0.9340	0.0213	9.0	1.1	9.9	1.2	A+	A-
Science	8	566347	2730	9	32	D.3.1.2	1	10968	0.65	0.65	0.11	0.16	0.07	0.00	0.35	0.35	-0.36	-0.17	-0.32	-0.1705	0.0220	5.9	1.1	4.1	1.1	A-	A-
Science	8	565685	2731	9	33	C.3.1.3	2	10968	0.28	0.19	0.28	0.12	0.40	0.00	0.04	-0.10	0.04	-0.35	0.11	1.7121	0.0231	9.9	1.3	9.9	1.7	A+	A+
Science	8	567025	2732	9	34	A.1.1.4	2	10968	0.37	0.37	0.33	0.15	0.14	0.00	0.29	0.29	-0.24	-0.35	-0.29	1.2378	0.0218	8.1	1.1	9.9	1.2	A-	A-
Science	8	565073	2733	9	71	C.2.2.1	2	10968	0.60	0.60	0.09	0.13	0.18	0.00	0.40	0.40	-0.43	-0.38	-0.22	0.0824	0.0215	1.0	1.0	0.6	1.0	A-	A-
Science	8	567032	2734	9	72	B.2.1.3	2	10968	0.39	0.39	0.15	0.19	0.27	0.00	0.27	0.27	-0.41	-0.33	-0.11	1.1291	0.0216	9.9	1.1	9.9	1.2	A+	A-
Science	8	565684	2735	9	73	C.1.1.3	2	10968	0.50	0.15	0.14	0.50	0.21	0.00	0.33	-0.37	-0.31	0.33	-0.22	0.5711	0.0212	8.2	1.1	8.2	1.1	A+	A-
Science	8	560108	2737	9	35	B.1.1.1	2	10968	0.57	0.14	0.11	0.57	0.17	0.00	0.35	-0.29	-0.33	0.35	-0.28	0.2233	0.0213	6.4	1.1	6.1	1.1		
Science	8	549855	2738	9	70	B.2.2.2		10968	0.57	0.57	0.17	0.15	0.10	0.00	0.45	0.45	-0.36	-0.42	-0.36	0.2097	0.0214	-6.5	1.0	-6.7	0.9		
Science	8	560656	2739	10	28	A.1.1.4	2	10960	0.45	0.45	0.14	0.22	0.19	0.00	0.36	0.36	-0.44	-0.27	-0.33	0.8186	0.0212	3.3	1.0	5.4	1.1	A-	A-
Science	8	560663	2740	10	29	D.1.1.1	2	10960	0.52	0.18	0.20	0.10	0.52	0.00	0.38	-0.26	-0.32	-0.48	0.38	0.4850	0.0212	2.6	1.0	2.9	1.0	A-	A-
Science	8	560657	2741	10	30	D.1.1.2	2	10960	0.42	0.14	0.28	0.42	0.16	0.00	0.20	-0.31	-0.12	0.20	-0.18	0.9557	0.0214	9.9	1.2	9.9	1.3	A+	A-
Science	8	560658	2742	10	31	A.2.1.1	2	10960	0.40	0.22	0.27	0.40	0.10	0.00	0.19	-0.16	-0.13	0.19	-0.30	1.0659	0.0215	9.9	1.2	9.9	1.4	A+	A+
Science	8	565247	2743	10	32	D.1.3.2	2	10960	0.76	0.09	0.09	0.76	0.05	0.00	0.52	-0.38	-0.42	0.52	-0.35	-0.8144	0.0242	-9.9	0.9	-9.9	0.7	A+	A-
Science	8	565076	2744	10	33	D.1.2.2	2	10960	0.31	0.31	0.33	0.20	0.16	0.00	0.14	0.14	-0.06	-0.22	-0.24	1.5559	0.0226	9.9	1.2	9.9	1.5	A-	A-
Science	8	565252	2745	10	34	A.2.2.1	2	10960	0.59	0.12	0.18	0.11	0.59	0.00	0.48	-0.45	-0.40	-0.36	0.48	0.1088	0.0215	-9.3	0.9	-9.5	0.9	A-	A-
Science	8	565240	2746	10	71	C.1.1.1	2	10960	0.55	0.55	0.14	0.19	0.12	0.00	0.40	0.40	-0.37	-0.31	-0.36	0.3264	0.0213	1.3	1.0	1.1	1.0	A+	A+
Science	8	567037	2747	10	72	B.3.3.2	2	10960	0.32	0.20	0.24	0.23	0.32	0.00	0.17	-0.19	-0.14	-0.21	0.17	1.4867	0.0224	9.9	1.2	9.9	1.4	A-	A-
Science	8	566087	2748	10	73	A.1.3.2	2	10960	0.26	0.53	0.08	0.13	0.26	0.00	0.23	-0.16	-0.45	-0.40	0.23	1.8353	0.0236	6.8	1.1	9.9	1.4	A-	A-
Science	8	559970	2750	10	35	B.2.2.2	1	10960	0.56	0.56	0.07	0.14	0.22	0.00	0.34	0.34	-0.37	-0.41	-0.18	0.2735	0.0213	7.7	1.1	9.5	1.1		
Science	8	558408	2751	10	70	A.1.1.2		10960	0.52	0.15	0.19	0.14	0.52	0.00	0.41	-0.34	-0.40	-0.37	0.41	0.4962	0.0212	-1.1	1.0	0.0	1.0		
Science	8	562202	2727	11	28	A.1.3.3	3	11010	0.32	0.32	0.15	0.15	0.38	0.00	0.19	0.19	-0.38	-0.35	-0.04	1.5082	0.0224	9.9	1.2	9.9	1.4	A+	A+
Science	8	562200	2752	11	29	C.2.2.3	2	11010	0.62	0.11	0.14	0.13	0.62	0.00	0.51	-0.40	-0.40	-0.44	0.51	-0.0580	0.0217	-9.9	0.9	-9.9	0.8	A-	A-
Science	8	562199	2753	11	30	C.1.1.3	2	11010	0.59	0.12	0.59	0.18	0.12	0.00	0.39	-0.36	0.39	-0.31	-0.31	0.1361	0.0214	1.5	1.0	-0.4	1.0	A+	A-
Science	8	562201	2754	11	31	D.1.1.2	2	11010	0.35	0.35	0.19	0.28	0.17	0.00	0.15	0.15	-0.22	-0.06	-0.24	1.3010	0.0219	9.9	1.3	9.9	1.4	A+	A+
Science	8	565077	2755	11	32	D.1.3.1	2	11010	0.69	0.09	0.69	0.12	0.10	0.00	0.50	-0.39	0.50	-0.42	-0.33	-0.4240	0.0226	-9.9	0.9	-9.9	0.8	A-	A-
Science	8	565250	2756	11	35	A.1.2.1	2	11010	0.50	0.14	0.19	0.50	0.17	0.00	0.44	-0.32	-0.42	0.44	-0.42	0.5540	0.0211	-4.3	1.0	-1.7	1.0	A-	A+
Science	8	565243	2757	11	71	D.1.1.1	2	11010	0.41	0.17	0.24	0.18	0.41	0.00	0.28	-0.30	-0.19	-0.35	0.28	1.0246	0.0214	9.9	1.1	9.9	1.2	A+	A-
Science	8	565708	2758	11	72	C.3.1.1	2	11010	0.33	0.24	0.33	0.30	0.12	0.00	0.19	-0.19	0.19	-0.13	-0.32	1.4044	0.0222	9.9	1.2	9.9	1.4	A-	A-
Science	8	565083	2759	11	73	A.2.2.1	2	11010	0.60	0.06	0.08	0.25	0.60	0.00	0.32	-0.32	-0.29	-0.23	0.32	0.0633	0.0215	9.9	1.1	9.3	1.1	A-	A-
Science	8	565237	2761	11	33	B.1.1.3	2	11010	0.42	0.42	0.30	0.07	0.22	0.00	0.13	0.13	-0.04	-0.35	-0.14	0.9781	0.0214	9.9	1.3	9.9	1.4	A-	A-
Science	8	560090	2762	11	34	A.1.2.3	2	11010	0.59	0.23	0.10	0.59	0.07	0.00	0.35	-0.20	-0.42	0.35	-0.34	0.1152	0.0215	7.1	1.1	5.8	1.1		
Science	8</																										

## Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Science	8	560606	2715	12	28	A.1.3.2	2	10988	0.55	0.15	0.55	0.11	0.18	0.00	0.43	-0.39	0.43	-0.43	-0.28	0.2946	0.0213	-2.5	1.0	-4.2	1.0	A-	A+
Science	8	560607	2764	12	29	A.3.1.4	2	10988	0.41	0.25	0.41	0.18	0.16	0.00	0.14	-0.02	0.14	-0.23	-0.19	1.0234	0.0215	9.9	1.3	9.9	1.4	A+	A+
Science	8	560610	2651	12	30	C.1.1.3	2	10988	0.53	0.08	0.13	0.26	0.53	0.00	0.53	-0.46	-0.50	-0.46	0.53	0.4388	0.0212	-9.9	0.9	-9.9	0.8	A-	A-
Science	8	560612	2650	12	31	C.2.2.2	2	10988	0.60	0.14	0.15	0.60	0.11	0.00	0.50	-0.39	-0.43	0.50	-0.44	0.0878	0.0216	-9.9	0.9	-9.9	0.9	A-	A-
Science	8	565417	2765	12	32	D.1.2.2	1	10988	0.56	0.11	0.56	0.10	0.22	0.00	0.35	-0.32	0.35	-0.40	-0.21	0.2668	0.0214	7.6	1.1	5.9	1.1	A-	A+
Science	8	564903	2766	12	34	A.3.3.1	2	10988	0.52	0.10	0.28	0.11	0.52	0.00	0.37	-0.34	-0.29	-0.40	0.37	0.4792	0.0212	5.4	1.1	5.9	1.1	A+	A-
Science	8	565256	2767	12	35	A.1.3.2	2	10988	0.29	0.18	0.14	0.39	0.29	0.00	0.10	-0.18	-0.28	0.01	0.10	1.6852	0.0231	9.9	1.3	9.9	1.6	A+	A+
Science	8	593323	2768	12	70	C.2.2.3	2	10988	0.46	0.16	0.46	0.24	0.14	0.00	0.36	-0.34	0.36	-0.29	-0.35	0.7898	0.0213	3.8	1.0	7.6	1.1	A-	B-
Science	8	566339	2769	12	71	B.3.3.3	2	10988	0.50	0.25	0.11	0.13	0.50	0.00	0.44	-0.39	-0.39	-0.40	0.44	0.5638	0.0212	-4.4	1.0	-2.9	1.0	A+	A-
Science	8	565075	2770	12	73	D.1.1.1	3	10988	0.34	0.24	0.34	0.25	0.17	0.00	0.03	-0.05	0.03	-0.02	-0.02	1.3668	0.0221	9.9	1.4	9.9	1.6	A-	A-
Science	8	559942	2772	12	33	B.3.1.2	2	10988	0.72	0.09	0.09	0.72	0.09	0.00	0.49	-0.36	-0.40	0.49	-0.34	-0.5838	0.0232	-9.7	0.9	-9.9	0.8		
Science	8	559943	2773	12	72	B.3.1.3	2	10988	0.39	0.13	0.39	0.28	0.20	0.00	0.31	-0.32	0.31	-0.29	-0.30	1.1501	0.0217	8.0	1.1	9.9	1.2		
Science	11	549893	2774	0	1	A.3.1.4		129911	0.67	0.67	0.05	0.22	0.05	0.00	0.41	0.41	-0.21	-0.40	-0.22	-0.3757	0.0064	-9.9	1.0	-9.9	0.9		
Science	11	554327	2775	0	2	A.3.2.1		129911	0.75	0.13	0.75	0.07	0.05	0.00	0.33	-0.18	0.33	-0.32	-0.25	-0.8435	0.0069	3.2	1.0	-0.7	1.0		
Science	11	549937	2776	0	3	A.3.3.2	2	129911	0.74	0.05	0.17	0.74	0.04	0.00	0.38	-0.23	-0.31	0.38	-0.28	-0.7569	0.0068	-9.5	1.0	-9.9	0.9		
Science	11	549999	2777	0	4	A.3.1.2	2	129911	0.84	0.03	0.84	0.03	0.11	0.00	0.40	-0.21	0.40	-0.24	-0.34	-1.4300	0.0079	-9.9	0.9	-9.9	0.8		
Science	11	554461	2778	0	5	A.3.3.1		129911	0.67	0.11	0.67	0.15	0.06	0.00	0.45	-0.31	0.45	-0.37	-0.37	-0.3834	0.0064	-9.9	0.9	-9.9	0.9		
Science	11	558196	2779	0	6	C.2.2.3	2	129911	0.77	0.07	0.08	0.77	0.08	0.00	0.42	-0.31	-0.31	0.42	-0.27	-0.9512	0.0071	-9.9	0.9	-9.9	0.9		
Science	11	554349	2780	0	7	A.2.1.2	2	129911	0.89	0.08	0.01	0.02	0.89	0.00	0.34	-0.27	-0.19	-0.18	0.34	-1.9223	0.0092	-8.3	1.0	-9.9	0.8		
Science	11	560023	2781	0	8	A.1.3.1	2	129911	0.85	0.85	0.07	0.03	0.04	0.00	0.28	0.28	-0.22	-0.20	-0.13	-1.5717	0.0082	-1.2	1.0	9.7	1.1		
Science	11	554460	2782	0	9	A.3.3.3		129911	0.62	0.11	0.62	0.17	0.10	0.00	0.40	-0.31	0.40	-0.33	-0.30	-0.1236	0.0062	-9.7	1.0	-9.9	1.0		
Science	11	554366	2783	0	10	A.1.1.4	2	129911	0.79	0.79	0.05	0.11	0.05	0.00	0.46	0.46	-0.30	-0.38	-0.28	-1.0949	0.0073	-9.9	0.9	-9.9	0.8		
Science	11	558075	2784	0	11	D.1.1.1	2	129911	0.67	0.07	0.09	0.16	0.67	0.01	0.45	-0.32	-0.36	-0.36	0.45	-0.3765	0.0064	-9.9	0.9	-9.9	0.9		
Science	11	549891	2785	0	12	A.2.1.3	2	129911	0.85	0.05	0.06	0.85	0.04	0.00	0.40	-0.28	-0.30	0.40	-0.21	-1.5286	0.0081	-9.9	0.9	-9.9	0.8		
Science	11	554315	2786	0	13	A.2.2.1		129911	0.70	0.22	0.04	0.70	0.04	0.00	0.38	-0.27	-0.36	0.38	-0.31	-0.5203	0.0065	-5.2	1.0	-9.6	1.0		
Science	11	558153	2787	0	14	D.1.3.2	2	129911	0.59	0.09	0.18	0.13	0.59	0.01	0.31	-0.26	-0.20	-0.33	0.31	0.0291	0.0061	9.9	1.1	9.9	1.1		
Science	11	560501	2789	0	16	C.3.1.4	3	129911	0.59	0.59	0.08	0.29	0.03	0.00	0.10	0.10	-0.32	0.05	-0.16	0.0474	0.0061	9.9	1.3	9.9	1.3		
Science	11	560499	2790	0	17	C.1.1.1	2	129911	0.55	0.10	0.15	0.20	0.55	0.00	0.41	-0.18	-0.36	-0.44	0.41	0.2192	0.0061	-9.9	1.0	-9.9	0.9		
Science	11	560506	2791	0	18	A.3.2.3	3	129911	0.52	0.09	0.15	0.23	0.52	0.00	0.37	-0.33	-0.41	-0.26	0.37	0.3701	0.0060	1.9	1.0	3.0	1.0		
Science	11	560502	2792	0	19	D.1.1.1	2	129911	0.66	0.07	0.66	0.16	0.11	0.00	0.43	-0.32	0.43	-0.32	-0.3004	0.0063	-9.9	0.9	-9.9	0.9			
Science	11	560465	2794	0	21	A.2.1.5	3	129911	0.55	0.55	0.17	0.14	0.13	0.02	0.44	0.44	-0.33	-0.35	-0.46	0.2435	0.0061	-9.9	0.9	-9.9	0.9		
Science	11	560466	2795	0	22	A.3.1.2	3	129911	0.44	0.11	0.12	0.33	0.44	0.00	0.31	-0.40	-0.50	-0.16	0.31	0.7535	0.0060	9.9	1.1	9.9	1.1		
Science	11	560469	2796	0	23	A.2.1.3	3	129911	0.57	0.57	0.10	0.15	0.16	0.01	0.39	0.39	-0.36	-0.37	-0.25	0.1545	0.0061	-9.7	1.0	-9.9	1.0		
Science	11	560464	2798	0	25	C.1.1.5	2	129911	0.64	0.64	0.13	0.11	0.10	0.02	0.45	0.45	-0.43	-0.40	-0.24	-0.1931	0.0062	-9.9	0.9	-9.9	0.9		
Science	11	554442	2799	0	26	C.2.2.2		129911	0.75	0.08	0.09	0.75	0.07	0.00	0.37	-0.27	-0.27	0.37	-0.27	-0.7998	0.0068	-7.2	1.0	-6.9	1.0		
Science	11	559853	2800	0	27	A.1.1.2	2	129911	0.68	0.68	0.09	0.19	0.04	0.00	0.30	0.30	-0.21	-0.22	-0.28	-0.4284	0.0064	9.9	1.1	9.9	1.1		
Science	11	550001	2801	0	28	A.2.1.3	2	129911	0.76	0.06	0.14	0.76	0.04	0.00	0.26	-0.30	-0.12	0.26	-0.19	-0.8991	0.0070	9.9	1.1	9.9	1.2		
Science	11	559966	2802	0	29	B.3.2.1	2	129911	0.73	0.73	0.07	0.05	0.14	0.00	0.44	0.44	-0.40	-0.39	-0.26	-0.7418	0.0068	-9.9	0.9	-9.9	0.9		
Science	11	558162	2803	0	30	D.1.2.1	2	129911	0.64	0.10	0.22	0.64	0.04	0.00	0.29	-0.34	-0.12	0.29	-0.36	-0.2309	0.0063	9.9	1.1	9.9	1.1		
Science	11	559914	2804	0	31	A.2.2.2	2	129911	0.72	0.09	0.06	0.12	0.72	0.00	0.42	-0.29	-0.35	-0.31	0.42	-0.6755	0.0067	-9.9	0.9	-9.9	0.9		
Science	11	549908	2805	0	32	B.3.3.1		129911	0.58	0.12	0.05	0.58	0.24	0.00	0.43	-0.33	-0.36	0.43	-0.38	0.0724	0.0061	-9.9	1.0	-9.9	0.9		
Science	11	558059	2806	0	33	A.1.1.3	2	129911	0.54	0.14	0.25	0.07	0.54	0.00	0.45	-0.44	-0.37	-0.38	0.45	0.2732	0.0060	-9.9	0.9	-9.9	0.9		
Science	11	549933	2807	0	34	B.3.3.3		129911	0.73	0.11	0.10	0.73	0.06	0.00	0.50	-0.35	-0.39	0.50	-0.41	-0.7144	0.0067	-9.9	0.9	-9.9	0.8		
Science	11	559761	2808	0	35	B.2.2.3	1	129911	0.54	0.20	0.17	0.09	0.54	0.01	0.47	-0.43	-0.38	-0.42	0.47	0.3116	0.0060	-9.9	0.9	-9.9	0.9		
Science	11	549944	2809	0	36	D.1.1.2		129911	0.61	0.61	0.21	0.15	0.03	0.00	0.36	0.36	-0.29	-0.32	-0.26	-0.0573	0.0062	3.1	1.0	6.1	1.0		
Science	11	558187	2810	0	37	B.2.1.2		129911	0.42	0.42	0.18	0.27	0.12	0.00	0.29	0.29	-0.35	-0.22	-0.26	0.8647	0.0061	9.9	1.1	9.9	1.1		
Science	11	560494	2814	0	41	A.2.2.2	2	129911	0.40	0.25	0.40	0.12	0.22	0.01	0.20	-0.20	0.20	-0.25	-0.13	0.9856	0.0061	9.9	1.1	9.9	1.3		
Science	11	560489	2815	0	42	B.3.1.3	2	129911	0.39	0.17	0.39	0.18	0.24	0.01	0.21	-0.23	0.21	-0.27	-0.11	1.0060	0.0061	9.9	1.1	9.9	1.2		
Science	11	560491	2816	0	43	A.1.1.2	3	129911	0.47	0.13	0.21	0.18	0.47	0.01	0.30	-0.26	-0.23	-0.31	0.30	0.6051	0.0060	9.9	1.1	9.9	1.1		
Science	11	560488	2817	0	44	B.1.1.1	2	129911	0.42	0.10	0.41	0.42	0.06	0.01	0.09	-0.33	0.07	0.09	-0.37	0.8893	0.0061	9.9	1.3	9.9	1.4		
Science	11	554347	281																								

## Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF		
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B	
Science	11	558103	2820	0	51	A.1.1.3	1	129911	0.83	0.08	0.05	0.83	0.04	0.00	0.45	-0.31	-0.32	0.45	-0.31	-1.4031	0.0079	-9.9	0.9	-9.9	0.7			
Science	11	558163	2821	0	52	A.1.1.2	2	129911	0.72	0.07	0.09	0.11	0.72	0.00	0.48	-0.35	-0.34	-0.38	0.48	-0.6813	0.0067	-9.9	0.9	-9.9	0.8			
Science	11	558183	2822	0	53	D.1.3.3	2	129911	0.51	0.12	0.18	0.20	0.51	0.00	0.32	-0.38	-0.27	-0.24	0.32	0.4485	0.0060	9.9	1.0	9.9	1.1			
Science	11	558186	2823	0	54	B.1.1.1	1	129911	0.62	0.06	0.06	0.62	0.11	0.21	0.00	0.46	-0.38	0.46	-0.42	-0.34	-0.0999	0.0062	-9.9	0.9	-9.9	0.9		
Science	11	550002	2824	0	55	A.2.1.1	2	129911	0.85	0.04	0.08	0.85	0.04	0.00	0.38	-0.33	-0.25	0.38	-0.21	-1.5420	0.0082	-9.9	0.9	-9.9	0.8			
Science	11	549890	2825	0	56	C.3.1.5		129911	0.57	0.13	0.57	0.25	0.04	0.00	0.24	-0.19	0.24	-0.20	-0.21	0.1358	0.0061	9.9	1.1	9.9	1.1			
Science	11	559880	2826	0	57	D.1.1.2	1	129911	0.54	0.12	0.22	0.12	0.54	0.00	0.35	-0.32	-0.32	-0.25	0.35	0.2796	0.0060	8.4	1.0	7.5	1.0			
Science	11	558172	2827	0	58	D.1.3.2		129911	0.54	0.14	0.54	0.24	0.07	0.01	0.36	-0.30	0.36	-0.32	-0.30	0.3090	0.0060	3.1	1.0	6.2	1.0			
Science	11	559918	2828	0	59	C.1.1.6	2	129911	0.61	0.22	0.10	0.61	0.07	0.00	0.35	-0.27	-0.25	0.35	-0.35	-0.0292	0.0062	7.0	1.0	2.0	1.0			
Science	11	560165	2829	0	60	D.2.1.2	1	129911	0.75	0.09	0.75	0.06	0.09	0.01	0.45	-0.30	0.45	-0.36	-0.33	-0.8255	0.0069	-9.9	0.9	-9.9	0.8			
Science	11	554376	2830	0	61	D.2.1.4		129911	0.84	0.09	0.84	0.05	0.01	0.00	0.29	-0.28	0.29	-0.11	-0.15	-1.4716	0.0080	1.7	1.0	3.3	1.0			
Science	11	565261	2833	1	47	B.3.1.4	2	16321	0.17	0.56	0.13	0.17	0.12	0.01	-0.18	0.27	0.00	-0.18	0.16	2.2907	0.0218	9.9	1.3	9.9	2.3	A+	A+	
Science	11	565709	2834	1	48	A.1.1.5	2	16321	0.33	0.33	0.18	0.26	0.21	0.02	0.21	0.21	-0.33	-0.15	-0.19	1.3200	0.0179	9.9	1.1	9.9	1.2	A+	A+	
Science	11	565421	2835	1	49	A.3.1.1	3	16321	0.58	0.05	0.10	0.58	0.26	0.02	0.36	-0.39	-0.38	0.36	-0.22	0.0813	0.0172	2.1	1.0	-0.3	1.0	A-	A-	
Science	11	562452	2836	1	64	A.1.3.1	3	16321	0.32	0.32	0.51	0.12	0.05	0.01	0.42	0.42	-0.38	-0.57	-0.43	1.3485	0.0180	-9.9	0.9	-3.2	1.0	A-	A+	
Science	11	562455	2837	1	65	A.2.2.2	1	16321	0.70	0.70	0.08	0.13	0.08	0.01	0.48	0.48	-0.38	-0.33	-0.37	-0.5113	0.0184	-9.9	0.9	-9.9	0.8	A+	A-	
Science	11	562454	2838	1	66	A.2.1.3	3	16321	0.42	0.07	0.12	0.42	0.37	0.01	0.26	-0.46	-0.24	0.26	-0.19	0.8326	0.0171	9.9	1.1	9.9	1.1	A-	A-	
Science	11	562453	2839	1	67	A.2.1.5	2	16321	0.71	0.10	0.71	0.11	0.07	0.01	0.41	-0.23	0.41	-0.31	-0.38	-0.5863	0.0186	-6.2	1.0	-7.9	0.9	A+	A-	
Science	11	565692	2841	1	70	C.2.1.1	2	16321	0.21	0.45	0.15	0.18	0.21	0.01	0.04	0.05	-0.10	-0.22	0.04	1.9999	0.0203	9.9	1.2	9.9	1.6	A-	A-	
Science	11	566653	2842	1	71	A.1.1.2	3	16321	0.64	0.06	0.10	0.20	0.64	0.01	0.50	-0.38	-0.43	-0.39	0.50	-0.1960	0.0176	-9.9	0.9	-9.9	0.8	A+	A-	
Science	11	566353	2843	1	72	D.2.1.4	3	16321	0.45	0.30	0.10	0.14	0.45	0.01	0.20	-0.09	-0.27	-0.28	0.20	0.6929	0.0170	9.9	1.2	9.9	1.2	A-	A-	
Science	11	549961	2845	1	69	B.1.1.1		16321	0.48	0.24	0.48	0.14	0.14	0.01	0.33	-0.20	0.33	-0.41	-0.31	0.5810	0.0170	4.3	1.0	6.6	1.1			
Science	11	554338	2846	1	46	A.2.2.1		16321	0.38	0.12	0.32	0.17	0.38	0.01	0.23	-0.29	-0.24	-0.16	0.23	1.0551	0.0174	9.9	1.1	9.9	1.2			
Science	11	565425	2847	2	46	C.1.1.1	2	16282	0.53	0.02	0.10	0.33	0.53	0.01	0.41	-0.32	-0.48	-0.32	0.41	0.3165	0.0170	-6.5	1.0	-7.5	0.9	A-	A-	
Science	11	565426	2848	2	48	C.1.1.5	2	16282	0.39	0.39	0.18	0.11	0.31	0.01	0.25	0.25	-0.32	-0.29	-0.15	0.9723	0.0173	9.9	1.1	9.9	1.2	A-	A-	
Science	11	566658	2849	2	49	B.1.1.3	2	16282	0.30	0.16	0.25	0.30	0.28	0.01	-0.08	0.07	0.08	-0.08	0.12	1.4484	0.0182	9.9	1.3	9.9	1.7	A-	A+	
Science	11	560620	2850	2	64	A.2.1.5	2	16282	0.67	0.67	0.06	0.06	0.19	0.01	0.28	0.28	-0.12	-0.19	-0.26	-0.3942	0.0181	8.2	1.1	8.3	1.1	A+	A+	
Science	11	560613	2851	2	65	A.1.1.2	2	16282	0.45	0.19	0.45	0.24	0.12	0.01	0.23	-0.15	0.23	-0.26	-0.20	0.7020	0.0170	9.9	1.1	9.9	1.2	A-	A-	
Science	11	560622	2852	2	66	A.2.2.2	2	16282	0.76	0.11	0.05	0.76	0.07	0.01	0.49	-0.38	-0.38	0.49	-0.30	-0.9039	0.0197	-9.9	0.9	-9.9	0.7	A-	A-	
Science	11	560619	2853	2	67	B.2.1.4	2	16282	0.57	0.13	0.10	0.57	0.20	0.01	0.45	-0.37	-0.47	0.45	-0.33	0.1450	0.0172	-9.9	0.9	-9.9	0.9	A-	A-	
Science	11	565427	2855	2	70	D.1.1.2	2	16282	0.38	0.24	0.38	0.28	0.09	0.01	0.31	-0.26	0.31	-0.29	-0.40	1.0571	0.0174	3.1	1.0	8.5	1.1	A-	A+	
Science	11	593330	2856	2	71	A.1.2.2	2	16282	0.36	0.16	0.23	0.36	0.23	0.02	0.15	-0.35	-0.13	0.15	-0.02	1.1643	0.0176	9.9	1.2	9.9	1.3	A+	A+	
Science	11	565714	2857	2	72	C.3.1.5	2	16282	0.33	0.21	0.14	0.33	0.30	0.01	0.19	-0.25	-0.25	0.19	-0.12	1.2960	0.0179	9.9	1.1	9.9	1.3	A-	A-	
Science	11	549932	2859	2	69	C.2.1.2		16282	0.48	0.08	0.28	0.48	0.16	0.01	0.31	-0.33	-0.29	0.31	-0.18	0.6039	0.0170	6.1	1.0	8.5	1.1			
Science	11	559948	2860	2	47	B.2.1.1	2	16282	0.43	0.07	0.21	0.27	0.43	0.02	0.24	-0.33	-0.26	-0.15	0.24	0.8062	0.0171	9.9	1.1	9.9	1.1			
Science	11	566625	2861	3	46	C.1.1.2	2	16208	0.60	0.15	0.60	0.10	0.13	0.02	0.32	-0.24	0.32	-0.31	-0.22	-0.0269	0.0174	5.6	1.0	2.9	1.0	B-	A-	
Science	11	565694	2862	3	47	C.2.1.4	3	16208	0.25	0.25	0.18	0.41	0.13	0.02	0.04	0.04	-0.17	0.03	-0.05	1.7369	0.0192	9.9	1.2	9.9	1.6	A-	A-	
Science	11	565309	2863	3	49	B.3.1.2	2	16208	0.40	0.14	0.40	0.26	0.18	0.02	0.31	-0.41	0.31	-0.22	-0.31	0.9181	0.0173	4.6	1.0	6.8	1.1	A-	A-	
Science	11	560614	2864	3	64	A.1.1.4	2	16208	0.38	0.15	0.39	0.38	0.07	0.01	0.24	-0.18	-0.26	0.24	-0.16	1.0297	0.0174	9.9	1.1	9.9	1.2	A-	A-	
Science	11	560618	2865	3	65	B.1.1.2	2	16208	0.34	0.20	0.14	0.31	0.34	0.01	0.23	-0.31	-0.26	-0.18	0.23	1.2626	0.0178	9.9	1.1	9.9	1.2	A-	A-	
Science	11	560616	2866	3	66	C.3.1.1	2	16208	0.41	0.18	0.11	0.28	0.41	0.02	0.25	-0.24	-0.28	-0.20	0.25	0.8829	0.0172	9.9	1.1	9.9	1.1	A-	A-	
Science	11	560621	2867	3	67	A.2.2.1	2	16208	0.30	0.13	0.08	0.30	0.48	0.01	0.15	-0.17	-0.37	0.15	-0.09	1.4524	0.0183	9.9	1.1	9.9	1.4	B-	A-	
Science	11	565299	2869	3	70	C.3.1.5	2	16208	0.12	0.12	0.15	0.63	0.09	0.01	0.07	0.07	-0.16	-0.06	-0.10	2.6840	0.0247	4.3	1.1	9.9	1.8	B-	A-	
Science	11	565302	2870	3	71	D.1.2.2	2	16208	0.59	0.14	0.59	0.20	0.05	0.01	0.36	-0.32	0.36	-0.26	-0.34	0.0193	0.0173	0.0	1.0	0.9	1.0	A-	A-	
Science	11	565306	2871	3	72	A.2.1.5	2	16208	0.54	0.54	0.06	0.29	0.09	0.01	0.54	0.54	-0.52	-0.48	-0.42	0.2881	0.0171	-9.9	0.8	-9.9	0.8	A-	A-	
Science	11	550000	2873	3	69	C.2.1.2		16208	0.40	0.27	0.40	0.14	0.17	0.02	0.24	-0.18	0.24	-0.35	-0.13	0.9607	0.0173	9.9	1.1	9.9	1.2			
Science	11	559857	2874	3	48	A.1.2.2	2	16208	0.38	0.36	0.20	0.38	0.05	0.02	0.30	-0.19	-0.39	0.30	-0.44	1.0539	0.0175	3.7	1.0	9.3	1.1			
Science	11	567046	2875	4	47	B.3.3.2	2	16380	0.54	0.54	0.11	0.18	0.15	0.02	0.26	0.26	-0.32	-0.15	-0.19	0.2690	0.0171	9.9	1.1	9.9	1.1	A+	B-	
Science	11	566356	2876	4	48	D.1.3.2	2	16380	0.55	0.09	0.17	0.55	0.16	0.02	0.33	-0.29	-0.27	0.33	-0.26	0.2328	0.0171	7.1	1.1	7.4	1.1	A-	A-	
Science	11	594785	2877	4	49	A.3.1.3	2	16380	0.68	0.13	0.11	0.06	0.68	0.02	0.36	-0.14	-0.36	-0.36	0.36	-0.4361	0.0182	0.1	1.0	1.6				

## Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Science	11	564565	2879	4	65	A.2.1.1	3	16380	0.50	0.09	0.25	0.50	0.15	0.01	0.33	-0.44	-0.31	0.33	-0.15	0.4707	0.0170	6.7	1.0	7.9	1.1	A-	A-
Science	11	564567	2880	4	66	A.2.2.2	1	16380	0.73	0.08	0.06	0.73	0.11	0.01	0.48	-0.39	-0.40	0.48	-0.31	-0.7008	0.0190	-9.9	0.9	-9.9	0.8	A-	A-
Science	11	564560	2881	4	67	C.1.1.1	1	16380	0.53	0.53	0.08	0.13	0.25	0.02	0.24	0.24	-0.31	-0.17	-0.17	0.3297	0.0171	9.9	1.1	9.9	1.2	A+	A+
Science	11	565698	2883	4	70	C.3.1.3	2	16380	0.25	0.18	0.48	0.25	0.08	0.01	0.06	-0.24	0.04	0.06	-0.26	1.7363	0.0191	9.9	1.2	9.9	1.6	A-	A-
Science	11	566655	2884	4	71	A.1.2.1	2	16380	0.53	0.53	0.17	0.08	0.20	0.02	0.42	0.42	-0.31	-0.49	-0.35	0.3128	0.0171	-6.9	1.0	-5.8	1.0	A-	A-
Science	11	565307	2885	4	72	A.3.3.3	2	16380	0.81	0.04	0.09	0.06	0.81	0.01	0.50	-0.34	-0.35	-0.35	0.50	-1.2088	0.0211	-9.9	0.8	-9.9	0.7	A-	B-
Science	11	554351	2887	4	69	D.2.1.1		16380	0.60	0.12	0.14	0.13	0.60	0.01	0.49	-0.38	-0.38	-0.45	0.49	-0.0217	0.0174	-9.9	0.9	-9.9	0.8		
Science	11	554369	2888	4	46	A.3.2.2		16380	0.53	0.10	0.27	0.53	0.08	0.02	0.36	-0.34	-0.27	0.36	-0.35	0.3230	0.0171	2.3	1.0	1.8	1.0		
Science	11	565275	2889	5	47	D.3.1.2	2	16408	0.43	0.17	0.25	0.43	0.13	0.02	0.24	-0.28	-0.23	0.24	-0.12	0.8035	0.0170	9.9	1.1	9.9	1.2	B-	A-
Science	11	593811	2890	5	48	B.3.2.2	2	16408	0.64	0.64	0.18	0.10	0.05	0.02	0.45	0.45	-0.32	-0.42	-0.38	-0.2320	0.0177	-9.9	0.9	-9.2	0.9	A+	A-
Science	11	565713	2891	5	49	A.1.3.2	2	16408	0.16	0.16	0.20	0.48	0.13	0.02	-0.08	-0.08	-0.06	0.18	0.03	2.3482	0.0221	9.9	1.2	9.9	2.2	A-	A+
Science	11	562456	2892	5	64	A.1.1.2	2	16408	0.27	0.21	0.44	0.08	0.27	0.01	0.21	-0.31	-0.12	-0.55	0.21	1.6398	0.0187	9.9	1.1	9.9	1.2	A+	A+
Science	11	562451	2893	5	65	B.3.1.2	1	16408	0.38	0.43	0.07	0.11	0.38	0.01	0.41	-0.33	-0.52	-0.53	0.41	1.0273	0.0173	-9.9	0.9	-5.0	1.0	A-	A-
Science	11	562447	2894	5	66	C.1.1.1	2	16408	0.52	0.25	0.52	0.16	0.06	0.01	0.51	-0.40	0.51	-0.52	-0.41	0.3676	0.0170	-9.9	0.9	-9.9	0.9	A-	A-
Science	11	562448	2895	5	67	C.1.1.2	2	16408	0.39	0.39	0.21	0.28	0.11	0.02	0.25	0.25	-0.34	-0.12	-0.33	0.9961	0.0173	9.9	1.1	9.9	1.2	A-	A-
Science	11	565720	2897	5	69	A.1.1.4	1	16408	0.44	0.44	0.14	0.10	0.31	0.01	0.27	0.27	-0.51	-0.38	-0.05	0.7461	0.0170	9.9	1.1	9.9	1.1	A-	A-
Science	11	565691	2898	5	70	C.1.1.6	2	16408	0.33	0.08	0.33	0.50	0.09	0.01	0.06	-0.31	0.06	0.05	-0.26	1.3256	0.0179	9.9	1.2	9.9	1.5	A-	A-
Science	11	565297	2899	5	72	C.2.1.4	2	16408	0.16	0.16	0.32	0.19	0.33	0.01	0.20	0.20	-0.29	-0.27	-0.22	2.4121	0.0225	0.4	1.0	9.9	1.3	B-	A-
Science	11	560066	2901	5	71	C.3.1.5	2	16408	0.36	0.31	0.25	0.36	0.07	0.01	0.27	-0.29	-0.27	0.27	-0.20	1.1622	0.0175	8.4	1.1	9.9	1.1		
Science	11	558159	2902	5	46	A.2.2.1		16408	0.47	0.47	0.18	0.27	0.06	0.02	0.30	0.30	-0.30	-0.23	-0.29	0.6162	0.0169	9.8	1.1	9.9	1.1		
Science	11	566355	2903	6	47	D.1.1.3	1	16424	0.37	0.12	0.18	0.37	0.31	0.02	0.16	-0.22	-0.31	0.16	-0.03	1.0885	0.0174	9.9	1.2	9.9	1.3	A-	A-
Science	11	593807	2904	6	48	B.3.1.3	2	16424	0.58	0.18	0.17	0.58	0.05	0.02	0.47	-0.37	-0.41	0.47	-0.37	0.0812	0.0172	-9.9	0.9	-9.9	0.9	A-	A-
Science	11	565688	2905	6	49	A.3.3.1	2	16424	0.49	0.27	0.11	0.12	0.49	0.02	0.38	-0.25	-0.43	-0.41	0.38	0.5090	0.0169	-3.1	1.0	-1.4	1.0	A-	A-
Science	11	562210	2906	6	64	A.1.1.2	2	16424	0.38	0.38	0.27	0.05	0.29	0.01	0.17	0.17	-0.25	-0.47	0.00	1.0778	0.0174	9.9	1.2	9.9	1.3	A-	A-
Science	11	562208	2907	6	65	A.2.1.1	2	16424	0.37	0.25	0.37	0.17	0.20	0.01	0.22	-0.35	0.22	-0.15	-0.12	1.1030	0.0174	9.9	1.1	9.9	1.2	A+	A+
Science	11	562209	2908	6	66	A.3.1.2	3	16424	0.49	0.20	0.19	0.49	0.11	0.01	0.25	-0.20	-0.22	0.25	-0.24	0.5070	0.0169	9.9	1.1	9.9	1.1	A+	A-
Science	11	562204	2909	6	67	C.1.1.1	1	16424	0.26	0.33	0.21	0.19	0.26	0.01	0.26	-0.24	-0.27	-0.38	0.26	1.6985	0.0189	0.2	1.0	9.9	1.2	A+	A+
Science	11	565304	2911	6	69	A.1.1.3	2	16424	0.80	0.04	0.12	0.80	0.03	0.01	0.30	-0.30	-0.15	0.30	-0.24	-1.1493	0.0208	-0.8	1.0	9.1	1.2	B+	A-
Science	11	567053	2912	6	71	B.3.3.3	3	16424	0.44	0.44	0.23	0.20	0.12	0.01	0.41	0.41	-0.30	-0.44	-0.42	0.7444	0.0170	-8.3	1.0	-4.7	1.0	A-	A-
Science	11	565693	2913	6	72	C.2.1.2	2	16424	0.17	0.39	0.17	0.33	0.10	0.01	-0.08	0.20	-0.08	0.05	-0.11	2.2652	0.0215	9.9	1.2	9.9	2.1	A-	A+
Science	11	559912	2915	6	70	A.2.2.2	1	16424	0.51	0.23	0.14	0.12	0.51	0.01	0.37	-0.23	-0.42	-0.37	0.37	0.4546	0.0169	0.4	1.0	0.8	1.0		
Science	11	549977	2916	6	46	A.2.1.1		16424	0.48	0.10	0.48	0.32	0.10	0.02	0.31	-0.32	0.31	-0.23	-0.31	0.6006	0.0169	7.0	1.0	8.8	1.1		
Science	11	566629	2917	7	47	C.3.1.4	2	15957	0.35	0.35	0.15	0.27	0.20	0.02	0.11	0.11	-0.17	-0.09	-0.06	1.1729	0.0178	9.9	1.2	9.9	1.3	A+	A+
Science	11	565303	2918	7	48	D.3.1.2	1	15957	0.50	0.17	0.18	0.14	0.50	0.01	0.26	-0.26	-0.24	-0.15	0.26	0.4925	0.0171	9.9	1.1	9.9	1.1	A-	A+
Science	11	566681	2919	7	49	B.1.1.3	2	15957	0.18	0.24	0.29	0.27	0.18	0.02	0.09	-0.06	-0.11	-0.16	0.09	2.1930	0.0215	8.3	1.1	9.9	1.6	A+	A+
Science	11	562211	2920	7	64	A.1.1.3	2	15957	0.63	0.16	0.63	0.09	0.12	0.01	0.22	-0.10	0.22	-0.33	-0.12	-0.1314	0.0177	9.9	1.1	9.9	1.2	A+	A-
Science	11	562206	2921	7	65	C.3.1.6	2	15957	0.83	0.06	0.05	0.83	0.05	0.01	0.41	-0.36	-0.32	0.41	-0.14	-1.3653	0.0222	-8.1	0.9	-7.6	0.8	A-	B-
Science	11	562212	2922	7	66	A.2.2.2	1	15957	0.56	0.19	0.15	0.56	0.09	0.01	0.40	-0.30	-0.33	0.40	-0.38	0.1858	0.0173	-5.2	1.0	-6.2	1.0	A-	A+
Science	11	562203	2923	7	67	C.2.1.1	1	15957	0.31	0.12	0.31	0.38	0.18	0.01	0.06	0.01	0.06	-0.15	0.06	1.3796	0.0182	9.9	1.2	9.9	1.5	A-	A-
Science	11	566652	2925	7	70	A.1.1.1	1	15957	0.56	0.08	0.56	0.23	0.12	0.01	0.36	-0.40	0.36	-0.26	-0.28	0.1921	0.0173	1.2	1.0	1.6	1.0	A+	A-
Science	11	593337	2926	7	71	B.3.3.1	2	15957	0.32	0.32	0.21	0.21	0.24	0.02	0.24	0.24	-0.29	-0.22	-0.24	1.3716	0.0182	8.2	1.1	9.9	1.2	A-	A-
Science	11	565300	2927	7	72	D.1.1.2	2	15957	0.38	0.17	0.38	0.12	0.32	0.01	0.28	-0.30	0.28	-0.31	-0.23	1.0469	0.0175	5.2	1.0	9.9	1.1	B-	A-
Science	11	554391	2929	7	69	D.1.1.1		15957	0.41	0.41	0.33	0.13	0.12	0.01	0.31	0.31	-0.28	-0.40	-0.20	0.9134	0.0174	5.7	1.0	8.0	1.1		
Science	11	549912	2930	7	46	A.1.3.1		15957	0.47	0.17	0.12	0.22	0.47	0.01	0.43	-0.31	-0.53	-0.37	0.43	0.6018	0.0172	-9.9	0.9	-9.7	0.9		
Science	11	566627	2931	8	46	C.2.2.2	1	15931	0.16	0.05	0.16	0.11	0.66	0.02	0.12	-0.44	0.12	-0.38	-0.07	2.4056	0.0228	5.0	1.1	9.9	1.6	A-	A-
Science	11	565418	2932	8	47	A.1.1.2	2	15931	0.82	0.06	0.07	0.82	0.03	0.02	0.47	-0.30	-0.39	0.47	-0.27	-1.3006	0.0219	-9.9	0.9	-9.9	0.7	A+	A-
Science	11	593812	2933	8	48	B.2.2.3	3	15931	0.59	0.21	0.59	0.10	0.07	0.02	0.49	-0.33	0.49	-0.48	-0.45	0.0175	0.0175	-9.9	0.9	-9.9	0.9	A+	A-
Science	11	564569	2934	8	64	A.2.1.3	3	15931	0.44	0.14	0.33	0.44	0.07	0.01	0.29	-0.23	-0.25	0.29	-0.35	0.7347	0.0172	9.3	1.1	9.9	1.1	A-	A-
Science	11	564561	2935	8	65	C.1.1.2	2	15931	0.38	0.52	0.38	0.07	0.02	0.01	0.04	0.05	0.04	-0.38	-0.27	1.0687	0.0176	9.9	1.3	9.9	1.4	A+	A+
Science	11	564562	2936	8	66	C.1.1.6	2	15931	0.52	0.52	0.16	0.26	0.06	0.01	0.32	0.32	-0.25	-0.30	-0.26	0.3645	0.0172	6.1	1.0	5.6			

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Science	11	565712	2939	8	69	A.1.3.1	3	15931	0.42	0.12	0.17	0.42	0.28	0.01	0.08	-0.22	-0.20	0.08	0.10	0.8440	0.0173	9.9	1.3	9.9	1.4	A-	A-
Science	11	593334	2940	8	70	B.3.2.3	2	15931	0.36	0.36	0.27	0.30	0.07	0.01	0.17	0.17	-0.11	-0.18	-0.27	1.1669	0.0178	9.9	1.1	9.9	1.3	B-	A-
Science	11	565305	2941	8	72	A.1.3.3	3	15931	0.58	0.14	0.58	0.16	0.11	0.01	0.33	-0.21	0.33	-0.34	-0.24	0.0943	0.0174	4.5	1.0	2.1	1.0	A-	A-
Science	11	560103	2943	8	71	A.2.2.1	2	15931	0.53	0.24	0.53	0.10	0.11	0.02	0.28	-0.14	0.28	-0.35	-0.30	0.3396	0.0172	9.9	1.1	9.9	1.1		
Science	11	559858	2944	8	49	B.3.3.3	2	15931	0.35	0.19	0.23	0.35	0.20	0.03	0.25	-0.33	-0.21	0.25	-0.21	1.2287	0.0179	9.2	1.1	9.9	1.2		
Writing	5	560216	2945	0	1	B.5	2	128193	0.82	0.05	0.82	0.09	0.04	0.00	0.32	-0.25	0.32	-0.20	-0.22	-0.3231	0.0092	9.9	1.6	9.9	9.9		
Writing	5	560215	2946	0	2	B.5	1	128193	0.45	0.12	0.20	0.22	0.45	0.00	0.26	-0.38	-0.20	-0.18	0.26	2.7459	0.0075	9.9	2.0	9.9	9.9		
Writing	5	560217	2947	0	3	B.6	1	128193	0.41	0.26	0.41	0.26	0.07	0.00	0.20	-0.22	0.20	-0.13	-0.25	3.1281	0.0077	9.9	2.1	9.9	9.9		
Writing	5	560218	2948	0	4	B.6	2	128193	0.82	0.05	0.05	0.82	0.08	0.00	0.44	-0.32	-0.30	0.44	-0.31	-0.2553	0.0091	9.9	1.4	9.9	9.0		
Writing	5	560366	2949	0	9	B.5	2	128193	0.69	0.10	0.69	0.12	0.08	0.00	0.37	-0.31	0.37	-0.25	-0.28	0.8859	0.0078	9.9	1.6	9.9	9.9		
Writing	5	553781	2950	0	10	B.5	2	128193	0.72	0.18	0.04	0.72	0.05	0.00	0.37	-0.24	-0.33	0.37	-0.33	0.6195	0.0080	9.9	1.6	9.9	9.9		
Writing	5	553782	2951	0	11	B.6	1	128193	0.67	0.05	0.22	0.67	0.05	0.00	0.37	-0.31	-0.27	0.37	-0.33	1.0981	0.0077	9.9	1.7	9.9	9.2		
Writing	5	553779	2952	0	12	B.6	1	128193	0.73	0.04	0.11	0.11	0.11	0.73	0.00	0.39	-0.34	-0.29	-0.28	0.5368	0.0081	9.9	1.5	9.9	9.9		
Writing	5	560185	2953	0	17	B.5	2	128193	0.72	0.72	0.05	0.09	0.14	0.00	0.44	0.44	-0.31	-0.33	-0.36	0.6732	0.0080	9.9	1.5	9.9	8.5		
Writing	5	560169	2954	0	18	B.6	2	128193	0.80	0.06	0.80	0.10	0.03	0.00	0.40	-0.32	0.40	-0.25	-0.31	-0.0886	0.0089	9.9	1.5	9.9	9.9		
Writing	5	560186	2955	0	19	B.6	1	128193	0.82	0.09	0.05	0.82	0.04	0.00	0.45	-0.32	-0.33	0.45	-0.31	-0.2857	0.0092	9.9	1.4	9.9	8.3		
Writing	5	560188	2956	0	20	B.5	2	128193	0.86	0.04	0.03	0.06	0.86	0.00	0.44	-0.30	-0.29	-0.31	0.44	-0.7707	0.0101	9.9	1.4	9.9	9.9		
Writing	5	566396	2959	1	5	B.6	1	21503	0.59	0.24	0.59	0.05	0.13	0.00	0.36	-0.30	0.36	-0.36	-0.27	1.6915	0.0183	9.9	1.7	9.9	9.1	A+	A-
Writing	5	566394	2960	1	6	B.6	1	21503	0.82	0.82	0.07	0.05	0.06	0.00	0.47	0.47	-0.36	-0.35	-0.29	-0.2598	0.0224	9.9	1.3	9.9	4.7	A+	C-
Writing	5	566393	2961	1	7	B.6	1	21503	0.29	0.29	0.18	0.14	0.39	0.00	0.11	0.11	-0.09	-0.26	-0.07	3.9276	0.0200	9.9	2.2	9.9	9.9	A-	A-
Writing	5	566392	2962	1	8	B.5	2	21503	0.73	0.05	0.06	0.16	0.73	0.00	0.47	-0.34	-0.33	-0.39	0.47	0.5760	0.0198	9.9	1.4	9.9	8.5	A-	A-
Writing	5	566560	2963	1	13	B.5	2	21503	0.83	0.11	0.03	0.83	0.03	0.00	0.43	-0.31	-0.35	0.43	-0.29	-0.3280	0.0226	9.9	1.4	9.9	7.4	A+	A-
Writing	5	566561	2964	1	14	B.6	1	21503	0.48	0.03	0.40	0.48	0.08	0.00	0.28	-0.34	-0.23	0.28	-0.31	2.4367	0.0182	9.9	2.0	9.9	9.9	A-	A+
Writing	5	566562	2965	1	15	B.5	2	21503	0.85	0.85	0.06	0.02	0.07	0.00	0.43	0.43	-0.26	-0.31	-0.33	-0.5598	0.0237	9.9	1.4	9.9	9.9	A-	A-
Writing	5	566563	2966	1	16	B.5	2	21503	0.55	0.19	0.55	0.17	0.09	0.00	0.30	-0.30	0.30	-0.15	-0.35	1.9859	0.0182	9.9	1.9	9.9	9.9	A+	A-
Writing	5	566565	2968	2	5	B.6	1	21368	0.53	0.10	0.11	0.25	0.53	0.00	0.32	-0.46	-0.31	-0.17	0.32	2.1303	0.0182	9.9	1.9	9.9	9.9	A-	B-
Writing	5	566566	2969	2	6	B.5	2	21368	0.83	0.83	0.02	0.12	0.03	0.00	0.45	0.45	-0.30	-0.36	-0.28	-0.3319	0.0227	9.9	1.3	9.9	6.0	A+	A-
Writing	5	566567	2970	2	7	B.5	1	21368	0.92	0.92	0.02	0.03	0.03	0.00	0.40	0.40	-0.25	-0.26	-0.26	-1.7041	0.0315	9.9	1.3	8.1	6.8	A+	A-
Writing	5	566568	2971	2	8	B.5	2	21368	0.64	0.03	0.08	0.24	0.64	0.00	0.21	-0.29	-0.28	-0.08	0.21	1.3136	0.0186	9.9	2.0	9.9	9.9	A-	A-
Writing	5	567006	2972	2	13	B.6	1	21368	0.48	0.48	0.11	0.29	0.12	0.00	0.27	0.27	-0.37	-0.14	-0.31	2.4606	0.0182	9.9	2.0	9.9	9.9	A-	A-
Writing	5	567003	2973	2	14	B.5	2	21368	0.85	0.04	0.85	0.08	0.03	0.00	0.33	-0.27	0.33	-0.17	-0.26	-0.5716	0.0238	9.9	1.5	9.9	9.9	A+	A-
Writing	5	567007	2974	2	15	B.5	2	21368	0.60	0.07	0.09	0.24	0.60	0.00	0.36	-0.28	-0.34	-0.28	0.36	1.5895	0.0183	9.9	1.7	9.9	9.9	A+	A-
Writing	5	567004	2975	2	16	B.6	1	21368	0.69	0.13	0.69	0.12	0.07	0.00	0.45	-0.34	0.45	-0.40	-0.32	0.9567	0.0190	9.9	1.5	9.9	7.4	A-	A-
Writing	5	566555	2977	3	5	B.6	1	21384	0.76	0.10	0.76	0.12	0.02	0.00	0.36	-0.29	0.36	-0.26	-0.23	0.3690	0.0201	9.9	1.5	9.9	9.9	A+	A-
Writing	5	566556	2978	3	6	B.6	1	21384	0.80	0.05	0.10	0.80	0.04	0.00	0.42	-0.30	-0.30	0.42	-0.31	-0.0383	0.0214	9.9	1.4	9.9	5.5	A-	C-
Writing	5	566557	2979	3	7	B.5	2	21384	0.59	0.06	0.59	0.30	0.04	0.00	0.19	-0.25	0.19	-0.11	-0.22	1.6753	0.0183	9.9	2.1	9.9	9.9	A+	A-
Writing	5	566559	2980	3	8	B.5	1	21384	0.88	0.88	0.04	0.07	0.02	0.00	0.34	0.34	-0.24	-0.22	-0.23	-0.9060	0.0255	9.9	1.4	9.9	9.9	A+	A-
Writing	5	566578	2981	3	13	B.5	2	21384	0.81	0.07	0.04	0.81	0.08	0.00	0.40	-0.31	-0.33	0.40	-0.23	-0.1018	0.0216	9.9	1.4	9.9	9.9	A-	B-
Writing	5	566575	2982	3	14	B.6	1	21384	0.64	0.64	0.11	0.11	0.14	0.00	0.28	0.28	-0.16	-0.28	-0.22	1.3165	0.0185	9.9	1.9	9.9	9.9	A-	A-
Writing	5	566577	2983	3	15	B.5	2	21384	0.58	0.58	0.11	0.18	0.12	0.00	0.35	0.35	-0.34	-0.27	-0.29	1.7174	0.0182	9.9	1.8	9.9	9.9	A-	A+
Writing	5	566579	2984	3	16	B.5	2	21384	0.76	0.13	0.05	0.05	0.76	0.00	0.39	-0.33	-0.22	-0.30	0.39	0.3193	0.0202	9.9	1.5	9.9	9.9	A+	B-
Writing	5	566571	2986	4	5	B.5	2	21364	0.67	0.67	0.11	0.09	0.13	0.00	0.31	0.31	-0.25	-0.23	-0.23	1.0655	0.0189	9.9	1.8	9.9	9.9	A-	B-
Writing	5	566574	2987	4	6	B.5	2	21364	0.76	0.76	0.02	0.20	0.03	0.00	0.33	0.33	-0.27	-0.25	-0.26	0.4007	0.0201	9.9	1.6	9.9	9.9	A-	A-
Writing	5	566570	2988	4	7	B.6	1	21364	0.87	0.05	0.87	0.03	0.04	0.00	0.45	-0.29	0.45	-0.31	-0.32	-0.8551	0.0253	9.9	1.2	6.4	3.1	A-	C-
Writing	5	566573	2989	4	8	B.6	1	21364	0.75	0.08	0.11	0.05	0.75	0.00	0.41	-0.32	-0.28	-0.32	0.41	0.4503	0.0200	9.9	1.5	9.9	9.2	A+	A-
Writing	5	566586	2990	4	13	B.6	1	21364	0.83	0.83	0.07	0.04	0.06	0.00	0.37	0.37	-0.26	-0.29	-0.22	-0.3022	0.0225	9.9	1.4	9.9	9.9	A+	A-
Writing	5	566587	2991	4	14	B.5	2	21364	0.77	0.14	0.77	0.07	0.02	0.00	0.36	-0.23	0.36	-0.30	-0.31	0.2560	0.0205	9.9	1.5	9.9	9.9	A+	A-
Writing	5	566588	2992	4	15	B.5	2	21364	0.27	0.10	0.53	0.27	0.10	0.00	0.05	-0.31	0.04	0.05	-0.24	4.1184	0.0206	9.9	2.4	9.9	9.9	A+	A-
Writing	5	566585	2993	4	16	B.6	1	21364	0.75	0.07	0.75	0.09	0.09	0.00	0.33	-0.26	0.33	-0.22	-0.25	0.4841	0.0199	9.9	1.6	9.9	9.9	A+	A+
Writing	5	566402	2995	5	5	B.5	2	21333	0.78	0.78	0.11	0.05	0.06	0.00	0.36	0.36	-0.23	-0.28	-0.28	0.1926	0.0208	9.9	1.5	9.9	9.9	A-	A-
Writing	5	566404	2996	5	6	B.6	1	21333	0.89	0.03	0.05	0.89	0.03	0.00	0.43	-0.25	-0.30	0.43	-0.29	-1.1255	0.0271	9.9	1.3	9.9	9.9		

