

TECHNICAL REPORT



**for the
2011 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

Term	Common Definition
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.)

Table G–1 (continued). Glossary of Terms

Term	Common Definition
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).

Table G–1 (continued). Glossary of Terms

Term	Common Definition
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.

Table G–1 (continued). Glossary of Terms

Term	Common Definition
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.
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.

Table G–1 (continued). Glossary of Terms

Term	Common Definition
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.
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.

Table G–1 (continued). Glossary of Terms

Term	Common Definition
<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).
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.

Table G–1 (continued). Glossary of Terms

Term	Common Definition
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.
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, 2010, and 2011 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. On the left, select “Programs,” “Programs O–R,” “Pennsylvania System of School Assessment (PSSA),” and then “PSSA Technical Analysis” from the “Most Requested Content...” box.

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**

Grade	Assessment Activity	Date
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 2003

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 3–8, 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 assessments were reevaluated, and it was decided to move the writing assessments 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**

Grade	Assessment Activity	Date
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 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 2005–06 school year, while the Grade 11 writing assessment continued in the same February testing 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**

Grade	Assessment Activity	Date
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 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 complete. 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 testing 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 mathematics, reading, and writing, 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**

Grade	Assessment Activity	Date
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 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 testing window featuring the mode-specific scoring guidelines, stimulus-based multiple-choice items, and a grade-specific emphasis in writing modes assessed, which had been 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 mathematics, reading, and writing 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**

Grade	Assessment Activity	Date
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 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 testing 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**

Grade	Assessment Activity	Date
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, science, 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 testing window from April through the first week of May.

The mathematics and reading assessments continued to be operational for Grades 3–8 and 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 included multiple-choice and open-ended questions. Students responded to standalone multiple-choice and open-ended questions (all grades) as well as scenario-based multiple-choice (Grades 8 and 11) and open-ended (Grade 11 only) questions. 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**

Grade	Assessment Activity	Date
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 OCCURRING IN THE 2010–11 SCHOOL YEAR

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

The mathematics and reading assessments continued to be operational for Grades 3–8 and 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 2011 assessment along with a set of embedded field test multiple-choice items.

The operational assessment for science at Grades 4, 8, and 11 included multiple-choice and open-ended questions. Students responded to standalone multiple-choice and open-ended questions (all grades) as well as scenario-based multiple-choice (Grades 8 and 11) and open-ended (Grade 11 only) questions. Field testing was 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**

Grade	Assessment Activity	Date
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

ASSESSMENT ACTIVITIES PLANNED FOR THE 2011–12 SCHOOL YEAR

Table P–9 shows the assessment plan for the 2011–12 school year. The testing window for mathematics and reading will begin in mid-March, while writing and science will begin mid to late April. The make-up period for mathematics and reading extends into late March, while writing and science extend into early May.

The mathematics and reading assessments will continue to be operational for Grades 3–8 and 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 2012 assessment along with a set of embedded field test multiple-choice items.

The operational assessment for science at Grades 4, 8, and 11 will include multiple-choice and open-ended questions. Students will respond to standalone multiple-choice and open-ended questions (all grades) as well as scenario-based multiple-choice (Grades 8 and 11) and open-ended (Grade 11 only) questions. Field testing will be embedded as part of the operational assessments at each grade level.

**Table P–9. Operational Assessment and Field Testing
During the 2011–12 School Year (Planned)**

Grade	Assessment Activity	Date
3	Operational mathematics and reading with embedded field test	March 2012
4	Operational mathematics and reading with embedded field test	March 2012
	Operational science with embedded field test	April 2012
5	Operational mathematics and reading with embedded field test	March 2012
	Operational writing with embedded field test	April 2012
6	Operational mathematics and reading with embedded field test	March 2012
7	Operational mathematics and reading with embedded field test	March 2012
8	Operational mathematics and reading with embedded field test	March 2012
	Operational writing with embedded field test	April 2012
	Operational science with embedded field test	April 2012
11	Operational mathematics and reading with embedded field test	March 2012
	Operational writing with embedded field test	April 2012
	Operational science with embedded field test	April 2012
12	Retest opportunity for students who as Grade 11 students in the spring of 2011 failed to reach at least the Proficient level in mathematics, reading, science, or writing	October/ November 2011

Chapter One: Background of the Pennsylvania System of School Assessment

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 1987–88 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 testing 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*, detail 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 Education 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 No Child Left Behind Act of 2001 (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, 2010, and 2011 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 2011 mathematics and reading tests may be found in Chapter Two and in the following Pennsylvania Department of Education publications available on the PDE website: *2010–2011 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 at www.education.state.pa.us. On the left, select “Programs,” “Programs O–R,” “Pennsylvania System of School Assessment (PSSA),” and then “Resource Materials.