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Writing	5	566405	2997	5	7	B.6	1	21333	0.55	0.06	0.06	0.33	0.55	0.00	0.34	-0.31	-0.32	-0.28	0.34	1.9964	0.0182	9.9	1.8	9.9	9.9	A-	A-
Writing	5	566406	2998	5	8	B.6	1	21333	0.64	0.64	0.24	0.06	0.06	0.00	0.26	0.26	-0.17	-0.25	-0.27	1.3507	0.0186	9.9	1.9	9.9	9.9	A-	A-
Writing	5	566398	2999	5	13	B.6	1	21333	0.79	0.08	0.03	0.11	0.79	0.00	0.37	-0.24	-0.35	-0.26	0.37	0.1513	0.0209	9.9	1.5	9.9	9.9	A+	A-
Writing	5	566399	3000	5	14	B.6	1	21333	0.64	0.16	0.12	0.08	0.64	0.00	0.39	-0.31	-0.31	-0.33	0.39	1.3186	0.0186	9.9	1.6	9.9	9.9	A+	A-
Writing	5	566400	3001	5	15	B.5	2	21333	0.91	0.91	0.04	0.02	0.02	0.00	0.43	0.43	-0.29	-0.28	-0.26	-1.4387	0.0294	9.9	1.2	2.2	1.8	A+	A-
Writing	5	566401	3002	5	16	B.5	2	21333	0.64	0.17	0.64	0.03	0.16	0.00	0.38	-0.29	0.38	-0.36	-0.31	1.3189	0.0186	9.9	1.6	9.9	9.9	A-	A-
Writing	5	566416	3004	6	5	B.5	2	21241	0.90	0.90	0.05	0.03	0.02	0.00	0.36	0.36	-0.25	-0.24	-0.21	-1.2505	0.0280	9.9	1.4	9.9	8.4	A+	A-
Writing	5	566417	3005	6	6	B.5	2	21241	0.69	0.14	0.11	0.69	0.06	0.00	0.41	-0.28	-0.32	0.41	-0.38	0.9513	0.0192	9.9	1.5	9.9	9.5	A+	A-
Writing	5	566419	3006	6	7	B.6	1	21241	0.65	0.18	0.06	0.11	0.65	0.00	0.32	-0.24	-0.39	-0.20	0.32	1.2496	0.0188	9.9	1.8	9.9	9.9	A+	A-
Writing	5	566418	3007	6	8	B.6	1	21241	0.73	0.12	0.73	0.08	0.07	0.00	0.38	-0.29	0.38	-0.29	-0.28	0.6565	0.0197	9.9	1.6	9.9	9.5	A+	A-
Writing	5	592721	3008	6	13	B.5	2	21241	0.81	0.81	0.06	0.08	0.05	0.00	0.35	0.35	-0.30	-0.25	-0.18	-0.0819	0.0218	9.9	1.5	9.9	9.9	A-	A-
Writing	5	592723	3009	6	14	B.6	1	21241	0.85	0.85	0.05	0.05	0.05	0.00	0.48	0.48	-0.35	-0.35	-0.30	-0.5788	0.0240	9.9	1.2	9.9	8.6	A-	C-
Writing	5	592725	3010	6	15	B.6	1	21241	0.38	0.08	0.10	0.43	0.38	0.00	0.27	-0.37	-0.36	-0.20	0.27	3.2068	0.0189	9.9	1.9	9.9	9.0	A-	A-
Writing	5	592724	3011	6	16	B.5	2	21241	0.62	0.04	0.27	0.07	0.62	0.00	0.41	-0.38	-0.32	-0.39	0.41	1.5052	0.0186	9.9	1.6	9.9	9.9	A-	A-
Writing	8	560393	3013	0	1	B.6	1	131741	0.59	0.59	0.20	0.16	0.04	0.00	0.32	0.32	-0.34	-0.18	-0.27	1.9725	0.0074	9.9	1.8	9.9	9.9		
Writing	8	560390	3014	0	2	B.5	2	131741	0.54	0.18	0.13	0.54	0.16	0.00	0.22	-0.25	-0.20	0.22	-0.12	2.3987	0.0073	9.9	2.0	9.9	9.9		
Writing	8	560389	3015	0	3	B.6	2	131741	0.73	0.03	0.20	0.03	0.73	0.00	0.30	-0.27	-0.22	-0.22	0.30	0.8308	0.0081	9.9	1.7	9.9	9.9		
Writing	8	560391	3016	0	4	B.5	2	131741	0.63	0.07	0.02	0.28	0.63	0.00	0.44	-0.31	-0.35	-0.40	0.44	1.6908	0.0075	9.9	1.5	9.9	6.6		
Writing	8	559813	3017	0	9	B.6	2	131741	0.84	0.04	0.03	0.84	0.09	0.00	0.43	-0.35	-0.33	0.43	-0.26	-0.2497	0.0095	9.9	1.4	9.9	6.6		
Writing	8	559815	3018	0	10	B.5	2	131741	0.65	0.65	0.24	0.07	0.04	0.00	0.34	0.34	-0.25	-0.36	-0.26	1.5375	0.0076	9.9	1.7	9.9	9.9		
Writing	8	559814	3019	0	11	B.5	2	131741	0.82	0.10	0.82	0.05	0.03	0.00	0.35	-0.21	0.35	-0.29	-0.24	-0.0566	0.0092	9.9	1.6	9.9	9.9		
Writing	8	559816	3020	0	12	B.5	2	131741	0.81	0.81	0.05	0.04	0.10	0.00	0.36	0.36	-0.28	-0.30	-0.21	0.1115	0.0089	9.9	1.5	9.9	9.9		
Writing	8	557743	3021	0	17	B.5		131741	0.64	0.64	0.07	0.06	0.23	0.00	0.39	0.39	-0.32	-0.27	-0.33	1.6011	0.0075	9.9	1.6	9.9	6.6		
Writing	8	557961	3022	0	18	B.6		131741	0.86	0.03	0.86	0.06	0.05	0.00	0.37	-0.25	0.37	-0.23	-0.27	-0.5494	0.0101	9.9	1.5	9.9	9.9		
Writing	8	557744	3023	0	19	B.5		131741	0.76	0.06	0.10	0.76	0.08	0.00	0.34	-0.23	-0.35	0.34	-0.14	0.5594	0.0083	9.9	1.6	9.9	9.9		
Writing	8	557745	3024	0	20	B.6		131741	0.64	0.21	0.08	0.07	0.64	0.00	0.33	-0.22	-0.30	-0.35	0.33	1.6398	0.0075	9.9	1.7	9.9	9.9		
Writing	8	594830	3027	1	5	B.5	2	21982	0.57	0.57	0.18	0.13	0.12	0.00	0.25	0.25	-0.28	-0.16	-0.16	2.1212	0.0180	9.9	2.0	9.9	9.9	A-	A-
Writing	8	594829	3028	1	6	B.5	2	21982	0.66	0.19	0.66	0.09	0.06	0.00	0.40	-0.30	0.40	-0.39	-0.29	1.4162	0.0187	9.9	1.5	9.9	9.6	A+	A-
Writing	8	594832	3029	1	7	B.6	1	21982	0.69	0.12	0.11	0.69	0.09	0.00	0.44	-0.35	-0.36	0.44	-0.32	1.2300	0.0189	9.9	1.5	9.9	5.0	A-	C-
Writing	8	594833	3030	1	8	B.6	1	21982	0.81	0.04	0.05	0.81	0.11	0.00	0.48	-0.33	-0.36	0.48	-0.36	0.1718	0.0215	9.9	1.3	9.9	4.1	A-	A-
Writing	8	567104	3031	1	13	B.6	1	21982	0.75	0.08	0.75	0.08	0.09	0.00	0.39	-0.28	0.39	-0.36	-0.20	0.6735	0.0201	9.9	1.6	9.9	8.0	A+	A-
Writing	8	567101	3032	1	14	B.5	2	21982	0.54	0.33	0.07	0.06	0.54	0.00	0.26	-0.15	-0.35	-0.36	0.26	2.2982	0.0179	9.9	1.9	9.9	9.9	A+	A-
Writing	8	567102	3033	1	15	B.6	1	21982	0.49	0.12	0.49	0.17	0.22	0.00	0.26	-0.33	0.26	-0.30	-0.13	2.6893	0.0179	9.9	1.9	9.9	9.9	A+	A-
Writing	8	567103	3034	1	16	B.6	1	21982	0.81	0.07	0.04	0.07	0.81	0.00	0.50	-0.38	-0.36	-0.33	0.50	0.1231	0.0217	9.9	1.3	9.9	5.2	A+	A-
Writing	8	594224	3036	2	5	B.5	2	21971	0.66	0.15	0.05	0.66	0.14	0.00	0.34	-0.22	-0.33	0.34	-0.30	1.4763	0.0187	9.9	1.7	9.9	9.3	A-	A-
Writing	8	594222	3037	2	6	B.6	1	21971	0.88	0.04	0.88	0.06	0.02	0.00	0.42	-0.28	0.42	-0.31	-0.24	-0.7587	0.0260	9.9	1.3	8.4	4.0	A+	A-
Writing	8	594223	3038	2	7	B.6	1	21971	0.77	0.07	0.07	0.77	0.09	0.00	0.43	-0.32	-0.35	0.43	-0.29	0.5130	0.0206	9.9	1.4	9.9	7.3	A+	A-
Writing	8	594221	3039	2	8	B.5	1	21971	0.44	0.44	0.06	0.11	0.40	0.00	0.30	0.30	-0.15	-0.49	-0.25	3.0602	0.0181	9.9	1.8	9.9	9.7	A-	B-
Writing	8	567092	3040	2	13	B.5	2	21971	0.66	0.26	0.66	0.07	0.02	0.00	0.32	-0.31	0.32	-0.16	-0.21	1.4833	0.0187	9.9	1.8	9.9	9.9	A-	A-
Writing	8	567093	3041	2	14	B.6	1	21971	0.41	0.13	0.09	0.41	0.37	0.00	0.07	-0.13	-0.16	0.07	0.00	3.2791	0.0183	9.9	2.3	9.9	9.9	A-	A-
Writing	8	567095	3042	2	15	B.6	1	21971	0.76	0.09	0.76	0.02	0.13	0.00	0.34	-0.20	0.34	-0.26	-0.30	0.6430	0.0203	9.9	1.6	9.9	9.9	A+	A+
Writing	8	567094	3043	2	16	B.6	1	21971	0.86	0.04	0.04	0.06	0.86	0.00	0.48	-0.33	-0.34	-0.33	0.48	-0.4298	0.0242	9.9	1.3	5.5	2.3	A+	B-
Writing	8	594472	3045	3	5	B.5	2	22037	0.85	0.85	0.07	0.03	0.05	0.00	0.40	0.40	-0.29	-0.27	-0.27	-0.2599	0.0233	9.9	1.4	9.9	8.7	A-	A-
Writing	8	594474	3046	3	6	B.6	2	22037	0.60	0.06	0.60	0.24	0.10	0.00	0.31	-0.28	0.31	-0.25	-0.24	1.9213	0.0180	9.9	1.8	9.9	9.9	A-	A-
Writing	8	594473	3047	3	7	B.5	2	22037	0.53	0.19	0.12	0.53	0.15	0.00	0.31	-0.25	-0.26	0.31	-0.30	2.3720	0.0178	9.9	1.8	9.9	9.9	A-	A-
Writing	8	594476	3048	3	8	B.5	2	22037	0.82	0.09	0.02	0.06	0.82	0.00	0.42	-0.35	-0.28	-0.25	0.42	-0.0175	0.0223	9.9	1.4	9.9	6.7	A+	A-
Writing	8	566980	3049	3	13	B.6	1	22037	0.57	0.57	0.14	0.18	0.11	0.00	0.28	0.28	-0.26	-0.26	-0.17	2.0762	0.0179	9.9	1.8	9.9	9.9	A-	A-
Writing	8	566978	3050	3	14	B.5	1	22037	0.59	0.12	0.59	0.17	0.12	0.00	0.35	-0.29	0.35	-0.30	-0.27	1.9772	0.0180	9.9	1.7	9.9	7.9	A+	A-
Writing	8	566979	3051	3	15	B.6	1	22037	0.84	0.07	0.84	0.05	0.04	0.00	0.40	-0.28	0.40	-0.31	-0.24	-0.1345	0.0228	9.9	1.4	9.9	7.5	A-	B-
Writing	8	566981	3052	3	16	B.6	1	22037	0.58	0.14	0.17	0.58	0.10	0.00	0.27	-0.27	-0.18	0.27	-0.22	2.0198	0.0180	9.9	1.9	9.9	9.9	A+	A+
Writing	8	594205	3054	4	5	B.6	1	22023	0.79	0.09	0.79	0.03	0.09	0.00	0.28	-0.23	0.28	-0.18	-0.19	0.2803	0.0213	9.9	1.7	9.9	9.9	A+	B-

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Writing	8	594207	3055	4	6	B.5	1	22023	0.94	0.01	0.04	0.94	0.02	0.00	0.35	-0.20	-0.26	0.35	-0.20	-1.7840	0.0336	9.9	1.3	9.9	9.9	A+	A-
Writing	8	594209	3056	4	7	B.5	2	22023	0.93	0.02	0.02	0.03	0.93	0.00	0.36	-0.22	-0.21	-0.25	0.36	-1.6814	0.0327	9.9	1.3	9.9	9.9	A+	A-
Writing	8	594208	3057	4	8	B.6	1	22023	0.81	0.04	0.81	0.12	0.03	0.00	0.44	-0.37	0.44	-0.31	-0.30	0.1475	0.0217	9.9	1.4	9.9	9.9	A+	B-
Writing	8	595275	3058	4	13	B.6	1	22023	0.71	0.12	0.71	0.05	0.12	0.00	0.40	-0.37	0.40	-0.32	-0.23	1.0060	0.0195	9.9	1.6	9.9	7.4	A+	A-
Writing	8	595277	3059	4	14	B.6	1	22023	0.45	0.35	0.07	0.13	0.45	0.00	0.20	-0.08	-0.32	-0.31	0.20	2.9674	0.0181	9.9	2.1	9.9	9.9	A-	A-
Writing	8	595276	3060	4	15	B.5	1	22023	0.71	0.18	0.06	0.71	0.05	0.00	0.32	-0.22	-0.27	0.32	-0.28	1.0316	0.0194	9.9	1.7	9.9	9.9	A+	A-
Writing	8	595278	3061	4	16	B.6	1	22023	0.66	0.13	0.12	0.08	0.66	0.00	0.46	-0.43	-0.34	-0.32	0.46	1.4334	0.0188	9.9	1.5	9.9	6.4	A+	A-
Writing	8	594193	3063	5	5	B.6	1	21975	0.79	0.79	0.14	0.05	0.02	0.00	0.27	0.27	-0.21	-0.18	-0.19	0.3414	0.0209	9.9	1.7	9.9	9.9	A+	A-
Writing	8	594194	3064	5	6	B.6	1	21975	0.77	0.03	0.77	0.04	0.16	0.00	0.35	-0.23	0.35	-0.34	-0.25	0.4986	0.0205	9.9	1.6	9.9	9.9	A-	B-
Writing	8	594195	3065	5	7	B.5	2	21975	0.88	0.01	0.88	0.04	0.06	0.00	0.31	-0.20	0.31	-0.23	-0.19	-0.7381	0.0257	9.9	1.5	9.9	9.9	A+	A-
Writing	8	594197	3066	5	8	B.5	2	21975	0.54	0.02	0.28	0.54	0.15	0.00	0.34	-0.37	-0.29	0.34	-0.33	2.2697	0.0180	9.9	1.8	9.9	9.4	A-	A-
Writing	8	592793	3067	5	13	B.6	1	21975	0.49	0.22	0.49	0.25	0.05	0.00	0.36	-0.29	0.36	-0.35	-0.35	2.6803	0.0180	9.9	1.7	9.9	9.3	A-	B-
Writing	8	592795	3068	5	14	B.5	2	21975	0.60	0.02	0.29	0.09	0.60	0.00	0.32	-0.28	-0.27	-0.30	0.32	1.8475	0.0182	9.9	1.8	9.9	9.1	A-	A-
Writing	8	592794	3069	5	15	B.6	1	21975	0.84	0.04	0.06	0.84	0.06	0.00	0.48	-0.36	-0.34	0.48	-0.33	-0.2170	0.0230	9.9	1.2	9.9	4.3	A-	C-
Writing	8	592796	3070	5	16	B.6	1	21975	0.82	0.82	0.03	0.07	0.07	0.00	0.27	0.27	-0.28	-0.19	-0.12	-0.0285	0.0222	9.9	1.7	9.9	9.9	A+	A+
Writing	8	593349	3072	6	5	B.6	1	21753	0.59	0.59	0.30	0.06	0.05	0.00	0.29	0.29	-0.22	-0.29	-0.27	1.9795	0.0180	9.9	1.8	9.9	9.0	A+	A+
Writing	8	593353	3073	6	6	B.6	1	21753	0.73	0.16	0.07	0.03	0.73	0.00	0.21	-0.09	-0.20	-0.25	0.21	0.8786	0.0196	9.9	1.9	9.9	9.9	A-	A+
Writing	8	593352	3074	6	7	B.6	1	21753	0.56	0.03	0.05	0.56	0.36	0.00	0.38	-0.37	-0.35	0.38	-0.32	2.1912	0.0179	9.9	1.6	9.9	6.4	A-	A-
Writing	8	593351	3075	6	8	B.5	2	21753	0.43	0.13	0.11	0.43	0.34	0.00	0.01	-0.08	-0.16	0.01	0.08	3.1001	0.0180	9.9	2.4	9.9	9.9	A-	A+
Writing	8	593029	3076	6	13	B.6	1	21753	0.71	0.04	0.71	0.07	0.17	0.00	0.30	-0.32	0.30	-0.24	-0.19	1.0365	0.0193	9.9	1.7	9.9	9.9	A+	A-
Writing	8	593030	3077	6	14	B.6	1	21753	0.82	0.05	0.82	0.09	0.04	0.00	0.36	-0.28	0.36	-0.25	-0.23	0.0983	0.0220	9.9	1.5	9.9	9.9	A-	A-
Writing	8	593032	3078	6	15	B.5	2	21753	0.91	0.02	0.03	0.04	0.91	0.00	0.44	-0.28	-0.29	-0.31	0.44	-1.1121	0.0287	9.9	1.2	5.8	3.2	A+	A-
Writing	8	593031	3079	6	16	B.5	2	21753	0.61	0.10	0.17	0.61	0.12	0.00	0.20	-0.22	-0.08	0.20	-0.23	1.8299	0.0181	9.9	2.0	9.9	9.9	A-	A+
Writing	11	560296	3081	0	1	B.6	2	130305	0.79	0.08	0.79	0.12	0.02	0.00	0.21	-0.14	0.21	-0.18	-0.08	-0.0775	0.0087	9.9	1.9	9.9	9.9		
Writing	11	560297	3082	0	2	B.6	1	130305	0.68	0.27	0.01	0.03	0.68	0.00	0.32	-0.29	-0.16	-0.23	0.32	0.8651	0.0078	9.9	1.8	9.9	9.9		
Writing	11	560299	3083	0	3	B.5	2	130305	0.96	0.96	0.01	0.02	0.02	0.00	0.32	0.32	-0.20	-0.22	-0.17	-2.9594	0.0168	9.9	1.5	9.9	9.9		
Writing	11	560298	3084	0	4	B.5	2	130305	0.74	0.03	0.21	0.02	0.74	0.00	0.36	-0.28	-0.31	-0.24	0.36	0.3714	0.0082	9.9	1.7	9.9	9.9		
Writing	11	553855	3085	0	9	B.6	1	130305	0.73	0.05	0.02	0.20	0.73	0.00	0.33	-0.22	-0.30	-0.27	0.33	0.4654	0.0081	9.9	1.8	9.9	9.9		
Writing	11	553856	3086	0	10	B.5	2	130305	0.63	0.63	0.12	0.17	0.07	0.00	0.37	0.37	-0.30	-0.31	-0.29	1.2947	0.0075	9.9	1.7	9.9	9.9		
Writing	11	553854	3087	0	11	B.6		130305	0.79	0.79	0.14	0.05	0.02	0.00	0.37	0.37	-0.27	-0.30	-0.25	-0.1281	0.0087	9.9	1.6	9.9	9.9		
Writing	11	553857	3088	0	12	B.6	1	130305	0.84	0.07	0.05	0.84	0.04	0.00	0.31	-0.20	-0.12	0.31	-0.34	-0.6803	0.0096	9.9	1.6	9.9	9.9		
Writing	11	560279	3089	0	17	B.5	2	130305	0.49	0.49	0.24	0.23	0.04	0.00	0.28	0.28	-0.33	-0.22	-0.16	2.3846	0.0073	9.9	1.8	9.9	9.9		
Writing	11	560276	3090	0	18	B.6	2	130305	0.85	0.04	0.85	0.03	0.07	0.00	0.45	-0.31	0.45	-0.35	-0.30	-0.7961	0.0098	9.9	1.4	9.9	9.2		
Writing	11	560275	3091	0	19	B.6	2	130305	0.81	0.07	0.04	0.81	0.08	0.00	0.38	-0.26	-0.32	0.38	-0.25	-0.3402	0.0090	9.9	1.6	9.9	9.9		
Writing	11	560277	3092	0	20	B.5	2	130305	0.87	0.07	0.04	0.87	0.02	0.00	0.43	-0.31	-0.30	0.43	-0.28	-1.0830	0.0104	9.9	1.4	9.9	9.9		
Writing	11	594835	3095	1	5	B.5	2	21810	0.85	0.05	0.85	0.05	0.05	0.00	0.26	-0.17	0.26	-0.23	-0.11	-0.8056	0.0240	9.9	1.7	9.9	9.9	A-	A-
Writing	11	594834	3096	1	6	B.6	1	21810	0.88	0.09	0.88	0.02	0.01	0.00	0.39	-0.29	0.39	-0.28	-0.23	-1.2104	0.0260	9.9	1.5	9.9	9.9	A+	B-
Writing	11	594836	3097	1	7	B.6	1	21810	0.38	0.38	0.39	0.09	0.14	0.00	0.11	0.11	0.05	-0.24	-0.37	3.0583	0.0184	9.9	2.2	9.9	9.9	A-	A-
Writing	11	594838	3098	1	8	B.5	2	21810	0.34	0.46	0.12	0.34	0.08	0.00	0.19	-0.15	-0.32	0.19	-0.17	3.3828	0.0190	9.9	1.9	9.9	9.9	A-	A-
Writing	11	595401	3099	1	13	B.5	2	21810	0.53	0.28	0.53	0.05	0.14	0.00	0.40	-0.38	0.40	-0.43	-0.28	1.9542	0.0181	9.9	1.6	9.9	8.2	A-	C-
Writing	11	595399	3100	1	14	B.6	1	21810	0.65	0.08	0.14	0.12	0.65	0.00	0.38	-0.37	-0.26	-0.30	0.38	1.0635	0.0189	9.9	1.7	9.9	9.9	A+	B-
Writing	11	595403	3101	1	15	B.5	2	21810	0.76	0.76	0.05	0.05	0.14	0.00	0.48	0.48	-0.28	-0.38	-0.41	0.1686	0.0207	9.9	1.4	9.9	6.9	B-	C-
Writing	11	595400	3102	1	16	B.6	1	21810	0.87	0.06	0.05	0.87	0.02	0.00	0.48	-0.38	-0.33	0.48	-0.27	-1.0762	0.0253	9.9	1.3	9.9	5.7	A-	C-
Writing	11	595392	3104	2	5	B.6	1	21796	0.94	0.94	0.03	0.02	0.01	0.00	0.43	0.43	-0.32	-0.28	-0.20	-2.4015	0.0351	9.6	1.3	4.3	4.4	A-	C-
Writing	11	595393	3105	2	6	B.5	2	21796	0.46	0.13	0.46	0.26	0.15	0.00	0.14	-0.16	0.14	-0.07	-0.17	2.4755	0.0179	9.9	2.1	9.9	9.9	A-	A+
Writing	11	595394	3106	2	7	B.6	1	21796	0.56	0.06	0.30	0.56	0.08	0.00	0.37	-0.39	-0.28	0.37	-0.40	1.7915	0.0180	9.9	1.6	9.9	8.7	A-	A-
Writing	11	595396	3107	2	8	B.5	2	21796	0.81	0.14	0.81	0.03	0.02	0.00	0.33	-0.22	0.33	-0.31	-0.26	-0.3788	0.0224	9.9	1.7	9.9	9.9	A+	A-
Writing	11	596892	3108	2	13	B.5	2	21796	0.51	0.13	0.15	0.51	0.21	0.00	0.28	-0.29	-0.27	0.28	-0.21	2.1270	0.0179	9.9	1.8	9.9	9.9	A-	A-
Writing	11	596894	3109	2	14	B.5	2	21796	0.34	0.52	0.34	0.12	0.02	0.00	0.04	0.02	0.04	-0.17	-0.29	3.3309	0.0189	9.9	2.3	9.9	9.9	A-	A-
Writing	11	596895	3110	2	15	B.6	1	21796	0.60	0.04	0.31	0.04	0.60	0.00	0.32	-0.41	-0.22	-0.41	0.32	1.4811	0.0183	9.9	1.8	9.9	9.9	A+	B-
Writing	11	596896	3111	2	16	B.5	2	21796	0.81	0.11	0.81	0.03	0.05	0.00	0.26	-0.13	0.26	-0.25	-0.23	-0.3333	0.0222	9.9	1.8	9.9	9.		

Appendix I: Item Statistics Multiple Choice

Item Information								Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	PVal	P(A)	P(B)	P(C)	P(D)	P(-)	PtBis	PT(A)	PT(B)	PT(C)	PT(D)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Writing	11	594814	3113	3	5	B.6	1	21814	0.66	0.10	0.66	0.10	0.14	0.00	0.29	-0.22	0.29	-0.23	-0.22	1.0090	0.0187	9.9	1.8	9.9	9.9	A-	B-
Writing	11	594815	3114	3	6	B.5	2	21814	0.36	0.36	0.17	0.30	0.17	0.00	0.21	0.21	-0.22	-0.23	-0.19	3.1582	0.0184	9.9	1.9	9.9	9.9	A-	B-
Writing	11	594817	3115	3	7	B.5	2	21814	0.33	0.14	0.36	0.17	0.33	0.00	0.14	-0.23	-0.06	-0.25	0.14	3.3890	0.0189	9.9	2.0	9.9	9.9	A+	A+
Writing	11	594818	3116	3	8	B.6	1	21814	0.39	0.23	0.21	0.39	0.16	0.00	0.11	-0.13	-0.08	0.11	-0.13	2.8970	0.0180	9.9	2.1	9.9	9.9	A+	A-
Writing	11	595493	3117	3	13	B.5	2	21814	0.73	0.04	0.05	0.17	0.73	0.00	0.34	-0.30	-0.38	-0.19	0.34	0.4358	0.0199	9.9	1.7	9.9	9.9	A+	A-
Writing	11	595398	3118	3	14	B.5	1	21814	0.64	0.17	0.64	0.16	0.03	0.00	0.22	-0.14	0.22	-0.20	-0.23	1.1319	0.0185	9.9	2.0	9.9	9.9	A+	A+
Writing	11	595494	3119	3	15	B.6	2	21814	0.29	0.31	0.29	0.12	0.27	0.00	0.26	-0.34	0.26	-0.30	-0.21	3.6559	0.0196	9.9	1.7	9.9	9.9	A+	B-
Writing	11	595397	3120	3	16	B.5	2	21814	0.55	0.06	0.20	0.20	0.55	0.00	0.35	-0.38	-0.38	-0.20	0.35	1.8384	0.0178	9.9	1.6	9.9	9.2	A+	A-
Writing	11	596706	3122	4	5	B.5	2	21698	0.71	0.71	0.10	0.11	0.07	0.00	0.25	0.25	-0.22	-0.16	-0.17	0.6142	0.0195	9.9	1.9	9.9	9.9	A+	B-
Writing	11	596705	3123	4	6	B.6	1	21698	0.60	0.11	0.10	0.60	0.20	0.00	0.30	-0.30	-0.30	0.30	-0.19	1.4287	0.0183	9.9	1.8	9.9	9.9	A+	A-
Writing	11	596707	3124	4	7	B.6	1	21698	0.71	0.15	0.71	0.08	0.06	0.00	0.38	-0.30	0.38	-0.35	-0.23	0.6084	0.0195	9.9	1.6	9.9	9.9	A-	A-
Writing	11	596709	3125	4	8	B.5	2	21698	0.66	0.09	0.07	0.17	0.66	0.00	0.36	-0.31	-0.28	-0.28	0.36	0.9727	0.0189	9.9	1.7	9.9	9.9	A-	B-
Writing	11	595426	3126	4	13	B.6	1	21698	0.71	0.24	0.04	0.71	0.02	0.00	0.42	-0.36	-0.41	0.42	-0.22	0.6309	0.0194	9.9	1.5	9.9	9.9	A+	A-
Writing	11	595424	3127	4	14	B.5	2	21698	0.79	0.07	0.79	0.10	0.04	0.00	0.28	-0.28	0.28	-0.13	-0.21	-0.1196	0.0213	9.9	1.7	9.9	9.9	A+	A-
Writing	11	595425	3128	4	15	B.5	2	21698	0.76	0.76	0.08	0.07	0.09	0.00	0.36	0.36	-0.34	-0.28	-0.17	0.1365	0.0206	9.9	1.6	9.9	9.9	A-	A-
Writing	11	595427	3129	4	16	B.5	2	21698	0.78	0.04	0.02	0.78	0.17	0.00	0.48	-0.31	-0.30	0.48	-0.42	0.0062	0.0209	9.9	1.4	9.9	8.2	A-	A-
Writing	11	595419	3131	5	5	B.6	1	21711	0.75	0.14	0.75	0.04	0.07	0.00	0.26	-0.14	0.26	-0.21	-0.26	0.2367	0.0203	9.9	1.8	9.9	9.9	A-	A-
Writing	11	595421	3132	5	6	B.5	2	21711	0.63	0.31	0.04	0.63	0.02	0.00	0.10	-0.03	-0.23	0.10	-0.15	1.2013	0.0185	9.9	2.2	9.9	9.9	A-	A-
Writing	11	595422	3133	5	7	B.6	2	21711	0.62	0.09	0.16	0.13	0.62	0.00	0.34	-0.29	-0.29	-0.27	0.34	1.2974	0.0184	9.9	1.7	9.9	9.9	A-	A-
Writing	11	595423	3134	5	8	B.5	2	21711	0.76	0.18	0.76	0.02	0.04	0.00	0.32	-0.27	0.32	-0.25	-0.19	0.1953	0.0204	9.9	1.7	9.9	9.9	A-	A-
Writing	11	594826	3135	5	13	B.5	2	21711	0.72	0.10	0.09	0.72	0.09	0.00	0.34	-0.26	-0.27	0.34	-0.23	0.5569	0.0196	9.9	1.7	9.9	9.9	A-	A-
Writing	11	594825	3136	5	14	B.5	2	21711	0.86	0.03	0.86	0.04	0.07	0.00	0.39	-0.25	0.39	-0.32	-0.23	-0.8736	0.0243	9.9	1.5	9.9	9.9	A+	A-
Writing	11	594828	3137	5	15	B.6	1	21711	0.50	0.17	0.13	0.20	0.50	0.00	0.40	-0.32	-0.40	-0.40	0.40	2.1834	0.0180	9.9	1.5	9.9	8.8	A-	B-
Writing	11	594827	3138	5	16	B.5	2	21711	0.71	0.71	0.17	0.09	0.03	0.00	0.38	0.38	-0.26	-0.39	-0.21	0.5695	0.0195	9.9	1.6	9.9	9.9	A-	C-
Writing	11	595415	3140	6	5	B.5	2	21476	0.87	0.87	0.06	0.02	0.05	0.00	0.12	0.12	-0.14	0.00	-0.07	-1.0365	0.0251	9.9	1.9	9.9	9.9	A-	A-
Writing	11	595416	3141	6	6	B.6	1	21476	0.39	0.02	0.03	0.39	0.55	0.00	0.02	-0.25	-0.32	0.02	0.04	2.8990	0.0185	9.9	2.3	9.9	9.9	A-	A-
Writing	11	595417	3142	6	7	B.6	1	21476	0.80	0.05	0.11	0.80	0.03	0.00	0.36	-0.29	-0.26	0.36	-0.24	-0.2666	0.0219	9.9	1.6	9.9	9.9	A+	A-
Writing	11	595414	3143	6	8	B.5	2	21476	0.84	0.04	0.05	0.07	0.84	0.00	0.31	-0.20	-0.28	-0.16	0.31	-0.7450	0.0237	9.9	1.6	9.9	9.9	A+	A-
Writing	11	595410	3144	6	13	B.5	2	21476	0.92	0.04	0.92	0.02	0.02	0.00	0.37	-0.30	0.37	-0.24	-0.17	-1.9922	0.0313	9.9	1.4	9.9	9.9	A+	A-
Writing	11	595409	3145	6	14	B.5	2	21476	0.87	0.05	0.06	0.87	0.02	0.00	0.29	-0.13	-0.24	0.29	-0.22	-1.0515	0.0251	9.9	1.6	9.9	9.9	A+	A-
Writing	11	595411	3146	6	15	B.6	1	21476	0.72	0.02	0.13	0.13	0.72	0.00	0.43	-0.30	-0.39	-0.32	0.43	0.4744	0.0199	9.9	1.6	9.9	9.9	A+	A-
Writing	11	595413	3147	6	16	B.5	1	21476	0.61	0.06	0.61	0.02	0.31	0.00	0.38	-0.36	0.38	-0.40	-0.31	1.3693	0.0186	9.9	1.7	9.9	9.1	A+	A-

## Appendix I: Item Statistics Open Ended

Item Information								Classical														Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	Mean	P(0)	P(1)	P(2)	P(3)	P(4)	P(B)	PtBis	PT(0)	PT(1)	PT(2)	PT(3)	PT(4)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Math	3	550311	25	0	25	A.1	3	126675	2.33	0.08	0.24	0.19	0.26	0.24	0.00	0.58	-0.43	-0.34	0.06	0.24	0.32	2.4099	0.0032	9.9	1.1	9.9	1.1		
Math	3	550232	26	0	26	C.2	1	126675	3.10	0.03	0.07	0.15	0.28	0.47	0.01	0.45	-0.24	-0.26	-0.18	0.01	0.34	1.3315	0.0038	9.9	1.6	9.9	1.6		
Math	3	557369	63	0	120	D.2	3	126675	2.30	0.09	0.20	0.25	0.25	0.21	0.00	0.56	-0.52	-0.21	0.06	0.20	0.29	2.4657	0.0033	9.9	1.2	9.9	1.2		
Math	3	593571	76	1	76	C.1	3	1100	2.75	0.01	0.10	0.24	0.40	0.24	0.00	0.55	-0.25	-0.43	-0.15	0.19	0.30	1.4811	0.0415	1.9	1.1	1.4	1.1	A+	B-
Math	3	566072	89	2	76	C.2	3	1100	2.18	0.03	0.23	0.34	0.33	0.07	0.00	0.53	-0.33	-0.34	-0.02	0.33	0.19	2.5167	0.0415	2.5	1.1	2.3	1.1	A+	A-
Math	3	565294	102	3	76	A.2	2	1100	3.00	0.04	0.10	0.22	0.11	0.53	0.00	0.59	-0.46	-0.32	-0.10	0.01	0.45	1.5231	0.0366	5.3	1.3	3.2	1.3	A-	B-
Math	3	564790	115	4	76	A.3	3	1100	2.51	0.09	0.15	0.16	0.36	0.24	0.00	0.65	-0.57	-0.26	-0.02	0.25	0.33	2.3196	0.0355	0.7	1.0	-0.1	1.0	A+	A-
Math	3	565295	128	5	76	D.2	3	1100	2.35	0.06	0.26	0.19	0.25	0.24	0.00	0.57	-0.44	-0.29	-0.01	0.21	0.34	2.3278	0.0347	3.7	1.2	3.8	1.2	A+	A-
Math	3	566073	141	6	76	B.1	3	1100	2.55	0.04	0.14	0.36	0.17	0.29	0.00	0.57	-0.42	-0.34	-0.04	0.13	0.36	1.9604	0.0367	3.2	1.1	3.0	1.2	A-	B-
Math	3	564789	154	7	76	A.1	2	1100	3.14	0.01	0.07	0.16	0.31	0.45	0.00	0.65	-0.20	-0.49	-0.30	0.07	0.43	0.8249	0.0429	-1.2	1.0	-1.3	0.9	A+	B-
Math	3	593671	167	8	76	B.2	3	1100	3.06	0.01	0.07	0.19	0.32	0.41	0.00	0.60	-0.24	-0.37	-0.29	0.03	0.44	1.1237	0.0422	1.4	1.1	0.9	1.0	A-	C-
Math	3	564793	180	9	76	D.1	2	1100	2.50	0.07	0.13	0.22	0.36	0.21	0.00	0.63	-0.53	-0.30	0.00	0.24	0.31	2.2823	0.0370	0.9	1.0	0.6	1.0	A-	C-
Math	4	548681	205	0	25	B.2	2	126335	2.57	0.08	0.14	0.23	0.23	0.32	0.00	0.58	-0.36	-0.30	-0.11	0.12	0.43	0.7239	0.0031	9.9	1.2	9.9	1.3		
Math	4	548675	206	0	26	A.2		126335	2.31	0.12	0.12	0.20	0.45	0.11	0.02	0.56	-0.39	-0.22	-0.10	0.28	0.31	1.2398	0.0033	9.9	1.2	9.9	1.3		
Math	4	557161	243	0	121	D.1	2	126335	2.46	0.08	0.19	0.14	0.36	0.23	0.00	0.57	-0.42	-0.27	-0.05	0.22	0.32	0.8809	0.0031	9.9	1.2	9.9	1.3		
Math	4	566461	256	1	77	D.1	2	1100	2.63	0.05	0.11	0.25	0.35	0.24	0.00	0.55	-0.30	-0.25	-0.20	0.12	0.40	0.6109	0.0365	3.4	1.2	4.0	1.2	A+	C-
Math	4	565293	269	2	77	E.1	2	1099	2.66	0.10	0.12	0.16	0.24	0.37	0.00	0.57	-0.47	-0.18	-0.06	0.05	0.41	0.7200	0.0318	5.9	1.3	6.9	1.4	A+	C-
Math	4	565291	282	3	77	A.3	3	1100	2.70	0.02	0.14	0.15	0.50	0.19	0.00	0.53	-0.23	-0.36	-0.15	0.17	0.32	0.3847	0.0395	2.9	1.1	3.7	1.2	A+	A-
Math	4	592728	295	4	77	A.2	2	1100	3.00	0.02	0.07	0.23	0.24	0.44	0.00	0.52	-0.25	-0.20	-0.31	0.00	0.44	0.0883	0.0371	4.2	1.2	6.1	1.4	A+	C-
Math	4	593880	308	5	77	C.3	2	1100	2.62	0.04	0.10	0.21	0.51	0.14	0.00	0.48	-0.29	-0.22	-0.17	0.17	0.29	0.6894	0.0399	4.3	1.2	5.0	1.3	A+	A-
Math	4	593881	321	6	77	E.3	2	1100	2.82	0.01	0.09	0.25	0.36	0.29	0.00	0.50	-0.21	-0.30	-0.18	0.03	0.39	0.0990	0.0393	4.0	1.2	5.0	1.2	A+	B-
Math	4	565428	334	7	77	C.2	2	1100	1.64	0.11	0.42	0.19	0.26	0.01	0.00	0.55	-0.39	-0.23	0.14	0.39	0.13	2.2153	0.0387	2.9	1.1	2.9	1.1	A+	C-
Math	4	593882	347	8	77	D.2	3	1101	1.76	0.16	0.31	0.24	0.19	0.11	0.00	0.60	-0.47	-0.20	0.15	0.26	0.32	1.6705	0.0343	2.8	1.1	2.3	1.1	A+	A-
Math	4	592609	360	9	77	B.1	2	1100	1.69	0.26	0.21	0.25	0.15	0.13	0.00	0.61	-0.51	-0.10	0.13	0.24	0.37	1.7652	0.0321	3.0	1.1	3.0	1.1	A-	A-
Math	5	548726	385	0	25	C.1		126411	2.06	0.14	0.22	0.24	0.23	0.17	0.00	0.62	-0.47	-0.23	0.04	0.25	0.37	1.6902	0.0032	9.9	1.2	9.9	1.2		
Math	5	556898	386	0	26	B.1	2	126411	1.77	0.12	0.37	0.21	0.22	0.08	0.01	0.64	-0.42	-0.32	0.17	0.36	0.29	2.0627	0.0035	9.9	1.0	9.1	1.0		
Math	5	548710	423	0	120	A.2		126411	2.19	0.06	0.24	0.28	0.30	0.12	0.00	0.58	-0.34	-0.34	-0.03	0.30	0.32	1.4657	0.0035	9.9	1.2	9.9	1.2		
Math	5	593089	436	1	76	D.1	3	1099	2.20	0.04	0.09	0.55	0.25	0.07	0.00	0.58	-0.37	-0.19	-0.18	0.34	0.29	1.5161	0.0446	-0.3	1.0	-0.5	1.0	A-	A-
Math	5	594345	449	2	76	C.2	3	1100	1.66	0.06	0.53	0.12	0.25	0.03	0.00	0.53	-0.37	-0.27	0.07	0.38	0.18	2.2172	0.0400	4.9	1.2	5.3	1.3	A-	A-
Math	5	594982	462	3	76	A.3	3	1100	2.24	0.02	0.25	0.28	0.35	0.09	0.00	0.63	-0.24	-0.52	0.03	0.34	0.30	1.2960	0.0407	0.8	1.0	0.9	1.0	A+	A-
Math	5	594978	475	4	76	A.2	3	1100	2.01	0.10	0.23	0.29	0.33	0.05	0.00	0.58	-0.44	-0.22	0.02	0.35	0.24	1.9812	0.0385	4.2	1.2	4.4	1.2	A+	A-
Math	5	566882	488	5	76	E.2	3	1099	1.97	0.16	0.26	0.14	0.30	0.13	0.00	0.63	-0.48	-0.23	0.09	0.28	0.35	1.8822	0.0338	4.6	1.2	4.6	1.2	A+	A-
Math	5	566837	501	6	76	D.2	3	1100	1.23	0.18	0.46	0.32	0.04	0.01	0.00	0.55	-0.48	-0.04	0.35	0.20	0.07	3.3403	0.0472	1.3	1.1	1.4	1.1	A+	A-
Math	5	594366	514	7	76	C.1	3	1099	1.49	0.06	0.53	0.28	0.12	0.01	0.00	0.57	-0.34	-0.33	0.27	0.34	0.15	2.6406	0.0463	-1.0	1.0	-0.9	1.0	A+	A-
Math	5	594974	527	8	76	B.1	3	1100	1.57	0.18	0.32	0.29	0.17	0.04	0.00	0.65	-0.56	-0.13	0.21	0.35	0.22	2.5012	0.0384	-1.0	1.0	-1.0	1.0	A+	A-
Math	5	566798	540	9	76	E.3	3	1100	2.42	0.03	0.25	0.21	0.27	0.23	0.00	0.58	-0.27	-0.42	-0.03	0.17	0.40	1.0353	0.0360	5.8	1.3	6.0	1.3	B+	C-
Math	6	548761	565	0	25	C.1		126263	2.60	0.09	0.13	0.19	0.28	0.31	0.00	0.64	-0.41	-0.31	-0.14	0.14	0.45	0.7152	0.0032	9.9	1.1	9.9	1.1		
Math	6	556745	566	0	26	E.1	3	126263	1.93	0.13	0.32	0.18	0.21	0.16	0.02	0.55	-0.43	-0.15	-0.02	0.22	0.36	1.4422	0.0032	9.9	1.4	9.9	1.4		
Math	6	548751	603	0	118	A.2		126263	1.62	0.11	0.40	0.32	0.12	0.06	0.00	0.49	-0.34	-0.21	0.16	0.23	0.25	1.8946	0.0038	9.9	1.2	9.9	1.3		
Math	6	593033	616	1	74	B.2	3	1100	2.00	0.07	0.31	0.27	0.26	0.10	0.00	0.67	-0.40	-0.42	0.10	0.38	0.29	1.3770	0.0376	-0.8	1.0	-0.9	1.0	A-	B-
Math	6	594977	629	2	74	A.2	3	1100	1.15	0.26	0.47	0.15	0.08	0.03	0.00	0.50	-0.41	-0.01	0.22	0.26	0.19	2.5532	0.0398	2.7	1.1	3.2	1.2	A+	A-
Math	6	593130	642	3	74	C.3	3	1099	1.56	0.09	0.59	0.07	0.16	0.09	0.00	0.53	-0.39	-0.20	0.07	0.29	0.30	1.7866	0.0375	3.4	1.2	4.1	1.3	A-	A-
Math	6	594984	655	4	74	A.3	3	1100	1.48	0.31	0.30	0.14	0.13	0.13	0.00	0.67	-0.55	-0.10	0.17	0.32	0.38	1.9996	0.0332	-1.5	0.9	-1.7	0.9	A-	A+
Math	6	594976	668	5	74	A.1	3	1100	2.82	0.02	0.12	0.17	0.38	0.30	0.00	0.72	-0.29	-0.47	-0.26	0.12	0.52	0.1907	0.0387	-4.8	0.8	-3.8	0.8	A+	A-
Math	6	594411	681	6	74	B.1	3	1100	1.97	0.03	0.37	0.25	0.30	0.05	0.00	0.66	-0.26	-0.55	0.13	0.44	0.23	1.3715	0.0408	-2.8	0.9	-2.6	0.9	A-	A-
Math	6	566909	694	7	74	E.2	3	1100	2.19	0.10	0.18	0.23	0.40	0.09	0.00	0.62	-0.48	-0.24	-0.02	0.36	0.26	1.3735	0.0370	2.6	1.1	3.0	1.1	A+	B-
Math	6	564879	707	8	74	C.1	3	1100	1.16	0.29	0.42	0.16	0.12	0.02	0.00	0.57	-0.47	-0.03	0.29	0.31	0.16	2.7781	0.0397	0.9	1.0	0.2	1.0	A+	B-
Math	6	566772	720	9	74	D.1	3	1100	2.02	0.03	0.30	0.37	0.21	0.09	0.00	0.57	-0												

## Appendix I: Item Statistics Open Ended

Item Information								Classical														Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	Mean	P(0)	P(1)	P(2)	P(3)	P(4)	P(B)	PtBis	PT(0)	PT(1)	PT(2)	PT(3)	PT(4)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Math	7	566896	861	6	72	E.1	3	1100	1.97	0.07	0.32	0.26	0.28	0.08	0.00	0.63	-0.20	-0.51	0.07	0.41	0.30	1.3537	0.0387	0.7	1.0	0.2	1.0	A-	B-
Math	7	594895	874	7	72	A.3	3	1100	1.34	0.20	0.47	0.18	0.10	0.05	0.00	0.62	-0.48	-0.14	0.30	0.28	0.27	2.2274	0.0397	-1.5	0.9	-1.2	1.0	A+	A+
Math	7	593108	887	8	72	C.3	3	1100	1.34	0.11	0.52	0.30	0.04	0.02	0.00	0.55	-0.31	-0.31	0.39	0.23	0.19	2.3955	0.0472	-1.0	1.0	-0.8	1.0	A+	A-
Math	7	566770	900	9	72	D.2	3	1100	1.16	0.31	0.41	0.16	0.07	0.06	0.00	0.62	-0.50	-0.03	0.29	0.29	0.29	2.4326	0.0386	-2.3	0.9	-2.3	0.9	A+	A-
Math	8	556408	925	0	25	A.2	3	129950	1.69	0.18	0.37	0.10	0.26	0.08	0.00	0.62	-0.44	-0.24	0.11	0.38	0.30	1.9366	0.0033	9.9	1.2	9.9	1.2		
Math	8	548831	926	0	26	D.1	3	129950	1.81	0.13	0.35	0.25	0.13	0.14	0.02	0.65	-0.38	-0.37	0.16	0.29	0.39	1.6162	0.0034	4.5	1.0	1.2	1.0		
Math	8	548830	963	0	117	C.3	3	129950	2.43	0.04	0.12	0.39	0.27	0.18	0.00	0.62	-0.33	-0.31	-0.20	0.26	0.39	0.7490	0.0037	9.9	1.1	9.9	1.1		
Math	8	595019	976	1	73	A.1	3	1099	1.96	0.03	0.44	0.14	0.31	0.08	0.00	0.59	-0.34	-0.43	0.13	0.33	0.29	1.3533	0.0394	5.8	1.3	5.4	1.3	A+	A-
Math	8	566822	989	2	73	E.4	3	1100	1.65	0.18	0.35	0.20	0.21	0.07	0.01	0.69	-0.51	-0.23	0.15	0.41	0.30	1.9996	0.0368	-2.9	0.9	-2.5	0.9	A+	A-
Math	8	594415	1002	3	73	C.1	3	1100	1.30	0.23	0.42	0.20	0.12	0.03	0.01	0.64	-0.50	-0.11	0.27	0.37	0.23	2.6189	0.0409	-1.8	0.9	-1.8	0.9	A-	A-
Math	8	595016	1015	4	73	A.3	3	1100	1.30	0.17	0.47	0.25	0.09	0.02	0.00	0.64	-0.54	-0.11	0.35	0.30	0.15	2.7734	0.0447	-1.5	0.9	-1.8	0.9	A+	B-
Math	8	564894	1028	5	73	D.2	3	1100	2.15	0.11	0.10	0.43	0.26	0.10	0.00	0.65	-0.51	-0.21	-0.03	0.33	0.31	1.4020	0.0391	0.8	1.0	1.0	1.0	A+	B-
Math	8	594458	1041	6	73	C.3	3	1100	2.76	0.03	0.06	0.12	0.71	0.09	0.00	0.57	-0.25	-0.40	-0.17	0.22	0.33	0.5965	0.0482	0.0	1.0	1.2	1.1	A+	A-
Math	8	593049	1054	7	73	E.1	3	1100	1.35	0.13	0.62	0.12	0.06	0.08	0.00	0.56	-0.40	-0.16	0.22	0.20	0.35	2.1557	0.0412	-0.1	1.0	-0.6	1.0	A+	B-
Math	8	594459	1067	8	73	B.2	3	1100	0.72	0.64	0.16	0.11	0.03	0.06	0.01	0.57	-0.59	0.24	0.30	0.19	0.30	3.0485	0.0386	-0.9	1.0	-3.6	0.7	A-	A-
Math	8	593048	1080	9	73	D.4	3	1100	1.47	0.17	0.38	0.29	0.13	0.02	0.00	0.69	-0.58	-0.16	0.32	0.34	0.20	2.4838	0.0419	-3.0	0.9	-3.1	0.9	A+	A-
Math	11	548869	1105	0	25	D.2		129874	1.58	0.31	0.25	0.15	0.13	0.16	0.02	0.67	-0.58	-0.07	0.15	0.26	0.43	1.2569	0.0031	9.9	1.1	9.9	1.1		
Math	11	551773	1106	0	26	A.1	3	129874	2.25	0.13	0.11	0.35	0.21	0.20	0.04	0.65	-0.45	-0.19	-0.15	0.25	0.45	0.4748	0.0033	9.9	1.1	9.9	1.2		
Math	11	548880	1143	0	120	E.4		129874	1.49	0.22	0.38	0.14	0.18	0.07	0.06	0.65	-0.49	-0.19	0.21	0.37	0.30	1.4771	0.0034	3.7	1.0	5.7	1.0		
Math	11	595017	1156	1	76	B.2	3	1100	1.80	0.18	0.30	0.11	0.37	0.04	0.02	0.67	-0.55	-0.21	0.15	0.44	0.25	1.3459	0.0366	2.7	1.1	3.2	1.2	B+	B-
Math	11	594428	1169	2	76	C.1	3	1100	1.61	0.26	0.06	0.53	0.13	0.02	0.03	0.67	-0.59	-0.09	0.24	0.38	0.21	1.7529	0.0393	-0.5	1.0	-1.0	1.0	A-	A-
Math	11	593077	1182	3	76	D.3	3	1099	1.43	0.33	0.31	0.10	0.12	0.14	0.01	0.67	-0.56	-0.04	0.13	0.32	0.41	1.4395	0.0336	0.1	1.0	-0.4	1.0	A-	A-
Math	11	593050	1194	4	76	D.1	3	1099	1.38	0.31	0.25	0.19	0.24	0.01	0.03	0.55	-0.52	0.04	0.14	0.37	0.12	2.2064	0.0373	8.9	1.4	8.7	1.5	A-	A-
Math	11	564898	1208	5	76	C.3	3	1100	1.09	0.49	0.16	0.12	0.21	0.01	0.02	0.65	-0.62	0.08	0.24	0.45	0.16	2.3483	0.0360	0.4	1.0	0.2	1.0	A+	A-
Math	11	564890	1221	6	76	A.3	3	1100	1.59	0.21	0.37	0.11	0.26	0.06	0.02	0.57	-0.46	-0.13	0.16	0.32	0.27	1.4332	0.0361	7.9	1.4	7.9	1.4	A-	A-
Math	11	594375	1234	7	76	C.3	2	1100	1.36	0.26	0.34	0.21	0.17	0.03	0.02	0.72	-0.63	-0.07	0.30	0.41	0.19	1.8791	0.0383	-4.1	0.8	-4.6	0.8	A+	A-
Math	11	566777	1247	8	76	E.1	3	1100	0.92	0.41	0.39	0.12	0.05	0.04	0.04	0.47	-0.45	0.16	0.21	0.18	0.21	2.1764	0.0398	4.4	1.2	5.4	1.3	A-	A-
Math	11	595080	1260	9	76	A.1	3	1100	0.76	0.49	0.35	0.09	0.05	0.02	0.04	0.53	-0.52	0.25	0.19	0.25	0.20	2.5880	0.0431	0.8	1.0	0.8	1.1	A+	A+
Reading	3	562090	1285	0	51	B.1.2.1	3	126587	1.43	0.10	0.46	0.36	0.08		0.00	0.49	-0.37	-0.20	0.29	0.24		1.2414	0.0046	9.9	1.1	9.9	1.1		
Reading	3	554731	1293	0	128	B.1.1.1		126587	1.48	0.07	0.45	0.41	0.07		0.00	0.49	-0.37	-0.24	0.33	0.20		1.1347	0.0048	9.9	1.1	9.9	1.1		
Reading	3	598470	1313	1	87	B.1.1.1	2	1104	1.43	0.10	0.48	0.33	0.10		0.00	0.47	-0.38	-0.14	0.23	0.25		1.1862	0.0475	3.4	1.1	3.4	1.2	B+	A-
Reading	3	598488	1332	2	87	A.1.5.1	2	1102	1.62	0.05	0.35	0.51	0.08		0.00	0.52	-0.31	-0.36	0.36	0.22		0.8650	0.0520	0.6	1.0	0.8	1.0	A+	A+
Reading	3	593391	1343	3	87	B.1.1.1	2	1101	1.70	0.04	0.36	0.47	0.13		0.01	0.47	-0.26	-0.33	0.23	0.27		0.5155	0.0499	2.6	1.1	2.5	1.1	A+	A-
Reading	3	566487	1354	4	87	A.1.4.1	3	1101	1.29	0.17	0.44	0.34	0.06		0.00	0.51	-0.43	-0.08	0.31	0.23		1.6865	0.0474	2.7	1.1	2.6	1.1	C+	A-
Reading	3	566500	1365	5	87	A.1.4.1	2	1106	1.62	0.06	0.44	0.32	0.18		0.00	0.42	-0.26	-0.21	0.08	0.33		0.6303	0.0452	5.6	1.2	5.7	1.3	A+	A+
Reading	3	593368	1376	6	87	A.2.3.1	2	1103	1.78	0.06	0.29	0.46	0.19		0.00	0.48	-0.39	-0.21	0.15	0.29		0.5086	0.0465	4.8	1.2	4.8	1.2	A+	A+
Reading	3	593379	1395	7	87	A.1.3.1	2	1101	1.45	0.11	0.43	0.35	0.10		0.00	0.49	-0.42	-0.14	0.28	0.22		1.1573	0.0460	3.8	1.2	3.8	1.2	A+	A+
Reading	3	593401	1406	8	87	A.2.3.1	2	1100	1.13	0.19	0.53	0.23	0.05		0.00	0.41	-0.37	0.01	0.26	0.15		1.8963	0.0482	4.2	1.2	4.5	1.2	B+	A-
Reading	3	593878	1417	9	87	B.1.2.1	3	1101	1.55	0.12	0.37	0.34	0.17		0.00	0.56	-0.43	-0.21	0.24	0.34		0.9846	0.0440	1.9	1.1	1.8	1.1	A+	A-
Reading	4	560788	1426	0	35	A.2.4.1		128453	1.96	0.09	0.21	0.35	0.35		0.00	0.55	-0.42	-0.26	0.09	0.38		0.3219	0.0038	9.9	1.1	9.9	1.1		
Reading	4	555026	1443	0	52	A.1.5.1		128453	1.65	0.19	0.24	0.32	0.26		0.00	0.66	-0.57	-0.17	0.26	0.40		0.9036	0.0035	-9.9	0.9	-9.9	0.9		
Reading	4	549140	1452	0	130	B.1.1.1		128453	1.71	0.03	0.36	0.47	0.14		0.00	0.37	-0.25	-0.24	0.17	0.21		0.4204	0.0045	9.9	1.2	9.9	1.2		
Reading	4	555111	1461	0	139	B.1.2.1		128453	1.43	0.17	0.38	0.29	0.16		0.00	0.37	-0.25	-0.16	0.18	0.25		1.1872	0.0038	9.9	1.4	9.9	1.4		
Reading	4	564943	1472	1	88	A.1.3.1	2	1099	2.07	0.09	0.17	0.33	0.41		0.00	0.61	-0.45	-0.29	0.02	0.46		0.1724	0.0414	0.1	1.0	-0.7	1.0	A+	A-
Reading	4	565930	1491	2	88	B.1.1.1	2	1101	1.57	0.08	0.50	0.21	0.22		0.00	0.45	-0.38	-0.14	0.08	0.33		0.7165	0.0415	3.8	1.2	4.8	1.2	B+	A+
Reading	4	565019	1502	3	88	A.1.3.1	2	1102	2.11	0.06	0.18	0.35	0.41		0.00	0.46	-0.27	-0.26	-0.05	0.38		0.0080	0.0429	5.9	1.3	4.9	1.2	A+	A+
Reading	4	564967	1513	4	88	B.1.1.1	2	1102	1.38	0.20	0.35	0.32	0.13		0.00	0.45	-0.31	-0.16	0.22	0.29		1.3258	0.0407	5.3	1.2	4.9	1.2	C+	A+
Reading	4	596223	1524	5	88	B.1.2.1	3	1101	1.33	0.14	0.46	0.33	0.07		0.00	0.39	-0.24	-0.17	0.24	0.22		1.4460	0.0455	3					

## Appendix I: Item Statistics Open Ended

Item Information								Classical														Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	Mean	P(0)	P(1)	P(2)	P(3)	P(4)	P(B)	PtBis	PT(0)	PT(1)	PT(2)	PT(3)	PT(4)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Reading	5	565950	1631	1	87	A.1.5.1	3	1100	1.97	0.02	0.17	0.62	0.18		0.00	0.44	-0.19	-0.36	0.13	0.26		-0.0284	0.0533	0.8	1.0	1.0	1.1	B+	A-
Reading	5	566062	1650	2	87	B.1.1.1	3	1101	1.58	0.08	0.33	0.51	0.07		0.00	0.55	-0.38	-0.28	0.34	0.25		1.1101	0.0486	-1.7	0.9	-1.8	0.9	C+	A+
Reading	5	566014	1661	3	87	B.1.1.1	3	1101	1.25	0.21	0.37	0.37	0.05		0.00	0.56	-0.48	-0.06	0.37	0.22		1.8303	0.0437	-2.3	0.9	-1.9	0.9	A+	A-
Reading	5	565997	1672	4	87	B.1.1.1	2	1100	1.98	0.02	0.18	0.60	0.20		0.00	0.47	-0.22	-0.40	0.15	0.27		-0.0593	0.0524	-0.2	1.0	-0.3	1.0	A+	B-
Reading	5	595829	1683	5	87	B.1.1.1	3	1099	2.03	0.02	0.22	0.48	0.28		0.00	0.46	-0.28	-0.32	0.07	0.30		-0.1357	0.0472	1.5	1.1	1.3	1.1	B+	A-
Reading	5	565979	1694	6	87	B.3.3.3	3	1099	1.28	0.28	0.22	0.43	0.07		0.00	0.38	-0.30	-0.13	0.30	0.15		1.7878	0.0402	7.8	1.3	7.8	1.4	A+	A+
Reading	5	565981	1713	7	87	B.3.3.1	3	1100	1.40	0.12	0.43	0.36	0.08		0.01	0.44	-0.37	-0.09	0.22	0.24		1.3764	0.0451	1.9	1.1	2.1	1.1	B+	A-
Reading	5	595776	1724	8	87	B.1.2.1	3	1101	1.95	0.01	0.24	0.53	0.22		0.00	0.48	-0.24	-0.35	0.08	0.33		-0.1438	0.0502	0.6	1.0	0.7	1.0	C+	A+
Reading	5	595856	1735	9	87	B.1.1	3	1101	1.88	0.04	0.22	0.54	0.19		0.00	0.60	-0.34	-0.42	0.22	0.35		0.3691	0.0484	-3.1	0.9	-3.1	0.9	B+	C-
Reading	6	557401	1751	0	42	B.1.1.1		128893	1.95	0.06	0.15	0.55	0.23		0.00	0.55	-0.39	-0.32	0.16	0.32		0.2138	0.0044	4.8	1.0	6.2	1.0		
Reading	6	557428	1758	0	49	B.1.2.1		128893	1.80	0.10	0.20	0.48	0.21		0.01	0.63	-0.52	-0.26	0.23	0.36		0.5408	0.0041	-9.9	0.9	-9.9	0.9		
Reading	6	557442	1764	0	124	B.1.1.1		128893	1.70	0.06	0.40	0.30	0.23		0.00	0.49	-0.38	-0.24	0.15	0.34		0.4442	0.0040	9.9	1.1	9.9	1.2		
Reading	6	557525	1779	0	139	A.2.3.2		128893	1.64	0.08	0.37	0.38	0.17		0.00	0.41	-0.30	-0.19	0.14	0.27		0.6461	0.0041	9.9	1.3	9.9	1.3		
Reading	6	592930	1790	1	85	A.2.5.1	3	1101	1.88	0.03	0.30	0.45	0.23		0.00	0.43	-0.29	-0.24	0.04	0.33		-0.0040	0.0469	3.5	1.1	3.6	1.2	C+	A-
Reading	6	592863	1809	2	85	B.1.1.1	3	1102	1.64	0.05	0.41	0.39	0.15		0.00	0.58	-0.32	-0.39	0.27	0.36		0.5479	0.0463	-3.1	0.9	-3.4	0.9	B+	A+
Reading	6	592885	1820	3	85	B.1.1.1	3	1100	1.71	0.05	0.34	0.47	0.15		0.00	0.55	-0.32	-0.37	0.28	0.30		0.4989	0.0472	-1.2	1.0	-1.2	1.0	A+	A+
Reading	6	592865	1831	4	85	A.1.3.2	3	1102	2.02	0.02	0.18	0.54	0.25		0.00	0.55	-0.32	-0.33	-0.01	0.41		-0.2212	0.0501	-1.1	1.0	-1.2	1.0	B+	A+
Reading	6	592916	1842	5	85	B.1.1.1	3	1101	1.91	0.02	0.23	0.58	0.18		0.00	0.53	-0.23	-0.41	0.15	0.33		-0.1085	0.0517	-1.5	0.9	-1.4	0.9	C+	A-
Reading	6	596666	1853	6	85	A.2.3.1	3	1100	2.00	0.02	0.18	0.58	0.22		0.00	0.48	-0.26	-0.35	0.08	0.31		-0.2601	0.0525	0.7	1.0	0.4	1.0	C+	A+
Reading	6	592908	1872	7	85	A.2.3.1	3	1101	1.74	0.03	0.33	0.51	0.13		0.00	0.51	-0.33	-0.33	0.23	0.28		0.3332	0.0503	-0.2	1.0	-0.2	1.0	A+	B-
Reading	6	592939	1883	8	85	A.2.3.1	3	1101	1.56	0.06	0.41	0.45	0.09		0.00	0.47	-0.33	-0.24	0.25	0.26		0.8386	0.0496	1.3	1.1	1.2	1.1	C+	A+
Reading	6	592993	1894	9	85	A.2.3.1	3	1126	2.00	0.04	0.16	0.55	0.25		0.00	0.63	-0.38	-0.42	0.12	0.40		-0.0085	0.0479	-3.4	0.9	-3.4	0.9	A+	B-
Reading	7	555597	1907	0	39	B.1.2.1		130337	1.77	0.04	0.27	0.59	0.11		0.00	0.49	-0.31	-0.31	0.23	0.27		0.4656	0.0048	1.5	1.0	3.0	1.0		
Reading	7	555427	1915	0	47	A.1.3.1		130337	1.78	0.06	0.25	0.51	0.17		0.01	0.57	-0.38	-0.33	0.22	0.34		0.5377	0.0042	-9.9	0.9	-9.9	0.9		
Reading	7	555556	1924	0	125	A.2.5.1		130337	1.66	0.11	0.32	0.37	0.20		0.00	0.57	-0.42	-0.24	0.20	0.37		0.7695	0.0038	-8.8	1.0	-9.9	1.0		
Reading	7	555471	1938	0	139	B.1.2.1		130337	1.75	0.17	0.22	0.30	0.31		0.01	0.55	-0.42	-0.16	0.03	0.45		0.7181	0.0034	9.9	1.1	9.9	1.1		
Reading	7	594134	1949	1	83	A.2.3.1	2	1101	1.83	0.05	0.28	0.46	0.21		0.00	0.54	-0.36	-0.30	0.14	0.35		0.3514	0.0449	-0.6	1.0	-0.5	1.0	C+	A+
Reading	7	594103	1968	2	83	A.2.3.1	3	1101	1.65	0.17	0.24	0.36	0.23		0.00	0.62	-0.52	-0.19	0.23	0.39		0.9024	0.0382	-2.1	0.9	-2.0	0.9	B+	A+
Reading	7	594114	1979	3	83	B.1.1.1	3	1102	1.42	0.27	0.25	0.27	0.21		0.00	0.45	-0.30	-0.17	0.10	0.40		1.2085	0.0358	5.1	1.2	5.4	1.3	B+	A+
Reading	7	594151	1990	4	83	A.2.3.1	3	1099	1.87	0.04	0.28	0.44	0.23		0.00	0.56	-0.34	-0.37	0.16	0.37		0.2512	0.0449	-1.2	1.0	-1.3	1.0	B+	A-
Reading	7	594152	2001	5	83	B.1.2.1	3	1151	1.97	0.03	0.22	0.49	0.26		0.00	0.56	-0.28	-0.41	0.12	0.38		0.0458	0.0453	-1.2	1.0	-0.8	1.0	C+	A+
Reading	7	594062	2012	6	83	B.1.1.1	3	1101	1.89	0.03	0.27	0.47	0.23		0.00	0.57	-0.33	-0.40	0.16	0.38		0.1664	0.0457	-2.1	0.9	-2.0	0.9	C+	A+
Reading	7	594128	2031	7	83	B.1.1.1	3	1101	2.07	0.04	0.18	0.44	0.33		0.00	0.60	-0.39	-0.36	0.05	0.41		-0.0059	0.0450	-2.3	0.9	-2.3	0.9	C+	A+
Reading	7	594094	2042	8	83	B.1.2.1	3	1100	1.62	0.12	0.31	0.38	0.18		0.01	0.56	-0.38	-0.25	0.20	0.37		0.8901	0.0407	-0.5	1.0	-0.8	1.0	B+	A-
Reading	7	594081	2053	9	83	B.1.1.1	2	1129	2.06	0.05	0.18	0.43	0.34		0.00	0.63	-0.38	-0.42	0.06	0.45		0.0178	0.0435	-3.9	0.9	-4.3	0.8	C+	A+
Reading	8	555690	2061	0	34	B.1.1.1		132866	1.86	0.03	0.26	0.52	0.19		0.00	0.56	-0.35	-0.35	0.17	0.34		0.7401	0.0044	-9.9	0.9	-9.9	0.9		
Reading	8	555881	2075	0	48	B.1.2.1		132866	1.62	0.09	0.34	0.42	0.15		0.00	0.55	-0.39	-0.26	0.23	0.33		1.3385	0.0040	-9.5	1.0	-9.9	1.0		
Reading	8	555849	2083	0	125	A.1.3.1		132866	1.90	0.02	0.23	0.57	0.18		0.00	0.55	-0.29	-0.40	0.17	0.34		0.5772	0.0046	-9.9	0.9	-9.9	0.9		
Reading	8	555705	2097	0	139	B.3.1.1		132866	1.81	0.07	0.22	0.55	0.16		0.01	0.56	-0.39	-0.29	0.20	0.32		1.0597	0.0042	-9.9	1.0	-9.9	1.0		
Reading	8	594924	2108	1	84	B.1.1.1	3	1101	1.85	0.03	0.25	0.55	0.17		0.00	0.61	-0.36	-0.42	0.21	0.37		0.7999	0.0489	-4.5	0.8	-4.5	0.8	C+	A+
Reading	8	594866	2127	2	84	A.2.4.1	3	1100	1.68	0.06	0.34	0.45	0.15		0.00	0.63	-0.44	-0.34	0.28	0.37		1.2180	0.0454	-4.7	0.8	-4.7	0.8	C+	A-
Reading	8	594844	2138	3	84	B.1.1.1	3	1100	1.97	0.06	0.14	0.56	0.23		0.00	0.64	-0.45	-0.34	0.12	0.40		0.8230	0.0463	-4.5	0.8	-4.4	0.8	B+	A+
Reading	8	594910	2149	4	84	B.1.1.1	3	1100	2.08	0.02	0.16	0.53	0.29		0.00	0.60	-0.32	-0.43	0.04	0.41		0.3464	0.0489	-3.7	0.9	-4.0	0.8	C+	B+
Reading	8	599491	2160	5	84	B.3.3.3	3	1100	1.40	0.07	0.56	0.28	0.10		0.00	0.48	-0.35	-0.20	0.23	0.28		1.5701	0.0471	-0.1	1.0	-0.1	1.0	C+	A+
Reading	8	594938	2171	6	84	A.2.5.1	3	1100	2.07	0.04	0.17	0.48	0.32		0.00	0.56	-0.37	-0.35	0.07	0.36		0.5334	0.0454	-1.9	0.9	-2.2	0.9	A+	A+
Reading	8	594911	2190	7	84	A.2.3.1	3	1101	1.63	0.07	0.37	0.44	0.13		0.00	0.48	-0.36	-0.21	0.19	0.30		1.3057	0.0453	0.2	1.0	0.3	1.0	A-	A-
Reading	8	594936	2201	8	84	A.2.3.1	3	1100	1.72	0.07	0.31	0.45	0.17		0.00	0.59	-0.37	-0.34	0.22	0.37		1.1693	0.0442	-3.1	0.9	-3.3	0.9	C+	A+
Reading	8	596306	2212	9	84	B.3.3.1	3	1100	1.60	0.07	0.37	0.44	0.12		0.00	0.49	-0.31	-0.26	0.22	0.31		1.3697	0.0454	0.1	1.0	-0.1	1.0	B+	A+
Reading	11	555975	2220	0	34	B.1.2.1		133248	2.00	0.04	0.16	0.57	0.23		0.01	0.58													

## Appendix I: Item Statistics Open Ended

Item Information							Classical														Rasch		Infit		Outfit		DIF		
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	Mean	P(0)	P(1)	P(2)	P(3)	P(4)	P(B)	PtBis	PT(0)	PT(1)	PT(2)	PT(3)	PT(4)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Reading	11	605015	2311	5	87	A.2.3.2	3	1105	1.97	0.06	0.22	0.41	0.31		0.02	0.65	-0.44	-0.39	0.14	0.43		0.1123	0.0428	-4.2	0.8	-4.4	0.8	B+	A-
Reading	11	595767	2322	6	87	B.1.1.1	3	1100	1.96	0.02	0.27	0.44	0.27		0.01	0.53	-0.24	-0.43	0.13	0.36		-0.1922	0.0459	-0.3	1.0	-0.4	1.0	A+	A-
Reading	11	595768	2341	7	87	B.1.1.1	3	1104	2.18	0.02	0.13	0.50	0.35		0.01	0.57	-0.24	-0.39	-0.10	0.45		-0.4571	0.0490	-2.5	0.9	-2.5	0.9	C+	A-
Reading	11	595842	2352	8	87	B.1.1.1	3	1102	2.04	0.04	0.17	0.50	0.29		0.01	0.57	-0.37	-0.36	0.07	0.38		-0.0461	0.0465	-1.7	0.9	-1.7	0.9	C+	B-
Reading	11	595914	2363	9	87	B.2.1.1	3	1103	1.95	0.04	0.22	0.49	0.25		0.01	0.55	-0.29	-0.40	0.12	0.37		0.0132	0.0461	-1.1	1.0	-1.2	1.0	C+	A-
Science	4	560124	2393	0	35	A.1.3.4	2	128564	1.42	0.16	0.26	0.58			0.00	0.41	-0.40	-0.04	0.33		0.2931	0.0046	9.9	1.2	9.9	1.4			
Science	4	560141	2394	0	36	D.1.3.2	2	128564	1.67	0.03	0.26	0.70			0.01	0.39	-0.22	-0.30	0.38		-0.8986	0.0060	9.9	1.1	9.9	1.1			
Science	4	559775	2395	0	37	A.3.2.3	3	128564	1.08	0.29	0.34	0.37			0.01	0.47	-0.47	0.09	0.35		1.1076	0.0043	9.9	1.1	9.9	1.2			
Science	4	558285	2425	0	72	B.1.1.4		128564	1.29	0.15	0.40	0.44			0.00	0.42	-0.38	-0.05	0.33		0.5039	0.0047	9.9	1.2	9.9	1.2			
Science	4	558266	2426	0	73	A.3.1.2		128564	1.28	0.07	0.59	0.35			0.01	0.33	-0.33	-0.05	0.23		0.1961	0.0055	9.9	1.2	9.9	1.2			
Science	4	565265	2435	1	74	D.2.1.1	2	1100	0.92	0.21	0.66	0.13			0.02	0.18	-0.06	-0.12	0.24		1.5814	0.0592	6.5	1.3	6.5	1.3	A-	A-	
Science	4	593623	2446	2	74	C.1.1.1	2	1098	0.81	0.31	0.57	0.12			0.01	0.26	-0.22	0.09	0.18		1.9225	0.0553	6.1	1.3	6.3	1.3	A-	A-	
Science	4	566267	2457	3	74	A.2.2.1	3	1100	1.20	0.25	0.30	0.45			0.02	0.41	-0.42	0.07	0.30		0.8333	0.0455	6.1	1.2	6.3	1.3	A-	B-	
Science	4	566268	2468	4	74	B.1.1.2	3	1100	0.50	0.52	0.45	0.03			0.02	0.41	-0.42	0.39	0.09		3.1862	0.0614	-0.4	1.0	-0.3	1.0	A-	A-	
Science	4	593619	2479	5	74	A.3.2.3	3	1100	0.49	0.63	0.25	0.12			0.01	0.40	-0.39	0.22	0.29		2.5517	0.0514	0.8	1.0	3.0	1.2	A+	A+	
Science	4	566269	2490	6	74	B.2.1.2	2	1100	1.51	0.15	0.19	0.66			0.02	0.34	-0.22	-0.24	0.36		0.1360	0.0501	7.4	1.4	5.6	1.5	A-	A-	
Science	4	593618	2501	7	74	B.3.2.1	3	1100	0.62	0.51	0.36	0.13			0.02	0.36	-0.32	0.13	0.29		2.2851	0.0508	3.3	1.1	3.4	1.2	A-	A+	
Science	4	566942	2512	8	74	A.2.1.3	2	1100	0.96	0.36	0.32	0.32			0.02	0.28	-0.23	-0.02	0.25		1.3661	0.0446	9.9	1.4	9.9	1.6	A-	A+	
Science	4	593616	2523	9	74	A.1.1.1	2	1100	1.52	0.10	0.28	0.62			0.02	0.42	-0.33	-0.19	0.38		-0.0767	0.0536	2.8	1.1	3.4	1.2	B+	A-	
Science	4	565270	2534	10	74	C.2.1.1	2	1100	1.20	0.27	0.26	0.47			0.02	0.49	-0.41	-0.09	0.45		0.8706	0.0448	2.8	1.1	2.1	1.1	A-	A-	
Science	4	566943	2545	11	74	A.3.1.3	3	1099	0.96	0.35	0.34	0.31			0.02	0.42	-0.38	0.05	0.34		1.3868	0.0455	4.2	1.2	4.5	1.2	A+	A-	
Science	4	566264	2556	12	74	A.1.1.2	3	1100	0.51	0.58	0.34	0.08			0.02	0.41	-0.40	0.28	0.23		2.6829	0.0546	1.2	1.1	1.0	1.1	A-	A-	
Science	8	559583	2586	0	36	A.2.2.1	3	132440	0.65	0.52	0.32	0.17			0.01	0.53	-0.52	0.26	0.37		1.4280	0.0044	-9.9	1.0	-9.9	0.9			
Science	8	558310	2587	0	37	B.3.1.3	3	132440	0.83	0.41	0.35	0.24			0.02	0.55	-0.49	0.10	0.45		0.9731	0.0043	-9.9	1.0	-9.9	0.9			
Science	8	559570	2588	0	38	B.3.1.3	3	132440	1.19	0.20	0.41	0.39			0.04	0.52	-0.46	-0.04	0.42		0.0711	0.0045	7.7	1.0	6.9	1.0			
Science	8	559579	2620	0	74	D.1.3.2	3	132440	0.81	0.41	0.36	0.23			0.02	0.52	-0.49	0.17	0.39		1.0288	0.0043	3.9	1.0	1.8	1.0			
Science	8	549793	2621	0	75	D.3.1.2		132440	1.01	0.24	0.51	0.25			0.01	0.39	-0.37	0.08	0.27		0.5459	0.0047	9.9	1.2	9.9	1.2			
Science	8	565280	2632	1	76	B.2.1.1	3	1100	0.33	0.70	0.27	0.03			0.01	0.34	-0.32	0.27	0.18		2.7270	0.0639	1.6	1.1	1.4	1.1	A+	A-	
Science	8	565279	2645	2	76	D.1.1.4	3	1100	1.00	0.15	0.71	0.15			0.01	0.49	-0.44	0.10	0.31		0.5634	0.0619	-2.2	0.9	-2.2	0.9	A-	B-	
Science	8	593626	2658	3	76	A.1.2.1	3	1100	0.80	0.42	0.37	0.22			0.02	0.50	-0.46	0.14	0.38		1.0758	0.0477	1.4	1.1	1.5	1.1	A-	A+	
Science	8	566953	2671	4	76	B.2.2.1	2	1101	1.50	0.17	0.16	0.67			0.02	0.52	-0.45	-0.17	0.49		-0.5199	0.0483	0.6	1.0	0.3	1.0	A+	C-	
Science	8	593627	2684	5	76	A.1.2.4	2	1100	1.05	0.20	0.56	0.24			0.02	0.42	-0.35	-0.01	0.33		0.4327	0.0533	2.3	1.1	2.2	1.1	A+	A-	
Science	8	566948	2697	6	76	A.1.2.2	2	1100	0.79	0.43	0.35	0.22			0.02	0.47	-0.46	0.19	0.33		1.0659	0.0469	3.0	1.1	2.3	1.1	A+	C-	
Science	8	565277	2710	7	76	C.2.1.2	2	1100	0.09	0.92	0.06	0.02			0.02	0.22	-0.22	0.18	0.12		3.4606	0.0951	0.0	1.0	1.0	1.2	A-	A-	
Science	8	593629	2723	8	76	A.1.3.4	2	1099	1.21	0.31	0.16	0.53			0.02	0.61	-0.57	-0.04	0.56		0.1502	0.0435	-0.4	1.0	-1.5	0.9	A-	C-	
Science	8	565272	2736	9	76	A.2.1.3	3	1100	0.45	0.65	0.26	0.10			0.05	0.44	-0.43	0.28	0.29		1.9728	0.0530	-0.7	1.0	-0.1	1.0	A-	A-	
Science	8	593631	2749	10	76	C.3.1.1	2	1100	0.52	0.66	0.15	0.19			0.03	0.39	-0.37	0.12	0.34		1.5833	0.0465	4.3	1.2	3.9	1.4	A-	A-	
Science	8	593633	2760	11	76	D.1.2.2	3	1100	0.89	0.36	0.39	0.25			0.03	0.44	-0.43	0.16	0.30		0.8445	0.0471	3.8	1.1	3.8	1.2	A+	C-	
Science	8	565090	2771	12	76	D.3.1.3	2	1100	1.04	0.25	0.46	0.29			0.01	0.38	-0.30	-0.03	0.32		0.4735	0.0489	5.5	1.2	5.5	1.2	A-	C-	
Science	11	558140	2788	0	15	B.3.1.2	3	129911	0.50	0.60	0.30	0.10			0.09	0.40	-0.38	0.23	0.28		1.6952	0.0047	5.8	1.0	4.6	1.0			
Science	11	560509	2793	0	20	A.2.1.3	4	129911	1.12	0.32	0.37	0.22	0.07	0.03	0.10	0.56	-0.46	-0.01	0.28	0.26	0.22	1.5031	0.0034	-9.9	1.0	-9.9	0.9		
Science	11	560473	2797	0	24	A.2.1.1	3	129911	0.92	0.46	0.28	0.17	0.07	0.02	0.09	0.57	-0.56	0.17	0.31	0.26	0.16	1.7919	0.0033	-9.9	1.0	-9.9	0.9		
Science	11	560146	2811	0	38	A.1.1.3	3	129911	1.07	0.28	0.37	0.35			0.06	0.53	-0.52	0.09	0.40		0.3084	0.0042	-9.9	1.0	-9.9	1.0			
Science	11	558116	2812	0	39	C.3.1.3	3	129911	0.85	0.37	0.42	0.21			0.06	0.46	-0.40	0.10	0.35		0.8408	0.0043	8.3	1.0	8.2	1.0			
Science	11	560130	2813	0	40	A.2.1.1	2	129911	0.71	0.48	0.34	0.19			0.07	0.47	-0.46	0.23	0.32		1.1241	0.0043	9.9	1.0	-0.4	1.0			
Science	11	560498	2818	0	45	A.3.2.1	3	129911	0.96	0.38	0.32	0.25	0.05	0.00	0.08	0.49	-0.44	0.08	0.29	0.23	0.08	2.2626	0.0037	9.9	1.1	9.9	1.1		
Science	11	558164	2831	0	62	A.1.1.2		129911	0.65	0.50	0.34	0.16			0.06	0.46	-0.46	0.27	0.29		1.2741	0.0044	4.7	1.0	-2.2	1.0			
Science	11	549969	2832	0	63	A.2.2.1		129911	0.63	0.49	0.38	0.13			0.08	0.49	-0.47	0.27	0.31		1.3895	0.0046	-9.9	1.0	-9.9	0.9			
Science	11	562457	2840	1	68	A.1.2.1	2	1100	1.05	0.43	0.21	0.25	0.08	0.03	0.08	0.60	-0.56	0.04	0.37	0.26	0.19	1.6226	0.0346	-1.9	0.9	-1.9	0.9	A-	C-
Science	11	565290	2844	1	73	B.1.1.3	3	1099	0.46	0.57	0.41	0.03			0.09	0.21	-0.17	0.11	0.19		2.3667	0.0602	4.0	1.2	4.9	1.2	A+	A-	
Science	11	560623	2854	2	68	B.3.1.2	2	1100	1.38	0.33	0.24	0.22	0.16	0.06	0.08	0.61	-												

## Appendix I: Item Statistics Open Ended

Item Information								Classical														Rasch		Infit		Outfit		DIF	
Cont	Grade	ID	PubID	Form	Seq	Std	DOK	N	Mean	P(0)	P(1)	P(2)	P(3)	P(4)	P(B)	PtBis	PT(0)	PT(1)	PT(2)	PT(3)	PT(4)	Meas	MeasSE	t	MS	t	MS	M/F	W/B
Science	11	562459	2896	5	68	A.2.1.1	3	1100	1.49	0.27	0.26	0.23	0.17	0.06	0.08	0.62	-0.56	-0.05	0.19	0.34	0.25	1.0874	0.0322	-1.6	0.9	-1.3	0.9	A+	C-
Science	11	596236	2900	5	73	D.2.1.2	3	1100	0.51	0.55	0.39	0.06			0.06	0.45	-0.48	0.41	0.16			1.8728	0.0548	-1.2	1.0	-1.5	0.9	B-	A-
Science	11	562215	2910	6	68	C.1.1.2	2	1100	1.01	0.46	0.24	0.17	0.10	0.04	0.09	0.55	-0.54	0.15	0.21	0.29	0.21	1.5912	0.0336	0.5	1.0	0.3	1.0	A+	A+
Science	11	565725	2914	6	73	C.1.1.6	2	1100	1.04	0.28	0.39	0.32			0.10	0.55	-0.47	-0.01	0.46			0.4018	0.0454	-2.5	0.9	-3.1	0.9	A+	C-
Science	11	562213	2924	7	68	A.1.3.1	2	1101	0.43	0.67	0.25	0.06	0.02	0.00	0.07	0.36	-0.39	0.30	0.15	0.12	0.06	2.9390	0.0492	1.5	1.1	1.7	1.1	A+	A+
Science	11	565723	2928	7	73	C.1.1.2	3	1100	0.66	0.49	0.36	0.15			0.10	0.54	-0.52	0.26	0.37			1.2812	0.0477	-2.8	0.9	-3.5	0.9	A+	A+
Science	11	564570	2938	8	68	C.1.1.5	2	1100	2.21	0.15	0.13	0.24	0.29	0.18	0.07	0.69	-0.50	-0.26	-0.06	0.28	0.43	0.3418	0.0313	-3.9	0.9	-4.2	0.8	A+	C-
Science	11	566958	2942	8	73	B.1.1.3	2	1100	0.48	0.63	0.25	0.12			0.13	0.46	-0.44	0.24	0.34			1.6503	0.0494	-1.6	0.9	-2.1	0.9	A-	A+
Writing	5	559496	2957	0	21	A.1	3	128193	2.61		0.04	0.37	0.52	0.07	0.00	0.64		-0.37	-0.41	0.40	0.32	2.1511	0.0063	-9.9	0.7	-9.9	0.6		
Writing	5	559496	2957	0	21	B.6	3	128193	2.58		0.06	0.38	0.49	0.07	0.00	0.68		-0.42	-0.42	0.43	0.33	2.2716	0.0061	-9.9	0.9	-9.9	0.8		
Writing	5	559636	2958	0	22	A.2	3	128193	2.57		0.05	0.39	0.50	0.06	0.00	0.64		-0.38	-0.41	0.42	0.30	2.3192	0.0063	-9.9	0.7	-9.9	0.6		
Writing	5	559636	2958	0	22	B.6	3	128193	2.56		0.05	0.39	0.49	0.06	0.00	0.67		-0.42	-0.42	0.45	0.31	2.3716	0.0062	-9.9	0.9	-9.9	0.8		
Writing	5	567099	2967	1	23	A.2	3	1096	2.69		0.03	0.33	0.55	0.08	0.00	0.65		-0.33	-0.46	0.33	0.38	1.7214	0.0678	-9.2	0.6	-8.9	0.6	B+	A-
Writing	5	567099	2967	1	23	B.6	3	1098	2.69		0.03	0.33	0.55	0.08	0.00	0.67		-0.36	-0.46	0.35	0.39	1.7474	0.0674	-7.8	0.7	-7.4	0.6	B+	A-
Writing	5	559652	2976	2	23	A.3	3	1093	2.66		0.05	0.33	0.54	0.08	0.00	0.64		-0.38	-0.40	0.36	0.34	2.0231	0.0653	-8.7	0.7	-8.8	0.6	A+	A-
Writing	5	559652	2976	2	23	B.6	3	1099	2.67		0.05	0.32	0.55	0.08	0.00	0.67		-0.39	-0.43	0.38	0.35	1.9715	0.0653	-6.2	0.8	-6.0	0.7	A+	A-
Writing	5	559635	2985	3	23	A.2	3	1099	2.68		0.03	0.37	0.51	0.10	0.00	0.63		-0.29	-0.48	0.34	0.36	1.6126	0.0661	-8.0	0.7	-7.8	0.7	B+	A-
Writing	5	559635	2985	3	23	B.6	3	1100	2.69		0.02	0.36	0.52	0.10	0.00	0.66		-0.29	-0.52	0.37	0.37	1.5791	0.0664	-5.7	0.8	-5.8	0.7	B+	A-
Writing	5	559649	2994	4	23	A.3	3	1098	2.66		0.03	0.34	0.57	0.06	0.00	0.64		-0.38	-0.45	0.41	0.30	1.9241	0.0692	-8.6	0.7	-8.4	0.6	B+	A-
Writing	5	559649	2994	4	23	B.6	3	1098	2.67		0.04	0.32	0.59	0.06	0.00	0.67		-0.42	-0.44	0.44	0.29	2.0169	0.0687	-6.8	0.7	-6.6	0.7	B+	A-
Writing	5	559640	3003	5	23	A.2	3	1095	2.74		0.03	0.31	0.55	0.11	0.00	0.64		-0.34	-0.47	0.33	0.35	1.5097	0.0666	-8.5	0.7	-8.0	0.6	C+	A-
Writing	5	559640	3003	5	23	B.6	3	1098	2.73		0.03	0.32	0.54	0.11	0.00	0.66		-0.33	-0.49	0.34	0.37	1.4911	0.0664	-6.1	0.8	-5.6	0.7	C+	A-
Writing	5	559654	3012	6	23	A.3	3	1092	2.50		0.04	0.47	0.44	0.05	0.00	0.59		-0.35	-0.38	0.41	0.26	2.5075	0.0687	-6.5	0.8	-6.8	0.7	B+	B-
Writing	5	559654	3012	6	23	B.6	3	1097	2.62		0.04	0.35	0.56	0.05	0.00	0.64		-0.40	-0.43	0.46	0.25	2.2247	0.0682	-4.3	0.8	-3.9	0.8	B+	A-
Writing	8	559680	3025	0	21	A.2	3	131741	2.76		0.03	0.27	0.60	0.10	0.00	0.70		-0.37	-0.50	0.36	0.37	1.6777	0.0064	-9.9	0.7	-9.9	0.6		
Writing	8	559680	3025	0	21	B.6	3	131741	2.76		0.03	0.28	0.58	0.11	0.00	0.71		-0.38	-0.50	0.36	0.38	1.6878	0.0063	-9.9	0.8	-9.9	0.7		
Writing	8	559693	3026	0	22	A.3	3	131741	2.68		0.04	0.33	0.53	0.10	0.00	0.68		-0.39	-0.46	0.38	0.36	2.0442	0.0061	-9.9	0.7	-9.9	0.6		
Writing	8	559693	3026	0	22	B.6	3	131741	2.69		0.05	0.32	0.53	0.10	0.00	0.70		-0.41	-0.46	0.38	0.37	2.0173	0.0061	-9.9	0.8	-9.9	0.7		
Writing	8	594281	3035	1	23	A.2	3	1098	2.77		0.04	0.26	0.60	0.11	0.00	0.67		-0.38	-0.45	0.33	0.36	1.7534	0.0666	-8.9	0.7	-9.0	0.6	B+	A-
Writing	8	594281	3035	1	23	B.6	3	1098	2.83		0.03	0.22	0.64	0.11	0.00	0.67		-0.40	-0.45	0.30	0.36	1.5671	0.0685	-5.9	0.8	-6.0	0.7	B+	A-
Writing	8	594287	3044	2	23	A.3	3	1099	2.82		0.03	0.23	0.64	0.10	0.00	0.65		-0.35	-0.44	0.28	0.37	1.5921	0.0693	-7.8	0.7	-7.9	0.6	A+	C-
Writing	8	594287	3044	2	23	B.6	3	1099	2.85		0.03	0.20	0.66	0.11	0.00	0.66		-0.36	-0.45	0.27	0.37	1.4628	0.0708	-5.0	0.8	-4.8	0.7	B+	B-
Writing	8	594284	3053	3	23	A.2	3	1098	2.73		0.03	0.30	0.56	0.10	0.00	0.61		-0.36	-0.42	0.32	0.32	1.8397	0.0662	-7.0	0.7	-7.2	0.7	C+	A-
Writing	8	594284	3053	3	23	B.6	3	1098	2.78		0.04	0.24	0.61	0.10	0.00	0.65		-0.40	-0.42	0.32	0.34	1.8072	0.0667	-6.0	0.8	-6.1	0.7	C+	A-
Writing	8	559647	3062	4	23	A.3	3	1098	2.79		0.03	0.26	0.61	0.10	0.00	0.65		-0.34	-0.47	0.32	0.36	1.6411	0.0692	-8.9	0.7	-8.7	0.6	B+	A-
Writing	8	559647	3062	4	23	B.6	3	1098	2.81		0.03	0.23	0.64	0.10	0.00	0.67		-0.37	-0.46	0.30	0.37	1.6119	0.0696	-6.1	0.7	-6.0	0.7	C+	A-
Writing	8	594285	3071	5	23	A.2	3	1096	2.67		0.04	0.36	0.48	0.11	0.00	0.62		-0.35	-0.43	0.34	0.33	2.0465	0.0637	-7.8	0.7	-7.9	0.7	A+	A-
Writing	8	594285	3071	5	23	B.6	3	1098	2.74		0.04	0.29	0.55	0.12	0.00	0.65		-0.38	-0.44	0.34	0.35	1.9199	0.0641	-5.9	0.8	-6.3	0.7	A+	A+
Writing	8	559614	3080	6	23	A.3	3	1096	2.78		0.02	0.28	0.60	0.10	0.00	0.60		-0.27	-0.45	0.28	0.35	1.5897	0.0692	-7.2	0.7	-7.5	0.6	B+	A-
Writing	8	559614	3080	6	23	B.6	3	1097	2.80		0.02	0.25	0.63	0.10	0.00	0.61		-0.29	-0.44	0.27	0.35	1.6097	0.0697	-4.9	0.8	-5.7	0.7	C+	A-
Writing	11	559593	3093	0	21	A.2	3	130305	2.71		0.05	0.27	0.60	0.08	0.00	0.67		-0.44	-0.40	0.39	0.32	1.8259	0.0063	-9.9	0.7	-9.9	0.6		
Writing	11	559593	3093	0	21	B.6	3	130305	2.70		0.05	0.27	0.59	0.08	0.00	0.70		-0.46	-0.42	0.41	0.33	1.8044	0.0063	-9.9	0.8	-9.9	0.7		
Writing	11	559611	3094	0	22	A.3	3	130305	2.79		0.04	0.22	0.65	0.09	0.00	0.68		-0.41	-0.45	0.36	0.34	1.3717	0.0067	-9.9	0.7	-9.9	0.5		
Writing	11	559611	3094	0	22	B.6	3	130305	2.79		0.04	0.22	0.64	0.09	0.00	0.71		-0.43	-0.47	0.37	0.35	1.3560	0.0066	-9.9	0.8	-9.9	0.7		
Writing	11	595295	3103	1	23	A.2	3	1090	2.82		0.03	0.22	0.65	0.10	0.00	0.61		-0.26	-0.50	0.35	0.29	1.2604	0.0704	-6.3	0.7	-7.3	0.6	B+	A-
Writing	11	595295	3103	1	23	B.6	3	1091	2.84		0.02	0.22	0.66	0.10	0.00	0.62		-0.28	-0.52	0.35	0.29	0.9882	0.0726	-2.4	0.9	-2.1	0.9	B+	A-
Writing	11	595303	3112	2	23	A.3	3	1094	2.88		0.02	0.19	0.68	0.11	0.00	0.63		-0.36	-0.46	0.30	0.30	0.9289	0.0720	-7.1	0.7	-7.2	0.6	B+	A+
Writing	11	595303	3112	2	23	B.6	3	1094	2.84		0.03	0.20	0.66	0.11	0.00	0.66		-0.41	-0.46	0.35	0.30	1.1437	0.0707	-3.5	0.8	-2.2	0.9	B+	A-
Writing	11	595297	3121	3	23	A.2	3	1087	2.84		0.03	0.20	0.67	0.10	0.00	0.61		-0.32	-0.46	0.32	0.29	1.1059	0.0721	-6.5	0.7	-7.3	0.6	A+	A+
Writing	11	595																											

Appendix J:  
Linking Item Statistics

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<b>Column Heading</b>	<b>Definition</b>
Type	Item type
Form	Form
Seq	Sequence
Prev Form	Previous form
Prev Seq	Previous sequence
Prev P-Val	Previous P-Value
P-Val	P-Value
Prev Meas	Previous Rasch item measure
Meas	Rasch item measure

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## Appendix J: Linking Item Statistics

### Mathematics Grade 3

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
557327	MC	0	1	0	1	0.95	0.95	-0.8516	-0.8434
550670	MC	0	6	0	6	0.83	0.85	0.7846	0.6748
557195	MC	0	8	0	8	0.87	0.88	0.4216	0.3744
557181	MC	0	10	0	10	0.91	0.90	-0.0750	0.0817
557246	MC	0	14	0	14	0.96	0.96	-1.0091	-0.8976
557273	MC	0	56	0	56	0.81	0.87	0.9370	0.5037
557344	MC	0	60	0	60	0.92	0.93	-0.2649	-0.3435
557257	MC	0	61	0	61	0.93	0.93	-0.4551	-0.3736
557184	MC	0	62	0	62	0.89	0.89	0.1872	0.2833
557224	MC	0	97	0	97	0.92	0.93	-0.2870	-0.3254
557207	MC	0	98	0	98	0.87	0.88	0.4114	0.4435
557192	MC	0	105	0	105	0.94	0.95	-0.6208	-0.7708
557241	MC	0	108	0	108	0.87	0.89	0.3406	0.2667
557337	MC	0	109	0	109	0.91	0.91	-0.0546	0.0454
557202	MC	0	114	0	114	0.84	0.87	0.6673	0.4873
557228	MC	0	119	0	119	0.82	0.79	0.8655	1.2180
550501	MC	1	68	5	68	0.91	0.92	-0.1217	-0.1817
557250	MC	1	75	2	75	0.74	0.74	1.5052	1.4834
557329	MC	2	68	4	68	0.93	0.96	-0.4818	-0.9689
550636	MC	2	73	7	73	0.80	0.83	1.0232	0.8685
550484	MC	3	66	4	66	0.88	0.89	0.2747	0.3176
550736	MC	3	74	6	74	0.68	0.71	1.8475	1.8178
550591	MC	4	73	4	73	0.91	0.93	-0.1843	-0.2350
549491	MC	4	74	5	74	0.83	0.81	0.7931	1.0574
557340	MC	5	70	2	70	0.90	0.92	0.0129	-0.0762
550630	MC	5	74	1	74	0.82	0.83	0.7920	0.9058
550487	MC	6	71	2	71	0.81	0.83	0.9468	0.9295
550477	MC	6	73	3	73	0.91	0.93	-0.1023	-0.3444
550215	MC	7	68	2	68	0.93	0.94	-0.3890	-0.3919
550466	MC	7	73	9	73	0.82	0.85	0.8949	0.6926
550532	MC	8	69	2	69	0.54	0.56	2.6320	2.6831
550243	MC	8	73	2	73	0.90	0.91	0.0366	0.0297
550627	MC	9	70	4	70	0.92	0.92	-0.2127	-0.1225
550464	MC	9	73	5	73	0.84	0.90	0.7092	0.1304
550232	OE	0	26	0	26	0.78	0.77	1.1621	1.3315
557369	OE	0	120	0	120	0.62	0.58	2.2036	2.4657
<b>Mean</b>						0.85	0.86	0.40	0.37

## Appendix J: Linking Item Statistics

### Mathematics Grade 4

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
550862	MC	0	3	0	3	0.51	0.51	1.2887	1.3617
556967	MC	0	9	0	9	0.49	0.55	1.4042	1.1485
557070	MC	0	11	0	11	0.67	0.70	0.4408	0.3440
550920	MC	0	19	0	19	0.74	0.75	0.0723	0.0968
556995	MC	0	22	0	22	0.59	0.62	0.8693	0.8154
550919	MC	0	59	0	57	0.61	0.61	0.7824	0.8680
556951	MC	0	61	0	59	0.59	0.62	0.8926	0.8023
550803	MC	0	98	0	96	0.69	0.73	0.3140	0.2066
550838	MC	0	102	0	100	0.50	0.53	1.3738	1.2522
557002	MC	0	103	0	101	0.57	0.57	1.0139	1.0560
557117	MC	0	106	0	104	0.81	0.85	-0.4575	-0.6813
556922	MC	0	111	0	109	0.60	0.59	0.8603	0.9530
550969	MC	0	112	0	110	0.70	0.72	0.2986	0.2234
557011	MC	0	115	0	113	0.50	0.48	1.3335	1.5189
557129	MC	0	118	0	116	0.90	0.91	-1.2960	-1.2753
556918	MC	0	119	0	117	0.72	0.75	0.1655	0.0427
557001	MC	1	68	4	66	0.53	0.53	1.2112	1.2149
544275	MC	1	72	6	70	0.81	0.82	-0.4332	-0.4743
550898	MC	2	68	3	66	0.83	0.84	-0.6470	-0.6327
544135	MC	2	71	6	69	0.66	0.71	0.4919	0.2902
544238	MC	3	68	5	66	0.81	0.82	-0.4128	-0.3873
542431	MC	3	75	2	73	0.66	0.68	0.5253	0.5014
542295	MC	4	69	2	67	0.77	0.79	-0.1484	-0.2230
542360	MC	4	74	3	72	0.82	0.86	-0.4899	-0.8211
544109	MC	5	69	4	67	0.66	0.69	0.5090	0.4245
544241	MC	5	73	9	71	0.77	0.79	-0.1403	-0.1630
542554	MC	6	69	1	67	0.75	0.79	-0.0509	-0.2013
542334	MC	6	72	2	70	0.59	0.54	0.8854	1.2253
557074	MC	7	70	4	68	0.81	0.82	-0.4458	-0.3805
557014	MC	7	72	5	70	0.54	0.52	1.1321	1.3501
544252	MC	8	70	6	68	0.84	0.83	-0.6626	-0.4613
550905	MC	8	71	5	69	0.69	0.69	0.3603	0.4214
542515	MC	9	71	2	69	0.52	0.47	1.2361	1.6096
544313	MC	9	75	8	73	0.84	0.84	-0.6391	-0.5701
548681	OE	0	25	0	25	0.62	0.64	0.7534	0.7239
557161	OE	0	121	0	119	0.61	0.61	0.8445	0.8809
<b>Mean</b>						0.67	0.69	0.37	0.36

## Appendix J: Linking Item Statistics

### Mathematics Grade 5

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
551077	MC	0	4	0	4	0.72	0.73	0.4542	0.4904
556879	MC	0	11	0	11	0.82	0.86	-0.2682	-0.4346
556861	MC	0	15	0	15	0.87	0.90	-0.6816	-0.8731
556754	MC	0	20	0	20	0.79	0.81	0.0330	-0.0591
556775	MC	0	22	0	22	0.46	0.49	1.8611	1.8289
556875	MC	0	57	0	58	0.70	0.73	0.5976	0.5126
556749	MC	0	62	0	63	0.89	0.90	-0.8841	-0.9676
556800	MC	0	63	0	65	0.56	0.55	1.3866	1.5257
556783	MC	0	100	0	101	0.63	0.66	0.9846	0.9256
556876	MC	0	106	0	107	0.74	0.72	0.3098	0.6002
556866	MC	0	107	0	108	0.56	0.64	1.3554	1.0512
556809	MC	0	109	0	110	0.56	0.58	1.3445	1.3606
556854	MC	0	114	0	115	0.90	0.90	-0.9944	-0.9163
556810	MC	0	115	0	116	0.63	0.65	0.9964	0.9657
556789	MC	0	116	0	117	0.61	0.63	1.0987	1.1122
556774	MC	0	118	0	119	0.43	0.46	2.0515	1.9916
544634	MC	1	67	5	68	0.49	0.47	1.7513	1.8810
544613	MC	1	70	5	71	0.46	0.39	1.9115	2.3131
544644	MC	2	67	1	68	0.86	0.89	-0.6294	-0.7588
544604	MC	2	72	8	73	0.62	0.61	1.0656	1.2306
541902	MC	3	68	1	69	0.76	0.78	0.1550	0.1331
544478	MC	3	72	1	73	0.55	0.57	1.3109	1.3834
544640	MC	4	68	9	69	0.73	0.79	0.3978	0.0843
541845	MC	4	74	9	75	0.79	0.82	0.0336	-0.0834
544664	MC	5	69	6	70	0.71	0.72	0.5544	0.5971
544452	MC	5	73	1	74	0.78	0.82	0.0012	-0.1100
540055	MC	6	69	8	70	0.82	0.84	-0.2182	-0.2999
541815	MC	6	73	7	74	0.76	0.77	0.2153	0.2536
544461	MC	7	69	4	70	0.76	0.74	0.2333	0.4632
544577	MC	7	73	6	74	0.73	0.74	0.3884	0.4520
544582	MC	8	70	6	71	0.68	0.70	0.6933	0.7370
544433	MC	8	73	9	74	0.66	0.67	0.8489	0.8934
544566	MC	9	70	4	71	0.63	0.65	0.9828	1.0404
544473	MC	9	72	2	73	0.42	0.56	2.0605	1.4906
548726	OE	0	25	0	25	0.50	0.52	1.6589	1.6902
556898	OE	0	26	0	26	0.43	0.44	2.0626	2.0627
<b>Mean</b>						0.67	0.69	0.70	0.68

## Appendix J: Linking Item Statistics

### Mathematics Grade 6

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
551181	MC	0	3	0	3	0.72	0.72	0.1376	0.2588
556622	MC	0	6	0	6	0.73	0.76	0.0606	-0.0322
556606	MC	0	11	0	11	0.69	0.72	0.3183	0.2333
556668	MC	0	16	0	16	0.66	0.67	0.4915	0.5472
556631	MC	0	19	0	19	0.68	0.70	0.3591	0.3635
556598	MC	0	61	0	62	0.62	0.67	0.7106	0.5277
556623	MC	0	96	0	97	0.84	0.88	-0.7751	-1.0560
556677	MC	0	97	0	98	0.79	0.78	-0.3692	-0.1771
556615	MC	0	100	0	101	0.85	0.82	-0.7978	-0.4289
556688	MC	0	104	0	105	0.49	0.56	1.3741	1.1186
556605	MC	0	106	0	107	0.86	0.88	-0.9567	-0.9961
557952	MC	0	110	0	111	0.50	0.52	1.3502	1.3492
556697	MC	0	111	0	112	0.67	0.68	0.4537	0.5007
556718	MC	0	112	0	113	0.64	0.64	0.5793	0.7260
556685	MC	0	113	0	114	0.74	0.76	-0.0157	-0.0118
556639	MC	0	116	0	117	0.77	0.77	-0.2076	-0.1163
551208	MC	1	67	1	68	0.81	0.80	-0.4982	-0.3843
542813	MC	1	73	9	74	0.82	0.79	-0.5250	-0.2452
545006	MC	2	66	3	67	0.70	0.70	0.2312	0.3532
545089	MC	2	70	7	71	0.71	0.74	0.1892	0.0881
551266	MC	3	67	7	68	0.65	0.70	0.5811	0.3838
545177	MC	3	71	1	72	0.45	0.48	1.5722	1.5506
545085	MC	4	65	4	66	0.57	0.57	0.9903	1.0771
542657	MC	4	70	3	71	0.75	0.75	-0.0489	0.0709
542649	MC	5	67	4	68	0.61	0.67	0.7381	0.5573
544990	MC	5	73	6	74	0.83	0.84	-0.6267	-0.6345
542835	MC	6	67	6	68	0.87	0.88	-0.9627	-0.9975
545166	MC	6	72	4	73	0.56	0.56	1.0081	1.1669
545154	MC	7	66	4	67	0.63	0.69	0.6532	0.3900
545231	MC	7	69	1	70	0.79	0.81	-0.4147	-0.3817
545104	MC	8	65	1	66	0.65	0.67	0.5165	0.5517
545238	MC	8	69	5	70	0.67	0.68	0.4170	0.5069
545168	MC	9	65	2	66	0.50	0.54	1.3442	1.2587
542796	MC	9	68	8	69	0.88	0.89	-1.1504	-1.1552
548761	OE	0	25	0	25	0.62	0.65	0.7869	0.7152
556745	OE	0	26	0	26	0.46	0.48	1.4287	1.4422
<b>Mean</b>						0.69	0.71	0.25	0.25

## Appendix J: Linking Item Statistics

### Mathematics Grade 7

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
551363	MC	0	3	0	3	0.78	0.78	-0.3778	-0.2664
556476	MC	0	6	0	6	0.72	0.76	-0.0220	-0.1542
556502	MC	0	10	0	10	0.73	0.77	-0.1039	-0.1761
556459	MC	0	11	0	11	0.58	0.65	0.7884	0.5279
556509	MC	0	24	0	24	0.74	0.76	-0.1009	-0.1190
556433	MC	0	49	0	49	0.75	0.80	-0.2331	-0.4423
556546	MC	0	50	0	50	0.74	0.77	-0.1360	-0.2042
556436	MC	0	53	0	53	0.65	0.68	0.3983	0.3860
556523	MC	0	57	0	57	0.72	0.77	0.0034	-0.2128
556457	MC	0	93	0	93	0.75	0.78	-0.1858	-0.2640
556522	MC	0	94	0	94	0.67	0.69	0.2918	0.2950
556530	MC	0	99	0	99	0.60	0.62	0.6541	0.7447
556479	MC	0	100	0	100	0.58	0.62	0.7689	0.7425
556469	MC	0	101	0	101	0.50	0.52	1.1618	1.2493
556535	MC	0	107	0	107	0.74	0.73	-0.0953	0.0662
556515	MC	0	109	0	109	0.69	0.71	0.1504	0.1908
544890	MC	1	64	1	64	0.48	0.47	1.2440	1.5092
542974	MC	1	69	1	69	0.56	0.59	0.8446	0.8528
542980	MC	2	63	3	63	0.68	0.66	0.2071	0.4871
542856	MC	2	67	1	67	0.74	0.78	-0.1867	-0.2688
544825	MC	3	64	6	64	0.75	0.79	-0.2147	-0.3041
543117	MC	3	68	3	68	0.64	0.66	0.4773	0.5073
544761	MC	4	67	2	67	0.58	0.65	0.7305	0.5502
544879	MC	4	71	8	71	0.80	0.82	-0.5200	-0.5381
543009	MC	5	65	6	65	0.44	0.42	1.4811	1.8073
544737	MC	5	69	9	69	0.80	0.82	-0.5342	-0.5474
544706	MC	6	65	9	65	0.54	0.55	1.0397	1.0766
542968	MC	6	69	3	69	0.60	0.64	0.6927	0.6063
543052	MC	7	67	4	67	0.78	0.74	-0.4110	0.0431
544753	MC	7	70	3	70	0.82	0.82	-0.6984	-0.6078
544798	MC	8	67	7	67	0.78	0.82	-0.3712	-0.5492
544865	MC	8	70	5	70	0.68	0.73	0.2070	0.1050
542912	MC	9	63	9	63	0.69	0.76	0.1962	-0.1075
544868	MC	9	68	9	68	0.73	0.79	-0.0175	-0.3665
543023	OE	0	25	0	25	0.34	0.36	1.9413	2.0489
556580	OE	0	116	0	116	0.50	0.52	0.9332	0.9976
<b>Mean</b>						0.66	0.69	0.28	0.27

## Appendix J: Linking Item Statistics

### Mathematics Grade 8

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
551528	MC	0	2	0	2	0.74	0.76	-0.0256	0.0168
556377	MC	0	5	0	6	0.72	0.76	0.0738	-0.0026
556392	MC	0	10	0	10	0.71	0.74	0.1489	0.1219
556349	MC	0	14	0	14	0.68	0.71	0.3260	0.3236
556303	MC	0	16	0	16	0.57	0.61	0.9449	0.8921
556309	MC	0	19	0	19	0.61	0.67	0.7455	0.5317
556397	MC	0	56	0	57	0.69	0.73	0.2832	0.2117
556363	MC	0	57	0	58	0.65	0.66	0.5181	0.6335
540448	MC	0	58	0	59	0.63	0.65	0.6034	0.6510
556381	MC	0	59	0	60	0.75	0.75	-0.1083	0.0260
556393	MC	0	99	0	100	0.85	0.88	-0.8346	-1.0071
556376	MC	0	102	0	103	0.62	0.63	0.7110	0.7636
556406	MC	0	103	0	104	0.67	0.67	0.3867	0.5475
556351	MC	0	109	0	110	0.75	0.81	-0.0800	-0.3554
556388	MC	0	114	0	115	0.73	0.74	0.0413	0.0889
551533	MC	0	116	0	117	0.65	0.67	0.5212	0.5438
545807	MC	1	66	7	67	0.59	0.57	0.8328	1.0522
540269	MC	1	69	6	70	0.85	0.85	-0.8256	-0.8199
545704	MC	2	64	4	65	0.62	0.64	0.6750	0.6988
541977	MC	2	68	1	69	0.62	0.60	0.6641	0.9790
540372	MC	3	64	2	65	0.54	0.52	1.0807	1.3914
545644	MC	3	68	6	69	0.84	0.85	-0.8000	-0.7766
540427	MC	4	64	6	65	0.78	0.79	-0.2755	-0.2634
545744	MC	4	68	7	69	0.72	0.76	0.1489	-0.0484
542023	MC	5	69	9	70	0.81	0.86	-0.4862	-0.7856
545593	MC	6	66	8	67	0.88	0.90	-1.1219	-1.3004
545650	MC	6	69	5	70	0.40	0.41	1.8288	2.0144
551511	MC	7	67	6	68	0.57	0.57	0.9645	1.1470
545813	MC	7	70	1	71	0.78	0.84	-0.3294	-0.6511
545754	MC	8	67	9	68	0.79	0.81	-0.3263	-0.3654
545602	MC	8	71	6	72	0.74	0.77	-0.0491	-0.0900
545688	MC	9	68	3	69	0.52	0.59	1.1813	1.0309
545768	MC	9	72	7	73	0.75	0.79	-0.0435	-0.1910
556408	OE	0	25	0	25	0.40	0.42	1.8601	1.9366
548830	OE	0	117	0	118	0.59	0.61	0.7011	0.7490
<b>Mean</b>						0.68	0.70	0.28	0.28

## Appendix J: Linking Item Statistics

### Mathematics Grade 11

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
554504	MC	0	7	0	7	0.73	0.74	-0.6089	-0.5912
554546	MC	0	8	0	8	0.54	0.59	0.4570	0.3360
554489	MC	0	10	0	10	0.66	0.70	-0.2102	-0.3303
554562	MC	0	13	0	13	0.73	0.74	-0.5885	-0.5985
554520	MC	0	18	0	18	0.67	0.65	-0.2196	-0.0246
554531	MC	0	21	0	21	0.70	0.73	-0.4134	-0.5229
554572	MC	0	54	0	55	0.78	0.80	-0.9316	-1.0034
554511	MC	0	57	0	58	0.81	0.82	-1.1536	-1.1893
554581	MC	0	58	0	59	0.71	0.74	-0.4855	-0.5611
554538	MC	0	62	0	63	0.80	0.83	-1.0863	-1.2199
554567	MC	0	63	0	64	0.69	0.73	-0.3894	-0.5421
554588	MC	0	102	0	103	0.57	0.59	0.3070	0.3297
545453	MC	0	105	0	106	0.54	0.53	0.4842	0.6331
554590	MC	0	109	0	110	0.71	0.73	-0.4759	-0.4978
554578	MC	0	112	0	113	0.68	0.69	-0.3178	-0.2846
554523	MC	0	116	0	117	0.63	0.65	-0.0434	-0.0032
545332	MC	1	67	2	68	0.49	0.48	0.7157	0.8873
540525	MC	1	75	6	76	0.66	0.67	-0.2108	-0.1429
545388	MC	2	70	5	71	0.75	0.75	-0.7483	-0.6470
545343	MC	2	75	1	76	0.70	0.72	-0.4862	-0.4746
540547	MC	3	67	6	74	0.66	0.67	-0.2139	-0.1024
545533	MC	3	72	2	73	0.73	0.75	-0.5674	-0.6188
542130	MC	4	73	8	68	0.73	0.75	-0.6262	-0.6587
545438	MC	5	67	4	68	0.68	0.70	-0.3197	-0.3222
545338	MC	5	72	6	73	0.61	0.64	0.1053	0.0251
545494	MC	6	72	3	73	0.53	0.56	0.4789	0.4934
545278	MC	6	74	1	75	0.69	0.71	-0.3881	-0.3855
545322	MC	7	69	5	70	0.58	0.61	0.2451	0.2215
542249	MC	7	71	3	72	0.64	0.68	-0.0646	-0.2100
545486	MC	8	72	5	73	0.81	0.82	-1.1312	-1.2042
545501	MC	8	75	3	76	0.55	0.63	0.3723	0.1229
545413	MC	9	68	8	69	0.82	0.82	-1.2036	-1.2109
545480	MC	9	73	2	74	0.69	0.69	-0.3376	-0.2631
551773	OE	0	26	0	26	0.54	0.56	0.4818	0.4748
548880	OE	0	120	0	121	0.37	0.37	1.2934	1.4771
<b>Mean</b>						0.66	0.68	-0.24	-0.25

## Appendix J: Linking Item Statistics

### Reading Grade 3

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
554816	MC	0	27	0	27	0.65	0.67	0.2854	0.2310
554815	MC	0	28	0	28	0.77	0.79	-0.4582	-0.5859
554813	MC	0	29	0	30	0.68	0.70	0.1242	0.0168
554807	MC	0	30	0	31	0.72	0.74	-0.1088	-0.2334
554810	MC	0	31	0	33	0.73	0.73	-0.1502	-0.1404
554809	MC	0	32	0	32	0.67	0.68	0.2003	0.1646
554814	MC	0	33	0	34	0.76	0.79	-0.3422	-0.5312
554812	MC	0	34	0	35	0.67	0.68	0.2148	0.1736
554729	MC	0	121	0	121	0.81	0.81	-0.7237	-0.7367
554725	MC	0	122	0	122	0.71	0.70	-0.0251	0.0346
554726	MC	0	124	0	124	0.76	0.76	-0.3743	-0.3628
554727	MC	0	125	0	126	0.88	0.88	-1.3289	-1.3153
554730	MC	0	127	0	127	0.84	0.84	-0.9596	-1.0004
557917	MC	1	88	4	85	0.65	0.70	0.2988	0.0305
554765	MC	1	89	4	86	0.66	0.67	0.2373	0.2239
554768	MC	1	90	4	87	0.52	0.54	0.9807	0.9025
554762	MC	1	91	4	88	0.59	0.61	0.6252	0.5190
554764	MC	1	92	4	89	0.83	0.82	-0.8357	-0.8530
554769	MC	1	93	4	91	0.61	0.65	0.5208	0.2990
554761	MC	1	94	4	93	0.80	0.81	-0.6098	-0.7283
554771	MC	1	95	4	94	0.52	0.45	0.9775	1.4170
554843	MC	6	88	2	85	0.73	0.75	-0.1789	-0.2308
554837	MC	6	89	2	86	0.77	0.78	-0.4616	-0.4569
554842	MC	6	90	2	88	0.71	0.71	-0.0560	0.0189
554847	MC	6	91	2	89	0.60	0.58	0.5827	0.7447
554840	MC	6	92	2	90	0.85	0.85	-1.0676	-1.0883
554848	MC	6	93	2	91	0.61	0.63	0.5008	0.4767
554839	MC	6	94	2	93	0.77	0.75	-0.4189	-0.2548
554844	MC	6	95	2	94	0.55	0.58	0.8123	0.7145
554731	OE	0	128	0	128	0.50	0.49	0.8805	1.1347
<b>Mean</b>						0.70	0.70	-0.03	-0.05

## Appendix J: Linking Item Statistics

### Reading Grade 4

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
555025	MC	0	44	0	42	0.71	0.72	-0.0061	-0.0755
555018	MC	0	45	0	43	0.73	0.74	-0.1190	-0.1568
555015	MC	0	46	0	44	0.49	0.51	1.1486	1.1117
555019	MC	0	47	0	45	0.64	0.65	0.3760	0.3658
555016	MC	0	48	0	46	0.77	0.78	-0.4061	-0.4681
555014	MC	0	49	0	48	0.77	0.75	-0.3678	-0.2178
555021	MC	0	50	0	47	0.78	0.80	-0.4619	-0.6158
555098	MC	0	131	0	130	0.89	0.91	-1.4513	-1.6186
555100	MC	0	132	0	131	0.76	0.77	-0.3196	-0.3744
555101	MC	0	133	0	132	0.80	0.81	-0.6319	-0.6976
555106	MC	0	134	0	134	0.79	0.79	-0.5016	-0.5030
555103	MC	0	136	0	136	0.77	0.76	-0.3937	-0.3287
555105	MC	0	137	0	137	0.56	0.57	0.7896	0.7731
555099	MC	0	138	0	138	0.67	0.67	0.2391	0.2438
555053	MC	1	89	6	84	0.73	0.73	-0.1463	-0.1166
555046	MC	1	90	6	85	0.78	0.74	-0.4375	-0.1779
555047	MC	1	91	6	86	0.69	0.70	0.1006	0.0414
555054	MC	1	92	6	87	0.46	0.47	1.3246	1.3021
555050	MC	1	93	6	88	0.81	0.78	-0.6494	-0.4862
555056	MC	1	94	6	89	0.73	0.74	-0.1128	-0.1958
555049	MC	1	95	6	90	0.65	0.64	0.3545	0.3933
555052	MC	1	96	6	93	0.44	0.46	1.4215	1.3448
555113	MC	6	89	1	85	0.76	0.78	-0.4028	-0.4282
555115	MC	6	90	1	88	0.61	0.63	0.4632	0.4966
555123	MC	6	91	1	90	0.71	0.70	-0.0511	0.1107
555121	MC	6	92	1	84	0.65	0.65	0.2939	0.3658
555116	MC	6	93	1	91	0.78	0.75	-0.5054	-0.2238
555114	MC	6	94	1	86	0.47	0.47	1.1659	1.3112
555118	MC	6	95	1	93	0.62	0.67	0.4197	0.2713
555117	MC	6	96	1	92	0.62	0.68	0.4251	0.2183
555026	OE	0	52	0	50	0.56	0.55	0.8274	0.9036
555111	OE	0	139	0	139	0.46	0.48	1.2324	1.1872
<b>Mean</b>						0.68	0.68	0.11	0.12

## Appendix J: Linking Item Statistics

### Reading Grade 5

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
555249	MC	0	44	0	44	0.45	0.48	1.4729	1.3283
555251	MC	0	45	0	46	0.85	0.87	-0.8670	-1.1057
555250	MC	0	46	0	47	0.69	0.72	0.2300	0.0183
555257	MC	0	47	0	48	0.82	0.82	-0.6617	-0.6577
555248	MC	0	48	0	49	0.89	0.89	-1.2972	-1.3978
555253	MC	0	49	0	50	0.72	0.71	0.0349	0.1023
555252	MC	0	50	0	51	0.64	0.65	0.4797	0.4287
555362	MC	0	131	0	131	0.79	0.80	-0.4393	-0.5205
555360	MC	0	132	0	132	0.60	0.62	0.7034	0.6198
555363	MC	0	133	0	133	0.67	0.71	0.3457	0.1057
555364	MC	0	135	0	134	0.56	0.55	0.8951	0.9490
555368	MC	0	136	0	135	0.60	0.65	0.6709	0.4527
555366	MC	0	137	0	136	0.74	0.71	-0.0662	0.0978
555370	MC	0	138	0	137	0.74	0.75	-0.0710	-0.1666
555335	MC	1	88	1	86	0.84	0.83	-0.8895	-0.7624
555334	MC	1	89	1	88	0.88	0.89	-1.2778	-1.3211
555333	MC	1	90	1	89	0.45	0.43	1.3569	1.5209
555339	MC	1	91	1	91	0.66	0.65	0.3202	0.4168
555337	MC	1	92	1	92	0.53	0.52	0.9985	1.0796
555338	MC	1	93	1	93	0.79	0.79	-0.5258	-0.4406
555340	MC	1	94	1	94	0.51	0.48	1.0956	1.2969
555341	MC	1	95	1	95	0.44	0.45	1.4285	1.4357
557612	MC	6	88	3	86	0.89	0.89	-1.3417	-1.2935
557613	MC	6	89	3	87	0.79	0.78	-0.3661	-0.3666
557614	MC	6	90	3	88	0.87	0.85	-1.1055	-0.8575
557615	MC	6	91	3	89	0.91	0.89	-1.4918	-1.3097
557617	MC	6	92	3	91	0.71	0.73	0.0967	-0.0196
557618	MC	6	93	3	92	0.80	0.78	-0.4570	-0.3557
557620	MC	6	94	3	94	0.72	0.66	0.0739	0.3919
557619	MC	6	95	3	93	0.60	0.60	0.7170	0.7327
555260	OE	0	51	0	52	0.55	0.54	0.7686	0.7000
555372	OE	0	139	0	139	0.53	0.53	1.0332	1.0051
<b>Mean</b>						0.69	0.69	0.06	0.07

## Appendix J: Linking Item Statistics

### Reading Grade 6

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
557416	MC	0	43	0	44	0.85	0.85	-1.0620	-1.1413
557420	MC	0	44	0	45	0.67	0.68	0.1562	0.0743
557421	MC	0	45	0	46	0.61	0.64	0.4590	0.3258
557424	MC	0	46	0	47	0.59	0.62	0.5632	0.4270
557418	MC	0	47	0	48	0.71	0.74	-0.0661	-0.2500
557427	MC	0	48	0	49	0.52	0.53	0.9367	0.9213
557431	MC	0	119	0	120	0.60	0.56	0.5500	0.7495
557430	MC	0	120	0	121	0.83	0.83	-0.8756	-0.9126
557433	MC	0	121	0	122	0.76	0.76	-0.4014	-0.4057
557437	MC	0	122	0	123	0.79	0.80	-0.5761	-0.6517
557439	MC	0	123	0	124	0.76	0.79	-0.3761	-0.6280
557502	MC	1	86	3	85	0.75	0.75	-0.3101	-0.3207
557506	MC	1	87	3	87	0.82	0.80	-0.8472	-0.6865
557503	MC	1	88	3	88	0.80	0.78	-0.6612	-0.5769
557512	MC	1	89	3	89	0.60	0.59	0.5106	0.5716
557510	MC	1	90	3	90	0.70	0.69	-0.0115	0.0595
557504	MC	1	91	3	91	0.65	0.70	0.2642	0.0052
557509	MC	1	92	3	92	0.84	0.84	-0.9790	-1.0084
557508	MC	1	93	3	93	0.68	0.67	0.0938	0.1687
553037	MC	6	86	4	85	0.58	0.62	0.6322	0.4710
553028	MC	6	87	4	84	0.75	0.74	-0.3219	-0.2223
553032	MC	6	88	4	86	0.60	0.60	0.5199	0.5849
553033	MC	6	89	4	88	0.82	0.80	-0.8248	-0.6555
553036	MC	6	90	4	89	0.80	0.79	-0.7047	-0.5928
553034	MC	6	91	4	91	0.58	0.56	0.6395	0.7630
553035	MC	6	92	4	92	0.69	0.69	0.0384	0.0308
553039	MC	6	93	4	93	0.61	0.61	0.4482	0.5215
557428	OE	0	49	0	50	0.58	0.60	0.6361	0.5408
557442	OE	0	124	0	125	0.56	0.57	0.5066	0.4442
<b>Mean</b>						0.69	0.70	-0.04	-0.05

## Appendix J: Linking Item Statistics

### Reading Grade 7

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
555591	MC	0	33	0	34	0.75	0.76	-0.2633	-0.3396
555594	MC	0	34	0	35	0.67	0.67	0.2347	0.2213
555587	MC	0	35	0	36	0.66	0.68	0.2533	0.1649
555588	MC	0	36	0	37	0.88	0.89	-1.3504	-1.4521
555593	MC	0	37	0	38	0.78	0.79	-0.4731	-0.5300
555592	MC	0	38	0	39	0.63	0.66	0.4141	0.3090
555459	MC	0	132	0	132	0.78	0.77	-0.4901	-0.4009
555467	MC	0	133	0	133	0.57	0.59	0.7584	0.6637
555458	MC	0	134	0	134	0.70	0.68	0.0207	0.1725
555461	MC	0	135	0	135	0.76	0.77	-0.3364	-0.3957
555466	MC	0	136	0	136	0.58	0.61	0.6834	0.5498
555463	MC	0	137	0	137	0.65	0.68	0.3268	0.1646
555468	MC	0	138	0	138	0.47	0.46	1.2389	1.2958
547995	MC	1	84	5	81	0.61	0.58	0.5246	0.7242
547985	MC	1	85	5	83	0.59	0.62	0.6494	0.5073
547983	MC	1	86	5	84	0.75	0.75	-0.2705	-0.2460
547986	MC	1	87	5	85	0.81	0.79	-0.7125	-0.5139
547987	MC	1	88	5	86	0.88	0.87	-1.3099	-1.2449
547993	MC	1	89	5	87	0.77	0.75	-0.4434	-0.2290
547988	MC	1	90	5	88	0.90	0.88	-1.5483	-1.3257
547989	MC	1	91	5	90	0.77	0.75	-0.4142	-0.2298
555573	MC	6	84	7	81	0.74	0.74	-0.2280	-0.1726
555580	MC	6	85	7	83	0.51	0.49	1.0346	1.1263
555571	MC	6	86	7	84	0.74	0.76	-0.1829	-0.3267
555581	MC	6	87	7	85	0.71	0.71	-0.0144	-0.0131
555575	MC	6	88	7	86	0.66	0.66	0.2431	0.2615
555576	MC	6	89	7	88	0.47	0.52	1.2168	1.0065
555578	MC	6	90	7	89	0.59	0.56	0.6169	0.8124
555572	MC	6	91	7	90	0.57	0.59	0.7629	0.6387
555597	OE	0	39	0	40	0.60	0.59	0.4891	0.4656
555471	OE	0	139	0	139	0.58	0.58	0.6818	0.7181
<b>Mean</b>						0.68	0.68	0.07	0.08

## Appendix J: Linking Item Statistics

### Reading Grade 8

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
555686	MC	0	27	0	28	0.73	0.74	0.4280	0.3362
555677	MC	0	28	0	29	0.56	0.58	1.3404	1.2338
555679	MC	0	29	0	30	0.82	0.86	-0.2415	-0.5334
555684	MC	0	30	0	31	0.76	0.78	0.2648	0.1221
555683	MC	0	32	0	32	0.81	0.83	-0.1651	-0.3103
555682	MC	0	33	0	33	0.38	0.39	2.2710	2.1292
555694	MC	0	132	0	133	0.70	0.69	0.6192	0.6616
555698	MC	0	133	0	134	0.69	0.71	0.6490	0.5595
555691	MC	0	135	0	136	0.65	0.66	0.8911	0.8077
555702	MC	0	137	0	137	0.66	0.63	0.8103	0.9695
555700	MC	0	138	0	138	0.55	0.55	1.4314	1.3660
555673	MC	1	85	9	83	0.72	0.70	0.5041	0.5690
555667	MC	1	86	9	84	0.60	0.59	1.1359	1.1669
555663	MC	1	87	9	85	0.51	0.53	1.6186	1.4674
555669	MC	1	88	9	86	0.61	0.56	1.1029	1.2854
555664	MC	1	89	9	87	0.74	0.75	0.3827	0.2943
555668	MC	1	90	9	89	0.49	0.45	1.7056	1.8225
555665	MC	1	91	9	91	0.75	0.74	0.3260	0.3271
555666	MC	1	92	9	92	0.81	0.81	-0.0856	-0.1352
555906	MC	6	85	5	83	0.73	0.71	0.4270	0.5228
555900	MC	6	86	5	84	0.79	0.79	-0.0087	0.0720
555905	MC	6	87	5	85	0.74	0.73	0.3439	0.4578
555904	MC	6	88	5	86	0.83	0.83	-0.2664	-0.2341
555899	MC	6	89	5	87	0.47	0.47	1.7879	1.7806
555898	MC	6	90	5	88	0.88	0.88	-0.7888	-0.7392
555901	MC	6	91	5	89	0.55	0.55	1.4073	1.4014
555902	MC	6	92	5	92	0.74	0.71	0.3769	0.5538
555690	OE	0	34	0	34	0.63	0.62	0.5568	0.7401
555705	OE	0	139	0	139	0.60	0.60	1.0496	1.0597
<b>Mean</b>						0.67	0.67	0.69	0.68

## Appendix J: Linking Item Statistics

### Reading Grade 11

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
555965	MC	0	27	0	27	0.77	0.78	-0.4550	-0.5445
557934	MC	0	29	0	28	0.88	0.89	-1.4455	-1.5706
555964	MC	0	30	0	29	0.82	0.83	-0.8216	-0.9367
555968	MC	0	31	0	30	0.61	0.61	0.4865	0.4336
555969	MC	0	32	0	32	0.44	0.39	1.3492	1.5659
555974	MC	0	33	0	34	0.77	0.80	-0.4933	-0.6532
556177	MC	0	131	0	130	0.59	0.61	0.5900	0.4349
556176	MC	0	132	0	131	0.76	0.75	-0.3803	-0.3217
556183	MC	0	133	0	132	0.57	0.55	0.6796	0.7404
556179	MC	0	134	0	133	0.67	0.68	0.1123	0.0427
556182	MC	0	135	0	134	0.87	0.88	-1.3005	-1.4103
556181	MC	0	136	0	135	0.57	0.57	0.6881	0.6401
556184	MC	0	137	0	137	0.55	0.56	0.7718	0.7173
556186	MC	0	138	0	138	0.56	0.56	0.7162	0.7191
555979	MC	1	88	5	87	0.81	0.78	-0.7608	-0.5952
555977	MC	1	89	5	88	0.36	0.36	1.7612	1.7056
555987	MC	1	90	5	89	0.68	0.65	0.1227	0.2354
555983	MC	1	91	5	90	0.64	0.62	0.3311	0.3760
555980	MC	1	92	5	91	0.60	0.58	0.5386	0.5906
555988	MC	1	93	5	93	0.72	0.71	-0.1590	-0.1355
555978	MC	1	94	5	94	0.74	0.72	-0.2297	-0.1399
555985	MC	1	95	5	95	0.69	0.67	0.0710	0.1359
556249	MC	6	88	1	86	0.69	0.69	0.0155	0.0317
556243	MC	6	89	1	87	0.67	0.69	0.0863	0.0366
556247	MC	6	90	1	88	0.89	0.90	-1.5306	-1.6739
556245	MC	6	91	1	89	0.66	0.64	0.1800	0.2729
556250	MC	6	92	1	90	0.66	0.60	0.1720	0.4854
556244	MC	6	93	1	91	0.67	0.68	0.1184	0.1009
556252	MC	6	94	1	92	0.64	0.64	0.2693	0.2679
556251	MC	6	95	1	95	0.60	0.58	0.5015	0.5850
555975	OE	0	34	0	35	0.65	0.67	0.0950	-0.0390
556187	OE	0	139	0	139	0.66	0.65	0.1222	0.0938
<b>Mean</b>						0.67	0.67	0.07	0.07

## Appendix J: Linking Item Statistics

Science Grade 4

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
558248	MC	0	3	0	3	0.49	0.49	1.3346	1.3764
558232	MC	0	5	0	5	0.73	0.73	0.0584	0.0347
554104	MC	0	6	0	6	0.64	0.68	0.5863	0.3254
554192	MC	0	11	0	11	0.56	0.54	0.9943	1.0964
558277	MC	0	14	0	14	0.77	0.78	-0.1659	-0.2946
558233	MC	0	15	0	15	0.64	0.66	0.5568	0.4533
553975	MC	0	16	0	16	0.74	0.75	0.0225	-0.0502
558202	MC	0	23	0	23	0.81	0.82	-0.4358	-0.5817
558242	MC	0	26	0	26	0.87	0.86	-1.0296	-0.9270
554129	MC	0	44	0	44	0.84	0.84	-0.7424	-0.7747
558241	MC	0	48	0	48	0.87	0.87	-0.9712	-1.0470
558284	MC	0	57	0	57	0.63	0.63	0.6355	0.6504
558240	MC	0	59	0	59	0.71	0.69	0.2082	0.2668
558286	MC	0	62	0	62	0.76	0.71	-0.1421	0.1979
558252	MC	0	65	0	65	0.75	0.79	-0.0782	-0.3684
554078	MC	0	66	0	66	0.80	0.79	-0.4205	-0.3857
549576	MC	1	30	2	30	0.79	0.76	-0.3282	-0.1925
554248	MC	1	67	12	67	0.62	0.57	0.6876	0.8697
559873	MC	2	32	4	32	0.62	0.61	0.6980	0.7434
559995	MC	2	70	10	70	0.56	0.53	0.9945	1.1579
560027	MC	3	33	11	34	0.72	0.74	0.1314	-0.0429
554044	MC	3	69	4	67	0.74	0.58	0.0400	0.8703
559772	MC	4	33	2	33	0.82	0.79	-0.5427	-0.3510
558207	MC	4	67	9	67	0.62	0.64	0.7188	0.5795
559868	MC	5	33	1	33	0.61	0.64	0.6515	0.5615
560026	MC	5	69	8	69	0.68	0.66	0.4043	0.4730
559847	MC	6	30	10	31	0.63	0.63	0.6100	0.6360
559923	MC	6	69	10	68	0.60	0.65	0.7611	0.5558
559899	MC	7	33	1	34	0.60	0.59	0.6989	0.8651
559987	MC	7	69	5	69	0.63	0.64	0.6120	0.5793
559882	MC	8	31	5	31	0.66	0.65	0.4806	0.5506
559997	MC	8	71	8	71	0.62	0.63	0.6839	0.6448
554038	MC	9	30	3	30	0.54	0.50	1.0510	1.3312
560028	MC	9	68	9	68	0.71	0.71	0.2161	0.1909
559848	MC	10	32	11	32	0.80	0.78	-0.3756	-0.2508
559983	MC	10	68	7	68	0.58	0.62	0.8695	0.7225
559774	MC	11	31	8	31	0.85	0.88	-0.7465	-1.1535
554241	MC	11	67	6	67	0.77	0.79	-0.1719	-0.3673
554211	MC	12	30	12	30	0.82	0.81	-0.5506	-0.5161
559894	MC	12	71	2	71	0.71	0.72	0.2202	0.1418
558285	OE	0	72	0	72	0.65	0.64	0.5901	0.5039
558266	OE	0	73	0	73	0.65	0.64	0.2161	0.1961
<b>Mean</b>						0.70	0.69	0.22	0.22

## Appendix J: Linking Item Statistics

Science Grade 8

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
549640	MC	0	1	0	1	0.91	0.91	-2.1624	-2.1545
558422	MC	0	7	0	7	0.84	0.84	-1.4223	-1.4028
549686	MC	0	8	0	8	0.60	0.64	0.0339	-0.1385
558419	MC	0	9	0	9	0.63	0.63	-0.0939	-0.1030
549861	MC	0	14	0	14	0.61	0.61	-0.0187	0.0028
558415	MC	0	19	0	19	0.63	0.67	-0.0988	-0.3216
558350	MC	0	24	0	24	0.60	0.60	0.0525	0.0479
549831	MC	0	25	0	25	0.65	0.64	-0.2007	-0.1241
558290	MC	0	26	0	26	0.63	0.65	-0.1318	-0.1781
549837	MC	0	27	0	27	0.69	0.69	-0.4068	-0.4100
549820	MC	0	49	0	49	0.54	0.61	0.3588	0.0407
558299	MC	0	53	0	53	0.81	0.82	-1.2344	-1.2914
549743	MC	0	54	0	54	0.64	0.64	-0.1440	-0.1171
558301	MC	0	60	0	60	0.77	0.79	-0.8964	-1.0387
558395	MC	0	62	0	62	0.75	0.74	-0.7705	-0.7055
549698	MC	0	63	0	63	0.69	0.69	-0.4337	-0.4391
560014	MC	1	34	2	34	0.59	0.60	0.0904	0.0071
560305	MC	1	73	4	73	0.56	0.54	0.2557	0.2934
559904	MC	2	34	1	34	0.62	0.59	-0.0910	0.0891
560012	MC	2	73	8	73	0.58	0.57	0.1773	0.2272
559888	MC	3	35	5	35	0.58	0.59	0.1635	0.1273
559891	MC	3	72	2	72	0.71	0.68	-0.5401	-0.3799
559915	MC	4	32	8	33	0.58	0.57	0.1694	0.2379
559976	MC	4	72	12	72	0.64	0.67	-0.1253	-0.2617
560087	MC	5	33	12	33	0.56	0.54	0.2515	0.3808
559974	MC	5	72	5	72	0.62	0.63	-0.0407	-0.0904
549599	MC	6	32	7	32	0.64	0.63	-0.1855	-0.0819
559940	MC	6	72	11	73	0.45	0.38	0.7530	1.1812
558357	MC	7	32	2	32	0.71	0.72	-0.5310	-0.5908
549655	MC	7	70	8	70	0.40	0.43	1.0421	0.9774
560002	MC	8	35	3	35	0.71	0.72	-0.5591	-0.5703
559964	MC	8	71	8	71	0.51	0.46	0.4921	0.7748
560108	MC	9	35	2	35	0.55	0.57	0.2924	0.2233
549855	MC	9	70	12	70	0.59	0.57	0.1150	0.2097
559970	MC	10	35	6	35	0.57	0.56	0.1728	0.2735
558408	MC	10	70	4	70	0.50	0.52	0.5330	0.4962
560090	MC	11	34	12	35	0.50	0.59	0.5289	0.1152
549790	MC	11	70	7	70	0.49	0.53	0.5833	0.4391
559942	MC	12	33	10	33	0.70	0.72	-0.4859	-0.5838
559943	MC	12	72	7	72	0.39	0.39	1.0568	1.1501
558310	SCR	0	37	0	37	0.42	0.42	0.8995	0.9731
549793	SCR	0	75	0	75	0.50	0.50	0.5435	0.5459
<b>Mean</b>						0.61	0.62	-0.05	-0.05

## Appendix J: Linking Item Statistics

Science Grade 11

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
549937	MC	0	3	0	3	0.74	0.74	-0.8002	-0.7569
549999	MC	0	4	0	4	0.84	0.84	-1.4805	-1.4300
558196	MC	0	6	0	6	0.76	0.77	-0.8985	-0.9512
554349	MC	0	7	0	7	0.89	0.89	-1.9036	-1.9223
554366	MC	0	10	0	10	0.79	0.79	-1.1239	-1.0949
558075	MC	0	11	0	11	0.65	0.67	-0.2851	-0.3765
549891	MC	0	12	0	12	0.85	0.85	-1.5825	-1.5286
558153	MC	0	14	0	14	0.59	0.59	0.0188	0.0291
550001	MC	0	28	0	28	0.77	0.76	-0.9877	-0.8991
558162	MC	0	30	0	30	0.64	0.64	-0.2366	-0.2309
558059	MC	0	33	0	33	0.54	0.54	0.2891	0.2732
558103	MC	0	51	0	51	0.79	0.83	-1.1316	-1.4031
558163	MC	0	52	0	52	0.71	0.72	-0.6048	-0.6813
558183	MC	0	53	0	53	0.55	0.51	0.2519	0.4485
550002	MC	0	55	0	55	0.82	0.85	-1.3103	-1.5420
554338	MC	1	46	3	46	0.38	0.38	1.0629	1.0551
549961	MC	1	69	3	69	0.49	0.48	0.5133	0.5810
559948	MC	2	47	4	47	0.47	0.43	0.6385	0.8062
549932	MC	2	69	1	69	0.50	0.48	0.4849	0.6039
559857	MC	3	48	7	48	0.39	0.38	0.9875	1.0539
550000	MC	3	69	7	69	0.44	0.40	0.8018	0.9607
554369	MC	4	46	7	46	0.54	0.53	0.2777	0.3230
554351	MC	4	69	2	69	0.63	0.60	-0.1640	-0.0217
558159	MC	5	46	4	46	0.46	0.47	0.6748	0.6162
560066	MC	5	71	2	71	0.37	0.36	1.1285	1.1622
549977	MC	6	46	1	46	0.46	0.48	0.6592	0.6006
559912	MC	6	70	4	70	0.50	0.51	0.4802	0.4546
549912	MC	7	46	6	46	0.45	0.47	0.7023	0.6018
554391	MC	7	69	6	69	0.39	0.41	1.0335	0.9134
559858	MC	8	49	6	49	0.36	0.35	1.1572	1.2287
560103	MC	8	71	1	48	0.51	0.53	0.4178	0.3396
558140	SCR	0	15	0	15	0.24	0.25	1.7872	1.6952
558116	SCR	0	39	0	39	0.42	0.42	0.8679	0.8408
<b>Mean</b>						0.57	0.57	0.05	0.05

## Appendix J: Linking Item Statistics

### Writing Grade 5

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
560216	MC	0	1	1	5	0.80	0.82	-0.0842	-0.3231
560215	MC	0	2	1	6	0.52	0.45	1.9967	2.7459
560217	MC	0	3	1	7	0.40	0.41	2.8387	3.1281
560218	MC	0	4	1	8	0.78	0.82	0.0630	-0.2553
560366	MC	0	9	5	5	0.68	0.69	0.8572	0.8859
553781	MC	0	10	5	6	0.73	0.72	0.5363	0.6195
553782	MC	0	11	5	7	0.68	0.67	0.8850	1.0981
553779	MC	0	12	5	8	0.74	0.73	0.4007	0.5368
560185	MC	0	17	4	13	0.71	0.72	0.6805	0.6732
560169	MC	0	18	4	14	0.81	0.80	-0.1900	-0.0886
560186	MC	0	19	4	15	0.84	0.82	-0.4698	-0.2857
560188	MC	0	20	4	16	0.88	0.86	-1.0002	-0.7707
559496	OE	0	21	2	23	0.67	0.65	1.7325	2.2716
559496	OE	0	21	2	23	0.66	0.65	1.7351	2.1511
559636	OE	0	22	5	23	0.67	0.64	1.7990	2.3716
559636	OE	0	22	5	23	0.66	0.64	1.9241	2.3192
<b>Mean</b>						0.70	0.69	0.86	1.07

## Appendix J: Linking Item Statistics

### Writing Grade 8

ID	Type	Form	Seq	Prev	Prev	Prev	P-Val	P-Val	Prev	Meas
				Form	Seq	P-Val			Meas	
560393	MC	0	1	3	13	0.56	0.59	1.9023	1.9725	
560390	MC	0	2	3	14	0.49	0.54	2.3656	2.3987	
560389	MC	0	3	3	15	0.70	0.73	0.8298	0.8308	
560391	MC	0	4	3	16	0.65	0.63	1.2695	1.6908	
559813	MC	0	9	3	5	0.81	0.84	-0.1611	-0.2497	
559815	MC	0	10	3	6	0.64	0.65	1.3134	1.5375	
559814	MC	0	11	3	7	0.83	0.82	-0.3450	-0.0566	
559816	MC	0	12	3	8	0.82	0.81	-0.2077	0.1115	
557743	MC	0	17	2	13	0.67	0.64	1.0327	1.6011	
557961	MC	0	18	2	14	0.86	0.86	-0.7222	-0.5494	
557744	MC	0	19	2	15	0.75	0.76	0.3760	0.5594	
557745	MC	0	20	2	16	0.68	0.64	0.9961	1.6398	
559680	OE	0	21	1	23	0.69	0.69	1.4018	1.6878	
559680	OE	0	21	1	23	0.68	0.69	1.5582	1.6777	
559693	OE	0	22	4	23	0.68	0.67	1.6521	2.0173	
559693	OE	0	22	4	23	0.67	0.67	1.7073	2.0442	
<b>Mean</b>						0.70	0.70	0.94	1.18	

## Appendix J: Linking Item Statistics

### Writing Grade 11

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
560296	MC	0	1	3	5	0.80	0.79	-0.3052	-0.0775
560297	MC	0	2	3	6	0.64	0.68	1.1102	0.8651
560299	MC	0	3	3	7	0.96	0.96	-3.0625	-2.9594
560298	MC	0	4	3	8	0.76	0.74	0.0766	0.3714
553855	MC	0	9	2	5	0.81	0.73	-0.4131	0.4654
553856	MC	0	10	2	6	0.65	0.63	1.0432	1.2947
553854	MC	0	11	2	7	0.79	0.79	-0.1934	-0.1281
553857	MC	0	12	2	8	0.85	0.84	-0.8074	-0.6803
560279	MC	0	17	5	13	0.53	0.49	1.9214	2.3846
560276	MC	0	18	5	14	0.86	0.85	-0.9878	-0.7961
560275	MC	0	19	5	15	0.82	0.81	-0.5363	-0.3402
560277	MC	0	20	5	16	0.88	0.87	-1.2519	-1.0830
559593	OE	0	21	3	23	0.70	0.68	1.3814	1.8044
559593	OE	0	21	3	23	0.68	0.68	1.7178	1.8259
559611	OE	0	22	4	23	0.72	0.70	0.8872	1.3560
559611	OE	0	22	4	23	0.71	0.70	1.1981	1.3717
<b>Mean</b>						0.76	0.74	0.11	0.35

## Appendix K:

### Reliabilities

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<b>Column Heading</b>	<b>Definition</b>
Strand	Strand (Tot.=total)
Group	Subgroup
Pts.	Points possible
Len.	Length
N	N
Mean	Mean
<i>SD</i>	Standard deviation
r	Reliability coefficient
<i>SEM</i>	Standard error of measurement
Items	Item types present

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Appendix K: Reliabilities

Mathematics Grade 3

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	72	63	126676	60.3	9.97	0.91	3.0	MC/OE
	A	All	31	28	126676	25.9	5.04	0.85	1.9	MC/OE
	B	All	10	10	126676	8.1	1.79	0.61	1.1	MC
	C	All	11	8	126676	9.4	1.77	0.50	1.2	MC/OE
	D	All	11	8	126676	8.4	2.08	0.54	1.4	MC/OE
	E	All	9	9	126676	8.5	0.99	0.64	0.6	MC

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	Male		72	63	64769	60.3	10.14	0.91	3.0	MC/OE
		Female		72	63	61745	60.4	9.77	0.91	3.0	MC/OE
	A	Male		31	28	64769	25.9	5.06	0.85	1.9	MC/OE
		Female		31	28	61745	25.9	5.01	0.85	2.0	MC/OE
	B	Male		10	10	64769	8.1	1.78	0.62	1.1	MC
		Female		10	10	61745	8.0	1.78	0.60	1.1	MC
	C	Male		11	8	64769	9.4	1.82	0.52	1.3	MC/OE
		Female		11	8	61745	9.5	1.71	0.48	1.2	MC/OE
	D	Male		11	8	64769	8.4	2.11	0.56	1.4	MC/OE
		Female		11	8	61745	8.5	2.05	0.53	1.4	MC/OE
	E	Male		9	9	64769	8.5	1.04	0.66	0.6	MC
		Female		9	9	61745	8.6	0.93	0.61	0.6	MC

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	White		72	63	90621	62.0	8.41	0.88	2.9	MC/OE
		Af. Amer.		72	63	19592	54.2	12.43	0.93	3.4	MC/OE
		Hispanic		72	63	10222	56.1	11.85	0.92	3.3	MC/OE
		Asian		72	63	4149	64.3	7.45	0.88	2.6	MC/OE
		Am. Indian		72	63	184	57.7	11.33	0.92	3.2	MC/OE
		Multi		72	63	1733	58.6	10.49	0.91	3.1	MC/OE
		A	White		31	28	90621	26.6	4.33	0.82	1.9
	Af. Amer.			31	28	19592	23.0	6.19	0.87	2.2	MC/OE
	Hispanic			31	28	10222	23.8	5.96	0.87	2.2	MC/OE
	Asian			31	28	4149	27.8	3.76	0.80	1.7	MC/OE
	Am. Indian			31	28	184	24.5	6.02	0.88	2.0	MC/OE
	Multi			31	28	1733	25.0	5.34	0.85	2.1	MC/OE
	B		White		10	10	90621	8.4	1.56	0.54	1.1
		Af. Amer.		10	10	19592	7.0	2.13	0.64	1.3	MC
		Hispanic		10	10	10222	7.3	2.03	0.63	1.2	MC
		Asian		10	10	4149	8.6	1.47	0.53	1.0	MC
		Am. Indian		10	10	184	7.7	1.87	0.59	1.2	MC
		Multi		10	10	1733	7.7	1.90	0.61	1.2	MC
		C	White		11	8	90621	9.6	1.58	0.45	1.2
	Af. Amer.			11	8	19592	8.6	2.14	0.54	1.4	MC/OE
	Hispanic			11	8	10222	8.9	2.01	0.53	1.4	MC/OE
	Asian			11	8	4149	10.0	1.44	0.45	1.1	MC/OE
	Am. Indian			11	8	184	9.2	1.89	0.50	1.3	MC/OE
	Multi			11	8	1733	9.2	1.81	0.47	1.3	MC/OE
	D		White		11	8	90621	8.7	1.90	0.48	1.4
		Af. Amer.		11	8	19592	7.6	2.42	0.62	1.5	MC/OE
		Hispanic		11	8	10222	7.8	2.38	0.61	1.5	MC/OE
Asian			11	8	4149	9.2	1.64	0.42	1.2	MC/OE	

Appendix K: Reliabilities

	Am. Indian	11	8	184	7.9	2.21	0.54	1.5	MC/OE
	Multi	11	8	1733	8.2	2.13	0.55	1.4	MC/OE
E	White	9	9	90621	8.7	0.77	0.54	0.5	MC
	Af. Amer.	9	9	19592	8.1	1.46	0.70	0.8	MC
	Hispanic	9	9	10222	8.3	1.30	0.69	0.7	MC
	Asian	9	9	4149	8.8	0.69	0.56	0.5	MC
	Am. Indian	9	9	184	8.4	1.11	0.65	0.7	MC
	Multi	9	9	1733	8.4	1.12	0.66	0.7	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
ELL	Tot.	All	72	63	4135	52.5	12.82	0.93	3.5	MC/OE
	A	All	31	28	4135	22.1	6.42	0.87	2.3	MC/OE
	B	All	10	10	4135	6.8	2.07	0.61	1.3	MC
	C	All	11	8	4135	8.5	2.20	0.54	1.5	MC/OE
	D	All	11	8	4135	7.2	2.50	0.63	1.5	MC/OE
	E	All	9	9	4135	7.9	1.59	0.73	0.8	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
IEP	Tot.	All	72	63	18626	52.8	13.65	0.94	3.5	MC/OE
	A	All	31	28	18626	22.2	6.87	0.89	2.2	MC/OE
	B	All	10	10	18626	7.1	2.22	0.68	1.3	MC
	C	All	11	8	18626	8.5	2.25	0.58	1.5	MC/OE
	D	All	11	8	18626	7.0	2.58	0.64	1.5	MC/OE
	E	All	9	9	18626	8.0	1.57	0.73	0.8	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
Eco. Disadv.	Tot.	All	72	63	54299	56.9	11.38	0.92	3.3	MC/OE
	A	All	31	28	54299	24.2	5.75	0.86	2.1	MC/OE
	B	All	10	10	54299	7.5	1.98	0.63	1.2	MC
	C	All	11	8	54299	9.0	1.97	0.52	1.4	MC/OE
	D	All	11	8	54299	7.9	2.29	0.59	1.5	MC/OE
	E	All	9	9	54299	8.3	1.23	0.67	0.7	MC

Appendix K: Reliabilities

Mathematics Grade 4

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	72	63	126333	49.1	12.95	0.92	3.7	MC/OE
	A	All	32	29	126333	20.8	6.48	0.86	2.5	MC/OE
	B	All	11	8	126333	7.2	2.72	0.66	1.6	MC/OE
	C	All	10	10	126333	7.0	2.03	0.61	1.3	MC
	D	All	10	7	126333	6.7	2.12	0.49	1.5	MC/OE
	E	All	9	9	126333	7.5	1.67	0.66	1.0	MC

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	Male	72	63	64345	49.7	13.08	0.92	3.7	MC/OE
		Female	72	63	61818	48.5	12.78	0.92	3.7	MC/OE
	A	Male	32	29	64345	21.1	6.56	0.86	2.4	MC/OE
		Female	32	29	61818	20.5	6.39	0.85	2.5	MC/OE
	B	Male	11	8	64345	7.4	2.69	0.66	1.6	MC/OE
		Female	11	8	61818	6.9	2.74	0.65	1.6	MC/OE
	C	Male	10	10	64345	7.0	2.07	0.62	1.3	MC
		Female	10	10	61818	7.0	1.99	0.58	1.3	MC
	D	Male	10	7	64345	6.6	2.13	0.50	1.5	MC/OE
		Female	10	7	61818	6.7	2.10	0.48	1.5	MC/OE
	E	Male	9	9	64345	7.5	1.68	0.67	1.0	MC
		Female	9	9	61818	7.4	1.66	0.65	1.0	MC

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	White	72	63	91254	51.3	11.83	0.91	3.6	MC/OE
		Af. Amer.	72	63	19307	40.7	13.30	0.91	4.0	MC/OE
		Hispanic	72	63	9710	42.8	13.35	0.91	3.9	MC/OE
		Asian	72	63	4085	56.0	11.18	0.91	3.3	MC/OE
		Am. Indian	72	63	194	46.0	12.39	0.90	3.9	MC/OE
		Multi	72	63	1622	46.7	13.39	0.92	3.8	MC/OE
		A	White	32	29	91254	21.8	6.11	0.85	2.4
	Af. Amer.		32	29	19307	17.0	6.38	0.83	2.6	MC/OE
	Hispanic		32	29	9710	17.9	6.42	0.84	2.6	MC/OE
	Asian		32	29	4085	24.4	5.63	0.85	2.2	MC/OE
	Am. Indian		32	29	194	19.3	6.22	0.83	2.6	MC/OE
	Multi		32	29	1622	19.7	6.62	0.86	2.5	MC/OE
	B		White	11	8	91254	7.6	2.51	0.62	1.5
		Af. Amer.	11	8	19307	5.4	2.71	0.61	1.7	MC/OE
		Hispanic	11	8	9710	5.9	2.78	0.63	1.7	MC/OE
		Asian	11	8	4085	8.2	2.43	0.64	1.5	MC/OE
		Am. Indian	11	8	194	6.5	2.68	0.63	1.6	MC/OE
		Multi	11	8	1622	6.6	2.78	0.65	1.7	MC/OE
		C	White	10	10	91254	7.3	1.90	0.57	1.3
	Af. Amer.		10	10	19307	5.9	2.12	0.58	1.4	MC
	Hispanic		10	10	9710	6.3	2.13	0.60	1.3	MC
	Asian		10	10	4085	7.7	1.85	0.59	1.2	MC
	Am. Indian		10	10	194	6.7	2.06	0.60	1.3	MC
	Multi		10	10	1622	6.7	2.12	0.62	1.3	MC
	D		White	10	7	91254	6.8	2.01	0.46	1.5
		Af. Amer.	10	7	19307	5.9	2.30	0.49	1.6	MC/OE
		Hispanic	10	7	9710	6.0	2.25	0.48	1.6	MC/OE
Asian		10	7	4085	7.7	1.84	0.48	1.3	MC/OE	

Appendix K: Reliabilities

	Am. Indian	10	7	194	6.2	2.22	0.48	1.6	MC/OE
	Multi	10	7	1622	6.5	2.16	0.49	1.5	MC/OE
E	White	9	9	91254	7.8	1.43	0.58	0.9	MC
	Af. Amer.	9	9	19307	6.5	2.08	0.70	1.1	MC
	Hispanic	9	9	9710	6.8	1.97	0.69	1.1	MC
	Asian	9	9	4085	8.0	1.32	0.58	0.9	MC
	Am. Indian	9	9	194	7.3	1.54	0.53	1.1	MC
	Multi	9	9	1622	7.3	1.76	0.66	1.0	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
ELL	Tot.	All	72	63	3341	37.7	13.02	0.91	4.0	MC/OE
	A	All	32	29	3341	15.8	6.24	0.82	2.6	MC/OE
	B	All	11	8	3341	5.0	2.60	0.57	1.7	MC/OE
	C	All	10	10	3341	5.4	2.09	0.56	1.4	MC
	D	All	10	7	3341	5.4	2.32	0.47	1.7	MC/OE
	E	All	9	9	3341	6.0	2.13	0.69	1.2	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
IEP	Tot.	All	72	63	18467	40.7	14.32	0.92	4.0	MC/OE
	A	All	32	29	18467	17.1	6.85	0.86	2.6	MC/OE
	B	All	11	8	18467	5.8	2.83	0.65	1.7	MC/OE
	C	All	10	10	18467	5.8	2.21	0.62	1.4	MC
	D	All	10	7	18467	5.5	2.39	0.52	1.7	MC/OE
	E	All	9	9	18467	6.5	2.19	0.74	1.1	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
Eco. Disadv.	Tot.	All	72	63	52599	44.1	13.18	0.91	3.9	MC/OE
	A	All	32	29	52599	18.5	6.45	0.84	2.6	MC/OE
	B	All	11	8	52599	6.1	2.76	0.63	1.7	MC/OE
	C	All	10	10	52599	6.4	2.10	0.59	1.3	MC
	D	All	10	7	52599	6.1	2.21	0.48	1.6	MC/OE
	E	All	9	9	52599	7.0	1.91	0.68	1.1	MC

Appendix K: Reliabilities

Mathematics Grade 5

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	72	63	126419	48.6	13.60	0.93	3.5	MC/OE
	A	All	32	29	126419	21.9	6.75	0.88	2.3	MC/OE
	B	All	11	8	126419	5.5	2.58	0.63	1.6	MC/OE
	C	All	10	7	126419	6.7	2.22	0.54	1.5	MC/OE
	D	All	10	10	126419	7.2	2.00	0.67	1.2	MC
	E	All	9	9	126419	7.2	2.00	0.73	1.0	MC

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	Male		72	63	64509	48.8	13.80	0.93	3.5	MC/OE
		Female		72	63	61743	48.4	13.37	0.93	3.6	MC/OE
	A	Male		32	29	64509	22.1	6.77	0.89	2.3	MC/OE
		Female		32	29	61743	21.7	6.72	0.88	2.3	MC/OE
	B	Male		11	8	64509	5.6	2.59	0.64	1.6	MC/OE
		Female		11	8	61743	5.4	2.56	0.63	1.6	MC/OE
	C	Male		10	7	64509	6.8	2.25	0.55	1.5	MC/OE
		Female		10	7	61743	6.7	2.19	0.52	1.5	MC/OE
	D	Male		10	10	64509	7.3	2.04	0.69	1.1	MC
		Female		10	10	61743	7.2	1.95	0.65	1.2	MC
	E	Male		9	9	64509	7.1	2.05	0.74	1.1	MC
		Female		9	9	61743	7.3	1.93	0.72	1.0	MC

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	White		72	63	91371	50.8	12.56	0.92	3.5	MC/OE
		Af. Amer.		72	63	19594	40.3	13.72	0.93	3.7	MC/OE
		Hispanic		72	63	9819	42.1	14.01	0.93	3.7	MC/OE
		Asian		72	63	3801	55.9	12.02	0.93	3.2	MC/OE
		Am. Indian		72	63	183	45.9	12.54	0.92	3.6	MC/OE
		Multi		72	63	1485	46.6	13.70	0.93	3.6	MC/OE
		A	White		32	29	91371	22.9	6.28	0.87	2.2
	Af. Amer.			32	29	19594	17.9	6.83	0.87	2.5	MC/OE
	Hispanic			32	29	9819	18.7	6.94	0.87	2.5	MC/OE
	Asian			32	29	3801	25.5	5.84	0.88	2.0	MC/OE
	Am. Indian			32	29	183	20.6	6.38	0.86	2.4	MC/OE
	Multi			32	29	1485	20.9	6.82	0.88	2.4	MC/OE
	B		White		11	8	91371	5.9	2.52	0.62	1.6
		Af. Amer.		11	8	19594	4.1	2.24	0.55	1.5	MC/OE
		Hispanic		11	8	9819	4.5	2.37	0.58	1.5	MC/OE
		Asian		11	8	3801	6.8	2.56	0.65	1.5	MC/OE
		Am. Indian		11	8	183	4.8	2.34	0.56	1.6	MC/OE
		Multi		11	8	1485	5.1	2.48	0.61	1.6	MC/OE
		C	White		10	7	91371	7.0	2.10	0.51	1.5
	Af. Amer.			10	7	19594	5.7	2.27	0.54	1.5	MC/OE
	Hispanic			10	7	9819	5.9	2.30	0.56	1.5	MC/OE
	Asian			10	7	3801	7.6	2.01	0.51	1.4	MC/OE
	Am. Indian			10	7	183	6.4	2.21	0.54	1.5	MC/OE
	Multi			10	7	1485	6.5	2.25	0.55	1.5	MC/OE
	D		White		10	10	91371	7.5	1.87	0.64	1.1
		Af. Amer.		10	10	19594	6.3	2.15	0.67	1.2	MC
		Hispanic		10	10	9819	6.5	2.14	0.68	1.2	MC
		Asian		10	10	3801	8.1	1.77	0.67	1.0	MC

Appendix K: Reliabilities

	Am. Indian	10	10	183	6.9	1.97	0.64	1.2	MC
	Multi	10	10	1485	7.1	2.04	0.67	1.2	MC
E	White	9	9	91371	7.5	1.81	0.70	1.0	MC
	Af. Amer.	9	9	19594	6.3	2.33	0.75	1.2	MC
	Hispanic	9	9	9819	6.5	2.30	0.75	1.1	MC
	Asian	9	9	3801	7.9	1.61	0.71	0.9	MC
	Am. Indian	9	9	183	7.1	1.91	0.69	1.1	MC
	Multi	9	9	1485	7.0	2.11	0.74	1.1	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
ELL	Tot.	All	72	63	2872	35.2	13.47	0.92	3.8	MC/OE
	A	All	32	29	2872	15.7	6.74	0.86	2.6	MC/OE
	B	All	11	8	2872	3.7	2.22	0.56	1.5	MC/OE
	C	All	10	7	2872	4.7	2.18	0.53	1.5	MC/OE
	D	All	10	10	2872	5.6	2.15	0.64	1.3	MC
	E	All	9	9	2872	5.5	2.43	0.74	1.2	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
IEP	Tot.	All	72	63	18167	38.1	14.63	0.93	3.8	MC/OE
	A	All	32	29	18167	17.0	7.19	0.88	2.5	MC/OE
	B	All	11	8	18167	4.1	2.41	0.61	1.5	MC/OE
	C	All	10	7	18167	5.2	2.37	0.57	1.6	MC/OE
	D	All	10	10	18167	5.9	2.30	0.70	1.3	MC
	E	All	9	9	18167	5.9	2.38	0.74	1.2	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
Eco. Disadv.	Tot.	All	72	63	51851	43.1	13.72	0.93	3.7	MC/OE
	A	All	32	29	51851	19.2	6.84	0.87	2.4	MC/OE
	B	All	11	8	51851	4.6	2.39	0.59	1.5	MC/OE
	C	All	10	7	51851	6.0	2.26	0.54	1.5	MC/OE
	D	All	10	10	51851	6.6	2.10	0.67	1.2	MC
	E	All	9	9	51851	6.6	2.21	0.74	1.1	MC

## Appendix K: Reliabilities

Mathematics Grade 6

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	72	63	126288	49.4	13.68	0.93	3.6	MC/OE
	A	All	22	19	126288	14.4	4.48	0.82	1.9	MC/OE
	B	All	9	9	126288	6.2	2.26	0.71	1.2	MC
	C	All	14	11	126288	9.8	3.05	0.69	1.7	MC/OE
	D	All	13	13	126288	9.7	2.74	0.75	1.4	MC
	E	All	14	11	126288	9.3	3.07	0.68	1.7	MC/OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	Male		72	63	64513	49.2	14.04	0.94	3.6	MC/OE
		Female		72	63	61606	49.7	13.27	0.93	3.6	MC/OE
	A	Male		22	19	64513	14.3	4.56	0.83	1.9	MC/OE
		Female		22	19	61606	14.5	4.38	0.81	1.9	MC/OE
	B	Male		9	9	64513	6.4	2.22	0.71	1.2	MC
		Female		9	9	61606	6.0	2.28	0.71	1.2	MC
	C	Male		14	11	64513	9.8	3.13	0.71	1.7	MC/OE
		Female		14	11	61606	9.9	2.96	0.68	1.7	MC/OE
	D	Male		13	13	64513	9.6	2.84	0.76	1.4	MC
		Female		13	13	61606	9.8	2.62	0.72	1.4	MC
	E	Male		14	11	64513	9.1	3.13	0.70	1.7	MC/OE
		Female		14	11	61606	9.5	2.98	0.67	1.7	MC/OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	White		72	63	91915	51.7	12.58	0.92	3.5	MC/OE
		Af. Amer.		72	63	19197	41.0	13.96	0.93	3.8	MC/OE
		Hispanic		72	63	9615	42.2	13.99	0.93	3.8	MC/OE
		Asian		72	63	3819	57.2	11.49	0.92	3.2	MC/OE
		Am. Indian		72	63	175	46.8	14.74	0.94	3.6	MC/OE
		Multi		72	63	1402	46.1	13.83	0.93	3.7	MC/OE
		A	White		22	19	91915	15.0	4.22	0.80	1.9
	Af. Amer.			22	19	19197	12.2	4.63	0.81	2.0	MC/OE
	Hispanic			22	19	9615	12.4	4.57	0.81	2.0	MC/OE
	Asian			22	19	3819	17.1	3.72	0.78	1.7	MC/OE
	Am. Indian			22	19	175	13.5	4.86	0.84	1.9	MC/OE
	Multi			22	19	1402	13.5	4.46	0.81	2.0	MC/OE
	B		White		9	9	91915	6.6	2.07	0.68	1.2
		Af. Amer.		9	9	19197	4.8	2.35	0.69	1.3	MC
		Hispanic		9	9	9615	5.1	2.37	0.70	1.3	MC
		Asian		9	9	3819	7.0	1.91	0.68	1.1	MC
		Am. Indian		9	9	175	5.8	2.41	0.74	1.2	MC
		Multi		9	9	1402	5.6	2.37	0.72	1.3	MC
		C	White		14	11	91915	10.3	2.82	0.67	1.6
	Af. Amer.			14	11	19197	8.1	3.19	0.68	1.8	MC/OE
	Hispanic			14	11	9615	8.3	3.20	0.68	1.8	MC/OE
	Asian			14	11	3819	11.2	2.68	0.70	1.5	MC/OE
	Am. Indian			14	11	175	9.4	3.22	0.72	1.7	MC/OE
	Multi			14	11	1402	9.2	3.12	0.69	1.7	MC/OE
	D		White		13	13	91915	10.1	2.56	0.73	1.3
		Af. Amer.		13	13	19197	8.4	2.91	0.73	1.5	MC
		Hispanic		13	13	9615	8.6	2.94	0.73	1.5	MC
Asian			13	13	3819	11.1	2.20	0.73	1.1	MC	

Appendix K: Reliabilities

	Am. Indian	13	13	175	9.3	2.97	0.78	1.4	MC
	Multi	13	13	1402	9.3	2.82	0.74	1.4	MC
E	White	14	11	91915	9.8	2.88	0.65	1.7	MC/OE
	Af. Amer.	14	11	19197	7.5	3.01	0.66	1.7	MC/OE
	Hispanic	14	11	9615	7.8	3.02	0.66	1.7	MC/OE
	Asian	14	11	3819	10.8	2.72	0.65	1.6	MC/OE
	Am. Indian	14	11	175	8.9	3.02	0.66	1.8	MC/OE
	Multi	14	11	1402	8.6	3.07	0.68	1.7	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
ELL	Tot.	All	72	63	2557	34.3	13.01	0.91	3.9	MC/OE
	A	All	22	19	2557	10.4	4.53	0.79	2.1	MC/OE
	B	All	9	9	2557	3.9	2.19	0.63	1.3	MC
	C	All	14	11	2557	6.5	3.02	0.63	1.8	MC/OE
	D	All	13	13	2557	7.1	2.92	0.69	1.6	MC
	E	All	14	11	2557	6.3	2.75	0.59	1.8	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
IEP	Tot.	All	72	63	17596	36.7	14.56	0.93	3.9	MC/OE
	A	All	22	19	17596	10.5	4.79	0.82	2.0	MC/OE
	B	All	9	9	17596	4.6	2.38	0.70	1.3	MC
	C	All	14	11	17596	7.4	3.26	0.68	1.8	MC/OE
	D	All	13	13	17596	7.4	3.09	0.74	1.6	MC
	E	All	14	11	17596	6.8	3.13	0.68	1.8	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
Eco. Disadv.	Tot.	All	72	63	50588	43.8	13.91	0.93	3.8	MC/OE
	A	All	22	19	50588	12.8	4.58	0.81	2.0	MC/OE
	B	All	9	9	50588	5.4	2.35	0.70	1.3	MC
	C	All	14	11	50588	8.7	3.16	0.68	1.8	MC/OE
	D	All	13	13	50588	8.8	2.87	0.73	1.5	MC
	E	All	14	11	50588	8.1	3.05	0.67	1.8	MC/OE

Appendix K: Reliabilities

Mathematics Grade 7

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	72	63	127685	47.9	14.61	0.94	3.6	MC/OE
	A	All	15	15	127685	10.7	3.31	0.79	1.5	MC
	B	All	10	10	127685	6.7	2.64	0.78	1.2	MC
	C	All	14	11	127685	9.5	2.75	0.68	1.6	MC/OE
	D	All	19	16	127685	12.6	4.47	0.80	2.0	MC/OE
E	All	14	11	127685	8.4	3.18	0.72	1.7	MC/OE	

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	Male		72	63	64719	47.7	14.94	0.94	3.6	MC/OE
		Female		72	63	62766	48.2	14.24	0.94	3.6	MC/OE
	A	Male		15	15	64719	10.6	3.38	0.80	1.5	MC
		Female		15	15	62766	10.7	3.24	0.79	1.5	MC
	B	Male		10	10	64719	6.8	2.67	0.79	1.2	MC
		Female		10	10	62766	6.7	2.60	0.77	1.3	MC
	C	Male		14	11	64719	9.4	2.78	0.69	1.6	MC/OE
		Female		14	11	62766	9.6	2.72	0.67	1.6	MC/OE
	D	Male		19	16	64719	12.4	4.54	0.81	2.0	MC/OE
		Female		19	16	62766	12.8	4.38	0.79	2.0	MC/OE
	E	Male		14	11	64719	8.4	3.26	0.74	1.7	MC/OE
		Female		14	11	62766	8.4	3.10	0.71	1.7	MC/OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	White		72	63	93596	50.2	13.53	0.93	3.5	MC/OE
		Af. Amer.		72	63	19313	39.1	14.70	0.93	3.8	MC/OE
		Hispanic		72	63	9386	39.8	14.77	0.93	3.8	MC/OE
		Asian		72	63	3784	56.6	12.64	0.93	3.2	MC/OE
		Am. Indian		72	63	175	46.7	15.02	0.94	3.6	MC/OE
		Multi		72	63	1242	44.4	14.92	0.94	3.7	MC/OE
	A	White		15	15	93596	11.1	3.12	0.78	1.5	MC
		Af. Amer.		15	15	19313	9.0	3.45	0.77	1.6	MC
		Hispanic		15	15	9386	9.1	3.40	0.77	1.6	MC
		Asian		15	15	3784	12.5	2.74	0.79	1.2	MC
		Am. Indian		15	15	175	10.3	3.51	0.82	1.5	MC
		Multi		15	15	1242	10.0	3.46	0.80	1.6	MC
	B	White		10	10	93596	7.1	2.48	0.76	1.2	MC
		Af. Amer.		10	10	19313	5.3	2.61	0.73	1.4	MC
		Hispanic		10	10	9386	5.4	2.67	0.75	1.3	MC
		Asian		10	10	3784	8.1	2.19	0.78	1.0	MC
		Am. Indian		10	10	175	6.8	2.60	0.77	1.2	MC
		Multi		10	10	1242	6.1	2.70	0.77	1.3	MC
	C	White		14	11	93596	9.9	2.55	0.64	1.5	MC/OE
		Af. Amer.		14	11	19313	8.0	2.90	0.69	1.6	MC/OE
		Hispanic		14	11	9386	8.3	2.91	0.69	1.6	MC/OE
		Asian		14	11	3784	10.9	2.51	0.65	1.5	MC/OE
		Am. Indian		14	11	175	9.1	2.86	0.69	1.6	MC/OE
		Multi		14	11	1242	8.9	2.83	0.69	1.6	MC/OE
	D	White		19	16	93596	13.3	4.17	0.78	1.9	MC/OE
		Af. Amer.		19	16	19313	10.1	4.55	0.79	2.1	MC/OE
		Hispanic		19	16	9386	10.3	4.60	0.79	2.1	MC/OE
Asian			19	16	3784	15.1	3.79	0.80	1.7	MC/OE	

Appendix K: Reliabilities

	Am. Indian	19	16	175	12.2	4.66	0.81	2.0	MC/OE
	Multi	19	16	1242	11.7	4.56	0.80	2.1	MC/OE
E	White	14	11	93596	8.8	3.02	0.70	1.7	MC/OE
	Af. Amer.	14	11	19313	6.7	3.11	0.72	1.7	MC/OE
	Hispanic	14	11	9386	6.7	3.14	0.72	1.7	MC/OE
	Asian	14	11	3784	10.0	2.95	0.69	1.6	MC/OE
	Am. Indian	14	11	175	8.1	3.06	0.71	1.6	MC/OE
	Multi	14	11	1242	7.7	3.23	0.73	1.7	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
ELL	Tot.	All	72	63	2425	32.8	13.81	0.92	3.8	MC/OE
	A	All	15	15	2425	7.9	3.38	0.75	1.7	MC
	B	All	10	10	2425	4.4	2.47	0.69	1.4	MC
	C	All	14	11	2425	7.1	2.90	0.69	1.6	MC/OE
	D	All	19	16	2425	8.2	4.34	0.77	2.1	MC/OE
	E	All	14	11	2425	5.1	2.83	0.68	1.6	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
IEP	Tot.	All	72	63	17198	33.9	14.56	0.93	3.8	MC/OE
	A	All	15	15	17198	7.8	3.48	0.76	1.7	MC
	B	All	10	10	17198	4.6	2.63	0.73	1.4	MC
	C	All	14	11	17198	7.3	2.93	0.71	1.6	MC/OE
	D	All	19	16	17198	8.6	4.44	0.78	2.1	MC/OE
	E	All	14	11	17198	5.6	3.06	0.72	1.6	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
Eco. Disadv.	Tot.	All	72	63	49577	41.6	14.60	0.93	3.8	MC/OE
	A	All	15	15	49577	9.4	3.39	0.77	1.6	MC
	B	All	10	10	49577	5.7	2.68	0.75	1.3	MC
	C	All	14	11	49577	8.5	2.84	0.69	1.6	MC/OE
	D	All	19	16	49577	10.8	4.52	0.79	2.1	MC/OE
	E	All	14	11	49577	7.1	3.11	0.72	1.7	MC/OE

Appendix K: Reliabilities

Mathematics Grade 8

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	72	63	129983	49.3	14.53	0.94	3.5	MC/OE
	A	All	15	12	129983	9.8	3.39	0.75	1.7	MC/OE
	B	All	10	10	129983	7.2	2.50	0.77	1.2	MC
	C	All	14	11	129983	9.6	3.11	0.76	1.5	MC/OE
	D	All	19	16	129983	12.7	4.39	0.82	1.9	MC/OE
	E	All	14	14	129983	10.0	2.86	0.74	1.5	MC

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	Male		72	63	66579	49.2	14.84	0.94	3.5	MC/OE
		Female		72	63	63128	49.5	14.15	0.94	3.5	MC/OE
	A	Male		15	12	66579	9.9	3.40	0.75	1.7	MC/OE
		Female		15	12	63128	9.7	3.37	0.74	1.7	MC/OE
	B	Male		10	10	66579	7.1	2.54	0.77	1.2	MC
		Female		10	10	63128	7.2	2.46	0.76	1.2	MC
	C	Male		14	11	66579	9.5	3.14	0.76	1.5	MC/OE
		Female		14	11	63128	9.6	3.06	0.75	1.5	MC/OE
	D	Male		19	16	66579	12.6	4.50	0.83	1.9	MC/OE
		Female		19	16	63128	12.9	4.25	0.81	1.9	MC/OE
	E	Male		14	14	66579	10.0	2.94	0.76	1.4	MC
		Female		14	14	63128	10.1	2.77	0.72	1.5	MC

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	White		72	63	96343	51.6	13.39	0.93	3.5	MC/OE
		Af. Amer.		72	63	19116	40.6	14.88	0.94	3.7	MC/OE
		Hispanic		72	63	9163	41.4	15.14	0.94	3.7	MC/OE
		Asian		72	63	3755	57.4	12.34	0.93	3.2	MC/OE
		Am. Indian		72	63	192	47.5	14.83	0.94	3.6	MC/OE
		Multi		72	63	1147	44.4	15.28	0.94	3.6	MC/OE
		A	White		15	12	96343	10.3	3.18	0.72	1.7
	Af. Amer.			15	12	19116	8.0	3.40	0.74	1.7	MC/OE
	Hispanic			15	12	9163	8.1	3.54	0.75	1.8	MC/OE
	Asian			15	12	3755	11.6	2.95	0.70	1.6	MC/OE
	Am. Indian			15	12	192	9.5	3.50	0.75	1.7	MC/OE
	Multi			15	12	1147	8.9	3.50	0.75	1.7	MC/OE
	B		White		10	10	96343	7.5	2.32	0.74	1.2
		Af. Amer.		10	10	19116	5.8	2.67	0.75	1.3	MC
		Hispanic		10	10	9163	6.0	2.70	0.76	1.3	MC
		Asian		10	10	3755	8.3	2.10	0.77	1.0	MC
		Am. Indian		10	10	192	7.0	2.50	0.75	1.2	MC
		Multi		10	10	1147	6.4	2.64	0.76	1.3	MC
		C	White		14	11	96343	10.0	2.88	0.73	1.5
	Af. Amer.			14	11	19116	7.8	3.28	0.76	1.6	MC/OE
	Hispanic			14	11	9163	8.2	3.25	0.77	1.6	MC/OE
	Asian			14	11	3755	11.1	2.62	0.74	1.3	MC/OE
	Am. Indian			14	11	192	9.1	3.19	0.77	1.5	MC/OE
	Multi			14	11	1147	8.6	3.27	0.77	1.6	MC/OE
	D		White		19	16	96343	13.3	4.18	0.81	1.8
		Af. Amer.		19	16	19116	10.6	4.43	0.82	1.9	MC/OE
		Hispanic		19	16	9163	10.7	4.40	0.82	1.9	MC/OE
Asian			19	16	3755	15.2	3.66	0.79	1.7	MC/OE	

Appendix K: Reliabilities

	Am. Indian	19	16	192	12.2	4.58	0.83	1.9	MC/OE
	Multi	19	16	1147	11.4	4.57	0.83	1.9	MC/OE
E	White	14	14	96343	10.5	2.63	0.71	1.4	MC
	Af. Amer.	14	14	19116	8.4	3.02	0.72	1.6	MC
	Hispanic	14	14	9163	8.4	3.09	0.74	1.6	MC
	Asian	14	14	3755	11.1	2.54	0.74	1.3	MC
	Am. Indian	14	14	192	9.8	2.85	0.72	1.5	MC
	Multi	14	14	1147	9.1	3.05	0.74	1.5	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
ELL	Tot.	All	72	63	2322	33.8	13.90	0.93	3.8	MC/OE
	A	All	15	12	2322	6.5	3.28	0.71	1.8	MC/OE
	B	All	10	10	2322	4.8	2.55	0.71	1.4	MC
	C	All	14	11	2322	6.8	3.21	0.75	1.6	MC/OE
	D	All	19	16	2322	9.0	4.16	0.80	1.9	MC/OE
	E	All	14	14	2322	6.7	2.81	0.64	1.7	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
IEP	Tot.	All	72	63	17426	35.1	14.82	0.94	3.7	MC/OE
	A	All	15	12	17426	6.8	3.41	0.74	1.7	MC/OE
	B	All	10	10	17426	5.1	2.63	0.73	1.4	MC
	C	All	14	11	17426	7.0	3.32	0.76	1.6	MC/OE
	D	All	19	16	17426	8.8	4.32	0.81	1.9	MC/OE
	E	All	14	14	17426	7.4	3.11	0.72	1.6	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
Eco. Disadv.	Tot.	All	72	63	48279	43.0	14.81	0.94	3.7	MC/OE
	A	All	15	12	48279	8.5	3.44	0.74	1.7	MC/OE
	B	All	10	10	48279	6.2	2.64	0.75	1.3	MC
	C	All	14	11	48279	8.4	3.22	0.76	1.6	MC/OE
	D	All	19	16	48279	11.0	4.41	0.82	1.9	MC/OE
	E	All	14	14	48279	8.9	3.01	0.73	1.6	MC

Appendix K: Reliabilities

Mathematics Grade 11

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	72	63	129910	47.6	15.23	0.94	3.7	MC/OE
	A	All	11	8	129910	7.4	2.51	0.62	1.5	MC/OE
	B	All	9	9	129910	6.1	2.20	0.72	1.2	MC
	C	All	11	11	129910	7.7	2.66	0.75	1.3	MC
	D	All	29	26	129910	19.2	6.70	0.88	2.4	MC/OE
	E	All	12	9	129910	7.1	2.83	0.70	1.6	MC/OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	Male		72	63	65182	47.7	15.60	0.94	3.7	MC/OE
		Female		72	63	64275	47.6	14.79	0.94	3.7	MC/OE
	A	Male		11	8	65182	7.5	2.55	0.63	1.6	MC/OE
		Female		11	8	64275	7.3	2.45	0.62	1.5	MC/OE
	B	Male		9	9	65182	6.1	2.25	0.73	1.2	MC
		Female		9	9	64275	6.0	2.13	0.70	1.2	MC
	C	Male		11	11	65182	7.8	2.67	0.76	1.3	MC
		Female		11	11	64275	7.6	2.64	0.74	1.3	MC
	D	Male		29	26	65182	19.0	6.88	0.88	2.4	MC/OE
		Female		29	26	64275	19.5	6.48	0.87	2.4	MC/OE
	E	Male		12	9	65182	7.2	2.86	0.71	1.5	MC/OE
		Female		12	9	64275	7.1	2.80	0.69	1.6	MC/OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	White		72	63	99492	49.9	14.19	0.94	3.6	MC/OE
		Af. Amer.		72	63	17855	37.6	15.12	0.94	3.8	MC/OE
		Hispanic		72	63	7583	39.0	14.93	0.94	3.8	MC/OE
		Asian		72	63	3603	57.4	12.94	0.94	3.3	MC/OE
		Am. Indian		72	63	196	44.2	15.81	0.94	3.8	MC/OE
		Multi		72	63	729	41.4	16.26	0.94	3.8	MC/OE
	A	White		11	8	99492	7.8	2.35	0.59	1.5	MC/OE
		Af. Amer.		11	8	17855	5.9	2.55	0.61	1.6	MC/OE
		Hispanic		11	8	7583	6.1	2.52	0.61	1.6	MC/OE
		Asian		11	8	3603	8.6	2.16	0.58	1.4	MC/OE
		Am. Indian		11	8	196	6.9	2.84	0.67	1.6	MC/OE
		Multi		11	8	729	6.4	2.65	0.63	1.6	MC/OE
	B	White		9	9	99492	6.4	2.07	0.70	1.1	MC
		Af. Amer.		9	9	17855	4.7	2.21	0.67	1.3	MC
		Hispanic		9	9	7583	5.0	2.24	0.68	1.3	MC
		Asian		9	9	3603	7.2	1.87	0.70	1.0	MC
		Am. Indian		9	9	196	5.7	2.24	0.71	1.2	MC
		Multi		9	9	729	5.3	2.25	0.69	1.2	MC
	C	White		11	11	99492	8.1	2.46	0.72	1.3	MC
		Af. Amer.		11	11	17855	6.0	2.78	0.72	1.5	MC
		Hispanic		11	11	7583	6.3	2.76	0.72	1.5	MC
		Asian		11	11	3603	9.1	2.20	0.74	1.1	MC
		Am. Indian		11	11	196	7.3	2.71	0.74	1.4	MC
		Multi		11	11	729	6.8	2.91	0.77	1.4	MC
	D	White		29	26	99492	20.1	6.37	0.87	2.3	MC/OE
		Af. Amer.		29	26	17855	15.4	6.65	0.87	2.4	MC/OE
		Hispanic		29	26	7583	15.9	6.55	0.86	2.4	MC/OE
		Asian		29	26	3603	23.8	5.53	0.86	2.1	MC/OE

Appendix K: Reliabilities

	Am. Indian	29	26	196	17.8	6.94	0.88	2.4	MC/OE
	Multi	29	26	729	16.9	7.15	0.89	2.4	MC/OE
E	White	12	9	99492	7.5	2.69	0.67	1.5	MC/OE
	Af. Amer.	12	9	17855	5.5	2.78	0.68	1.6	MC/OE
	Hispanic	12	9	7583	5.6	2.74	0.69	1.5	MC/OE
	Asian	12	9	3603	8.7	2.67	0.68	1.5	MC/OE
	Am. Indian	12	9	196	6.6	2.85	0.69	1.6	MC/OE
	Multi	12	9	729	6.1	2.99	0.71	1.6	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
ELL	Tot.	All	72	63	1758	33.4	15.22	0.94	3.8	MC/OE
	A	All	11	8	1758	5.2	2.55	0.62	1.6	MC/OE
	B	All	9	9	1758	4.3	2.20	0.65	1.3	MC
	C	All	11	11	1758	5.4	2.90	0.75	1.5	MC
	D	All	29	26	1758	14.1	6.84	0.87	2.4	MC/OE
	E	All	12	9	1758	4.4	2.65	0.66	1.6	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
IEP	Tot.	All	72	63	15040	31.5	14.45	0.93	3.8	MC/OE
	A	All	11	8	15040	5.1	2.58	0.62	1.6	MC/OE
	B	All	9	9	15040	4.1	2.21	0.66	1.3	MC
	C	All	11	11	15040	5.3	2.72	0.70	1.5	MC
	D	All	29	26	15040	12.5	6.24	0.85	2.4	MC/OE
	E	All	12	9	15040	4.5	2.64	0.69	1.5	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
Eco. Disadv.	Tot.	All	72	63	38541	40.7	15.12	0.94	3.8	MC/OE
	A	All	11	8	38541	6.4	2.55	0.62	1.6	MC/OE
	B	All	9	9	38541	5.2	2.24	0.69	1.2	MC
	C	All	11	11	38541	6.6	2.77	0.73	1.4	MC
	D	All	29	26	38541	16.5	6.63	0.87	2.4	MC/OE
	E	All	12	9	38541	6.0	2.78	0.69	1.5	MC/OE

Appendix K: Reliabilities

Reading Grade 3

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		46	42	126588	30.6	9.09	0.91	2.7
A	All		29	29	126588	20.4	6.03	0.87	2.1	MC
B	All		17	13	126588	10.3	3.48	0.78	1.6	MC/OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		Male	46	42	64712	29.8	9.30	0.91	2.7
Female			46	42	61715	31.5	8.78	0.91	2.7	MC/OE
A		Male	29	29	64712	19.9	6.18	0.88	2.2	MC
		Female	29	29	61715	20.9	5.82	0.87	2.1	MC
B		Male	17	13	64712	9.9	3.54	0.78	1.6	MC/OE
		Female	17	13	61715	10.6	3.38	0.77	1.6	MC/OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		White	46	42	90591	32.3	8.39	0.90	2.6
Af. Amer.			46	42	19561	25.2	9.10	0.90	2.9	MC/OE
Hispanic			46	42	10205	25.9	9.40	0.91	2.9	MC/OE
Asian			46	42	4141	33.6	8.24	0.90	2.6	MC/OE
Am. Indian			46	42	185	28.5	9.56	0.92	2.8	MC/OE
Multi			46	42	1731	29.2	9.14	0.91	2.8	MC/OE
A		White	29	29	90591	21.5	5.56	0.86	2.1	MC
		Af. Amer.	29	29	19561	16.9	6.11	0.85	2.3	MC
		Hispanic	29	29	10205	17.2	6.28	0.86	2.3	MC
		Asian	29	29	4141	22.2	5.39	0.86	2.0	MC
		Am. Indian	29	29	185	19.0	6.53	0.89	2.2	MC
		Multi	29	29	1731	19.4	6.10	0.87	2.2	MC
B		White	17	13	90591	10.8	3.27	0.76	1.6	MC/OE
		Af. Amer.	17	13	19561	8.3	3.47	0.75	1.7	MC/OE
		Hispanic	17	13	10205	8.7	3.58	0.77	1.7	MC/OE
		Asian	17	13	4141	11.4	3.27	0.76	1.6	MC/OE
		Am. Indian	17	13	185	9.5	3.51	0.77	1.7	MC/OE
		Multi	17	13	1731	9.7	3.47	0.77	1.7	MC/OE

ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		46	42	4111	21.7	8.61	0.88	3.0
A	All		29	29	4111	14.5	5.84	0.83	2.4	MC
B	All		17	13	4111	7.2	3.29	0.71	1.8	MC/OE

IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		46	42	18593	23.3	10.02	0.92	2.9
A	All		29	29	18593	15.6	6.76	0.88	2.3	MC
B	All		17	13	18593	7.7	3.71	0.78	1.7	MC/OE

Eco. Dis.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		46	42	54246	27.0	9.23	0.90	2.9
A	All		29	29	54246	18.0	6.18	0.86	2.3	MC
B	All		17	13	54246	9.0	3.50	0.76	1.7	MC/OE

Appendix K: Reliabilities

Reading Grade 4

	<b>Strand</b>	<b>Group</b>	<b>Pts.</b>	<b>Len.</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>r</b>	<b>SEM</b>	<b>Items</b>
<b>Overall</b>	Tot.	All	52	44	128452	35.0	9.98	0.91	3.1	MC/OE
	A	All	32	28	128452	22.5	6.67	0.88	2.4	MC/OE
	B	All	20	16	128452	12.5	3.79	0.74	1.9	MC/OE
<b>Gender</b>	Tot.	Male	52	44	65564	34.0	10.24	0.91	3.1	MC/OE
		Female	52	44	62718	36.0	9.59	0.90	3.0	MC/OE
	A	Male	32	28	65564	22.0	6.88	0.88	2.4	MC/OE
		Female	32	28	62718	23.1	6.40	0.87	2.3	MC/OE
	B	Male	20	16	65564	12.1	3.84	0.74	1.9	MC/OE
		Female	20	16	62718	12.9	3.69	0.72	1.9	MC/OE
<b>Ethnicity</b>	Tot.	White	52	44	92735	36.6	9.15	0.89	3.0	MC/OE
		Af. Amer.	52	44	19700	29.0	10.39	0.90	3.2	MC/OE
		Hispanic	52	44	9902	29.9	10.61	0.91	3.2	MC/OE
		Asian	52	44	4105	38.9	8.48	0.89	2.9	MC/OE
		Am. Indian	52	44	198	33.8	9.94	0.90	3.1	MC/OE
		Multi	52	44	1647	33.6	10.08	0.90	3.1	MC/OE
	A	White	32	28	92735	23.6	6.12	0.86	2.3	MC/OE
		Af. Amer.	32	28	19700	18.6	6.97	0.87	2.5	MC/OE
		Hispanic	32	28	9902	19.1	7.14	0.88	2.5	MC/OE
		Asian	32	28	4105	25.1	5.64	0.86	2.1	MC/OE
		Am. Indian	32	28	198	21.7	6.42	0.85	2.4	MC/OE
		Multi	32	28	1647	21.7	6.71	0.87	2.4	MC/OE
	B	White	20	16	92735	13.0	3.54	0.70	1.9	MC/OE
		Af. Amer.	20	16	19700	10.4	3.94	0.74	2.0	MC/OE
		Hispanic	20	16	9902	10.8	3.97	0.75	2.0	MC/OE
		Asian	20	16	4105	13.8	3.36	0.68	1.9	MC/OE
		Am. Indian	20	16	198	12.1	3.94	0.75	2.0	MC/OE
		Multi	20	16	1647	11.9	3.84	0.74	2.0	MC/OE
<b>ELL</b>	Tot.	All	52	44	3419	24.5	9.60	0.88	3.3	MC/OE
	A	All	32	28	3419	15.5	6.53	0.84	2.6	MC/OE
	B	All	20	16	3419	9.0	3.67	0.69	2.0	MC/OE
<b>IEP</b>	Tot.	All	52	44	20600	26.5	11.01	0.91	3.2	MC/OE
	A	All	32	28	20600	16.9	7.42	0.88	2.5	MC/OE
	B	All	20	16	20600	9.5	4.07	0.76	2.0	MC/OE
<b>Eco. Dis.</b>	Tot.	All	52	44	53860	30.9	10.34	0.90	3.2	MC/OE
	A	All	32	28	53860	19.8	6.93	0.87	2.5	MC/OE
	B	All	20	16	53860	11.1	3.91	0.74	2.0	MC/OE

Appendix K: Reliabilities

Reading Grade 5

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	128933	35.6	8.79	0.90	2.8
A	All		31	27	128933	21.2	5.33	0.82	2.2	MC/OE
B	All		21	17	128933	14.4	3.94	0.80	1.8	MC/OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		Male	52	44	65967	34.7	9.08	0.90	2.9
Female			52	44	62799	36.7	8.34	0.89	2.8	MC/OE
A		Male	31	27	65967	20.8	5.51	0.84	2.2	MC/OE
		Female	31	27	62799	21.7	5.10	0.81	2.2	MC/OE
B		Male	21	17	65967	13.9	4.05	0.81	1.8	MC/OE
		Female	21	17	62799	15.0	3.73	0.78	1.7	MC/OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		White	52	44	93149	37.1	7.97	0.88	2.8
Af. Amer.			52	44	20061	30.9	9.46	0.90	3.0	MC/OE
Hispanic			52	44	10028	31.1	9.79	0.90	3.0	MC/OE
Asian			52	44	3815	39.0	7.84	0.88	2.7	MC/OE
Am. Indian			52	44	189	34.4	8.17	0.87	3.0	MC/OE
Multi			52	44	1523	34.7	8.90	0.89	2.9	MC/OE
A		White	31	27	93149	22.1	4.82	0.80	2.2	MC/OE
		Af. Amer.	31	27	20061	18.3	5.71	0.82	2.4	MC/OE
		Hispanic	31	27	10028	18.4	5.89	0.84	2.4	MC/OE
		Asian	31	27	3815	23.0	4.91	0.81	2.1	MC/OE
		Am. Indian	31	27	189	20.5	5.02	0.79	2.3	MC/OE
		Multi	31	27	1523	20.7	5.42	0.83	2.3	MC/OE
B		White	21	17	93149	14.9	3.64	0.78	1.7	MC/OE
		Af. Amer.	21	17	20061	12.6	4.26	0.80	1.9	MC/OE
		Hispanic	21	17	10028	12.7	4.38	0.82	1.9	MC/OE
		Asian	21	17	3815	16.1	3.40	0.77	1.6	MC/OE
		Am. Indian	21	17	189	13.9	3.75	0.77	1.8	MC/OE
		Multi	21	17	1523	14.1	3.95	0.79	1.8	MC/OE

ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	2955	24.5	9.02	0.87	3.2
A	All		31	27	2955	14.5	5.44	0.79	2.5	MC/OE
B	All		21	17	2955	10.1	4.19	0.78	2.0	MC/OE

IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	20696	26.9	10.24	0.91	3.1
A	All		31	27	20696	16.3	6.18	0.85	2.4	MC/OE
B	All		21	17	20696	10.6	4.56	0.82	1.9	MC/OE

Eco. Dis.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	53374	32.2	9.35	0.90	3.0
A	All		31	27	53374	19.2	5.67	0.83	2.3	MC/OE
B	All		21	17	53374	13.0	4.19	0.80	1.9	MC/OE

Appendix K: Reliabilities

Reading Grade 6

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	128921	35.7	9.72	0.91	3.0
A	All		30	28	128921	21.3	5.80	0.86	2.2	MC/OE
B	All		22	16	128921	14.5	4.37	0.80	2.0	MC/OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		Male	52	44	66087	34.7	10.08	0.91	3.0
Female			52	44	62660	36.8	9.18	0.90	2.9	MC/OE
A		Male	30	28	66087	20.9	6.01	0.87	2.2	MC/OE
		Female	30	28	62660	21.7	5.53	0.85	2.2	MC/OE
B		Male	22	16	66087	13.8	4.50	0.81	2.0	MC/OE
		Female	22	16	62660	15.2	4.11	0.78	1.9	MC/OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		White	52	44	93759	37.3	8.90	0.90	2.9
Af. Amer.			52	44	19696	30.1	10.05	0.90	3.2	MC/OE
Hispanic			52	44	9830	30.1	10.31	0.91	3.2	MC/OE
Asian			52	44	3844	39.7	8.52	0.90	2.8	MC/OE
Am. Indian			52	44	182	34.0	10.07	0.91	3.1	MC/OE
Multi			52	44	1439	33.9	9.91	0.91	3.0	MC/OE
A		White	30	28	93759	22.3	5.29	0.84	2.1	MC/OE
		Af. Amer.	30	28	19696	17.9	6.03	0.84	2.4	MC/OE
		Hispanic	30	28	9830	17.8	6.12	0.85	2.4	MC/OE
		Asian	30	28	3844	23.3	5.10	0.84	2.0	MC/OE
		Am. Indian	30	28	182	20.3	5.79	0.84	2.3	MC/OE
		Multi	30	28	1439	20.1	5.93	0.85	2.3	MC/OE
B		White	22	16	93759	15.1	4.08	0.78	1.9	MC/OE
		Af. Amer.	22	16	19696	12.3	4.53	0.78	2.1	MC/OE
		Hispanic	22	16	9830	12.3	4.66	0.80	2.1	MC/OE
		Asian	22	16	3844	16.4	3.86	0.77	1.8	MC/OE
		Am. Indian	22	16	182	13.7	4.74	0.82	2.0	MC/OE
		Multi	22	16	1439	13.8	4.46	0.80	2.0	MC/OE

ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	2641	22.6	8.93	0.86	3.3
A	All		30	28	2641	13.5	5.30	0.77	2.5	MC/OE
B	All		22	16	2641	9.1	4.24	0.74	2.2	MC/OE

IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	20261	25.4	10.41	0.90	3.2
A	All		30	28	20261	15.5	6.30	0.85	2.4	MC/OE
B	All		22	16	20261	9.9	4.61	0.79	2.1	MC/OE

Eco. Dis.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	52066	31.5	10.01	0.90	3.1
A	All		30	28	52066	18.8	6.01	0.85	2.3	MC/OE
B	All		22	16	52066	12.7	4.50	0.79	2.1	MC/OE

Appendix K: Reliabilities

Reading Grade 7

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	130376	34.8	9.48	0.90	3.0
A	All		26	22	130376	17.3	5.01	0.82	2.1	MC/OE
B	All		26	22	130376	17.5	4.90	0.80	2.2	MC/OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		Male	52	44	66306	33.5	9.84	0.90	3.1
Female			52	44	63872	36.2	8.89	0.89	3.0	MC/OE
A		Male	26	22	66306	16.7	5.20	0.83	2.1	MC/OE
		Female	26	22	63872	18.0	4.72	0.81	2.1	MC/OE
B		Male	26	22	66306	16.8	5.07	0.81	2.2	MC/OE
		Female	26	22	63872	18.2	4.61	0.79	2.1	MC/OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		White	52	44	95542	36.3	8.86	0.89	3.0
Af. Amer.			52	44	19782	29.8	9.48	0.89	3.2	MC/OE
Hispanic			52	44	9609	29.1	9.73	0.89	3.2	MC/OE
Asian			52	44	3811	38.5	8.67	0.89	2.8	MC/OE
Am. Indian			52	44	179	34.1	9.32	0.89	3.1	MC/OE
Multi			52	44	1265	33.0	9.47	0.89	3.1	MC/OE
A		White	26	22	95542	18.1	4.70	0.81	2.1	MC/OE
		Af. Amer.	26	22	19782	14.8	5.04	0.80	2.2	MC/OE
		Hispanic	26	22	9609	14.4	5.15	0.81	2.3	MC/OE
		Asian	26	22	3811	19.3	4.59	0.81	2.0	MC/OE
		Am. Indian	26	22	179	16.9	4.94	0.80	2.2	MC/OE
		Multi	26	22	1265	16.4	5.12	0.82	2.2	MC/OE
B		White	26	22	95542	18.3	4.61	0.79	2.1	MC/OE
		Af. Amer.	26	22	19782	15.1	4.93	0.78	2.3	MC/OE
		Hispanic	26	22	9609	14.8	5.05	0.79	2.3	MC/OE
		Asian	26	22	3811	19.3	4.51	0.80	2.0	MC/OE
		Am. Indian	26	22	179	17.2	4.87	0.80	2.2	MC/OE
		Multi	26	22	1265	16.7	4.80	0.78	2.2	MC/OE

ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	2482	22.7	7.66	0.81	3.3
A	All		26	22	2482	11.0	4.04	0.67	2.3	MC/OE
B	All		26	22	2482	11.7	4.26	0.69	2.4	MC/OE

IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	19971	24.8	9.62	0.89	3.3
A	All		26	22	19971	12.2	5.06	0.80	2.3	MC/OE
B	All		26	22	19971	12.6	5.06	0.79	2.3	MC/OE

Eco. Dis.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	51095	30.7	9.56	0.89	3.2
A	All		26	22	51095	15.2	5.07	0.81	2.2	MC/OE
B	All		26	22	51095	15.5	4.98	0.79	2.3	MC/OE

Appendix K: Reliabilities

Reading Grade 8

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	132906	34.6	8.89	0.89	3.0
A	All		22	20	132906	15.8	4.11	0.80	1.8	MC/OE
B	All		30	24	132906	18.8	5.23	0.80	2.3	MC/OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		Male	52	44	68332	33.2	9.17	0.89	3.0
Female			52	44	64293	36.1	8.29	0.88	2.9	MC/OE
A		Male	22	20	68332	15.2	4.29	0.81	1.9	MC/OE
		Female	22	20	64293	16.4	3.81	0.78	1.8	MC/OE
B		Male	30	24	68332	18.0	5.33	0.81	2.3	MC/OE
		Female	30	24	64293	19.7	4.95	0.79	2.3	MC/OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		White	52	44	98452	35.9	8.30	0.88	2.9
Af. Amer.			52	44	19636	30.2	9.10	0.88	3.1	MC/OE
Hispanic			52	44	9405	29.6	9.52	0.89	3.1	MC/OE
Asian			52	44	3772	38.5	8.14	0.88	2.8	MC/OE
Am. Indian			52	44	201	33.9	9.19	0.90	3.0	MC/OE
Multi			52	44	1169	32.4	9.30	0.89	3.1	MC/OE
A		White	22	20	98452	16.4	3.81	0.78	1.8	MC/OE
		Af. Amer.	22	20	19636	13.9	4.34	0.79	2.0	MC/OE
		Hispanic	22	20	9405	13.5	4.57	0.81	2.0	MC/OE
		Asian	22	20	3772	17.3	3.75	0.80	1.7	MC/OE
		Am. Indian	22	20	201	15.5	4.24	0.81	1.9	MC/OE
		Multi	22	20	1169	14.8	4.35	0.81	1.9	MC/OE
B		White	30	24	98452	19.5	4.96	0.79	2.3	MC/OE
		Af. Amer.	30	24	19636	16.4	5.26	0.79	2.4	MC/OE
		Hispanic	30	24	9405	16.1	5.43	0.80	2.4	MC/OE
		Asian	30	24	3772	21.2	4.82	0.79	2.2	MC/OE
		Am. Indian	30	24	201	18.4	5.41	0.82	2.3	MC/OE
		Multi	30	24	1169	17.6	5.42	0.81	2.4	MC/OE

ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	2389	23.5	8.32	0.85	3.3
A	All		22	20	2389	10.6	4.13	0.74	2.1	MC/OE
B	All		30	24	2389	12.9	4.76	0.73	2.5	MC/OE

IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	20402	24.9	9.15	0.88	3.2
A	All		22	20	20402	11.5	4.49	0.79	2.1	MC/OE
B	All		30	24	20402	13.4	5.18	0.78	2.5	MC/OE

Eco. Dis.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	49882	30.7	9.09	0.88	3.1
A	All		22	20	49882	14.1	4.33	0.79	2.0	MC/OE
B	All		30	24	49882	16.6	5.25	0.79	2.4	MC/OE

Appendix K: Reliabilities

Reading Grade 11

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	133291	35.3	9.38	0.90	2.9
A	All		21	21	133291	15.1	4.15	0.81	1.8	MC
B	All		31	23	133291	20.1	5.69	0.84	2.3	MC/OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		Male	52	44	67246	34.2	9.74	0.91	2.9
Female			52	44	65562	36.4	8.83	0.90	2.9	MC/OE
A		Male	21	21	67246	14.9	4.33	0.83	1.8	MC
		Female	21	21	65562	15.3	3.94	0.79	1.8	MC
B		Male	31	23	67246	19.3	5.86	0.85	2.3	MC/OE
		Female	31	23	65562	21.0	5.34	0.83	2.2	MC/OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		White	52	44	101881	36.7	8.67	0.89	2.8
Af. Amer.			52	44	18542	29.5	9.85	0.90	3.1	MC/OE
Hispanic			52	44	7798	30.1	9.67	0.90	3.1	MC/OE
Asian			52	44	3628	38.1	8.92	0.91	2.7	MC/OE
Am. Indian			52	44	201	33.9	9.50	0.90	3.0	MC/OE
Multi			52	44	764	31.9	10.28	0.91	3.0	MC/OE
A		White	21	21	101881	15.8	3.78	0.79	1.7	MC
		Af. Amer.	21	21	18542	12.5	4.48	0.80	2.0	MC
		Hispanic	21	21	7798	12.7	4.48	0.81	2.0	MC
		Asian	21	21	3628	16.0	3.97	0.82	1.7	MC
		Am. Indian	21	21	201	14.8	4.17	0.80	1.9	MC
		Multi	21	21	764	13.7	4.63	0.83	1.9	MC
B		White	31	23	101881	20.9	5.37	0.83	2.2	MC/OE
		Af. Amer.	31	23	18542	17.0	5.87	0.83	2.4	MC/OE
		Hispanic	31	23	7798	17.4	5.68	0.83	2.4	MC/OE
		Asian	31	23	3628	22.1	5.41	0.84	2.1	MC/OE
		Am. Indian	31	23	201	19.2	5.77	0.83	2.4	MC/OE
		Multi	31	23	764	18.2	6.12	0.85	2.4	MC/OE

ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	1782	22.5	7.68	0.82	3.2
A	All		21	21	1782	9.1	3.71	0.68	2.1	MC
B	All		31	23	1782	13.4	4.63	0.72	2.4	MC/OE

IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	18480	24.8	9.60	0.89	3.2
A	All		21	21	18480	10.8	4.50	0.79	2.1	MC
B	All		31	23	18480	14.0	5.65	0.81	2.4	MC/OE

Eco. Dis.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	40186	30.9	9.63	0.90	3.1
A	All		21	21	40186	13.3	4.43	0.81	2.0	MC
B	All		31	23	40186	17.6	5.71	0.83	2.4	MC/OE

Appendix K: Reliabilities

Science Grade 4

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	68	63	128565	48.6	12.22	0.93	3.3	MC/OE
	A	All	34	31	128565	24.8	6.29	0.87	2.3	MC/OE
	B	All	12	11	128565	8.5	2.50	0.70	1.4	MC/OE
	C	All	11	11	128565	8.1	2.41	0.72	1.3	MC
	D	All	11	10	128565	7.2	2.33	0.65	1.4	MC/OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	Male		68	63	65603	48.8	12.56	0.93	3.3	MC/OE
		Female		68	63	62737	48.5	11.82	0.92	3.3	MC/OE
	A	Male		34	31	65603	24.7	6.44	0.87	2.3	MC/OE
		Female		34	31	62737	25.0	6.13	0.86	2.3	MC/OE
	B	Male		12	11	65603	8.6	2.54	0.71	1.4	MC/OE
		Female		12	11	62737	8.5	2.44	0.68	1.4	MC/OE
	C	Male		11	11	65603	8.1	2.44	0.73	1.3	MC
		Female		11	11	62737	8.0	2.37	0.70	1.3	MC
	D	Male		11	10	65603	7.4	2.38	0.68	1.4	MC/OE
		Female		11	10	62737	7.0	2.26	0.63	1.4	MC/OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	White		68	63	92572	51.5	10.45	0.91	3.2	MC/OE
		Af. Amer.		68	63	19614	39.1	12.90	0.92	3.6	MC/OE
		Hispanic		68	63	10098	40.6	12.95	0.92	3.6	MC/OE
		Asian		68	63	4199	52.1	10.96	0.92	3.1	MC/OE
		Am. Indian		68	63	196	47.8	12.43	0.93	3.3	MC/OE
		Multi		68	63	1637	46.2	12.47	0.93	3.4	MC/OE
		A	White		34	31	92572	26.2	5.37	0.83	2.2
	Af. Amer.			34	31	19614	20.0	6.87	0.86	2.6	MC/OE
	Hispanic			34	31	10098	20.9	6.90	0.86	2.5	MC/OE
	Asian			34	31	4199	26.7	5.48	0.84	2.2	MC/OE
	Am. Indian			34	31	196	24.4	6.26	0.86	2.4	MC/OE
	Multi			34	31	1637	23.6	6.47	0.86	2.4	MC/OE
	B		White		12	11	92572	9.0	2.20	0.64	1.3
		Af. Amer.		12	11	19614	6.9	2.73	0.69	1.5	MC/OE
		Hispanic		12	11	10098	7.1	2.72	0.70	1.5	MC/OE
		Asian		12	11	4199	9.2	2.23	0.67	1.3	MC/OE
		Am. Indian		12	11	196	8.4	2.52	0.69	1.4	MC/OE
		Multi		12	11	1637	8.1	2.59	0.70	1.4	MC/OE
		C	White		11	11	92572	8.6	2.12	0.66	1.2
	Af. Amer.			11	11	19614	6.4	2.58	0.69	1.4	MC
	Hispanic			11	11	10098	6.6	2.55	0.68	1.4	MC
	Asian			11	11	4199	8.6	2.25	0.71	1.2	MC
	Am. Indian			11	11	196	7.9	2.54	0.75	1.3	MC
	Multi			11	11	1637	7.7	2.47	0.71	1.3	MC
	D		White		11	10	92572	7.7	2.17	0.62	1.3
		Af. Amer.		11	10	19614	5.7	2.19	0.55	1.5	MC/OE
		Hispanic		11	10	10098	5.9	2.22	0.57	1.5	MC/OE
Asian			11	10	4199	7.7	2.26	0.66	1.3	MC/OE	
Am. Indian			11	10	196	7.1	2.39	0.67	1.4	MC/OE	
Multi			11	10	1637	6.8	2.33	0.64	1.4	MC/OE	

Appendix K: Reliabilities

	<b>Strand</b>	<b>Group</b>	<b>Pts.</b>	<b>Len.</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>r</b>	<b>SEM</b>	<b>Items</b>
<b>ELL</b>	Tot.	All	68	63	3860	34.7	12.00	0.90	3.7	MC/OE
	A	All	34	31	3860	17.9	6.53	0.83	2.7	MC/OE
	B	All	12	11	3860	6.0	2.63	0.65	1.6	MC/OE
	C	All	11	11	3860	5.5	2.37	0.59	1.5	MC
	D	All	11	10	3860	5.2	2.07	0.48	1.5	MC/OE
<b>IEP</b>	Tot.	All	68	63	20554	41.2	13.56	0.93	3.6	MC/OE
	A	All	34	31	20554	20.9	7.15	0.88	2.5	MC/OE
	B	All	12	11	20554	7.2	2.79	0.72	1.5	MC/OE
	C	All	11	11	20554	6.8	2.60	0.70	1.4	MC
	D	All	11	10	20554	6.2	2.37	0.63	1.4	MC/OE
<b>Eco. Disadv.</b>	Tot.	All	68	63	53914	43.2	12.82	0.92	3.5	MC/OE
	A	All	34	31	53914	22.2	6.73	0.86	2.5	MC/OE
	B	All	12	11	53914	7.6	2.67	0.70	1.5	MC/OE
	C	All	11	11	53914	7.1	2.54	0.70	1.4	MC
	D	All	11	10	53914	6.3	2.29	0.61	1.4	MC/OE

## Appendix K: Reliabilities

Science Grade 8

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	68	63	132452	42.6	13.74	0.93	3.5	MC/OE
	A	All	34	33	132452	22.0	7.21	0.89	2.4	MC/OE
	B	All	11	9	132452	6.6	2.67	0.69	1.5	MC/OE
	C	All	12	12	132452	7.4	2.59	0.66	1.5	MC
	D	All	11	9	132452	6.6	2.60	0.70	1.4	MC/OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	Male		68	63	68092	42.8	14.22	0.94	3.5	MC/OE
		Female		68	63	64111	42.5	13.18	0.93	3.6	MC/OE
	A	Male		34	33	68092	22.0	7.47	0.90	2.4	MC/OE
		Female		34	33	64111	22.1	6.92	0.87	2.4	MC/OE
	B	Male		11	9	68092	6.6	2.71	0.70	1.5	MC/OE
		Female		11	9	64111	6.5	2.63	0.68	1.5	MC/OE
	C	Male		12	12	68092	7.5	2.69	0.69	1.5	MC
		Female		12	12	64111	7.3	2.47	0.62	1.5	MC
	D	Male		11	9	68092	6.6	2.64	0.71	1.4	MC/OE
		Female		11	9	64111	6.6	2.57	0.69	1.4	MC/OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	White		68	63	98095	45.4	12.55	0.92	3.5	MC/OE
		Af. Amer.		68	63	19377	32.3	12.68	0.91	3.7	MC/OE
		Hispanic		68	63	9467	33.2	13.07	0.92	3.7	MC/OE
		Asian		68	63	3876	47.4	13.12	0.93	3.4	MC/OE
		Am. Indian		68	63	197	41.0	13.78	0.93	3.6	MC/OE
		Multi		68	63	1179	37.8	13.81	0.93	3.6	MC/OE
		A	White		34	33	98095	23.4	6.66	0.87	2.4
	Af. Amer.			34	33	19377	16.9	6.77	0.85	2.6	MC/OE
	Hispanic			34	33	9467	17.3	6.96	0.86	2.6	MC/OE
	Asian			34	33	3876	24.7	6.70	0.88	2.3	MC/OE
	Am. Indian			34	33	197	21.3	7.22	0.88	2.5	MC/OE
	Multi			34	33	1179	19.7	7.27	0.88	2.5	MC/OE
	B		White		11	9	98095	7.1	2.49	0.65	1.5
		Af. Amer.		11	9	19377	4.8	2.50	0.64	1.5	MC/OE
		Hispanic		11	9	9467	4.9	2.60	0.66	1.5	MC/OE
		Asian		11	9	3876	7.3	2.69	0.71	1.4	MC/OE
		Am. Indian		11	9	197	6.4	2.67	0.69	1.5	MC/OE
		Multi		11	9	1179	5.8	2.73	0.70	1.5	MC/OE
		C	White		12	12	98095	7.8	2.44	0.63	1.5
	Af. Amer.			12	12	19377	5.8	2.48	0.58	1.6	MC
	Hispanic			12	12	9467	6.0	2.49	0.59	1.6	MC
	Asian			12	12	3876	8.2	2.49	0.66	1.4	MC
	Am. Indian			12	12	197	6.9	2.61	0.65	1.5	MC
	Multi			12	12	1179	6.6	2.66	0.66	1.6	MC
	D		White		11	9	98095	7.1	2.38	0.65	1.4
		Af. Amer.		11	9	19377	4.7	2.49	0.66	1.5	MC/OE
		Hispanic		11	9	9467	5.0	2.52	0.67	1.5	MC/OE
		Asian		11	9	3876	7.3	2.52	0.70	1.4	MC/OE
		Am. Indian		11	9	197	6.4	2.51	0.66	1.5	MC/OE
Multi			11	9	1179	5.8	2.64	0.70	1.5	MC/OE	

Appendix K: Reliabilities

	<b>Strand</b>	<b>Group</b>	<b>Pts.</b>	<b>Len.</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>r</b>	<b>SEM</b>	<b>Items</b>
<b>ELL</b>	Tot.	All	68	63	2734	25.9	9.83	0.86	3.7	MC/OE
	A	All	34	33	2734	13.7	5.41	0.76	2.6	MC/OE
	B	All	11	9	2734	3.5	2.12	0.52	1.5	MC/OE
	C	All	12	12	2734	5.0	2.18	0.44	1.6	MC
	D	All	11	9	2734	3.7	2.04	0.52	1.4	MC/OE
	<b>Strand</b>	<b>Group</b>	<b>Pts.</b>	<b>Len.</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>r</b>	<b>SEM</b>	<b>Items</b>
<b>IEP</b>	Tot.	All	68	63	20230	30.3	12.73	0.92	3.7	MC/OE
	A	All	34	33	20230	15.6	6.70	0.85	2.6	MC/OE
	B	All	11	9	20230	4.6	2.53	0.65	1.5	MC/OE
	C	All	12	12	20230	5.6	2.52	0.60	1.6	MC
	D	All	11	9	20230	4.6	2.53	0.67	1.5	MC/OE
	<b>Strand</b>	<b>Group</b>	<b>Pts.</b>	<b>Len.</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>r</b>	<b>SEM</b>	<b>Items</b>
<b>Eco. Disadv.</b>	Tot.	All	68	63	49589	35.7	13.33	0.92	3.7	MC/OE
	A	All	34	33	49589	18.6	7.06	0.87	2.6	MC/OE
	B	All	11	9	49589	5.4	2.63	0.67	1.5	MC/OE
	C	All	12	12	49589	6.3	2.54	0.61	1.6	MC
	D	All	11	9	49589	5.4	2.59	0.68	1.5	MC/OE

## Appendix K: Reliabilities

Science Grade 11

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	74	62	129926	39.5	13.02	0.92	3.7	MC/OE
	A	All	38	31	129926	21.0	7.01	0.86	2.6	MC/OE
	B	All	12	10	129926	5.0	2.32	0.61	1.4	MC/OE
	C	All	12	10	129926	6.6	2.60	0.63	1.6	MC/OE
	D	All	12	11	129926	6.9	2.60	0.67	1.5	MC/OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	Male		74	62	65643	39.7	13.42	0.93	3.7	MC/OE
		Female		74	62	63919	39.4	12.56	0.91	3.7	MC/OE
	A	Male		38	31	65643	20.8	7.21	0.87	2.6	MC/OE
		Female		38	31	63919	21.1	6.77	0.85	2.6	MC/OE
	B	Male		12	10	65643	5.1	2.33	0.63	1.4	MC/OE
		Female		12	10	63919	5.0	2.30	0.60	1.5	MC/OE
	C	Male		12	10	65643	6.8	2.67	0.66	1.6	MC/OE
		Female		12	10	63919	6.4	2.50	0.59	1.6	MC/OE
	D	Male		12	11	65643	7.0	2.64	0.69	1.5	MC/OE
		Female		12	11	63919	6.8	2.56	0.65	1.5	MC/OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	White		74	62	100692	41.9	11.98	0.91	3.7	MC/OE
		Af. Amer.		74	62	16901	28.9	11.90	0.90	3.7	MC/OE
		Hispanic		74	62	7424	30.2	12.06	0.91	3.7	MC/OE
		Asian		74	62	3599	43.5	13.42	0.92	3.7	MC/OE
		Am. Indian		74	62	195	38.2	12.42	0.91	3.7	MC/OE
		Multi		74	62	734	33.8	12.99	0.92	3.7	MC/OE
	A	White		38	31	100692	22.2	6.45	0.84	2.6	MC/OE
		Af. Amer.		38	31	16901	15.5	6.62	0.85	2.6	MC/OE
		Hispanic		38	31	7424	16.1	6.67	0.85	2.6	MC/OE
		Asian		38	31	3599	23.1	7.15	0.87	2.6	MC/OE
		Am. Indian		38	31	195	20.2	6.80	0.85	2.6	MC/OE
		Multi		38	31	734	18.0	7.16	0.87	2.6	MC/OE
	B	White		12	10	100692	5.4	2.23	0.59	1.4	MC/OE
		Af. Amer.		12	10	16901	3.6	2.10	0.55	1.4	MC/OE
		Hispanic		12	10	7424	3.7	2.13	0.56	1.4	MC/OE
		Asian		12	10	3599	5.7	2.47	0.65	1.5	MC/OE
		Am. Indian		12	10	195	4.9	2.32	0.60	1.5	MC/OE
		Multi		12	10	734	4.4	2.28	0.61	1.4	MC/OE
	C	White		12	10	100692	7.0	2.47	0.59	1.6	MC/OE
		Af. Amer.		12	10	16901	4.8	2.38	0.55	1.6	MC/OE
		Hispanic		12	10	7424	5.2	2.38	0.55	1.6	MC/OE
		Asian		12	10	3599	7.5	2.65	0.65	1.6	MC/OE
		Am. Indian		12	10	195	6.4	2.35	0.51	1.6	MC/OE
Multi			12	10	734	5.5	2.59	0.61	1.6	MC/OE	
D	White		12	11	100692	7.3	2.43	0.62	1.5	MC/OE	
	Af. Amer.		12	11	16901	5.0	2.46	0.62	1.5	MC/OE	
	Hispanic		12	11	7424	5.2	2.47	0.62	1.5	MC/OE	
	Asian		12	11	3599	7.2	2.65	0.68	1.5	MC/OE	
	Am. Indian		12	11	195	6.7	2.49	0.63	1.5	MC/OE	
	Multi		12	11	734	5.8	2.57	0.64	1.5	MC/OE	

Appendix K: Reliabilities

	<b>Strand</b>	<b>Group</b>	<b>Pts.</b>	<b>Len.</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>r</b>	<b>SEM</b>	<b>Items</b>
<b>ELL</b>	Tot.	All	74	62	1883	22.7	8.44	0.82	3.6	MC/OE
	A	All	38	31	1883	11.8	4.86	0.74	2.5	MC/OE
	B	All	12	10	1883	2.6	1.60	0.29	1.4	MC/OE
	C	All	12	10	1883	4.3	2.08	0.43	1.6	MC/OE
	D	All	12	11	1883	4.0	1.92	0.39	1.5	MC/OE
	<b>Strand</b>	<b>Group</b>	<b>Pts.</b>	<b>Len.</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>r</b>	<b>SEM</b>	<b>Items</b>
<b>IEP</b>	Tot.	All	74	62	17802	26.9	11.48	0.90	3.6	MC/OE
	A	All	38	31	17802	14.0	6.30	0.83	2.6	MC/OE
	B	All	12	10	17802	3.4	2.04	0.54	1.4	MC/OE
	C	All	12	10	17802	4.6	2.32	0.56	1.5	MC/OE
	D	All	12	11	17802	4.9	2.42	0.62	1.5	MC/OE
	<b>Strand</b>	<b>Group</b>	<b>Pts.</b>	<b>Len.</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>r</b>	<b>SEM</b>	<b>Items</b>
<b>Eco. Disadv.</b>	Tot.	All	74	62	38167	32.7	12.44	0.91	3.7	MC/OE
	A	All	38	31	38167	17.4	6.80	0.85	2.6	MC/OE
	B	All	12	10	38167	4.1	2.18	0.57	1.4	MC/OE
	C	All	12	10	38167	5.5	2.47	0.58	1.6	MC/OE
	D	All	12	11	38167	5.7	2.57	0.65	1.5	MC/OE

Appendix K: Reliabilities

Writing Grade 5

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	128201	65.4	14.55	0.79	6.6
A	All		80	2	128201	51.8	11.94	0.71	6.4	OE
B	All		20	14	128201	13.7	3.45	0.81	1.5	MC/OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		Male	100	16	65420	62.5	14.68	0.80	6.6
Female			100	16	62583	68.5	13.75	0.77	6.6	MC/OE
A		Male	80	2	65420	49.4	12.02	0.71	6.4	OE
		Female	80	2	62583	54.3	11.32	0.68	6.4	OE
B		Male	20	14	65420	13.1	3.54	0.81	1.5	MC/OE
		Female	20	14	62583	14.2	3.25	0.79	1.5	MC/OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		White	100	16	92797	67.5	13.95	0.78	6.6
Af. Amer.			100	16	19774	58.4	14.04	0.78	6.6	MC/OE
Hispanic			100	16	9907	58.7	14.36	0.79	6.6	MC/OE
Asian			100	16	3808	71.7	14.05	0.78	6.6	MC/OE
Am. Indian			100	16	186	63.2	13.90	0.74	7.1	MC/OE
Multi			100	16	1516	63.0	14.71	0.79	6.8	MC/OE
A		White	80	2	92797	53.2	11.59	0.69	6.4	OE
		Af. Amer.	80	2	19774	46.7	11.47	0.69	6.4	OE
		Hispanic	80	2	9907	46.9	11.74	0.70	6.4	OE
		Asian	80	2	3808	56.5	11.71	0.70	6.4	OE
		Am. Indian	80	2	186	50.2	11.41	0.63	6.9	OE
		Multi	80	2	1516	49.9	12.08	0.70	6.6	OE
B		White	20	14	92797	14.2	3.19	0.79	1.5	MC/OE
		Af. Amer.	20	14	19774	11.8	3.54	0.79	1.6	MC/OE
		Hispanic	20	14	9907	11.8	3.53	0.79	1.6	MC/OE
		Asian	20	14	3808	15.2	3.08	0.80	1.4	MC/OE
		Am. Indian	20	14	186	13.0	3.41	0.80	1.5	MC/OE
		Multi	20	14	1516	13.1	3.51	0.80	1.6	MC/OE

ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	2908	52.7	13.91	0.78	6.5
A	All		80	2	2908	42.8	11.55	0.70	6.3	OE
B	All		20	14	2908	9.9	3.30	0.73	1.7	MC/OE

IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	20355	53.5	15.24	0.81	6.6
A	All		80	2	20355	43.0	12.50	0.74	6.4	OE
B	All		20	14	20355	10.5	3.67	0.79	1.7	MC/OE

Eco. Dis.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	52842	59.9	14.16	0.78	6.6
A	All		80	2	52842	47.7	11.60	0.70	6.4	OE
B	All		20	14	52842	12.2	3.51	0.79	1.6	MC/OE

Appendix K: Reliabilities

Writing Grade 8

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	131780	68.4	14.90	0.81	6.6
A	All		80	2	131780	54.4	12.12	0.72	6.4	OE
B	All		20	14	131780	14.0	3.42	0.80	1.5	MC/OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		Male	100	16	67596	65.3	15.20	0.81	6.6
Female			100	16	63959	71.6	13.83	0.78	6.5	MC/OE
A		Male	80	2	67596	52.0	12.38	0.73	6.4	OE
		Female	80	2	63959	57.0	11.25	0.68	6.3	OE
B		Male	20	14	67596	13.3	3.49	0.79	1.6	MC/OE
		Female	20	14	63959	14.6	3.21	0.78	1.5	MC/OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		White	100	16	97900	70.5	14.05	0.78	6.5
Af. Amer.			100	16	19297	60.3	14.78	0.79	6.7	MC/OE
Hispanic			100	16	9226	60.7	15.03	0.80	6.7	MC/OE
Asian			100	16	3745	74.9	14.41	0.79	6.7	MC/OE
Am. Indian			100	16	199	67.3	14.86	0.83	6.2	MC/OE
Multi			100	16	1173	64.4	15.71	0.83	6.5	MC/OE
A		White	80	2	97900	56.0	11.55	0.70	6.3	OE
		Af. Amer.	80	2	19297	48.4	11.99	0.71	6.5	OE
		Hispanic	80	2	9226	48.7	12.13	0.72	6.5	OE
		Asian	80	2	3745	59.5	11.88	0.70	6.5	OE
		Am. Indian	80	2	199	53.6	11.93	0.75	6.0	OE
		Multi	80	2	1173	51.4	12.85	0.76	6.3	OE
B		White	20	14	97900	14.5	3.15	0.77	1.5	MC/OE
		Af. Amer.	20	14	19297	11.9	3.51	0.77	1.7	MC/OE
		Hispanic	20	14	9226	12.0	3.61	0.79	1.7	MC/OE
		Asian	20	14	3745	15.4	3.12	0.79	1.4	MC/OE
		Am. Indian	20	14	199	13.7	3.55	0.81	1.6	MC/OE
		Multi	20	14	1173	13.0	3.54	0.79	1.6	MC/OE

ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	2310	52.7	14.04	0.76	6.8
A	All		80	2	2310	43.0	11.60	0.68	6.6	OE
B	All		20	14	2310	9.7	3.20	0.70	1.7	MC/OE

IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	19968	54.2	14.92	0.80	6.7
A	All		80	2	19968	43.8	12.27	0.72	6.5	OE
B	All		20	14	19968	10.4	3.45	0.76	1.7	MC/OE

Eco. Dis.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	49136	62.0	14.77	0.80	6.6
A	All		80	2	49136	49.6	11.99	0.71	6.4	OE
B	All		20	14	49136	12.4	3.51	0.78	1.6	MC/OE

Appendix K: Reliabilities

Writing Grade 11

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	130352	69.6	14.35	0.81	6.3
A	All		80	2	130352	54.9	11.83	0.73	6.1	OE
B	All		20	14	130352	14.7	3.19	0.80	1.4	MC/OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		Male	100	16	65513	66.7	15.06	0.82	6.4
Female			100	16	64377	72.6	12.86	0.77	6.1	MC/OE
A		Male	80	2	65513	52.6	12.43	0.74	6.3	OE
		Female	80	2	64377	57.4	10.63	0.68	6.0	OE
B		Male	20	14	65513	14.1	3.34	0.80	1.5	MC/OE
		Female	20	14	64377	15.3	2.90	0.77	1.4	MC/OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		White	100	16	100796	71.0	13.70	0.79	6.2
Af. Amer.			100	16	17208	62.9	15.20	0.81	6.7	MC/OE
Hispanic			100	16	7389	64.1	14.58	0.80	6.5	MC/OE
Asian			100	16	3552	74.8	13.62	0.80	6.1	MC/OE
Am. Indian			100	16	198	68.2	14.79	0.80	6.7	MC/OE
Multi			100	16	721	65.8	15.58	0.84	6.3	MC/OE
A		White	80	2	100796	56.0	11.40	0.72	6.1	OE
		Af. Amer.	80	2	17208	50.1	12.51	0.73	6.5	OE
		Hispanic	80	2	7389	51.1	11.93	0.72	6.3	OE
		Asian	80	2	3552	59.2	11.20	0.72	6.0	OE
		Am. Indian	80	2	198	54.0	12.21	0.71	6.5	OE
		Multi	80	2	721	52.1	12.86	0.78	6.1	OE
B		White	20	14	100796	15.1	2.96	0.78	1.4	MC/OE
		Af. Amer.	20	14	17208	12.8	3.44	0.79	1.6	MC/OE
		Hispanic	20	14	7389	12.9	3.42	0.79	1.6	MC/OE
		Asian	20	14	3552	15.6	3.02	0.80	1.4	MC/OE
		Am. Indian	20	14	198	14.2	3.19	0.78	1.5	MC/OE
		Multi	20	14	721	13.8	3.42	0.81	1.5	MC/OE

ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	1627	55.9	14.08	0.75	7.0
A	All		80	2	1627	45.5	11.87	0.67	6.8	OE
B	All		20	14	1627	10.4	3.09	0.69	1.7	MC/OE

IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	17660	55.4	15.83	0.81	6.8
A	All		80	2	17660	44.4	13.22	0.75	6.6	OE
B	All		20	14	17660	11.1	3.47	0.77	1.7	MC/OE

Eco. Dis.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	38368	64.2	14.92	0.81	6.6
A	All		80	2	38368	51.0	12.27	0.73	6.4	OE
B	All		20	14	38368	13.3	3.40	0.79	1.6	MC/OE

Appendix L:  
Cut Scores and Scale Transformations

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<b>Column Heading</b>	<b>Definition</b>
LOSS	Lowest Obtainable Scaled Score

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Appendix L: Cut Scores and Scale Transformations

	Grade	Scaling	LOSS	Scaled Score Cuts			Logit Cuts		
				Basic	Prof.	Adv.	Basic	Prof.	Adv.
<b>Mathematics</b>	<b>3</b>	128.81X + 964.24	750	1044	1180	1370	0.6192	1.6750	3.1501
	<b>4</b>	200.00X + 1183.52	700	1156	1246	1445	-0.1376	0.3124	1.3074
	<b>5</b>	189.80X + 1134.10	700	1158	1312	1483	0.1259	0.9373	1.8383
	<b>6</b>	200.00X + 1201.54	700	1174	1298	1476	-0.1377	0.4823	1.3723
	<b>7</b>	200.00X + 1225.28	700	1183	1298	1472	-0.2114	0.3636	1.2336
	<b>8</b>	177.53X + 1182.30	700	1171	1284	1446	-0.0637	0.5729	1.4854
	<b>11</b>	206.42X + 1203.10	700	1167	1304	1509	-0.1749	0.4888	1.4819
<b>Reading</b>	<b>3</b>	123.80X + 1207.70	1000	1168	1235	1442	-0.3207	0.2205	1.8926
	<b>4</b>	200.00X + 1156.30	700	1112	1255	1469	-0.2215	0.4935	1.5635
	<b>5</b>	198.80X + 1094.60	700	1137	1275	1497	0.2133	0.9074	2.0241
	<b>6</b>	200.00X + 1168.96	700	1121	1278	1456	-0.2398	0.5452	1.4352
	<b>7</b>	200.00X + 1194.40	700	1131	1279	1470	-0.3170	0.4230	1.3780
	<b>8</b>	234.82X + 1113.70	700	1146	1280	1473	0.1376	0.7082	1.5301
	<b>11</b>	245.45X + 1115.20	700	1112	1257	1492	-0.0130	0.5777	1.5351
<b>Science</b>	<b>7</b>	176.75X + 1225.65	1050	1150	1275	1483	-0.4280	0.2792	1.4560
	<b>8</b>	191.54X + 1196.64	925	1150	1275	1464	-0.2435	0.4091	1.3958
	<b>11</b>	101.81X + 1194.69	1050	1150	1275	1347	-0.4390	0.7888	1.4960
<b>Writing</b>	<b>7</b>	100.00X + 1071.44	700	745	1236	1909	-3.2644	1.6456	8.3756
	<b>8</b>	100.00X + 1123.84	700	914	1236	1748	-2.0984	1.1216	6.2416
	<b>11</b>	100.00X + 1244.30	700	952	1236	1806	-2.9230	-0.0830	5.6170



Appendix M:  
PSSA Historical Statistics



Appendix M: PSSA Historical Statistics

			2005	2006	2007	2008	2009	2010				2005	2006	2007	2008	2009	2010
Mathematics Grade 3	Raw Score	Mean	-	-	54.98	55.00	60.02	60.32	Raw Score	Mean	-	45.08	43.61	44.28	47.22	49.11	
		SD	-	-	9.66	9.91	10.63	9.97		SD	-	12.66	12.41	13.25	14.51	12.95	
		Max	-	-	66	66	72	72		Max	-	66	66	66	72	72	
	Scaled Score	Mean	-	-	1314.5	1332.9	1333.0	1341.0	Scaled Score	Mean	-	1403.0	1416.7	1445.3	1456.6	1469.6	
		SD	-	-	176.6	184.7	176.0	164.7		SD	-	220.6	221.0	243.0	234.0	222.4	
		Max	-	-	1765	1827	1814	1816		Max	-	2282	2348	2370	2405	2446	
	Raw Cuts	Bel. Basic/Basic	-	-	37	36	38	38	Raw Cuts	Bel. Basic/Basic	-	29	28	27	26	28	
		Basic/Prof.	-	-	50	49	53	52		Basic/Prof.	-	36	34	33	33	35	
		Prof./Adv.	-	-	61	60	65	65		Prof./Adv.	-	50	47	47	49	50	
	Theta Cuts	Bel. Basic/Basic	-	-	0.6369	0.6397	0.6171	0.6277	Theta Cuts	Bel. Basic/Basic	-	-0.1359	-0.1029	-0.0871	-0.1178	-0.1150	
		Basic/Prof.	-	-	1.7479	1.7081	1.7404	1.7186		Basic/Prof.	-	0.3124	0.3496	0.3348	0.3321	0.3378	
		Prof./Adv.	-	-	3.3362	3.2408	3.1592	3.2516		Prof./Adv.	-	1.3089	1.3315	1.3437	1.3204	1.3175	
	Impact %	Bel. Basic	-	-	6.1	6.0	5.2	4.2	Impact %	Bel. Basic	-	12.6	12.7	12.3	9.4	7.0	
		Basic	-	-	15.4	13.5	13.1	11.3		Basic	-	10.1	9.3	8.2	8.8	8.1	
		Proficient	-	-	44.2	38.0	38.1	41.1		Proficient	-	33.7	31.1	29.6	30.6	30.9	
		Advanced	-	-	34.3	42.5	43.6	43.4		Advanced	-	43.5	46.9	50.0	51.2	54.0	
		Prof. + Adv.	-	-	78.5	80.5	81.7	84.5		Prof. + Adv.	-	77.3	78.0	79.5	81.8	84.8	
	Demographic	N Count	-	-	125533	126552	127268	126676	Demographic	N Count	-	127959	126154	126414	127601	126333	
% City		-	-	11.4	11.2	10.9	10.8	% City		-	11.6	11.3	11.0	10.9	10.6		
% White		-	-	73.1	72.8	72.5	71.5	% White		-	74.5	73.6	73.0	72.5	72.2		
% Black		-	-	15.8	15.8	15.5	15.5	% Black		-	15.4	15.7	15.7	15.6	15.3		
% Hispanic		-	-	7.2	7.5	7.6	8.1	% Hispanic		-	6.4	6.9	7.5	7.6	7.7		

			2005	2006	2007	2008	2009	2010				2005	2006	2007	2008	2009	2010
Mathematics Grade 5	Raw Score	Mean	47.21	44.71	43.81	43.39	46.20	48.59	Raw Score	Mean	-	42.44	44.66	42.96	47.90	49.42	
		SD	12.31	12.99	12.45	14.08	14.57	13.60		SD	-	13.07	11.81	13.85	14.36	13.68	
		Max	66	66	66	66	72	72		Max	-	66	66	66	72	72	
	Scaled Score	Mean	1419.3	1424.0	1427.6	1453.1	1451.9	1477.1	Scaled Score	Mean	-	1400.2	1421.1	1457.4	1469.9	1493.4	
		SD	223.8	238.1	226.7	234.2	226.2	236.3		SD	-	227.7	233.6	253.5	240.2	245.0	
		Max	2272	2292	2476	2329	2409	2432		Max	-	2345	2369	2453	2415	2447	
	Raw Cuts	Bel. Basic/Basic	31	29	28	23	25	28	Raw Cuts	Bel. Basic/Basic	-	28	31	26	28	29	
		Basic/Prof.	43	40	38	35	37	40		Basic/Prof.	-	37	39	35	38	39	
		Prof./Adv.	54	51	49	48	51	52		Prof./Adv.	-	49	50	47	51	51	
	Theta Cuts	Bel. Basic/Basic	-	0.1924	0.1886	0.1398	0.1286	0.1494	Theta Cuts	Bel. Basic/Basic	-	-0.1366	-0.1292	-0.0912	-0.1288	-0.1237	
		Basic/Prof.	-	0.9868	0.9326	0.9407	0.9367	0.9992		Basic/Prof.	-	0.4823	0.5116	0.5200	0.5206	0.5324	
		Prof./Adv.	-	1.8626	1.8384	1.8360	1.8797	1.9071		Prof./Adv.	-	1.3721	1.4429	1.4008	1.4040	1.3791	
	Impact %	Bel. Basic	11.9	13.4	12.1	10.4	9.6	8.8	Impact %	Bel. Basic	-	15.8	14.4	14.1	11.1	9.4	
		Basic	19.1	19.8	17.0	16.4	16.9	16.8		Basic	-	16.2	15.9	13.6	13.2	12.6	
		Proficient	30.9	28.0	29.5	27.5	29.2	26.8		Proficient	-	30.2	30.0	25.5	26.2	24.7	
		Advanced	38.1	38.9	41.5	45.7	44.3	47.6		Advanced	-	37.8	39.6	46.8	49.5	53.3	
		Prof. + Adv.	69.0	66.9	71.0	73.2	73.5	74.4		Prof. + Adv.	-	68.0	69.6	72.3	75.7	78.0	
	Demographic	N Count	134322	131702	129781	127324	127544	126419	Demographic	N Count	-	136186	133610	130851	128421	126288	
% City		12.3	11.6	11.0	10.8	10.6	10.6	% City		-	11.4	10.8	10.3	10.2	10.2		
% White		74.4	74.7	74.2	73.4	72.9	72.3	% White		-	74.5	74.5	74.2	73.3	72.8		
% Black		16.3	15.6	15.4	15.6	15.5	15.5	% Black		-	16.1	15.6	15.3	15.4	15.2		
% Hispanic		6.0	6.3	6.7	7.2	7.5	7.8	% Hispanic		-	6.2	6.5	6.9	7.3	7.6		

Appendix M: PSSA Historical Statistics

			2005	2006	2007	2008	2009	2010				2005	2006	2007	2008	2009	2010
Mathematics Grade 7	Raw Score	Mean	-	39.77	40.54	41.58	45.62	47.88	Raw Score	Mean	43.97	42.33	42.62	44.17	47.17	49.33	
		SD	-	13.38	13.23	13.41	14.57	14.61		SD	13.69	13.71	13.70	13.54	14.84	14.53	
		Max	-	66	66	66	72	72		Max	66	66	66	66	72	72	
	Scaled Score	Mean	-	1393.3	1419.2	1442.7	1464.2	1500.0	Scaled Score	Mean	1369.2	1368.7	1393.5	1406.3	1419.8	1450.7	
		SD	-	221.7	248.5	236.7	233.4	254.7		SD	222.2	222.5	222.3	221.0	220.3	236.9	
		Max	-	2343	2487	2407	2450	2475		Max	2240	2225	2259	2270	2286	2314	
	Raw Cuts	Bel. Basic/Basic	-	26	27	26	26	28	Raw Cuts	Bel. Basic/Basic	31	29	28	29	28	30	
		Basic/Prof.	-	34	35	34	35	36		Basic/Prof.	41	39	37	38	39	40	
		Prof./Adv.	-	46	46	46	49	49		Prof./Adv.	52	50	49	50	52	52	
	Theta Cuts	Bel. Basic/Basic	-	-0.2123	-0.2114	-0.1486	-0.2145	-0.1565	Theta Cuts	Bel. Basic/Basic	-	-0.0514	-0.0174	-0.0046	-0.0649	-0.0609	
		Basic/Prof.	-	0.3636	0.4076	0.4271	0.3755	0.3673		Basic/Prof.	-	0.6355	0.6341	0.6221	0.6285	0.6122	
		Prof./Adv.	-	1.2351	1.3170	1.2916	1.2920	1.2552		Prof./Adv.	-	1.4907	1.5493	1.5535	1.4991	1.5042	
	Impact %	Bel. Basic	-	17.3	17.8	14.9	11.6	11.7	Impact %	Bel. Basic	19.3	18.9	16.9	16.0	12.8	12.0	
		Basic	-	16.3	15.0	14.5	13.1	10.3		Basic	17.8	18.9	15.2	13.7	16.0	12.8	
		Proficient	-	29.3	26.2	26.8	27.8	23.6		Proficient	26.5	26.1	27.6	27.7	26.6	24.1	
		Advanced	-	37.2	41.0	43.8	47.5	54.3		Advanced	36.4	36.1	40.3	42.6	44.7	51.1	
		Prof. + Adv.	-	66.4	67.2	70.6	75.3	78.0		Prof. + Adv.	62.9	62.2	67.9	70.3	71.2	75.1	
	Demographic	N Count	-	141300	138838	135807	132803	127685	Demographic	N Count	145999	143749	141451	138582	135909	129983	
% City		-	10.9	10.7	10.0	9.7	9.6	% City		11.1	11.0	10.6	10.3	9.8	9.5		
% White		-	75.1	74.3	74.4	74.1	73.3	% White		76.8	75.9	75.0	74.5	74.4	74.1		
% Black		-	15.8	15.9	15.4	15.1	15.1	% Black		15.0	15.4	15.7	15.6	15.0	14.7		
% Hispanic		-	6.0	6.4	6.7	7.0	7.4	% Hispanic		5.3	5.6	6.2	6.5	6.9	7.0		

			2005	2006	2007	2008	2009	2010
Mathematics Grade 11	Raw Score	Mean	39.89	43.39	40.95	42.00	45.97	47.62
		SD	15.17	14.24	14.25	14.33	15.50	15.23
		Max	66	66	66	66	72	72
	Scaled Score	Mean	1338.1	1342.5	1332.8	1343.8	1345.4	1372.2
		SD	288.3	292.5	253.3	267.3	259.9	276.0
		Max	2440	2398	2349	2342	2347	2377
	Raw Cuts	Bel. Basic/Basic	31	36	31	33	35	37
		Basic/Prof.	41	45	41	42	46	46
		Prof./Adv.	53	55	54	54	59	58
	Theta Cuts	Bel. Basic/Basic	-	-0.1182	-0.1546	-0.1113	-0.1731	-0.1149
		Basic/Prof.	-	0.5620	0.5150	0.5254	0.5272	0.4987
		Prof./Adv.	-	1.5382	1.5344	1.5474	1.5417	1.4788
	Impact %	Bel. Basic	30.5	30.4	26.6	26.6	24.9	24.8
		Basic	18.7	17.7	19.8	17.6	19.5	15.6
		Proficient	24.6	23.9	29.5	30.0	29.9	27.6
		Advanced	26.3	28.1	24.2	25.9	25.7	32.0
		Prof. + Adv.	50.8	51.9	53.7	55.9	55.7	59.6
	Demographic	N Count	129962	132666	135632	135137	133952	129910
% City		9.3	8.5	8.2	7.8	8.4	8.2	
% White		80.5	80.5	79.5	79.1	77.8	76.6	
% Black		12.1	12.2	12.6	12.7	13.5	13.7	
% Hispanic		3.8	4.0	4.5	5.0	5.3	5.8	

Appendix M: PSSA Historical Statistics

		2005	2006	2007	2008	2009	2010			2005	2006	2007	2008	2009	2010	
Reading Grade 3	Raw Score	Mean	-	-	30.18	30.64	30.82	30.64	Raw Score	Mean	-	33.10	31.74	33.93	34.07	34.97
		SD	-	-	9.43	8.87	8.80	9.09		SD	-	9.92	9.63	9.82	10.15	9.98
		Max	-	-	46	46	46	46		Max	-	52	52	52	52	52
	Scaled Score	Mean	-	-	1330.8	1334.8	1342.1	1350.2	Scaled Score	Mean	-	1339.3	1349.2	1366.6	1375.5	1379.6
		SD	-	-	149.7	139.4	145.8	158.6		SD	-	217.9	218.7	225.1	223.0	222.9
		Max	-	-	1891	1896	1928	1966		Max	-	2303	2411	2318	2299	2294
	Raw Cuts	Bel. Basic/Basic	-	-	19	19	20	19	Raw Cuts	Bel. Basic/Basic	-	22	21	22	21	22
		Basic/Prof.	-	-	25	25	25	25		Basic/Prof.	-	30	28	30	29	30
		Prof./Adv.	-	-	39	39	38	38		Prof./Adv.	-	40	38	40	40	41
	Theta Cuts	Bel. Basic/Basic	-	-	-0.3137	-0.3235	-0.2423	-0.3251	Theta Cuts	Bel. Basic/Basic	-	-0.2218	-0.1667	-0.2014	-0.2069	-0.2073
		Basic/Prof.	-	-	0.2857	0.2836	0.2779	0.3125		Basic/Prof.	-	0.4935	0.5021	0.5469	0.5023	0.5057
		Prof./Adv.	-	-	2.0417	2.0544	1.9360	2.0230		Prof./Adv.	-	1.5629	1.5675	1.6028	1.5925	1.6441
	Impact %	Bel. Basic	-	-	14.8	12.4	13.5	12.9	Impact %	Bel. Basic	-	15.3	14.9	13.6	12.8	12.8
		Basic	-	-	12.4	10.7	9.5	11.9		Basic	-	16.6	15.0	16.3	14.6	14.3
		Proficient	-	-	50.8	57.1	50.8	47.9		Proficient	-	37.1	38.1	35.8	36.2	36.3
		Advanced	-	-	22.0	19.7	26.2	27.3		Advanced	-	31.0	32.0	34.3	36.4	36.6
		Prof. + Adv.	-	-	72.8	76.9	77.0	75.2		Prof. + Adv.	-	68.1	70.1	70.1	72.6	72.9
	Demographic	N Count	-	-	125344	126395	127154	126588	Demographic	N Count	-	127680	125981	126280	127519	128452
% City		-	-	11.4	11.2	10.9	10.8	% City		-	11.5	11.3	11.0	10.9	10.5	
% White		-	-	73.2	72.8	72.5	71.6	% White		-	74.5	73.7	73.0	72.5	72.2	
% Black		-	-	15.8	15.8	15.5	15.5	% Black		-	15.4	15.7	15.7	15.6	15.3	
% Hispanic		-	-	7.2	7.5	7.6	8.1	% Hispanic		-	6.4	6.9	7.4	7.6	7.7	

		2005	2006	2007	2008	2009	2010			2005	2006	2007	2008	2009	2010	
Reading Grade 5	Raw Score	Mean	35.87	35.13	33.83	34.57	35.11	35.65	Raw Score	Mean	-	32.96	33.11	34.54	35.44	35.71
		SD	9.52	9.81	9.68	9.80	9.19	8.79		SD	-	9.26	9.87	9.60	9.67	9.72
		Max	52	52	52	52	52	52		Max	-	52	52	52	52	52
	Scaled Score	Mean	1334.8	1311.5	1318.0	1329.7	1332.1	1328.9	Scaled Score	Mean	-	1335.6	1342.7	1357.6	1373.1	1378.4
		SD	235.1	232.9	221.9	222.0	219.8	217.6		SD	-	210.4	223.9	221.5	222.4	233.7
		Max	2300	2234	2261	2262	2322	2357		Max	-	2339	2306	2290	2285	2293
	Raw Cuts	Bel. Basic/Basic	28	28	26	26	27	28	Raw Cuts	Bel. Basic/Basic	-	23	23	24	24	25
		Basic/Prof.	35	35	33	34	34	35		Basic/Prof.	-	31	31	32	33	33
		Prof./Adv.	44	44	43	43	43	43		Prof./Adv.	-	39	40	41	41	41
	Theta Cuts	Bel. Basic/Basic	-	0.2263	0.2564	0.2378	0.2289	0.2219	Theta Cuts	Bel. Basic/Basic	-	-0.2409	-0.1960	-0.1898	-0.1980	-0.1583
		Basic/Prof.	-	0.9268	0.9094	0.9934	0.9321	0.9505		Basic/Prof.	-	0.5452	0.5488	0.5587	0.6215	0.5928
		Prof./Adv.	-	2.0985	2.0854	2.0706	2.1020	2.0584		Prof./Adv.	-	1.4345	1.5094	1.5553	1.5044	1.5051
	Impact %	Bel. Basic	19.1	21.1	20.4	18.9	17.9	17.2	Impact %	Bel. Basic	-	15.6	17.0	15.3	14.0	14.8
		Basic	16.7	18.3	19.7	19.6	17.5	18.7		Basic	-	18.5	19.6	17.7	18.4	16.4
		Proficient	41.3	39.8	39.2	38.1	41.8	41.2		Proficient	-	33.5	32.7	34.9	30.5	30.7
		Advanced	22.9	20.8	20.8	23.5	22.7	22.9		Advanced	-	32.4	30.8	32.0	37.1	38.1
		Prof. + Adv.	64.2	60.6	59.9	61.5	64.5	64.1		Prof. + Adv.	-	65.9	63.5	66.9	67.6	68.7
	Demographic	N Count	134142	131488	129593	127211	127430	128933	Demographic	N Count	-	135914	133399	130706	128284	128921
% City		12.2	11.6	11.0	10.8	10.6	10.5	% City		-	11.4	10.8	10.3	10.2	10.1	
% White		74.4	74.7	74.3	73.5	72.9	72.2	% White		-	74.5	74.6	74.3	73.3	72.7	
% Black		16.3	15.6	15.5	15.6	15.5	15.6	% Black		-	16.0	15.6	15.3	15.4	15.3	
% Hispanic		5.9	6.3	6.7	7.2	7.5	7.8	% Hispanic		-	6.2	6.5	6.9	7.3	7.6	

Appendix M: PSSA Historical Statistics

			2005	2006	2007	2008	2009	2010				2005	2006	2007	2008	2009	2010
Reading Grade 7	Raw Score	Mean	-	33.13	33.19	34.12	34.52	34.83	Raw Score	Mean	39.12	34.98	33.08	33.57	34.77	34.61	
		SD	-	9.75	10.18	10.05	9.91	9.48		SD	9.07	9.78	8.98	10.13	9.55	8.89	
		Max	-	52	52	52	52	52		Max	52	52	52	52	52	52	
	Scaled Score	Mean	-	1363.5	1372.4	1394.2	1413.1	1413.9	Scaled Score	Mean	1359.5	1424.8	1441.3	1479.9	1499.5	1491.3	
		SD	-	220.1	229.7	234.8	231.0	219.2		SD	274.3	284.7	249.2	272.8	263.7	245.3	
		Max	-	2351	2361	2366	2388	2373		Max	2349	2559	2646	2628	2621	2635	
	Raw Cuts	Bel. Basic/Basic	-	22	22	22	21	22	Raw Cuts	Bel. Basic/Basic	33	25	22	20	21	21	
		Basic/Prof.	-	30	30	30	30	30		Basic/Prof.	39	31	28	26	27	27	
		Prof./Adv.	-	39	39	40	39	39		Prof./Adv.	45	39	36	35	36	36	
	Theta Cuts	Bel. Basic/Basic	-	-0.3167	-0.2713	-0.2808	-0.3012	-0.2353	Theta Cuts	Bel. Basic/Basic	-	0.1584	0.1727	0.1507	0.1775	0.1659	
		Basic/Prof.	-	0.4230	0.4511	0.4361	0.4955	0.4820		Basic/Prof.	-	0.7466	0.7668	0.7042	0.7360	0.7294	
		Prof./Adv.	-	1.3773	1.3771	1.4939	1.4066	1.4015		Prof./Adv.	-	1.6424	1.6248	1.5700	1.6317	1.6340	
	Impact %	Bel. Basic	-	14.6	16.0	13.8	11.2	11.2	Impact %	Bel. Basic	19.7	16.2	12.3	12.1	10.6	8.7	
		Basic	-	17.3	17.3	16.2	17.4	15.3		Basic	16.3	13.2	12.7	9.6	8.9	9.4	
		Proficient	-	33.2	30.3	34.0	30.0	31.6		Proficient	30.6	27.1	29.3	24.2	25.2	28.6	
		Advanced	-	34.9	36.5	36.0	41.4	41.9		Advanced	33.5	43.5	45.7	54.1	55.3	53.3	
		Prof. + Adv.	-	68.0	66.8	70.0	71.4	73.5		Prof. + Adv.	64.0	70.6	75.0	78.2	80.5	81.9	
	Demographic	N Count	-	141012	138610	135669	132641	130376	Demographic	N Count	145752	143401	141193	138377	135739	132906	
% City		-	10.9	10.6	10.0	9.7	9.6	% City		11.1	11.0	10.6	10.2	9.8	9.4		
% White		-	75.2	74.4	74.5	74.2	73.3	% White		76.8	76.0	75.0	74.5	74.5	74.1		
% Black		-	15.7	15.9	15.4	15.1	15.2	% Black		15.0	15.4	15.7	15.6	15.0	14.8		
% Hispanic		-	6.0	6.4	6.7	7.0	7.4	% Hispanic		5.3	5.6	6.2	6.5	6.9	7.1		

			2005	2006	2007	2008	2009	2010
Reading Grade 11	Raw Score	Mean	38.75	34.76	34.02	34.81	35.04	35.25
		SD	9.51	9.13	9.55	9.28	9.39	9.38
		Max	52	52	52	52	52	52
	Scaled Score	Mean	1362.9	1366.4	1346.2	1360.2	1368.5	1363.2
		SD	316.5	278.5	266.9	276.2	280.8	280.4
		Max	2446	2631	2529	2546	2524	2520
	Raw Cuts	Bel. Basic/Basic	33	27	26	27	27	27
		Basic/Prof.	38	33	32	33	33	33
		Prof./Adv.	45	41	41	41	41	41
	Theta Cuts	Bel. Basic/Basic	-	0.0646	0.0416	0.0582	0.0675	0.0156
		Basic/Prof.	-	0.6639	0.6034	0.6497	0.6540	0.6097
		Prof./Adv.	-	1.6804	1.6229	1.6056	1.5958	1.5606
	Impact %	Bel. Basic	22.0	18.5	19.3	19.0	18.8	18.0
		Basic	12.9	16.3	15.3	16.2	15.9	14.8
		Proficient	31.4	33.9	36.5	32.9	32.1	33.2
		Advanced	33.6	31.2	28.9	31.8	33.1	34.0
		Prof. + Adv.	65.0	65.2	65.4	64.7	65.3	67.2
	Demographic	N Count	129693	132434	135364	135015	133753	133291
% City		9.3	8.5	8.2	7.8	8.4	8.2	
% White		80.6	80.5	79.6	79.2	77.8	76.4	
% Black		12.1	12.2	12.5	12.7	13.4	13.9	
% Hispanic		3.8	4.0	4.5	4.9	5.2	5.9	

Appendix M: PSSA Historical Statistics

		2008	2009	2010			2008	2009	2010	
Science Grade 4	Raw Score	Mean	45.80	47.25	48.64	Raw Score	Mean	38.25	41.00	42.61
		SD	11.04	11.53	12.22		SD	11.71	13.02	13.74
		Max	66	66	68		Max	66	66	68
	Scaled Score	Mean	1429.4	1449.2	1456.8	Scaled Score	Mean	1284.4	1302.9	1309.0
		SD	174.1	176.0	200.4		SD	174.1	197.6	210.1
		Max	2256	2271	2254		Max	2297	2303	2258
	Raw Cuts	Bel. Basic/Basic	26	25	28	Raw Cuts	Bel. Basic/Basic	29	31	33
		Basic/Prof.	36	36	38		Basic/Prof.	39	41	42
		Prof./Adv.	51	52	53		Prof./Adv.	51	53	55
	Theta Cuts	Bel. Basic/Basic	-0.4243	-0.4261	-0.3909	Theta Cuts	Bel. Basic/Basic	-0.2333	-0.2118	-0.1829
		Basic/Prof.	0.2798	0.3223	0.3093		Basic/Prof.	0.4587	0.4620	0.4202
		Prof./Adv.	1.4659	1.5133	1.4914		Prof./Adv.	1.4173	1.4098	1.4771
	Impact %	Bel. Basic	5.9	4.9	7.7	Impact %	Bel. Basic	23.1	24.0	25.5
		Basic	12.7	11.7	10.8		Basic	24.3	21.1	17.3
		Proficient	41.2	41.0	35.5		Proficient	36.4	32.5	33.7
		Advanced	40.3	42.4	45.9		Advanced	16.3	22.3	23.5
		Prof. + Adv.	81.5	83.4	81.5		Prof. + Adv.	52.7	54.8	57.2
	Demographic	N Count	126426	127537	128565	Demographic	N Count	137790	134969	132452
% City		10.9	10.7	10.5	% City		10.1	9.7	9.3	
% White		72.9	72.5	72.0	% White		74.6	74.5	74.1	
% Black		15.5	15.5	15.3	% Black		15.3	14.9	14.6	
% Hispanic		7.6	7.7	7.9	% Hispanic		6.6	7.0	7.1	

		2008	2009	2010	
Science Grade 11	Raw Score	Mean	36.11	39.02	39.48
		SD	12.46	13.16	13.02
		Max	72	72	74
	Scaled Score	Mean	1236.3	1244.0	1242.6
		SD	89.0	101.5	96.7
		Max	1825	1859	1862
	Raw Cuts	Bel. Basic/Basic	24	27	27
		Basic/Prof.	42	44	45
		Prof./Adv.	53	53	54
	Theta Cuts	Bel. Basic/Basic	-0.3955	-0.3898	-0.4062
		Basic/Prof.	0.7921	0.8144	0.8288
		Prof./Adv.	1.5577	1.4967	1.5053
	Impact %	Bel. Basic	18.1	19.8	19.0
		Basic	46.2	40.5	41.2
		Proficient	25.2	22.5	25.0
		Advanced	10.5	17.2	14.8
		Prof. + Adv.	35.6	39.7	39.8
	Demographic	N Count	131157	130262	129926
% City		6.8	7.3	7.0	
% White		80.2	78.8	77.5	
% Black		11.6	12.4	13.0	
% Hispanic		4.8	5.1	5.7	

Appendix M: PSSA Historical Statistics

		2006	2007	2008	2009	2010			2006	2007	2008	2009	2010	
Writing Grade 5	Raw Score	Mean	68.63	65.07	66.56	66.03	65.44	Raw Score	Mean	71.71	67.24	68.05	67.82	68.36
		SD	12.97	13.03	13.93	14.35	14.55		SD	14.09	13.91	13.32	13.83	14.90
		Max	100	100	100	100	100		Max	100	100	100	100	100
	Scaled Score	Mean	1300.2	1274.5	1319.6	1303.2	1322.1	Scaled Score	Mean	1340.5	1375.1	1322.5	1363.1	1400.9
		SD	248.9	215.4	304.4	246.0	265.5		SD	266.0	258.4	210.5	265.5	271.9
		Max	2188	2145	2615	2162	2249		Max	2119	2265	2098	2288	2245
	Raw Cuts	Bel. Basic/Basic	35	35	34	31	30	Raw Cuts	Bel. Basic/Basic	45	40	43	43	38
		Basic/Prof.	68	64	65	64	63		Basic/Prof.	69	60	63	62	60
		Prof./Adv.	96	98	89	97	94		Prof./Adv.	92	85	94	85	86
	Theta Cuts	Bel. Basic/Basic					-3.2280	Theta Cuts	Bel. Basic/Basic					-2.0663
		Basic/Prof.					1.7554		Basic/Prof.					1.1789
		Prof./Adv.					8.4710		Prof./Adv.					6.4115
	Impact %	Bel. Basic	0.8	1.1	1.2	1.0	1.8	Impact %	Bel. Basic	3.4	2.8	2.9	4.2	3.2
		Basic	45.0	41.6	41.6	40.9	36.5		Basic	30.6	25.5	28.0	24.6	21.6
		Proficient	52.0	56.0	52.7	55.5	59.8		Proficient	60.5	60.9	66.8	60.7	61.7
		Advanced	2.1	1.3	4.6	2.6	2.0		Advanced	5.6	10.9	2.3	10.5	13.5
		Prof. + Adv.	54.1	57.3	57.3	58.1	61.7		Prof. + Adv.	66.0	71.7	69.1	71.2	75.1
	Demographic	N Count	129802	128637	125547	126625	128201	Demographic	N Count	141365	139263	136417	134976	131780
% City		11.2	10.7	10.5	10.4	10.4	% City		10.4	10.1	9.8	9.6	9.3	
% White		75.2	74.6	73.9	73.1	72.4	% White		76.7	75.6	75.0	74.7	74.3	
% Black		15.2	15.2	15.5	15.3	15.4	% Black		14.9	15.3	15.2	14.9	14.6	
% Hispanic		6.2	6.6	7.0	7.5	7.7	% Hispanic		5.5	6.0	6.4	6.8	7.0	

		2006	2007	2008	2009	2010	
Writing Grade 11	Raw Score	Mean	71.90	70.23	69.71	72.30	69.60
		SD	13.22	11.48	13.27	14.48	14.35
		Max	100	100	100	100	100
	Scaled Score	Mean	1515.7	1442.9	1470.6	1480.4	1483.7
		SD	274.8	216.7	262.8	283.7	282.3
		Max	2356	2283	2377	2257	2382
	Raw Cuts	Bel. Basic/Basic	36	38	36	39	35
		Basic/Prof.	57	59	56	60	57
		Prof./Adv.	83	87	84	88	82
	Theta Cuts	Bel. Basic/Basic					-2.7956
		Basic/Prof.					-0.0159
		Prof./Adv.					5.6311
	Impact %	Bel. Basic	1.2	0.8	1.2	2.3	2.2
		Basic	13.1	11.3	13.0	14.9	17.1
		Proficient	69.8	80.2	72.2	67.9	67.7
		Advanced	15.8	7.7	13.6	14.8	13.0
		Prof. + Adv.	85.7	87.8	85.8	82.8	80.7
	Demographic	N Count	130572	133368	132349	132866	130352
% City		7.9	7.4	7.0	7.9	7.3	
% White		81.4	80.3	80.1	78.2	77.3	
% Black		11.6	12.0	11.9	13.1	13.2	
% Hispanic		3.8	4.3	4.8	5.1	5.7	

## Appendix N:

### Raw-to-Scaled Score Conversion Tables

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<b>Column Heading</b>	<b>Definition</b>
Raw	Raw score
Meas	Rasch measure
MeasSE	Rasch measure standard error
SS	Scaled score
SSSE	Scaled score standard error
Freq	Frequency
Freq%	Frequency percent
Cum	Cumulative frequency
Cum%	Cumulative frequency percent
Pct	Percentile

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## Appendix N: Raw-to-Scaled Score Conversion Tables

### Mathematics Grade 3

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.5747	1.8350	750	236	0	0.0	0	0.0	0
1	-4.3470	1.0167	750	131	0	0.0	0	0.0	0
2	-3.6201	0.7305	750	94	0	0.0	0	0.0	0
3	-3.1811	0.6057	750	78	0	0.0	0	0.0	0
4	-2.8599	0.5323	750	69	0	0.0	0	0.0	0
5	-2.6035	0.4830	750	62	0	0.0	0	0.0	0
6	-2.3880	0.4471	750	58	1	0.0	1	0.0	1
7	-2.2007	0.4195	750	54	0	0.0	1	0.0	1
8	-2.0340	0.3976	750	51	2	0.0	3	0.0	1
9	-1.8831	0.3797	750	49	5	0.0	8	0.0	1
10	-1.7447	0.3648	750	47	8	0.0	16	0.0	1
11	-1.6162	0.3522	756	45	19	0.0	35	0.0	1
12	-1.4961	0.3414	772	44	24	0.0	59	0.0	1
13	-1.3827	0.3320	786	43	27	0.0	86	0.1	1
14	-1.2752	0.3238	800	42	35	0.0	121	0.1	1
15	-1.1728	0.3166	813	41	44	0.0	165	0.1	1
16	-1.0746	0.3102	826	40	59	0.0	224	0.2	1
17	-0.9802	0.3045	838	39	86	0.1	310	0.2	1
18	-0.8890	0.2995	850	39	105	0.1	415	0.3	1
19	-0.8007	0.2950	861	38	109	0.1	524	0.4	1
20	-0.7149	0.2909	872	37	123	0.1	647	0.5	1
21	-0.6313	0.2873	883	37	140	0.1	787	0.6	1
22	-0.5497	0.2841	893	37	151	0.1	938	0.7	1
23	-0.4698	0.2812	904	36	175	0.1	1113	0.9	1
24	-0.3914	0.2787	914	36	189	0.1	1302	1.0	1
25	-0.3144	0.2764	924	36	160	0.1	1462	1.2	1
26	-0.2386	0.2744	934	35	226	0.2	1688	1.3	1
27	-0.1637	0.2727	943	35	219	0.2	1907	1.5	1
28	-0.0898	0.2712	953	35	200	0.2	2107	1.7	2
29	-0.0166	0.2700	962	35	261	0.2	2368	1.9	2
30	0.0560	0.2689	971	35	279	0.2	2647	2.1	2
31	0.1281	0.2681	981	35	284	0.2	2931	2.3	2
32	0.1997	0.2675	990	34	301	0.2	3232	2.6	2
33	0.2712	0.2670	999	34	366	0.3	3598	2.8	3
34	0.3424	0.2668	1008	34	394	0.3	3992	3.2	3
35	0.4136	0.2668	1018	34	423	0.3	4415	3.5	3
36	0.4848	0.2669	1027	34	421	0.3	4836	3.8	4
37	0.5561	0.2673	1036	34	495	0.4	5331	4.2	4
38	0.6277	0.2678	1045	34	530	0.4	5861	4.6	4
39	0.6996	0.2685	1054	35	543	0.4	6404	5.1	5
40	0.7719	0.2694	1064	35	641	0.5	7045	5.6	5
41	0.8448	0.2705	1073	35	724	0.6	7769	6.1	6
42	0.9183	0.2719	1083	35	763	0.6	8532	6.7	6
43	0.9926	0.2734	1092	35	805	0.6	9337	7.4	7
44	1.0678	0.2751	1102	35	844	0.7	10181	8.0	8
45	1.1441	0.2771	1112	36	1023	0.8	11204	8.8	8
46	1.2215	0.2793	1122	36	1107	0.9	12311	9.7	9
47	1.3001	0.2817	1132	36	1189	0.9	13500	10.7	10
48	1.3802	0.2844	1142	37	1286	1.0	14786	11.7	11
49	1.4620	0.2874	1153	37	1451	1.1	16237	12.8	12

Appendix N: Raw-to-Scaled Score Conversion Tables

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
50	1.5455	0.2906	1163	37	1589	1.3	17826	14.1	13
51	1.6310	0.2942	1174	38	1789	1.4	19615	15.5	15
52	1.7186	0.2981	1186	38	1944	1.5	21559	17.0	16
53	1.8088	0.3024	1197	39	2172	1.7	23731	18.7	18
54	1.9016	0.3070	1209	40	2348	1.9	26079	20.6	20
55	1.9974	0.3121	1222	40	2694	2.1	28773	22.7	22
56	2.0965	0.3177	1234	41	2839	2.2	31612	25.0	24
57	2.1994	0.3239	1248	42	3326	2.6	34938	27.6	26
58	2.3065	0.3307	1261	43	3682	2.9	38620	30.5	29
59	2.4184	0.3384	1276	44	4106	3.2	42726	33.7	32
60	2.5358	0.3470	1291	45	4537	3.6	47263	37.3	36
61	2.6596	0.3570	1307	46	5140	4.1	52403	41.4	39
62	2.7911	0.3686	1324	47	5830	4.6	58233	46.0	44
63	2.9319	0.3823	1342	49	6376	5.0	64609	51.0	48
64	3.0843	0.3990	1362	51	7059	5.6	71668	56.6	54
65	3.2516	0.4197	1383	54	7717	6.1	79385	62.7	60
66	3.4385	0.4461	1407	57	8371	6.6	87756	69.3	66
67	3.6529	0.4812	1435	62	9045	7.1	96801	76.4	73
68	3.9072	0.5300	1468	68	8855	7.0	105656	83.4	80
69	4.2255	0.6031	1509	78	8277	6.5	113933	89.9	87
70	4.6613	0.7283	1565	94	6821	5.4	120754	95.3	93
71	5.3850	1.0153	1658	131	4278	3.4	125032	98.7	97
72	6.6108	1.8344	1816	236	1644	1.3	126676	100.0	99

## Appendix N: Raw-to-Scaled Score Conversion Tables

### Mathematics Grade 4

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.5563	1.8364	700	367	0	0.0	0	0.0	0
1	-4.3254	1.0189	700	204	0	0.0	0	0.0	0
2	-3.5947	0.7328	700	147	0	0.0	0	0.0	0
3	-3.1527	0.6078	700	122	0	0.0	0	0.0	0
4	-2.8293	0.5342	700	107	0	0.0	0	0.0	0
5	-2.5710	0.4844	700	97	0	0.0	0	0.0	0
6	-2.3543	0.4481	713	90	1	0.0	1	0.0	1
7	-2.1663	0.4201	750	84	3	0.0	4	0.0	1
8	-1.9994	0.3978	784	80	7	0.0	11	0.0	1
9	-1.8486	0.3794	814	76	16	0.0	27	0.0	1
10	-1.7105	0.3640	841	73	35	0.0	62	0.0	1
11	-1.5828	0.3509	867	70	61	0.0	123	0.1	1
12	-1.4637	0.3396	891	68	95	0.1	218	0.2	1
13	-1.3517	0.3297	913	66	137	0.1	355	0.3	1
14	-1.2459	0.3210	934	64	192	0.2	547	0.4	1
15	-1.1454	0.3133	954	63	243	0.2	790	0.6	1
16	-1.0494	0.3064	974	61	324	0.3	1114	0.9	1
17	-0.9575	0.3001	992	60	389	0.3	1503	1.2	1
18	-0.8691	0.2945	1010	59	484	0.4	1987	1.6	1
19	-0.7839	0.2894	1027	58	528	0.4	2515	2.0	2
20	-0.7015	0.2848	1043	57	540	0.4	3055	2.4	2
21	-0.6216	0.2805	1059	56	599	0.5	3654	2.9	3
22	-0.5440	0.2767	1075	55	722	0.6	4376	3.5	3
23	-0.4685	0.2731	1090	55	753	0.6	5129	4.1	4
24	-0.3948	0.2699	1105	54	809	0.6	5938	4.7	4
25	-0.3227	0.2670	1119	53	858	0.7	6796	5.4	5
26	-0.2522	0.2643	1133	53	1005	0.8	7801	6.2	6
27	-0.1830	0.2619	1147	52	1100	0.9	8901	7.0	7
28	-0.1150	0.2597	1161	52	1189	0.9	10090	8.0	8
29	-0.0481	0.2578	1174	52	1258	1.0	11348	9.0	8
30	0.0179	0.2560	1187	51	1357	1.1	12705	10.1	10
31	0.0831	0.2545	1200	51	1415	1.1	14120	11.2	11
32	0.1475	0.2533	1213	51	1560	1.2	15680	12.4	12
33	0.2114	0.2522	1226	50	1674	1.3	17354	13.7	13
34	0.2748	0.2513	1238	50	1787	1.4	19141	15.2	14
35	0.3378	0.2507	1251	50	1931	1.5	21072	16.7	16
36	0.4005	0.2503	1264	50	1969	1.6	23041	18.2	17
37	0.4631	0.2501	1276	50	2001	1.6	25042	19.8	19
38	0.5256	0.2501	1289	50	2212	1.8	27254	21.6	21
39	0.5883	0.2504	1301	50	2221	1.8	29475	23.3	22
40	0.6511	0.2509	1314	50	2482	2.0	31957	25.3	24
41	0.7141	0.2516	1326	50	2544	2.0	34501	27.3	26
42	0.7777	0.2525	1339	51	2603	2.1	37104	29.4	28
43	0.8418	0.2537	1352	51	2753	2.2	39857	31.5	30
44	0.9065	0.2552	1365	51	2863	2.3	42720	33.8	33
45	0.9721	0.2569	1378	51	2924	2.3	45644	36.1	35
46	1.0386	0.2589	1391	52	3041	2.4	48685	38.5	37
47	1.1062	0.2612	1405	52	3038	2.4	51723	40.9	40
48	1.1751	0.2639	1419	53	3190	2.5	54913	43.5	42
49	1.2455	0.2668	1433	53	3226	2.6	58139	46.0	45

Appendix N: Raw-to-Scaled Score Conversion Tables

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
50	1.3175	0.2701	1447	54	3397	2.7	61536	48.7	47
51	1.3915	0.2738	1462	55	3507	2.8	65043	51.5	50
52	1.4676	0.2779	1477	56	3560	2.8	68603	54.3	53
53	1.5461	0.2825	1493	57	3520	2.8	72123	57.1	56
54	1.6273	0.2876	1509	58	3780	3.0	75903	60.1	59
55	1.7117	0.2934	1526	59	3845	3.0	79748	63.1	62
56	1.7996	0.2997	1543	60	3802	3.0	83550	66.1	65
57	1.8915	0.3068	1562	61	3801	3.0	87351	69.1	68
58	1.9881	0.3149	1581	63	3784	3.0	91135	72.1	71
59	2.0901	0.3239	1602	65	3775	3.0	94910	75.1	74
60	2.1984	0.3343	1623	67	3824	3.0	98734	78.2	77
61	2.3140	0.3461	1646	69	3685	2.9	102419	81.1	80
62	2.4385	0.3599	1671	72	3648	2.9	106067	84.0	83
63	2.5737	0.3760	1698	75	3565	2.8	109632	86.8	85
64	2.7223	0.3952	1728	79	3342	2.6	112974	89.4	88
65	2.8876	0.4187	1761	84	2981	2.4	115955	91.8	91
66	3.0749	0.4479	1799	90	2734	2.2	118689	93.9	93
67	3.2920	0.4856	1842	97	2400	1.9	121089	95.8	95
68	3.5522	0.5369	1894	107	1945	1.5	123034	97.4	97
69	3.8797	0.6122	1959	122	1561	1.2	124595	98.6	98
70	4.3286	0.7387	2049	148	997	0.8	125592	99.4	99
71	5.0701	1.0253	2198	205	563	0.4	126155	99.9	99
72	6.3117	1.8411	2446	368	178	0.1	126333	100.0	99

## Appendix N: Raw-to-Scaled Score Conversion Tables

### Mathematics Grade 5

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.2856	1.8337	700	348	0	0.0	0	0.0	0
1	-4.0611	1.0145	700	193	0	0.0	0	0.0	0
2	-3.3385	0.7276	700	138	1	0.0	1	0.0	1
3	-2.9035	0.6025	700	114	0	0.0	1	0.0	1
4	-2.5861	0.5290	700	100	0	0.0	1	0.0	1
5	-2.3331	0.4796	700	91	0	0.0	1	0.0	1
6	-2.1206	0.4437	732	84	0	0.0	1	0.0	1
7	-1.9362	0.4162	767	79	4	0.0	5	0.0	1
8	-1.7722	0.3944	798	75	18	0.0	23	0.0	1
9	-1.6238	0.3767	826	71	29	0.0	52	0.0	1
10	-1.4875	0.3620	852	69	56	0.0	108	0.1	1
11	-1.3610	0.3495	876	66	82	0.1	190	0.2	1
12	-1.2426	0.3389	898	64	145	0.1	335	0.3	1
13	-1.1310	0.3297	919	63	229	0.2	564	0.4	1
14	-1.0250	0.3216	940	61	288	0.2	852	0.7	1
15	-0.9239	0.3146	959	60	332	0.3	1184	0.9	1
16	-0.8269	0.3084	977	59	442	0.3	1626	1.3	1
17	-0.7335	0.3028	995	57	504	0.4	2130	1.7	1
18	-0.6433	0.2979	1012	57	522	0.4	2652	2.1	2
19	-0.5559	0.2935	1029	56	688	0.5	3340	2.6	2
20	-0.4709	0.2896	1045	55	723	0.6	4063	3.2	3
21	-0.3881	0.2861	1060	54	787	0.6	4850	3.8	4
22	-0.3071	0.2830	1076	54	816	0.6	5666	4.5	4
23	-0.2278	0.2802	1091	53	956	0.8	6622	5.2	5
24	-0.1500	0.2776	1106	53	998	0.8	7620	6.0	6
25	-0.0736	0.2754	1120	52	1083	0.9	8703	6.9	6
26	0.0017	0.2734	1134	52	1176	0.9	9879	7.8	7
27	0.0760	0.2717	1149	52	1262	1.0	11141	8.8	8
28	0.1494	0.2702	1162	51	1223	1.0	12364	9.8	9
29	0.2220	0.2689	1176	51	1352	1.1	13716	10.8	10
30	0.2940	0.2678	1190	51	1460	1.2	15176	12.0	11
31	0.3655	0.2668	1203	51	1572	1.2	16748	13.2	13
32	0.4364	0.2661	1217	51	1631	1.3	18379	14.5	14
33	0.5071	0.2655	1230	50	1730	1.4	20109	15.9	15
34	0.5775	0.2651	1244	50	1728	1.4	21837	17.3	17
35	0.6476	0.2649	1257	50	1957	1.5	23794	18.8	18
36	0.7178	0.2648	1270	50	1976	1.6	25770	20.4	20
37	0.7879	0.2649	1284	50	2076	1.6	27846	22.0	21
38	0.8581	0.2651	1297	50	2221	1.8	30067	23.8	23
39	0.9285	0.2656	1310	50	2262	1.8	32329	25.6	25
40	0.9992	0.2661	1324	51	2295	1.8	34624	27.4	26
41	1.0702	0.2669	1337	51	2448	1.9	37072	29.3	28
42	1.1417	0.2678	1351	51	2498	2.0	39570	31.3	30
43	1.2137	0.2690	1364	51	2690	2.1	42260	33.4	32
44	1.2864	0.2703	1378	51	2699	2.1	44959	35.6	34
45	1.3598	0.2718	1392	52	2835	2.2	47794	37.8	37
46	1.4342	0.2735	1406	52	2889	2.3	50683	40.1	39
47	1.5096	0.2755	1421	52	3014	2.4	53697	42.5	41
48	1.5861	0.2777	1435	53	3013	2.4	56710	44.9	44
49	1.6639	0.2802	1450	53	3103	2.5	59813	47.3	46

Appendix N: Raw-to-Scaled Score Conversion Tables

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
50	1.7431	0.2831	1465	54	3127	2.5	62940	49.8	49
51	1.8242	0.2862	1480	54	3250	2.6	66190	52.4	51
52	1.9071	0.2897	1496	55	3188	2.5	69378	54.9	54
53	1.9921	0.2937	1512	56	3329	2.6	72707	57.5	56
54	2.0798	0.2982	1529	57	3570	2.8	76277	60.3	59
55	2.1701	0.3032	1546	58	3602	2.8	79879	63.2	62
56	2.2638	0.3089	1564	59	3656	2.9	83535	66.1	65
57	2.3611	0.3153	1582	60	3613	2.9	87148	68.9	68
58	2.4628	0.3227	1602	61	3548	2.8	90696	71.7	70
59	2.5697	0.3311	1622	63	3736	3.0	94432	74.7	73
60	2.6824	0.3408	1643	65	3576	2.8	98008	77.5	76
61	2.8023	0.3521	1666	67	3659	2.9	101667	80.4	79
62	2.9309	0.3653	1690	69	3673	2.9	105340	83.3	82
63	3.0700	0.3810	1717	72	3559	2.8	108899	86.1	85
64	3.2221	0.3998	1746	76	3317	2.6	112216	88.8	87
65	3.3910	0.4229	1778	80	3127	2.5	115343	91.2	90
66	3.5818	0.4518	1814	86	2945	2.3	118288	93.6	92
67	3.8025	0.4892	1856	93	2559	2.0	120847	95.6	95
68	4.0662	0.5402	1906	103	2062	1.6	122909	97.2	96
69	4.3972	0.6151	1969	117	1642	1.3	124551	98.5	98
70	4.8495	0.7409	2055	141	1103	0.9	125654	99.4	99
71	5.5938	1.0265	2196	195	560	0.4	126214	99.8	99
72	6.8366	1.8414	2432	349	205	0.2	126419	100.0	99

## Appendix N: Raw-to-Scaled Score Conversion Tables

### Mathematics Grade 6

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.4680	1.8320	700	366	0	0.0	0	0.0	0
1	-4.2478	1.0115	700	202	0	0.0	0	0.0	0
2	-3.5314	0.7234	700	145	0	0.0	0	0.0	0
3	-3.1025	0.5974	700	119	0	0.0	0	0.0	0
4	-2.7911	0.5233	700	105	1	0.0	1	0.0	1
5	-2.5441	0.4733	700	95	0	0.0	1	0.0	1
6	-2.3377	0.4369	734	87	3	0.0	4	0.0	1
7	-2.1591	0.4091	770	82	2	0.0	6	0.0	1
8	-2.0010	0.3869	801	77	17	0.0	23	0.0	1
9	-1.8584	0.3689	830	74	19	0.0	42	0.0	1
10	-1.7279	0.3539	856	71	48	0.0	90	0.1	1
11	-1.6072	0.3412	880	68	108	0.1	198	0.2	1
12	-1.4946	0.3303	903	66	144	0.1	342	0.3	1
13	-1.3886	0.3209	924	64	228	0.2	570	0.5	1
14	-1.2883	0.3127	944	63	302	0.2	872	0.7	1
15	-1.1928	0.3055	963	61	365	0.3	1237	1.0	1
16	-1.1015	0.2991	981	60	462	0.4	1699	1.3	1
17	-1.0137	0.2934	999	59	530	0.4	2229	1.8	2
18	-0.9291	0.2884	1016	58	570	0.5	2799	2.2	2
19	-0.8472	0.2839	1032	57	703	0.6	3502	2.8	2
20	-0.7678	0.2799	1048	56	724	0.6	4226	3.3	3
21	-0.6905	0.2763	1063	55	740	0.6	4966	3.9	4
22	-0.6150	0.2731	1079	55	840	0.7	5806	4.6	4
23	-0.5412	0.2702	1093	54	882	0.7	6688	5.3	5
24	-0.4689	0.2677	1108	54	911	0.7	7599	6.0	6
25	-0.3979	0.2654	1122	53	955	0.8	8554	6.8	6
26	-0.3280	0.2634	1136	53	1048	0.8	9602	7.6	7
27	-0.2591	0.2617	1150	52	1063	0.8	10665	8.4	8
28	-0.1910	0.2601	1163	52	1153	0.9	11818	9.4	9
29	-0.1237	0.2588	1177	52	1244	1.0	13062	10.3	10
30	-0.0570	0.2578	1190	52	1277	1.0	14339	11.4	11
31	0.0092	0.2569	1203	51	1419	1.1	15758	12.5	12
32	0.0750	0.2562	1217	51	1440	1.1	17198	13.6	13
33	0.1405	0.2557	1230	51	1506	1.2	18704	14.8	14
34	0.2058	0.2554	1243	51	1640	1.3	20344	16.1	15
35	0.2710	0.2553	1256	51	1725	1.4	22069	17.5	17
36	0.3362	0.2553	1269	51	1811	1.4	23880	18.9	18
37	0.4014	0.2555	1282	51	1937	1.5	25817	20.4	20
38	0.4668	0.2560	1295	51	1975	1.6	27792	22.0	21
39	0.5324	0.2566	1308	51	2062	1.6	29854	23.6	23
40	0.5984	0.2573	1321	51	2216	1.8	32070	25.4	25
41	0.6649	0.2583	1335	52	2227	1.8	34297	27.2	26
42	0.7319	0.2595	1348	52	2359	1.9	36656	29.0	28
43	0.7996	0.2608	1361	52	2444	1.9	39100	31.0	30
44	0.8680	0.2624	1375	52	2595	2.1	41695	33.0	32
45	0.9373	0.2642	1389	53	2679	2.1	44374	35.1	34
46	1.0076	0.2662	1403	53	2675	2.1	47049	37.3	36
47	1.0791	0.2684	1417	54	2806	2.2	49855	39.5	38
48	1.1518	0.2709	1432	54	2931	2.3	52786	41.8	41
49	1.2259	0.2737	1447	55	3139	2.5	55925	44.3	43

Appendix N: Raw-to-Scaled Score Conversion Tables

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
50	1.3017	0.2768	1462	55	3085	2.4	59010	46.7	46
51	1.3791	0.2802	1477	56	3232	2.6	62242	49.3	48
52	1.4588	0.2840	1493	57	3383	2.7	65625	52.0	51
53	1.5406	0.2882	1510	58	3351	2.7	68976	54.6	53
54	1.6250	0.2929	1527	59	3449	2.7	72425	57.3	56
55	1.7123	0.2982	1544	60	3552	2.8	75977	60.2	59
56	1.8030	0.3042	1562	61	3715	2.9	79692	63.1	62
57	1.8975	0.3108	1581	62	3763	3.0	83455	66.1	65
58	1.9965	0.3184	1601	64	3770	3.0	87225	69.1	68
59	2.1006	0.3270	1622	65	3800	3.0	91025	72.1	71
60	2.2107	0.3369	1644	67	3923	3.1	94948	75.2	74
61	2.3281	0.3483	1667	70	3948	3.1	98896	78.3	77
62	2.4539	0.3616	1692	72	3909	3.1	102805	81.4	80
63	2.5903	0.3772	1720	75	3879	3.1	106684	84.5	83
64	2.7393	0.3957	1749	79	3589	2.8	110273	87.3	86
65	2.9046	0.4180	1782	84	3400	2.7	113673	90.0	89
66	3.0907	0.4457	1820	89	3128	2.5	116801	92.5	91
67	3.3048	0.4812	1863	96	2725	2.2	119526	94.6	94
68	3.5589	0.5294	1913	106	2447	1.9	121973	96.6	96
69	3.8756	0.6007	1977	120	1786	1.4	123759	98.0	97
70	4.3064	0.7229	2063	145	1299	1.0	125058	99.0	99
71	5.0184	1.0072	2205	201	872	0.7	125930	99.7	99
72	6.2295	1.8273	2447	365	358	0.3	126288	100.0	99

## Appendix N: Raw-to-Scaled Score Conversion Tables

### Mathematics Grade 7

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.4959	1.8342	700	367	0	0.0	0	0.0	0
1	-4.2703	1.0152	700	203	0	0.0	0	0.0	0
2	-3.5469	0.7280	700	146	1	0.0	1	0.0	1
3	-3.1117	0.6023	700	120	0	0.0	1	0.0	1
4	-2.7947	0.5282	700	106	0	0.0	1	0.0	1
5	-2.5428	0.4782	717	96	4	0.0	5	0.0	1
6	-2.3320	0.4416	759	88	0	0.0	5	0.0	1
7	-2.1496	0.4135	795	83	13	0.0	18	0.0	1
8	-1.9880	0.3911	828	78	20	0.0	38	0.0	1
9	-1.8423	0.3728	857	75	45	0.0	83	0.1	1
10	-1.7092	0.3575	883	72	113	0.1	196	0.2	1
11	-1.5861	0.3445	908	69	171	0.1	367	0.3	1
12	-1.4713	0.3333	931	67	258	0.2	625	0.5	1
13	-1.3635	0.3236	953	65	370	0.3	995	0.8	1
14	-1.2615	0.3151	973	63	490	0.4	1485	1.2	1
15	-1.1646	0.3077	992	62	572	0.4	2057	1.6	1
16	-1.0720	0.3011	1011	60	682	0.5	2739	2.1	2
17	-0.9831	0.2952	1029	59	804	0.6	3543	2.8	2
18	-0.8976	0.2899	1046	58	883	0.7	4426	3.5	3
19	-0.8149	0.2852	1062	57	941	0.7	5367	4.2	4
20	-0.7348	0.2810	1078	56	987	0.8	6354	5.0	5
21	-0.6569	0.2772	1094	55	1055	0.8	7409	5.8	5
22	-0.5811	0.2738	1109	55	1173	0.9	8582	6.7	6
23	-0.5069	0.2707	1124	54	1136	0.9	9718	7.6	7
24	-0.4344	0.2680	1138	54	1205	0.9	10923	8.6	8
25	-0.3632	0.2656	1153	53	1245	1.0	12168	9.5	9
26	-0.2932	0.2634	1167	53	1418	1.1	13586	10.6	10
27	-0.2244	0.2615	1180	52	1344	1.1	14930	11.7	11
28	-0.1565	0.2598	1194	52	1488	1.2	16418	12.9	12
29	-0.0894	0.2584	1207	52	1482	1.2	17900	14.0	13
30	-0.0229	0.2571	1221	51	1570	1.2	19470	15.2	15
31	0.0429	0.2561	1234	51	1597	1.3	21067	16.5	16
32	0.1083	0.2553	1247	51	1648	1.3	22715	17.8	17
33	0.1733	0.2547	1260	51	1734	1.4	24449	19.1	18
34	0.2381	0.2543	1273	51	1782	1.4	26231	20.5	20
35	0.3027	0.2542	1286	51	1883	1.5	28114	22.0	21
36	0.3673	0.2542	1299	51	1875	1.5	29989	23.5	23
37	0.4320	0.2544	1312	51	1986	1.6	31975	25.0	24
38	0.4969	0.2549	1325	51	2018	1.6	33993	26.6	26
39	0.5619	0.2555	1338	51	2154	1.7	36147	28.3	27
40	0.6275	0.2564	1351	51	2174	1.7	38321	30.0	29
41	0.6935	0.2575	1364	52	2246	1.8	40567	31.8	31
42	0.7601	0.2588	1377	52	2285	1.8	42852	33.6	33
43	0.8275	0.2604	1391	52	2394	1.9	45246	35.4	34
44	0.8958	0.2622	1404	52	2500	2.0	47746	37.4	36
45	0.9650	0.2642	1418	53	2517	2.0	50263	39.4	38
46	1.0355	0.2666	1432	53	2605	2.0	52868	41.4	40
47	1.1072	0.2691	1447	54	2641	2.1	55509	43.5	42
48	1.1804	0.2720	1461	54	2798	2.2	58307	45.7	45
49	1.2552	0.2752	1476	55	2839	2.2	61146	47.9	47

Appendix N: Raw-to-Scaled Score Conversion Tables

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
50	1.3319	0.2786	1492	56	2937	2.3	64083	50.2	49
51	1.4105	0.2824	1507	56	2988	2.3	67071	52.5	51
52	1.4914	0.2866	1524	57	3177	2.5	70248	55.0	54
53	1.5749	0.2911	1540	58	3373	2.6	73621	57.7	56
54	1.6611	0.2961	1558	59	3230	2.5	76851	60.2	59
55	1.7503	0.3016	1575	60	3409	2.7	80260	62.9	62
56	1.8431	0.3076	1594	62	3476	2.7	83736	65.6	64
57	1.9397	0.3142	1613	63	3449	2.7	87185	68.3	67
58	2.0407	0.3215	1633	64	3516	2.8	90701	71.0	70
59	2.1466	0.3297	1655	66	3590	2.8	94291	73.8	72
60	2.2584	0.3390	1677	68	3670	2.9	97961	76.7	75
61	2.3768	0.3495	1701	70	3664	2.9	101625	79.6	78
62	2.5031	0.3616	1726	72	3640	2.9	105265	82.4	81
63	2.6389	0.3759	1753	75	3540	2.8	108805	85.2	84
64	2.7866	0.3929	1783	79	3381	2.6	112186	87.9	87
65	2.9489	0.4138	1815	83	3253	2.5	115439	90.4	89
66	3.1309	0.4402	1851	88	2989	2.3	118428	92.8	92
67	3.3396	0.4750	1893	95	2779	2.2	121207	94.9	94
68	3.5875	0.5232	1943	105	2369	1.9	123576	96.8	96
69	3.8979	0.5957	2005	119	1959	1.5	125535	98.3	98
70	4.3237	0.7205	2090	144	1278	1.0	126813	99.3	99
71	5.0344	1.0080	2232	202	638	0.5	127451	99.8	99
72	6.2488	1.8295	2475	366	234	0.2	127685	100.0	99

## Appendix N: Raw-to-Scaled Score Conversion Tables

### Mathematics Grade 8

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.4531	1.8316	700	325	0	0.0	0	0.0	0
1	-4.2341	1.0107	700	179	0	0.0	0	0.0	0
2	-3.5193	0.7223	700	128	0	0.0	0	0.0	0
3	-3.0919	0.5961	700	106	0	0.0	0	0.0	0
4	-2.7822	0.5217	700	93	1	0.0	1	0.0	1
5	-2.5368	0.4716	732	84	0	0.0	1	0.0	1
6	-2.3319	0.4351	768	77	4	0.0	5	0.0	1
7	-2.1549	0.4072	800	72	12	0.0	17	0.0	1
8	-1.9983	0.3851	828	68	31	0.0	48	0.0	1
9	-1.8571	0.3670	853	65	57	0.0	105	0.1	1
10	-1.7279	0.3520	876	62	95	0.1	200	0.2	1
11	-1.6086	0.3394	897	60	153	0.1	353	0.3	1
12	-1.4971	0.3286	917	58	231	0.2	584	0.4	1
13	-1.3922	0.3193	935	57	345	0.3	929	0.7	1
14	-1.2929	0.3112	953	55	428	0.3	1357	1.0	1
15	-1.1983	0.3041	970	54	556	0.4	1913	1.5	1
16	-1.1078	0.2979	986	53	638	0.5	2551	2.0	2
17	-1.0206	0.2924	1001	52	747	0.6	3298	2.5	2
18	-0.9366	0.2876	1016	51	774	0.6	4072	3.1	3
19	-0.8551	0.2833	1030	50	817	0.6	4889	3.8	3
20	-0.7760	0.2795	1045	50	922	0.7	5811	4.5	4
21	-0.6988	0.2761	1058	49	1000	0.8	6811	5.2	5
22	-0.6234	0.2731	1072	48	1006	0.8	7817	6.0	6
23	-0.5495	0.2705	1085	48	1009	0.8	8826	6.8	6
24	-0.4770	0.2682	1098	48	1069	0.8	9895	7.6	7
25	-0.4056	0.2662	1110	47	1041	0.8	10936	8.4	8
26	-0.3352	0.2645	1123	47	1115	0.9	12051	9.3	9
27	-0.2657	0.2630	1135	47	1152	0.9	13203	10.2	10
28	-0.1968	0.2617	1147	46	1201	0.9	14404	11.1	11
29	-0.1286	0.2607	1159	46	1245	1.0	15649	12.0	12
30	-0.0609	0.2599	1171	46	1390	1.1	17039	13.1	13
31	0.0066	0.2593	1183	46	1424	1.1	18463	14.2	14
32	0.0737	0.2589	1195	46	1479	1.1	19942	15.3	15
33	0.1406	0.2586	1207	46	1541	1.2	21483	16.5	16
34	0.2075	0.2586	1219	46	1599	1.2	23082	17.8	17
35	0.2744	0.2587	1231	46	1701	1.3	24783	19.1	18
36	0.3414	0.2590	1243	46	1713	1.3	26496	20.4	20
37	0.4086	0.2595	1255	46	1848	1.4	28344	21.8	21
38	0.4761	0.2601	1267	46	1902	1.5	30246	23.3	23
39	0.5439	0.2609	1279	46	2066	1.6	32312	24.9	24
40	0.6122	0.2619	1291	46	2109	1.6	34421	26.5	26
41	0.6811	0.2630	1303	47	2156	1.7	36577	28.1	27
42	0.7507	0.2644	1316	47	2271	1.7	38848	29.9	29
43	0.8210	0.2658	1328	47	2462	1.9	41310	31.8	31
44	0.8920	0.2675	1341	47	2458	1.9	43768	33.7	33
45	0.9641	0.2693	1353	48	2597	2.0	46365	35.7	35
46	1.0372	0.2714	1366	48	2680	2.1	49045	37.7	37
47	1.1114	0.2736	1380	49	2694	2.1	51739	39.8	39
48	1.1869	0.2760	1393	49	2857	2.2	54596	42.0	41
49	1.2638	0.2786	1407	49	2921	2.2	57517	44.2	43

Appendix N: Raw-to-Scaled Score Conversion Tables

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
50	1.3422	0.2815	1421	50	3004	2.3	60521	46.6	45
51	1.4222	0.2846	1435	51	3061	2.4	63582	48.9	48
52	1.5042	0.2880	1449	51	3084	2.4	66666	51.3	50
53	1.5883	0.2918	1464	52	3278	2.5	69944	53.8	53
54	1.6746	0.2960	1480	53	3317	2.6	73261	56.4	55
55	1.7635	0.3006	1495	53	3429	2.6	76690	59.0	58
56	1.8554	0.3058	1512	54	3457	2.7	80147	61.7	60
57	1.9507	0.3116	1529	55	3520	2.7	83667	64.4	63
58	2.0499	0.3183	1546	57	3574	2.7	87241	67.1	66
59	2.1536	0.3260	1565	58	3735	2.9	90976	70.0	69
60	2.2627	0.3349	1584	59	3816	2.9	94792	72.9	71
61	2.3784	0.3453	1605	61	3811	2.9	98603	75.9	74
62	2.5018	0.3577	1626	64	3696	2.8	102299	78.7	77
63	2.6349	0.3725	1650	66	3805	2.9	106104	81.6	80
64	2.7803	0.3906	1676	69	3791	2.9	109895	84.5	83
65	2.9415	0.4132	1705	73	3898	3.0	113793	87.5	86
66	3.1239	0.4419	1737	78	3645	2.8	117438	90.3	89
67	3.3356	0.4800	1774	85	3440	2.6	120878	93.0	92
68	3.5906	0.5326	1820	95	3007	2.3	123885	95.3	94
69	3.9146	0.6107	1877	108	2638	2.0	126523	97.3	96
70	4.3643	0.7415	1957	132	1956	1.5	128479	98.8	98
71	5.1154	1.0331	2090	183	1100	0.8	129579	99.7	99
72	6.3722	1.8488	2314	328	404	0.3	129983	100.0	99

Appendix N: Raw-to-Scaled Score Conversion Tables

Mathematics Grade 11

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.9544	1.8319	700	378	0	0.0	0	0.0	0
1	-4.7345	1.0114	700	209	2	0.0	2	0.0	1
2	-4.0185	0.7232	700	149	1	0.0	3	0.0	1
3	-3.5900	0.5970	700	123	0	0.0	3	0.0	1
4	-3.2792	0.5227	700	108	2	0.0	5	0.0	1
5	-3.0329	0.4725	700	98	4	0.0	9	0.0	1
6	-2.8271	0.4360	700	90	5	0.0	14	0.0	1
7	-2.6495	0.4080	700	84	12	0.0	26	0.0	1
8	-2.4922	0.3857	700	80	27	0.0	53	0.0	1
9	-2.3506	0.3675	718	76	62	0.0	115	0.1	1
10	-2.2212	0.3523	745	73	128	0.1	243	0.2	1
11	-2.1017	0.3395	769	70	201	0.2	444	0.3	1
12	-1.9902	0.3285	792	68	304	0.2	748	0.6	1
13	-1.8855	0.3190	814	66	461	0.4	1209	0.9	1
14	-1.7865	0.3106	834	64	601	0.5	1810	1.4	1
15	-1.6923	0.3033	854	63	746	0.6	2556	2.0	2
16	-1.6022	0.2969	872	61	850	0.7	3406	2.6	2
17	-1.5158	0.2912	890	60	984	0.8	4390	3.4	3
18	-1.4325	0.2861	907	59	1025	0.8	5415	4.2	4
19	-1.3520	0.2816	924	58	1159	0.9	6574	5.1	5
20	-1.2739	0.2776	940	57	1136	0.9	7710	5.9	5
21	-1.1978	0.2740	956	57	1235	1.0	8945	6.9	6
22	-1.1236	0.2709	971	56	1336	1.0	10281	7.9	7
23	-1.0510	0.2681	986	55	1272	1.0	11553	8.9	8
24	-0.9798	0.2656	1001	55	1355	1.0	12908	9.9	9
25	-0.9098	0.2635	1015	54	1364	1.0	14272	11.0	10
26	-0.8409	0.2616	1030	54	1364	1.0	15636	12.0	12
27	-0.7729	0.2600	1044	54	1496	1.2	17132	13.2	13
28	-0.7056	0.2587	1057	53	1495	1.2	18627	14.3	14
29	-0.6390	0.2576	1071	53	1530	1.2	20157	15.5	15
30	-0.5728	0.2568	1085	53	1616	1.2	21773	16.8	16
31	-0.5071	0.2561	1098	53	1577	1.2	23350	18.0	17
32	-0.4416	0.2557	1112	53	1688	1.3	25038	19.3	19
33	-0.3763	0.2554	1125	53	1754	1.4	26792	20.6	20
34	-0.3110	0.2554	1139	53	1758	1.4	28550	22.0	21
35	-0.2458	0.2555	1152	53	1833	1.4	30383	23.4	23
36	-0.1805	0.2558	1166	53	1843	1.4	32226	24.8	24
37	-0.1149	0.2563	1179	53	1963	1.5	34189	26.3	26
38	-0.0491	0.2570	1193	53	2020	1.6	36209	27.9	27
39	0.0172	0.2578	1207	53	2098	1.6	38307	29.5	29
40	0.0839	0.2588	1220	53	2239	1.7	40546	31.2	30
41	0.1511	0.2599	1234	54	2221	1.7	42767	32.9	32
42	0.2190	0.2612	1248	54	2404	1.9	45171	34.8	34
43	0.2876	0.2627	1262	54	2353	1.8	47524	36.6	36
44	0.3570	0.2643	1277	55	2444	1.9	49968	38.5	38
45	0.4273	0.2661	1291	55	2521	1.9	52489	40.4	39
46	0.4987	0.2680	1306	55	2715	2.1	55204	42.5	41
47	0.5710	0.2701	1321	56	2745	2.1	57949	44.6	44
48	0.6446	0.2724	1336	56	2774	2.1	60723	46.7	46
49	0.7194	0.2749	1352	57	2782	2.1	63505	48.9	48

Appendix N: Raw-to-Scaled Score Conversion Tables

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
50	0.7957	0.2776	1367	57	2893	2.2	66398	51.1	50
51	0.8736	0.2804	1383	58	2987	2.3	69385	53.4	52
52	0.9531	0.2836	1400	59	3000	2.3	72385	55.7	55
53	1.0345	0.2870	1417	59	3177	2.4	75562	58.2	57
54	1.1180	0.2908	1434	60	3089	2.4	78651	60.5	59
55	1.2038	0.2951	1452	61	3205	2.5	81856	63.0	62
56	1.2923	0.2998	1470	62	3151	2.4	85007	65.4	64
57	1.3837	0.3052	1489	63	3282	2.5	88289	68.0	67
58	1.4788	0.3114	1509	64	3265	2.5	91554	70.5	69
59	1.5779	0.3186	1529	66	3343	2.6	94897	73.0	72
60	1.6821	0.3270	1550	67	3206	2.5	98103	75.5	74
61	1.7922	0.3371	1573	70	3363	2.6	101466	78.1	77
62	1.9098	0.3491	1597	72	3321	2.6	104787	80.7	79
63	2.0367	0.3637	1624	75	3370	2.6	108157	83.3	82
64	2.1753	0.3817	1652	79	3316	2.6	111473	85.8	85
65	2.3295	0.4043	1684	83	3342	2.6	114815	88.4	87
66	2.5044	0.4332	1720	89	3276	2.5	118091	90.9	90
67	2.7083	0.4715	1762	97	3150	2.4	121241	93.3	92
68	2.9549	0.5244	1813	108	2776	2.1	124017	95.5	94
69	3.2698	0.6025	1878	124	2386	1.8	126403	97.3	96
70	3.7085	0.7332	1969	151	1906	1.5	128309	98.8	98
71	4.4453	1.0250	2121	212	1179	0.9	129488	99.7	99
72	5.6890	1.8430	2377	380	422	0.3	129910	100.0	99

Appendix N: Raw-to-Scaled Score Conversion Tables

Reading Grade 3

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.3909	1.8396	1000	228	0	0.0	0	0.0	0
1	-4.1517	1.0247	1000	127	0	0.0	0	0.0	0
2	-3.4092	0.7408	1000	92	3	0.0	3	0.0	1
3	-2.9553	0.6175	1000	76	12	0.0	15	0.0	1
4	-2.6200	0.5454	1000	68	26	0.0	41	0.0	1
5	-2.3496	0.4970	1000	62	64	0.1	105	0.1	1
6	-2.1204	0.4620	1000	57	157	0.1	262	0.2	1
7	-1.9195	0.4354	1000	54	304	0.2	566	0.4	1
8	-1.7391	0.4145	1000	51	465	0.4	1031	0.8	1
9	-1.5744	0.3977	1013	49	700	0.6	1731	1.4	1
10	-1.4219	0.3839	1032	48	929	0.7	2660	2.1	2
11	-1.2790	0.3724	1049	46	1212	1.0	3872	3.1	3
12	-1.1439	0.3629	1066	45	1489	1.2	5361	4.2	4
13	-1.0152	0.3549	1082	44	1536	1.2	6897	5.4	5
14	-0.8918	0.3481	1097	43	1725	1.4	8622	6.8	6
15	-0.7725	0.3425	1112	42	1729	1.4	10351	8.2	7
16	-0.6569	0.3378	1126	42	1850	1.5	12201	9.6	9
17	-0.5442	0.3340	1140	41	2037	1.6	14238	11.2	10
18	-0.4337	0.3309	1154	41	2072	1.6	16310	12.9	12
19	-0.3251	0.3285	1168	41	2161	1.7	18471	14.6	14
20	-0.2177	0.3267	1181	40	2316	1.8	20787	16.4	16
21	-0.1114	0.3256	1194	40	2395	1.9	23182	18.3	17
22	-0.0056	0.3251	1207	40	2533	2.0	25715	20.3	19
23	0.1001	0.3251	1220	40	2697	2.1	28412	22.4	21
24	0.2060	0.3258	1233	40	3018	2.4	31430	24.8	24
25	0.3125	0.3270	1246	40	3131	2.5	34561	27.3	26
26	0.4200	0.3289	1260	41	3413	2.7	37974	30.0	29
27	0.5289	0.3314	1273	41	3600	2.8	41574	32.8	31
28	0.6397	0.3346	1287	41	3897	3.1	45471	35.9	34
29	0.7530	0.3385	1301	42	4212	3.3	49683	39.2	38
30	0.8692	0.3433	1315	43	4381	3.5	54064	42.7	41
31	0.9890	0.3491	1330	43	4639	3.7	58703	46.4	45
32	1.1132	0.3559	1346	44	5111	4.0	63814	50.4	48
33	1.2427	0.3641	1362	45	5345	4.2	69159	54.6	53
34	1.3787	0.3737	1378	46	5449	4.3	74608	58.9	57
35	1.5227	0.3852	1396	48	5641	4.5	80249	63.4	61
36	1.6762	0.3990	1415	49	5898	4.7	86147	68.1	66
37	1.8419	0.4156	1436	51	5936	4.7	92083	72.7	70
38	2.0230	0.4360	1458	54	6069	4.8	98152	77.5	75
39	2.2239	0.4613	1483	57	6047	4.8	104199	82.3	80
40	2.4512	0.4933	1511	61	5846	4.6	110045	86.9	85
41	2.7145	0.5349	1544	66	5459	4.3	115504	91.2	89
42	3.0301	0.5910	1583	73	4621	3.7	120125	94.9	93
43	3.4255	0.6711	1632	83	3385	2.7	123510	97.6	96
44	3.9587	0.7993	1698	99	2080	1.6	125590	99.2	98
45	4.8022	1.0777	1802	133	838	0.7	126428	99.9	99
46	6.1236	1.8727	1966	232	160	0.1	126588	100.0	99

## Appendix N: Raw-to-Scaled Score Conversion Tables

### Reading Grade 4

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.4520	1.8402	700	368	0	0.0	0	0.0	0
1	-4.2116	1.0254	700	205	0	0.0	0	0.0	0
2	-3.4681	0.7412	700	148	1	0.0	1	0.0	1
3	-3.0141	0.6173	700	123	6	0.0	7	0.0	1
4	-2.6795	0.5442	700	109	12	0.0	19	0.0	1
5	-2.4108	0.4949	700	99	34	0.0	53	0.0	1
6	-2.1841	0.4589	719	92	71	0.1	124	0.1	1
7	-1.9865	0.4312	759	86	148	0.1	272	0.2	1
8	-1.8103	0.4091	794	82	267	0.2	539	0.4	1
9	-1.6504	0.3911	826	78	414	0.3	953	0.7	1
10	-1.5034	0.3761	856	75	569	0.4	1522	1.2	1
11	-1.3667	0.3635	883	73	805	0.6	2327	1.8	1
12	-1.2385	0.3528	909	71	917	0.7	3244	2.5	2
13	-1.1174	0.3436	933	69	1023	0.8	4267	3.3	3
14	-1.0021	0.3357	956	67	1140	0.9	5407	4.2	4
15	-0.8917	0.3288	978	66	1325	1.0	6732	5.2	5
16	-0.7856	0.3229	999	65	1424	1.1	8156	6.3	6
17	-0.6831	0.3177	1020	64	1498	1.2	9654	7.5	7
18	-0.5835	0.3133	1040	63	1547	1.2	11201	8.7	8
19	-0.4866	0.3095	1059	62	1636	1.3	12837	10.0	9
20	-0.3918	0.3063	1078	61	1785	1.4	14622	11.4	11
21	-0.2988	0.3037	1097	61	1773	1.4	16395	12.8	12
22	-0.2073	0.3015	1115	60	1907	1.5	18302	14.2	14
23	-0.1169	0.2998	1133	60	2001	1.6	20303	15.8	15
24	-0.0274	0.2986	1151	60	2064	1.6	22367	17.4	17
25	0.0614	0.2978	1169	60	2203	1.7	24570	19.1	18
26	0.1500	0.2974	1186	59	2333	1.8	26903	20.9	20
27	0.2384	0.2974	1204	59	2419	1.9	29322	22.8	22
28	0.3270	0.2979	1222	60	2664	2.1	31986	24.9	24
29	0.4160	0.2988	1240	60	2803	2.2	34789	27.1	26
30	0.5057	0.3002	1257	60	3003	2.3	37792	29.4	28
31	0.5964	0.3021	1276	60	3129	2.4	40921	31.9	31
32	0.6883	0.3044	1294	61	3343	2.6	44264	34.5	33
33	0.7818	0.3073	1313	61	3531	2.7	47795	37.2	36
34	0.8773	0.3108	1332	62	3870	3.0	51665	40.2	39
35	0.9751	0.3149	1351	63	4142	3.2	55807	43.4	42
36	1.0758	0.3198	1371	64	4544	3.5	60351	47.0	45
37	1.1798	0.3254	1392	65	4757	3.7	65108	50.7	49
38	1.2879	0.3320	1414	66	5216	4.1	70324	54.7	53
39	1.4006	0.3397	1436	68	5399	4.2	75723	59.0	57
40	1.5189	0.3487	1460	70	5739	4.5	81462	63.4	61
41	1.6441	0.3592	1485	72	6081	4.7	87543	68.2	66
42	1.7775	0.3716	1512	74	6354	4.9	93897	73.1	71
43	1.9209	0.3863	1540	77	6455	5.0	100352	78.1	76
44	2.0770	0.4042	1572	81	6453	5.0	106805	83.1	81
45	2.2491	0.4262	1606	85	5902	4.6	112707	87.7	85
46	2.4423	0.4539	1645	91	5125	4.0	117832	91.7	90
47	2.6645	0.4902	1689	98	4235	3.3	122067	95.0	93
48	2.9285	0.5399	1742	108	3121	2.4	125188	97.5	96
49	3.2585	0.6137	1808	123	1820	1.4	127008	98.9	98

## Appendix N: Raw-to-Scaled Score Conversion Tables

<b>Raw</b>	<b>Meas</b>	<b>MeasSE</b>	<b>SS</b>	<b>SSSE</b>	<b>Freq</b>	<b>Freq%</b>	<b>Cum</b>	<b>Cum%</b>	<b>Pct</b>
50	3.7083	0.7387	1898	148	1019	0.8	128027	99.7	99
51	4.4486	1.0242	2046	205	354	0.3	128381	99.9	99
52	5.6878	1.8399	2294	368	71	0.1	128452	100.0	99

Appendix N: Raw-to-Scaled Score Conversion Tables

Reading Grade 5

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.6408	1.8368	700	365	0	0.0	0	0.0	0
1	-4.4085	1.0201	700	203	1	0.0	1	0.0	1
2	-3.6745	0.7356	700	146	1	0.0	2	0.0	1
3	-3.2279	0.6122	700	122	1	0.0	3	0.0	1
4	-2.8986	0.5402	700	107	11	0.0	14	0.0	1
5	-2.6335	0.4921	700	98	29	0.0	43	0.0	1
6	-2.4088	0.4574	700	91	59	0.0	102	0.1	1
7	-2.2119	0.4310	700	86	112	0.1	214	0.2	1
8	-2.0353	0.4103	700	82	201	0.2	415	0.3	1
9	-1.8740	0.3935	722	78	268	0.2	683	0.5	1
10	-1.7246	0.3797	752	75	414	0.3	1097	0.9	1
11	-1.5850	0.3681	780	73	524	0.4	1621	1.3	1
12	-1.4531	0.3584	806	71	656	0.5	2277	1.8	2
13	-1.3277	0.3501	831	70	730	0.6	3007	2.3	2
14	-1.2077	0.3429	855	68	867	0.7	3874	3.0	3
15	-1.0922	0.3368	877	67	945	0.7	4819	3.7	3
16	-0.9806	0.3316	900	66	1003	0.8	5822	4.5	4
17	-0.8721	0.3271	921	65	1024	0.8	6846	5.3	5
18	-0.7664	0.3233	942	64	1079	0.8	7925	6.1	6
19	-0.6630	0.3200	963	64	1099	0.9	9024	7.0	7
20	-0.5615	0.3174	983	63	1227	1.0	10251	8.0	7
21	-0.4614	0.3152	1003	63	1371	1.1	11622	9.0	8
22	-0.3626	0.3136	1023	62	1371	1.1	12993	10.1	10
23	-0.2646	0.3124	1042	62	1550	1.2	14543	11.3	11
24	-0.1673	0.3117	1061	62	1660	1.3	16203	12.6	12
25	-0.0702	0.3114	1081	62	1858	1.4	18061	14.0	13
26	0.0268	0.3116	1100	62	1957	1.5	20018	15.5	15
27	0.1240	0.3123	1119	62	2104	1.6	22122	17.2	16
28	0.2219	0.3134	1139	62	2437	1.9	24559	19.0	18
29	0.3206	0.3150	1158	63	2668	2.1	27227	21.1	20
30	0.4204	0.3171	1178	63	3097	2.4	30324	23.5	22
31	0.5219	0.3198	1198	64	3263	2.5	33587	26.0	25
32	0.6252	0.3230	1219	64	3811	3.0	37398	29.0	28
33	0.7307	0.3269	1240	65	4241	3.3	41639	32.3	31
34	0.8390	0.3314	1261	66	4644	3.6	46283	35.9	34
35	0.9505	0.3367	1284	67	4998	3.9	51281	39.8	38
36	1.0659	0.3428	1307	68	5808	4.5	57089	44.3	42
37	1.1857	0.3498	1330	70	6137	4.8	63226	49.0	47
38	1.3109	0.3579	1355	71	6706	5.2	69932	54.2	52
39	1.4423	0.3673	1381	73	7144	5.5	77076	59.8	57
40	1.5811	0.3781	1409	75	7363	5.7	84439	65.5	63
41	1.7288	0.3907	1438	78	7527	5.8	91966	71.3	68
42	1.8871	0.4055	1470	81	7494	5.8	99460	77.1	74
43	2.0584	0.4229	1504	84	7092	5.5	106552	82.6	80
44	2.2459	0.4437	1541	88	6343	4.9	112895	87.6	85
45	2.4539	0.4690	1582	93	5363	4.2	118258	91.7	90
46	2.6883	0.5004	1629	99	4256	3.3	122514	95.0	93
47	2.9584	0.5405	1683	107	2929	2.3	125443	97.3	96
48	3.2787	0.5939	1746	118	1876	1.5	127319	98.7	98
49	3.6755	0.6703	1825	133	1004	0.8	128323	99.5	99

## Appendix N: Raw-to-Scaled Score Conversion Tables

<b>Raw</b>	<b>Meas</b>	<b>MeasSE</b>	<b>SS</b>	<b>SSSE</b>	<b>Freq</b>	<b>Freq%</b>	<b>Cum</b>	<b>Cum%</b>	<b>Pct</b>
50	4.2047	0.7949	1930	158	452	0.4	128775	99.9	99
51	5.0385	1.0721	2096	213	130	0.1	128905	100.0	99
52	6.3513	1.8694	2357	372	28	0.0	128933	100.0	99

Appendix N: Raw-to-Scaled Score Conversion Tables

Reading Grade 6

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.5518	1.8351	700	367	0	0.0	0	0.0	0
1	-4.3240	1.0169	700	203	0	0.0	0	0.0	0
2	-3.5968	0.7308	700	146	2	0.0	2	0.0	1
3	-3.1571	0.6062	700	121	7	0.0	9	0.0	1
4	-2.8352	0.5332	700	107	15	0.0	24	0.0	1
5	-2.5776	0.4843	700	97	28	0.0	52	0.0	1
6	-2.3607	0.4488	700	90	76	0.1	128	0.1	1
7	-2.1717	0.4218	735	84	135	0.1	263	0.2	1
8	-2.0029	0.4005	768	80	232	0.2	495	0.4	1
9	-1.8496	0.3832	799	77	367	0.3	862	0.7	1
10	-1.7083	0.3691	827	74	532	0.4	1394	1.1	1
11	-1.5765	0.3573	854	71	648	0.5	2042	1.6	1
12	-1.4525	0.3473	878	69	837	0.6	2879	2.2	2
13	-1.3348	0.3389	902	68	953	0.7	3832	3.0	3
14	-1.2224	0.3318	924	66	1036	0.8	4868	3.8	3
15	-1.1144	0.3257	946	65	1095	0.8	5963	4.6	4
16	-1.0101	0.3205	967	64	1151	0.9	7114	5.5	5
17	-0.9088	0.3161	987	63	1221	0.9	8335	6.5	6
18	-0.8101	0.3124	1007	62	1355	1.1	9690	7.5	7
19	-0.7134	0.3094	1026	62	1335	1.0	11025	8.6	8
20	-0.6186	0.3069	1045	61	1464	1.1	12489	9.7	9
21	-0.5250	0.3050	1064	61	1529	1.2	14018	10.9	10
22	-0.4325	0.3035	1082	61	1550	1.2	15568	12.1	11
23	-0.3406	0.3025	1101	61	1661	1.3	17229	13.4	13
24	-0.2494	0.3019	1119	60	1881	1.5	19110	14.8	14
25	-0.1583	0.3018	1137	60	2059	1.6	21169	16.4	16
26	-0.0672	0.3020	1156	60	2191	1.7	23360	18.1	17
27	0.0242	0.3027	1174	61	2233	1.7	25593	19.9	19
28	0.1162	0.3038	1192	61	2397	1.9	27990	21.7	21
29	0.2089	0.3052	1211	61	2681	2.1	30671	23.8	23
30	0.3026	0.3071	1229	61	2942	2.3	33613	26.1	25
31	0.3976	0.3095	1248	62	3104	2.4	36717	28.5	27
32	0.4943	0.3123	1268	62	3576	2.8	40293	31.3	30
33	0.5928	0.3156	1288	63	3804	3.0	44097	34.2	33
34	0.6936	0.3195	1308	64	4132	3.2	48229	37.4	36
35	0.7971	0.3240	1328	65	4341	3.4	52570	40.8	39
36	0.9037	0.3291	1350	66	4879	3.8	57449	44.6	43
37	1.0139	0.3350	1372	67	5189	4.0	62638	48.6	47
38	1.1283	0.3417	1395	68	5414	4.2	68052	52.8	51
39	1.2477	0.3495	1419	70	5791	4.5	73843	57.3	55
40	1.3730	0.3585	1444	72	6016	4.7	79859	61.9	60
41	1.5051	0.3689	1470	74	6422	5.0	86281	66.9	64
42	1.6456	0.3811	1498	76	6335	4.9	92616	71.8	69
43	1.7963	0.3957	1528	79	6411	5.0	99027	76.8	74
44	1.9597	0.4132	1561	83	6005	4.7	105032	81.5	79
45	2.1391	0.4347	1597	87	5649	4.4	110681	85.9	84
46	2.3396	0.4619	1637	92	5311	4.1	115992	90.0	88
47	2.5690	0.4974	1683	99	4345	3.4	120337	93.3	92
48	2.8399	0.5461	1737	109	3609	2.8	123946	96.1	95
49	3.1765	0.6187	1804	124	2522	2.0	126468	98.1	97

## Appendix N: Raw-to-Scaled Score Conversion Tables

<b>Raw</b>	<b>Meas</b>	<b>MeasSE</b>	<b>SS</b>	<b>SSSE</b>	<b>Freq</b>	<b>Freq%</b>	<b>Cum</b>	<b>Cum%</b>	<b>Pct</b>
50	3.6320	0.7421	1895	148	1491	1.2	127959	99.3	99
51	4.3767	1.0258	2044	205	746	0.6	128705	99.8	99
52	5.6177	1.8403	2293	368	216	0.2	128921	100.0	99

Appendix N: Raw-to-Scaled Score Conversion Tables

Reading Grade 7

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.3639	1.8357	700	367	1	0.0	1	0.0	1
1	-4.1345	1.0179	700	204	1	0.0	2	0.0	1
2	-3.4052	0.7321	700	146	2	0.0	4	0.0	1
3	-2.9638	0.6076	700	122	3	0.0	7	0.0	1
4	-2.6403	0.5346	700	107	12	0.0	19	0.0	1
5	-2.3813	0.4857	718	97	32	0.0	51	0.0	1
6	-2.1631	0.4501	762	90	62	0.0	113	0.1	1
7	-1.9729	0.4230	800	85	124	0.1	237	0.2	1
8	-1.8032	0.4016	834	80	234	0.2	471	0.4	1
9	-1.6490	0.3843	865	77	330	0.3	801	0.6	1
10	-1.5069	0.3700	893	74	440	0.3	1241	1.0	1
11	-1.3746	0.3580	919	72	587	0.5	1828	1.4	1
12	-1.2502	0.3478	944	70	740	0.6	2568	2.0	2
13	-1.1322	0.3392	968	68	899	0.7	3467	2.7	2
14	-1.0197	0.3318	990	66	1022	0.8	4489	3.4	3
15	-0.9117	0.3254	1012	65	1113	0.9	5602	4.3	4
16	-0.8077	0.3200	1033	64	1265	1.0	6867	5.3	5
17	-0.7068	0.3153	1053	63	1359	1.0	8226	6.3	6
18	-0.6086	0.3113	1073	62	1517	1.2	9743	7.5	7
19	-0.5128	0.3080	1092	62	1529	1.2	11272	8.6	8
20	-0.4189	0.3052	1111	61	1634	1.3	12906	9.9	9
21	-0.3264	0.3029	1129	61	1725	1.3	14631	11.2	11
22	-0.2353	0.3011	1147	60	1839	1.4	16470	12.6	12
23	-0.1451	0.2997	1165	60	2065	1.6	18535	14.2	13
24	-0.0555	0.2988	1183	60	2167	1.7	20702	15.9	15
25	0.0336	0.2983	1201	60	2364	1.8	23066	17.7	17
26	0.1225	0.2983	1219	60	2446	1.9	25512	19.6	19
27	0.2116	0.2987	1237	60	2676	2.1	28188	21.6	21
28	0.3011	0.2995	1255	60	3095	2.4	31283	24.0	23
29	0.3911	0.3007	1273	60	3245	2.5	34528	26.5	25
30	0.4820	0.3025	1291	61	3439	2.6	37967	29.1	28
31	0.5742	0.3047	1309	61	3735	2.9	41702	32.0	31
32	0.6678	0.3074	1328	61	3965	3.0	45667	35.0	34
33	0.7633	0.3107	1347	62	4286	3.3	49953	38.3	37
34	0.8611	0.3147	1367	63	4611	3.5	54564	41.9	40
35	0.9614	0.3193	1387	64	4916	3.8	59480	45.6	44
36	1.0651	0.3247	1407	65	5173	4.0	64653	49.6	48
37	1.1725	0.3309	1429	66	5399	4.1	70052	53.7	52
38	1.2843	0.3382	1451	68	5638	4.3	75690	58.1	56
39	1.4015	0.3466	1475	69	5843	4.5	81533	62.5	60
40	1.5249	0.3564	1499	71	5926	4.5	87459	67.1	65
41	1.6559	0.3678	1526	74	6081	4.7	93540	71.7	69
42	1.7961	0.3813	1554	76	6106	4.7	99646	76.4	74
43	1.9475	0.3973	1584	79	5743	4.4	105389	80.8	79
44	2.1128	0.4165	1617	83	5531	4.2	110920	85.1	83
45	2.2958	0.4400	1654	88	5213	4.0	116133	89.1	87
46	2.5021	0.4693	1695	94	4536	3.5	120669	92.6	91
47	2.7399	0.5073	1742	101	3584	2.7	124253	95.3	94
48	3.0227	0.5588	1799	112	2797	2.1	127050	97.4	96
49	3.3756	0.6338	1870	127	1850	1.4	128900	98.9	98

## Appendix N: Raw-to-Scaled Score Conversion Tables

<b>Raw</b>	<b>Meas</b>	<b>MeasSE</b>	<b>SS</b>	<b>SSSE</b>	<b>Freq</b>	<b>Freq%</b>	<b>Cum</b>	<b>Cum%</b>	<b>Pct</b>
50	3.8532	0.7592	1965	152	1019	0.8	129919	99.6	99
51	4.6274	1.0422	2120	208	384	0.3	130303	99.9	99
52	5.8944	1.8513	2373	370	73	0.1	130376	100.0	99

## Appendix N: Raw-to-Scaled Score Conversion Tables

### Reading Grade 8

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-4.9616	1.8382	700	432	0	0.0	0	0.0	0
1	-3.7261	1.0220	700	240	1	0.0	1	0.0	1
2	-2.9890	0.7371	700	173	2	0.0	3	0.0	1
3	-2.5408	0.6128	700	144	4	0.0	7	0.0	1
4	-2.2113	0.5399	700	127	16	0.0	23	0.0	1
5	-1.9470	0.4908	700	115	45	0.0	68	0.1	1
6	-1.7240	0.4552	709	107	65	0.0	133	0.1	1
7	-1.5295	0.4279	755	100	100	0.1	233	0.2	1
8	-1.3557	0.4064	795	95	192	0.1	425	0.3	1
9	-1.1978	0.3890	832	91	308	0.2	733	0.6	1
10	-1.0522	0.3747	867	88	408	0.3	1141	0.9	1
11	-0.9164	0.3627	899	85	533	0.4	1674	1.3	1
12	-0.7885	0.3526	929	83	630	0.5	2304	1.7	1
13	-0.6674	0.3440	957	81	794	0.6	3098	2.3	2
14	-0.5515	0.3367	984	79	939	0.7	4037	3.0	3
15	-0.4404	0.3305	1010	78	1025	0.8	5062	3.8	3
16	-0.3330	0.3251	1036	76	1129	0.8	6191	4.7	4
17	-0.2288	0.3206	1060	75	1213	0.9	7404	5.6	5
18	-0.1272	0.3168	1084	74	1321	1.0	8725	6.6	6
19	-0.0278	0.3137	1107	74	1374	1.0	10099	7.6	7
20	0.0697	0.3111	1130	73	1528	1.1	11627	8.7	8
21	0.1659	0.3091	1153	73	1669	1.3	13296	10.0	9
22	0.2609	0.3075	1175	72	1830	1.4	15126	11.4	11
23	0.3551	0.3064	1197	72	1897	1.4	17023	12.8	12
24	0.4487	0.3058	1219	72	2127	1.6	19150	14.4	14
25	0.5422	0.3056	1241	72	2358	1.8	21508	16.2	15
26	0.6357	0.3059	1263	72	2606	2.0	24114	18.1	17
27	0.7294	0.3065	1285	72	2908	2.2	27022	20.3	19
28	0.8237	0.3076	1307	72	3060	2.3	30082	22.6	21
29	0.9188	0.3092	1329	73	3502	2.6	33584	25.3	24
30	1.0150	0.3112	1352	73	3852	2.9	37436	28.2	27
31	1.1126	0.3137	1375	74	4090	3.1	41526	31.2	30
32	1.2119	0.3167	1398	74	4522	3.4	46048	34.6	33
33	1.3133	0.3202	1422	75	4971	3.7	51019	38.4	37
34	1.4172	0.3244	1446	76	5272	4.0	56291	42.4	40
35	1.5239	0.3292	1472	77	5787	4.4	62078	46.7	45
36	1.6340	0.3347	1497	79	6151	4.6	68229	51.3	49
37	1.7482	0.3410	1524	80	6377	4.8	74606	56.1	54
38	1.8669	0.3483	1552	82	6507	4.9	81113	61.0	59
39	1.9911	0.3567	1581	84	6643	5.0	87756	66.0	64
40	2.1217	0.3663	1612	86	6735	5.1	94491	71.1	69
41	2.2598	0.3774	1644	89	6405	4.8	100896	75.9	74
42	2.4071	0.3903	1679	92	6397	4.8	107293	80.7	78
43	2.5652	0.4055	1716	95	5949	4.5	113242	85.2	83
44	2.7369	0.4236	1756	99	5229	3.9	118471	89.1	87
45	2.9255	0.4456	1801	105	4488	3.4	122959	92.5	91
46	3.1361	0.4731	1850	111	3545	2.7	126504	95.2	94
47	3.3762	0.5085	1906	119	2642	2.0	129146	97.2	96
48	3.6587	0.5569	1973	131	1864	1.4	131010	98.6	98
49	4.0072	0.6284	2055	148	1066	0.8	132076	99.4	99

Appendix N: Raw-to-Scaled Score Conversion Tables

<b>Raw</b>	<b>Meas</b>	<b>MeasSE</b>	<b>SS</b>	<b>SSSE</b>	<b>Freq</b>	<b>Freq%</b>	<b>Cum</b>	<b>Cum%</b>	<b>Pct</b>
50	4.4749	0.7503	2164	176	596	0.4	132672	99.8	99
51	5.2316	1.0315	2342	242	204	0.2	132876	100.0	99
52	6.4806	1.8434	2635	433	30	0.0	132906	100.0	99

Appendix N: Raw-to-Scaled Score Conversion Tables

Reading Grade 11

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.5882	1.8340	700	450	0	0.0	0	0.0	0
1	-4.3628	1.0152	700	249	0	0.0	0	0.0	0
2	-3.6387	0.7288	700	179	1	0.0	1	0.0	1
3	-3.2018	0.6042	700	148	4	0.0	5	0.0	1
4	-2.8821	0.5313	700	130	12	0.0	17	0.0	1
5	-2.6264	0.4826	700	118	38	0.0	55	0.0	1
6	-2.4108	0.4475	700	110	67	0.1	122	0.1	1
7	-2.2227	0.4209	700	103	123	0.1	245	0.2	1
8	-2.0546	0.4000	700	98	231	0.2	476	0.4	1
9	-1.9014	0.3833	700	94	365	0.3	841	0.6	1
10	-1.7598	0.3696	700	91	502	0.4	1343	1.0	1
11	-1.6275	0.3583	716	88	594	0.4	1937	1.5	1
12	-1.5026	0.3488	746	86	711	0.5	2648	2.0	2
13	-1.3838	0.3409	776	84	828	0.6	3476	2.6	2
14	-1.2700	0.3342	803	82	966	0.7	4442	3.3	3
15	-1.1602	0.3285	830	81	1085	0.8	5527	4.1	4
16	-1.0539	0.3238	857	79	1186	0.9	6713	5.0	5
17	-0.9503	0.3198	882	78	1236	0.9	7949	6.0	5
18	-0.8491	0.3166	907	78	1312	1.0	9261	6.9	6
19	-0.7498	0.3139	931	77	1374	1.0	10635	8.0	7
20	-0.6520	0.3117	955	77	1456	1.1	12091	9.1	9
21	-0.5553	0.3101	979	76	1656	1.2	13747	10.3	10
22	-0.4595	0.3089	1002	76	1749	1.3	15496	11.6	11
23	-0.3643	0.3082	1026	76	1938	1.5	17434	13.1	12
24	-0.2695	0.3079	1049	76	1985	1.5	19419	14.6	14
25	-0.1747	0.3079	1072	76	2193	1.6	21612	16.2	15
26	-0.0797	0.3084	1096	76	2434	1.8	24046	18.0	17
27	0.0156	0.3092	1119	76	2701	2.0	26747	20.1	19
28	0.1115	0.3104	1143	76	2896	2.2	29643	22.2	21
29	0.2084	0.3120	1166	77	3085	2.3	32728	24.6	23
30	0.3063	0.3140	1190	77	3349	2.5	36077	27.1	26
31	0.4056	0.3164	1215	78	3669	2.8	39746	29.8	28
32	0.5066	0.3193	1240	78	4040	3.0	43786	32.8	31
33	0.6097	0.3227	1265	79	4433	3.3	48219	36.2	35
34	0.7150	0.3266	1291	80	4715	3.5	52934	39.7	38
35	0.8231	0.3311	1317	81	5050	3.8	57984	43.5	42
36	0.9344	0.3362	1345	83	5457	4.1	63441	47.6	46
37	1.0493	0.3421	1373	84	5768	4.3	69209	51.9	50
38	1.1686	0.3488	1402	86	6125	4.6	75334	56.5	54
39	1.2930	0.3566	1433	88	6267	4.7	81601	61.2	59
40	1.4232	0.3655	1465	90	6391	4.8	87992	66.0	64
41	1.5606	0.3759	1498	92	6204	4.7	94196	70.7	68
42	1.7064	0.3881	1534	95	6412	4.8	100608	75.5	73
43	1.8625	0.4024	1572	99	6180	4.6	106788	80.1	78
44	2.0312	0.4197	1614	103	5872	4.4	112660	84.5	82
45	2.2161	0.4409	1659	108	5282	4.0	117942	88.5	87
46	2.4220	0.4676	1710	115	4678	3.5	122620	92.0	90
47	2.6565	0.5024	1767	123	3747	2.8	126367	94.8	93
48	2.9323	0.5504	1835	135	2976	2.2	129343	97.0	96
49	3.2732	0.6219	1919	153	2018	1.5	131361	98.6	98

## Appendix N: Raw-to-Scaled Score Conversion Tables

<b>Raw</b>	<b>Meas</b>	<b>MeasSE</b>	<b>SS</b>	<b>SSSE</b>	<b>Freq</b>	<b>Freq%</b>	<b>Cum</b>	<b>Cum%</b>	<b>Pct</b>
50	3.7323	0.7442	2031	183	1200	0.9	132561	99.5	99
51	4.4794	1.0267	2215	252	592	0.4	133153	99.9	99
52	5.7214	1.8406	2520	452	138	0.1	133291	100.0	99

## Appendix N: Raw-to-Scaled Score Conversion Tables

### Science Grade 4

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.7971	1.8335	1050	324	0	0.0	0	0.0	0
1	-4.5730	1.0143	1050	179	0	0.0	0	0.0	0
2	-3.8510	0.7272	1050	129	0	0.0	0	0.0	0
3	-3.4166	0.6019	1050	106	1	0.0	1	0.0	1
4	-3.0999	0.5283	1050	93	0	0.0	1	0.0	1
5	-2.8475	0.4788	1050	85	0	0.0	1	0.0	1
6	-2.6359	0.4428	1050	78	5	0.0	6	0.0	1
7	-2.4523	0.4152	1050	73	8	0.0	14	0.0	1
8	-2.2891	0.3934	1050	70	7	0.0	21	0.0	1
9	-2.1415	0.3755	1050	66	18	0.0	39	0.0	1
10	-2.0061	0.3607	1050	64	50	0.0	89	0.1	1
11	-1.8807	0.3481	1050	62	85	0.1	174	0.1	1
12	-1.7633	0.3373	1050	60	122	0.1	296	0.2	1
13	-1.6527	0.3280	1050	58	170	0.1	466	0.4	1
14	-1.5478	0.3199	1050	57	263	0.2	729	0.6	1
15	-1.4477	0.3128	1050	55	301	0.2	1030	0.8	1
16	-1.3519	0.3064	1050	54	384	0.3	1414	1.1	1
17	-1.2598	0.3008	1050	53	467	0.4	1881	1.5	1
18	-1.1708	0.2959	1050	52	567	0.4	2448	1.9	2
19	-1.0846	0.2914	1050	52	630	0.5	3078	2.4	2
20	-1.0009	0.2874	1050	51	643	0.5	3721	2.9	3
21	-0.9193	0.2838	1063	50	669	0.5	4390	3.4	3
22	-0.8397	0.2807	1077	50	835	0.6	5225	4.1	4
23	-0.7617	0.2778	1091	49	880	0.7	6105	4.7	4
24	-0.6852	0.2753	1105	49	864	0.7	6969	5.4	5
25	-0.6101	0.2730	1118	48	1006	0.8	7975	6.2	6
26	-0.5361	0.2711	1131	48	959	0.7	8934	6.9	7
27	-0.4631	0.2694	1144	48	1003	0.8	9937	7.7	7
28	-0.3909	0.2679	1157	47	1029	0.8	10966	8.5	8
29	-0.3195	0.2666	1169	47	1144	0.9	12110	9.4	9
30	-0.2487	0.2656	1182	47	1194	0.9	13304	10.3	10
31	-0.1784	0.2648	1194	47	1237	1.0	14541	11.3	11
32	-0.1084	0.2642	1206	47	1282	1.0	15823	12.3	12
33	-0.0387	0.2638	1219	47	1417	1.1	17240	13.4	13
34	0.0308	0.2636	1231	47	1505	1.2	18745	14.6	14
35	0.1002	0.2636	1243	47	1534	1.2	20279	15.8	15
36	0.1697	0.2638	1256	47	1723	1.3	22002	17.1	16
37	0.2393	0.2642	1268	47	1833	1.4	23835	18.5	18
38	0.3093	0.2648	1280	47	1877	1.5	25712	20.0	19
39	0.3796	0.2656	1293	47	2073	1.6	27785	21.6	21
40	0.4504	0.2667	1305	47	2258	1.8	30043	23.4	22
41	0.5219	0.2680	1318	47	2317	1.8	32360	25.2	24
42	0.5941	0.2695	1331	48	2496	1.9	34856	27.1	26
43	0.6672	0.2713	1344	48	2560	2.0	37416	29.1	28
44	0.7414	0.2734	1357	48	2815	2.2	40231	31.3	30
45	0.8167	0.2758	1370	49	3078	2.4	43309	33.7	32
46	0.8935	0.2785	1384	49	3146	2.4	46455	36.1	35
47	0.9719	0.2816	1397	50	3317	2.6	49772	38.7	37
48	1.0521	0.2850	1412	50	3652	2.8	53424	41.6	40
49	1.1345	0.2889	1426	51	3765	2.9	57189	44.5	43

Appendix N: Raw-to-Scaled Score Conversion Tables

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
50	1.2192	0.2933	1441	52	3894	3.0	61083	47.5	46
51	1.3067	0.2982	1457	53	4082	3.2	65165	50.7	49
52	1.3972	0.3038	1473	54	4339	3.4	69504	54.1	52
53	1.4914	0.3101	1489	55	4467	3.5	73971	57.5	56
54	1.5898	0.3173	1507	56	4547	3.5	78518	61.1	59
55	1.6930	0.3254	1525	58	4749	3.7	83267	64.8	63
56	1.8019	0.3348	1544	59	4885	3.8	88152	68.6	67
57	1.9175	0.3456	1565	61	4992	3.9	93144	72.4	71
58	2.0413	0.3582	1586	63	5035	3.9	98179	76.4	74
59	2.1749	0.3732	1610	66	4976	3.9	103155	80.2	78
60	2.3208	0.3912	1636	69	4743	3.7	107898	83.9	82
61	2.4823	0.4133	1664	73	4605	3.6	112503	87.5	86
62	2.6643	0.4410	1697	78	4133	3.2	116636	90.7	89
63	2.8744	0.4773	1734	84	3607	2.8	120243	93.5	92
64	3.1254	0.5270	1778	93	3299	2.6	123542	96.1	95
65	3.4408	0.6009	1834	106	2519	2.0	126061	98.1	97
66	3.8740	0.7265	1910	128	1556	1.2	127617	99.3	99
67	4.5950	1.0138	2038	179	742	0.6	128359	99.8	99
68	5.8185	1.8333	2254	324	206	0.2	128565	100.0	99

Appendix N: Raw-to-Scaled Score Conversion Tables

Science Grade 8

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.8116	1.8328	925	351	0	0.0	0	0.0	0
1	-4.5896	1.0128	925	194	0	0.0	0	0.0	0
2	-3.8708	0.7250	925	139	0	0.0	0	0.0	0
3	-3.4398	0.5990	925	115	0	0.0	0	0.0	0
4	-3.1267	0.5248	925	101	6	0.0	6	0.0	1
5	-2.8781	0.4748	925	91	5	0.0	11	0.0	1
6	-2.6704	0.4383	925	84	11	0.0	22	0.0	1
7	-2.4907	0.4103	925	79	32	0.0	54	0.0	1
8	-2.3317	0.3880	925	74	48	0.0	102	0.1	1
9	-2.1883	0.3699	925	71	101	0.1	203	0.2	1
10	-2.0572	0.3547	925	68	162	0.1	365	0.3	1
11	-1.9360	0.3419	925	65	277	0.2	642	0.5	1
12	-1.8229	0.3309	925	63	434	0.3	1076	0.8	1
13	-1.7166	0.3214	925	62	589	0.4	1665	1.3	1
14	-1.6160	0.3131	925	60	786	0.6	2451	1.9	2
15	-1.5203	0.3058	925	59	939	0.7	3390	2.6	2
16	-1.4288	0.2993	925	57	1131	0.9	4521	3.4	3
17	-1.3409	0.2936	940	56	1308	1.0	5829	4.4	4
18	-1.2562	0.2886	956	55	1414	1.1	7243	5.5	5
19	-1.1742	0.2840	972	54	1541	1.2	8784	6.6	6
20	-1.0947	0.2800	987	54	1694	1.3	10478	7.9	7
21	-1.0173	0.2764	1002	53	1639	1.2	12117	9.1	9
22	-0.9418	0.2732	1016	52	1867	1.4	13984	10.6	10
23	-0.8679	0.2704	1030	52	1861	1.4	15845	12.0	11
24	-0.7955	0.2679	1044	51	1836	1.4	17681	13.3	13
25	-0.7243	0.2657	1058	51	1891	1.4	19572	14.8	14
26	-0.6542	0.2638	1071	51	1965	1.5	21537	16.3	16
27	-0.5851	0.2621	1085	50	1967	1.5	23504	17.7	17
28	-0.5168	0.2607	1098	50	2033	1.5	25537	19.3	19
29	-0.4491	0.2595	1111	50	2040	1.5	27577	20.8	20
30	-0.3820	0.2586	1123	50	1988	1.5	29565	22.3	22
31	-0.3153	0.2579	1136	49	2179	1.6	31744	24.0	23
32	-0.2490	0.2573	1149	49	2094	1.6	33838	25.5	25
33	-0.1829	0.2570	1162	49	2247	1.7	36085	27.2	26
34	-0.1168	0.2569	1174	49	2251	1.7	38336	28.9	28
35	-0.0508	0.2570	1187	49	2385	1.8	40721	30.7	30
36	0.0153	0.2573	1200	49	2472	1.9	43193	32.6	32
37	0.0816	0.2578	1212	49	2630	2.0	45823	34.6	34
38	0.1483	0.2585	1225	50	2646	2.0	48469	36.6	36
39	0.2153	0.2594	1238	50	2624	2.0	51093	38.6	38
40	0.2830	0.2606	1251	50	2795	2.1	53888	40.7	40
41	0.3512	0.2620	1264	50	2814	2.1	56702	42.8	42
42	0.4202	0.2636	1277	50	2905	2.2	59607	45.0	44
43	0.4902	0.2655	1291	51	2862	2.2	62469	47.2	46
44	0.5612	0.2676	1304	51	3172	2.4	65641	49.6	48
45	0.6335	0.2701	1318	52	3258	2.5	68899	52.0	51
46	0.7072	0.2728	1332	52	3237	2.4	72136	54.5	53
47	0.7825	0.2759	1347	53	3304	2.5	75440	57.0	56
48	0.8595	0.2794	1361	54	3506	2.6	78946	59.6	58
49	0.9387	0.2834	1376	54	3494	2.6	82440	62.2	61

Appendix N: Raw-to-Scaled Score Conversion Tables

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
50	1.0202	0.2878	1392	55	3690	2.8	86130	65.0	64
51	1.1044	0.2927	1408	56	3741	2.8	89871	67.9	66
52	1.1918	0.2983	1425	57	3811	2.9	93682	70.7	69
53	1.2825	0.3046	1442	58	3792	2.9	97474	73.6	72
54	1.3775	0.3117	1460	60	3825	2.9	101299	76.5	75
55	1.4771	0.3198	1480	61	3819	2.9	105118	79.4	78
56	1.5824	0.3292	1500	63	3810	2.9	108928	82.2	81
57	1.6942	0.3400	1521	65	3705	2.8	112633	85.0	84
58	1.8140	0.3526	1544	68	3560	2.7	116193	87.7	86
59	1.9435	0.3675	1569	70	3457	2.6	119650	90.3	89
60	2.0851	0.3855	1596	74	3172	2.4	122822	92.7	92
61	2.2421	0.4076	1626	78	2714	2.0	125536	94.8	94
62	2.4193	0.4354	1660	83	2241	1.7	127777	96.5	96
63	2.6243	0.4718	1699	90	1780	1.3	129557	97.8	97
64	2.8699	0.5217	1746	100	1357	1.0	130914	98.8	98
65	3.1796	0.5960	1806	114	875	0.7	131789	99.5	99
66	3.6067	0.7222	1887	138	466	0.4	132255	99.9	99
67	4.3212	1.0105	2024	194	169	0.1	132424	100.0	99
68	5.5399	1.8314	2258	351	28	0.0	132452	100.0	99

Appendix N: Raw-to-Scaled Score Conversion Tables

Science Grade 11

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.7383	1.8337	1050	187	0	0.0	0	0.0	0
1	-4.5140	1.0144	1050	103	0	0.0	0	0.0	0
2	-3.7916	0.7275	1050	74	0	0.0	0	0.0	0
3	-3.3569	0.6022	1050	61	3	0.0	3	0.0	1
4	-3.0399	0.5286	1050	54	5	0.0	8	0.0	1
5	-2.7873	0.4790	1050	49	5	0.0	13	0.0	1
6	-2.5754	0.4430	1050	45	15	0.0	28	0.0	1
7	-2.3916	0.4154	1050	42	50	0.0	78	0.1	1
8	-2.2283	0.3935	1050	40	110	0.1	188	0.1	1
9	-2.0807	0.3756	1050	38	201	0.2	389	0.3	1
10	-1.9452	0.3607	1050	37	380	0.3	769	0.6	1
11	-1.8197	0.3482	1050	35	494	0.4	1263	1.0	1
12	-1.7023	0.3374	1050	34	680	0.5	1943	1.5	1
13	-1.5917	0.3280	1050	33	892	0.7	2835	2.2	2
14	-1.4868	0.3198	1050	33	1099	0.8	3934	3.0	3
15	-1.3869	0.3126	1053	32	1313	1.0	5247	4.0	4
16	-1.2911	0.3063	1063	31	1365	1.1	6612	5.1	5
17	-1.1991	0.3006	1073	31	1466	1.1	8078	6.2	6
18	-1.1103	0.2955	1082	30	1628	1.3	9706	7.5	7
19	-1.0243	0.2910	1090	30	1702	1.3	11408	8.8	8
20	-0.9408	0.2869	1099	29	1775	1.4	13183	10.1	9
21	-0.8595	0.2833	1107	29	1737	1.3	14920	11.5	11
22	-0.7802	0.2800	1115	29	1862	1.4	16782	12.9	12
23	-0.7026	0.2771	1123	28	1900	1.5	18682	14.4	14
24	-0.6266	0.2744	1131	28	1959	1.5	20641	15.9	15
25	-0.5520	0.2720	1138	28	2010	1.5	22651	17.4	17
26	-0.4786	0.2699	1146	27	2047	1.6	24698	19.0	18
27	-0.4062	0.2680	1153	27	2227	1.7	26925	20.7	20
28	-0.3348	0.2664	1161	27	2225	1.7	29150	22.4	22
29	-0.2643	0.2649	1168	27	2259	1.7	31409	24.2	23
30	-0.1944	0.2636	1175	27	2455	1.9	33864	26.1	25
31	-0.1253	0.2626	1182	27	2424	1.9	36288	27.9	27
32	-0.0566	0.2617	1189	27	2555	2.0	38843	29.9	29
33	0.0117	0.2609	1196	27	2749	2.1	41592	32.0	31
34	0.0797	0.2604	1203	27	2756	2.1	44348	34.1	33
35	0.1473	0.2600	1210	26	2936	2.3	47284	36.4	35
36	0.2149	0.2597	1217	26	3080	2.4	50364	38.8	38
37	0.2823	0.2596	1223	26	3118	2.4	53482	41.2	40
38	0.3497	0.2597	1230	26	3327	2.6	56809	43.7	42
39	0.4172	0.2600	1237	26	3442	2.6	60251	46.4	45
40	0.4849	0.2604	1244	27	3432	2.6	63683	49.0	48
41	0.5528	0.2609	1251	27	3546	2.7	67229	51.7	50
42	0.6211	0.2616	1258	27	3631	2.8	70860	54.5	53
43	0.6897	0.2625	1265	27	3740	2.9	74600	57.4	56
44	0.7590	0.2636	1272	27	3673	2.8	78273	60.2	59
45	0.8288	0.2649	1279	27	3767	2.9	82040	63.1	62
46	0.8993	0.2663	1286	27	3890	3.0	85930	66.1	65
47	0.9707	0.2680	1294	27	3898	3.0	89828	69.1	68
48	1.0430	0.2699	1301	27	3730	2.9	93558	72.0	71
49	1.1164	0.2720	1308	28	3663	2.8	97221	74.8	73

Appendix N: Raw-to-Scaled Score Conversion Tables

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
50	1.1910	0.2744	1316	28	3519	2.7	100740	77.5	76
51	1.2670	0.2771	1324	28	3438	2.6	104178	80.2	79
52	1.3447	0.2800	1332	29	3354	2.6	107532	82.8	81
53	1.4240	0.2833	1340	29	3191	2.5	110723	85.2	84
54	1.5053	0.2870	1348	29	2905	2.2	113628	87.5	86
55	1.5888	0.2911	1356	30	2706	2.1	116334	89.5	88
56	1.6749	0.2957	1365	30	2402	1.8	118736	91.4	90
57	1.7638	0.3008	1374	31	2116	1.6	120852	93.0	92
58	1.8561	0.3066	1384	31	1963	1.5	122815	94.5	94
59	1.9520	0.3131	1393	32	1665	1.3	124480	95.8	95
60	2.0524	0.3205	1404	33	1400	1.1	125880	96.9	96
61	2.1577	0.3290	1414	33	1116	0.9	126996	97.7	97
62	2.2692	0.3388	1426	34	875	0.7	127871	98.4	98
63	2.3877	0.3502	1438	36	670	0.5	128541	98.9	99
64	2.5150	0.3637	1451	37	522	0.4	129063	99.3	99
65	2.6530	0.3798	1465	39	329	0.3	129392	99.6	99
66	2.8046	0.3994	1480	41	236	0.2	129628	99.8	99
67	2.9736	0.4236	1497	43	150	0.1	129778	99.9	99
68	3.1658	0.4544	1517	46	76	0.1	129854	99.9	99
69	3.3902	0.4946	1540	50	46	0.0	129900	100.0	99
70	3.6614	0.5496	1567	56	19	0.0	129919	100.0	99
71	4.0064	0.6298	1603	64	1	0.0	129920	100.0	99
72	4.4833	0.7620	1651	78	4	0.0	129924	100.0	99
73	5.2690	1.0516	1731	107	1	0.0	129925	100.0	99
74	6.5547	1.8605	1862	189	1	0.0	129926	100.0	99

## Appendix N: Raw-to-Scaled Score Conversion Tables

### Writing Grade 5

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
22	-6.8973	1.8373	700	184	27	0.0	27	0.0	1
23	-5.6632	1.0216	700	102	155	0.1	182	0.1	1
24	-4.9256	0.7385	700	74	348	0.3	530	0.4	1
25	-4.4737	0.6170	700	62	441	0.3	971	0.8	1
26	-4.1378	0.5471	700	55	460	0.4	1431	1.1	1
27	-3.8641	0.5016	700	50	381	0.3	1812	1.4	1
28	-3.6291	0.4698	709	47	293	0.2	2105	1.6	2
29	-3.4196	0.4466	729	45	172	0.1	2277	1.8	2
30	-3.2280	0.4294	749	43	121	0.1	2398	1.9	2
31	-3.0494	0.4166	767	42	82	0.1	2480	1.9	2
32	-2.8798	0.4072	783	41	77	0.1	2557	2.0	2
33	-2.7170	0.4003	800	40	109	0.1	2666	2.1	2
34	-2.5587	0.3957	816	40	239	0.2	2905	2.3	2
35	-2.4034	0.3928	831	39	473	0.4	3378	2.6	2
36	-2.2498	0.3914	846	39	701	0.5	4079	3.2	3
37	-2.0967	0.3913	862	39	768	0.6	4847	3.8	3
38	-1.9432	0.3923	877	39	790	0.6	5637	4.4	4
39	-1.7886	0.3940	893	39	652	0.5	6289	4.9	5
40	-1.6325	0.3963	908	40	549	0.4	6838	5.3	5
41	-1.4745	0.3988	924	40	553	0.4	7391	5.8	6
42	-1.3144	0.4013	940	40	450	0.4	7841	6.1	6
43	-1.1525	0.4034	956	40	368	0.3	8209	6.4	6
44	-0.9892	0.4047	973	40	374	0.3	8583	6.7	7
45	-0.8251	0.4052	989	41	623	0.5	9206	7.2	7
46	-0.6611	0.4047	1005	40	1044	0.8	10250	8.0	8
47	-0.4979	0.4030	1022	40	1673	1.3	11923	9.3	9
48	-0.3364	0.4004	1038	40	2250	1.8	14173	11.1	10
49	-0.1775	0.3969	1054	40	2586	2.0	16759	13.1	12
50	-0.0215	0.3929	1069	39	3062	2.4	19821	15.5	14
51	0.1311	0.3884	1085	39	3497	2.7	23318	18.2	17
52	0.2802	0.3838	1099	38	3845	3.0	27163	21.2	20
53	0.4257	0.3792	1114	38	3951	3.1	31114	24.3	23
54	0.5679	0.3749	1128	37	3616	2.8	34730	27.1	26
55	0.7069	0.3708	1142	37	2690	2.1	37420	29.2	28
56	0.8431	0.3673	1156	37	1593	1.2	39013	30.4	30
57	0.9768	0.3642	1169	36	930	0.7	39943	31.2	31
58	1.1086	0.3618	1182	36	917	0.7	40860	31.9	32
59	1.2388	0.3600	1195	36	1203	0.9	42063	32.8	32
60	1.3680	0.3590	1208	36	1660	1.3	43723	34.1	33
61	1.4968	0.3588	1221	36	2241	1.7	45964	35.9	35
62	1.6257	0.3594	1234	36	3078	2.4	49042	38.3	37
63	1.7554	0.3610	1247	36	4034	3.1	53076	41.4	40
64	1.8866	0.3636	1260	36	4802	3.7	57878	45.1	43
65	2.0200	0.3673	1273	37	5026	3.9	62904	49.1	47
66	2.1567	0.3723	1287	37	4221	3.3	67125	52.4	51
67	2.2976	0.3787	1301	38	2597	2.0	69722	54.4	53
68	2.4440	0.3868	1316	39	887	0.7	70609	55.1	55
69	2.5974	0.3969	1331	40	413	0.3	71022	55.4	55
70	2.7598	0.4094	1347	41	757	0.6	71779	56.0	56
71	2.9335	0.4247	1365	42	1182	0.9	72961	56.9	56

Appendix N: Raw-to-Scaled Score Conversion Tables

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
72	3.1216	0.4435	1384	44	1947	1.5	74908	58.4	58
73	3.3283	0.4665	1404	47	3394	2.6	78302	61.1	60
74	3.5588	0.4944	1427	49	5323	4.2	83625	65.2	63
75	3.8194	0.5273	1453	53	7625	5.9	91250	71.2	68
76	4.1166	0.5629	1483	56	9528	7.4	100778	78.6	75
77	4.4524	0.5941	1517	59	8735	6.8	109513	85.4	82
78	4.8159	0.6077	1553	61	5485	4.3	114998	89.7	88
79	5.1806	0.5962	1590	60	506	0.4	115504	90.1	90
80	5.5200	0.5672	1623	57	43	0.0	115547	90.1	90
81	5.8232	0.5340	1654	53	49	0.0	115596	90.2	90
82	6.0921	0.5039	1681	50	79	0.1	115675	90.2	90
83	6.3333	0.4791	1705	48	200	0.2	115875	90.4	90
84	6.5532	0.4597	1727	46	387	0.3	116262	90.7	91
85	6.7576	0.4450	1747	45	755	0.6	117017	91.3	91
86	6.9507	0.4345	1767	43	1339	1.0	118356	92.3	92
87	7.1362	0.4275	1785	43	2195	1.7	120551	94.0	93
88	7.3172	0.4238	1803	42	2734	2.1	123285	96.2	95
89	7.4963	0.4233	1821	42	2194	1.7	125479	97.9	97
90	7.6764	0.4260	1839	43	170	0.1	125649	98.0	98
91	7.8602	0.4321	1857	43	1	0.0	125650	98.0	98
92	8.0510	0.4422	1877	44	1	0.0	125651	98.0	98
93	8.2528	0.4571	1897	46	9	0.0	125660	98.0	98
94	8.4710	0.4783	1919	48	13	0.0	125673	98.0	98
95	8.7137	0.5086	1943	51	42	0.0	125715	98.1	98
96	8.9939	0.5527	1971	55	100	0.1	125815	98.1	98
97	9.3356	0.6213	2005	62	227	0.2	126042	98.3	98
98	9.7925	0.7417	2051	74	509	0.4	126551	98.7	99
99	10.5347	1.0236	2125	102	781	0.6	127332	99.3	99
100	11.7716	1.8383	2249	184	869	0.7	128201	100.0	99

Appendix N: Raw-to-Scaled Score Conversion Tables

Writing Grade 8

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
22	-7.0865	1.8381	700	184	39	0.0	39	0.0	1
23	-5.8503	1.0231	700	102	161	0.1	200	0.2	1
24	-5.1095	0.7406	700	74	302	0.2	502	0.4	1
25	-4.6546	0.6196	700	62	438	0.3	940	0.7	1
26	-4.3153	0.5502	700	55	399	0.3	1339	1.0	1
27	-4.0383	0.5050	720	51	299	0.2	1638	1.2	1
28	-3.7997	0.4736	744	47	192	0.1	1830	1.4	1
29	-3.5865	0.4508	765	45	112	0.1	1942	1.5	1
30	-3.3911	0.4340	785	43	78	0.1	2020	1.5	2
31	-3.2084	0.4216	803	42	48	0.0	2068	1.6	2
32	-3.0347	0.4125	820	41	26	0.0	2094	1.6	2
33	-2.8673	0.4061	837	41	58	0.0	2152	1.6	2
34	-2.7043	0.4018	853	40	207	0.2	2359	1.8	2
35	-2.5439	0.3994	869	40	467	0.4	2826	2.1	2
36	-2.3848	0.3985	885	40	655	0.5	3481	2.6	2
37	-2.2259	0.3989	901	40	764	0.6	4245	3.2	3
38	-2.0663	0.4002	917	40	749	0.6	4994	3.8	4
39	-1.9054	0.4022	933	40	667	0.5	5661	4.3	4
40	-1.7427	0.4045	950	40	498	0.4	6159	4.7	4
41	-1.5781	0.4068	966	41	407	0.3	6566	5.0	5
42	-1.4118	0.4086	983	41	290	0.2	6856	5.2	5
43	-1.2444	0.4096	999	41	181	0.1	7037	5.3	5
44	-1.0766	0.4093	1016	41	187	0.1	7224	5.5	5
45	-0.9096	0.4077	1033	41	390	0.3	7614	5.8	6
46	-0.7445	0.4048	1049	40	829	0.6	8443	6.4	6
47	-0.5823	0.4006	1066	40	1487	1.1	9930	7.5	7
48	-0.4239	0.3954	1081	40	1997	1.5	11927	9.1	8
49	-0.2697	0.3897	1097	39	2599	2.0	14526	11.0	10
50	-0.1201	0.3837	1112	38	3086	2.3	17612	13.4	12
51	0.0249	0.3777	1126	38	3204	2.4	20816	15.8	15
52	0.1653	0.3720	1140	37	3139	2.4	23955	18.2	17
53	0.3017	0.3666	1154	37	2624	2.0	26579	20.2	19
54	0.4344	0.3618	1167	36	2021	1.5	28600	21.7	21
55	0.5637	0.3576	1180	36	1264	1.0	29864	22.7	22
56	0.6903	0.3540	1193	35	589	0.4	30453	23.1	23
57	0.8145	0.3512	1205	35	426	0.3	30879	23.4	23
58	0.9371	0.3490	1218	35	693	0.5	31572	24.0	24
59	1.0584	0.3476	1230	35	1186	0.9	32758	24.9	24
60	1.1789	0.3470	1242	35	1848	1.4	34606	26.3	26
61	1.2993	0.3472	1254	35	2715	2.1	37321	28.3	27
62	1.4201	0.3482	1266	35	3544	2.7	40865	31.0	30
63	1.5421	0.3502	1278	35	4252	3.2	45117	34.2	33
64	1.6656	0.3531	1290	35	4502	3.4	49619	37.7	36
65	1.7916	0.3571	1303	36	4226	3.2	53845	40.9	39
66	1.9209	0.3623	1316	36	3178	2.4	57023	43.3	42
67	2.0545	0.3689	1329	37	1519	1.2	58542	44.4	44
68	2.1935	0.3770	1343	38	415	0.3	58957	44.7	45
69	2.3393	0.3870	1358	39	306	0.2	59263	45.0	45
70	2.4937	0.3991	1373	40	762	0.6	60025	45.5	45
71	2.6588	0.4139	1390	41	1426	1.1	61451	46.6	46

Appendix N: Raw-to-Scaled Score Conversion Tables

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
72	2.8373	0.4316	1408	43	2554	1.9	64005	48.6	48
73	3.0327	0.4530	1427	45	4387	3.3	68392	51.9	50
74	3.2493	0.4784	1449	48	6737	5.1	75129	57.0	54
75	3.4920	0.5073	1473	51	9337	7.1	84466	64.1	61
76	3.7650	0.5374	1500	54	10971	8.3	95437	72.4	68
77	4.0686	0.5629	1531	56	10277	7.8	105714	80.2	76
78	4.3939	0.5747	1563	57	5662	4.3	111376	84.5	82
79	4.7218	0.5676	1596	57	555	0.4	111931	84.9	85
80	5.0328	0.5461	1627	55	44	0.0	111975	85.0	85
81	5.3169	0.5195	1656	52	41	0.0	112016	85.0	85
82	5.5735	0.4940	1681	49	115	0.1	112131	85.1	85
83	5.8066	0.4722	1705	47	233	0.2	112364	85.3	85
84	6.0210	0.4547	1726	45	572	0.4	112936	85.7	85
85	6.2214	0.4412	1746	44	1096	0.8	114032	86.5	86
86	6.4115	0.4314	1765	43	2014	1.5	116046	88.1	87
87	6.5946	0.4250	1783	43	3385	2.6	119431	90.6	89
88	6.7737	0.4218	1801	42	4197	3.2	123628	93.8	92
89	6.9512	0.4215	1819	42	3060	2.3	126688	96.1	95
90	7.1299	0.4244	1837	42	267	0.2	126955	96.3	96
91	7.3125	0.4307	1855	43	1	0.0	126956	96.3	96
92	7.5021	0.4409	1874	44	2	0.0	126958	96.3	96
93	7.7029	0.4560	1894	46	11	0.0	126969	96.3	96
94	7.9201	0.4773	1916	48	36	0.0	127005	96.4	96
95	8.1618	0.5077	1940	51	72	0.1	127077	96.4	96
96	8.4411	0.5520	1968	55	187	0.1	127264	96.6	97
97	8.7820	0.6206	2002	62	448	0.3	127712	96.9	97
98	9.2380	0.7412	2048	74	1008	0.8	128720	97.7	97
99	9.9794	1.0233	2122	102	1654	1.3	130374	98.9	98
100	11.2158	1.8382	2245	184	1406	1.1	131780	100.0	99

Appendix N: Raw-to-Scaled Score Conversion Tables

Writing Grade 11

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
22	-7.2177	1.8370	700	184	37	0.0	37	0.0	1
23	-5.9847	1.0207	700	102	113	0.1	150	0.1	1
24	-5.2490	0.7371	719	74	270	0.2	420	0.3	1
25	-4.7995	0.6149	764	61	386	0.3	806	0.6	1
26	-4.4664	0.5443	798	54	413	0.3	1219	0.9	1
27	-4.1961	0.4979	825	50	413	0.3	1632	1.3	1
28	-3.9650	0.4651	848	47	302	0.2	1934	1.5	1
29	-3.7604	0.4408	868	44	254	0.2	2188	1.7	2
30	-3.5744	0.4223	887	42	210	0.2	2398	1.8	2
31	-3.4023	0.4080	904	41	124	0.1	2522	1.9	2
32	-3.2405	0.3968	920	40	120	0.1	2642	2.0	2
33	-3.0866	0.3880	936	39	102	0.1	2744	2.1	2
34	-2.9388	0.3812	950	38	141	0.1	2885	2.2	2
35	-2.7956	0.3758	965	38	256	0.2	3141	2.4	2
36	-2.6560	0.3717	979	37	449	0.3	3590	2.8	3
37	-2.5191	0.3686	992	37	565	0.4	4155	3.2	3
38	-2.3842	0.3662	1006	37	674	0.5	4829	3.7	3
39	-2.2507	0.3644	1019	36	676	0.5	5505	4.2	4
40	-2.1184	0.3631	1032	36	654	0.5	6159	4.7	4
41	-1.9870	0.3621	1046	36	587	0.5	6746	5.2	5
42	-1.8561	0.3612	1059	36	505	0.4	7251	5.6	5
43	-1.7260	0.3603	1072	36	377	0.3	7628	5.9	6
44	-1.5966	0.3593	1085	36	326	0.3	7954	6.1	6
45	-1.4679	0.3582	1098	36	266	0.2	8220	6.3	6
46	-1.3400	0.3568	1110	36	429	0.3	8649	6.6	6
47	-1.2133	0.3552	1123	36	702	0.5	9351	7.2	7
48	-1.0877	0.3535	1136	35	1027	0.8	10378	8.0	8
49	-0.9635	0.3515	1148	35	1442	1.1	11820	9.1	9
50	-0.8406	0.3495	1160	35	1869	1.4	13689	10.5	10
51	-0.7192	0.3474	1172	35	2166	1.7	15855	12.2	11
52	-0.5992	0.3454	1184	35	2388	1.8	18243	14.0	13
53	-0.4805	0.3436	1196	34	2461	1.9	20704	15.9	15
54	-0.3631	0.3419	1208	34	2112	1.6	22816	17.5	17
55	-0.2466	0.3406	1220	34	1525	1.2	24341	18.7	18
56	-0.1310	0.3396	1231	34	857	0.7	25198	19.3	19
57	-0.0159	0.3391	1243	34	402	0.3	25600	19.6	19
58	0.0990	0.3390	1254	34	484	0.4	26084	20.0	20
59	0.2141	0.3395	1266	34	737	0.6	26821	20.6	20
60	0.3297	0.3405	1277	34	1211	0.9	28032	21.5	21
61	0.4462	0.3423	1289	34	1841	1.4	29873	22.9	22
62	0.5642	0.3448	1301	34	2538	1.9	32411	24.9	24
63	0.6842	0.3482	1313	35	3330	2.6	35741	27.4	26
64	0.8068	0.3525	1325	35	3973	3.0	39714	30.5	29
65	0.9330	0.3579	1338	36	4390	3.4	44104	33.8	32
66	1.0634	0.3646	1351	36	3890	3.0	47994	36.8	35
67	1.1993	0.3728	1364	37	2318	1.8	50312	38.6	38
68	1.3420	0.3828	1379	38	628	0.5	50940	39.1	39
69	1.4931	0.3950	1394	40	277	0.2	51217	39.3	39
70	1.6549	0.4099	1410	41	566	0.4	51783	39.7	40
71	1.8302	0.4282	1427	43	1110	0.9	52893	40.6	40

Appendix N: Raw-to-Scaled Score Conversion Tables

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
72	2.0232	0.4511	1447	45	2170	1.7	55063	42.2	41
73	2.2394	0.4798	1468	48	3770	2.9	58833	45.1	44
74	2.4870	0.5166	1493	52	6144	4.7	64977	49.8	47
75	2.7779	0.5638	1522	56	9399	7.2	74376	57.1	53
76	3.1291	0.6225	1557	62	12963	9.9	87339	67.0	62
77	3.5571	0.6840	1600	68	15076	11.6	102415	78.6	73
78	4.0522	0.7141	1650	71	10341	7.9	112756	86.5	83
79	4.5474	0.6842	1699	68	618	0.5	113374	87.0	87
80	4.9767	0.6247	1742	62	33	0.0	113407	87.0	87
81	5.3322	0.5692	1778	57	26	0.0	113433	87.0	87
82	5.6311	0.5259	1807	53	62	0.0	113495	87.1	87
83	5.8901	0.4935	1833	49	158	0.1	113653	87.2	87
84	6.1214	0.4696	1856	47	333	0.3	113986	87.4	87
85	6.3334	0.4521	1878	45	608	0.5	114594	87.9	88
86	6.5319	0.4397	1897	44	1350	1.0	115944	88.9	88
87	6.7214	0.4315	1916	43	2503	1.9	118447	90.9	90
88	6.9054	0.4270	1935	43	4025	3.1	122472	94.0	92
89	7.0870	0.4259	1953	43	3589	2.8	126061	96.7	95
90	7.2691	0.4281	1971	43	194	0.1	126255	96.9	97
91	7.4546	0.4339	1990	43	0	0.0	126255	96.9	97
92	7.6468	0.4437	2009	44	3	0.0	126258	96.9	97
93	7.8498	0.4584	2029	46	7	0.0	126265	96.9	97
94	8.0692	0.4795	2051	48	24	0.0	126289	96.9	97
95	8.3129	0.5095	2076	51	44	0.0	126333	96.9	97
96	8.5940	0.5535	2104	55	117	0.1	126450	97.0	97
97	8.9367	0.6220	2138	62	280	0.2	126730	97.2	97
98	9.3943	0.7423	2184	74	710	0.5	127440	97.8	97
99	10.1373	1.0240	2258	102	1422	1.1	128862	98.9	98
100	11.3748	1.8386	2382	184	1490	1.1	130352	100.0	99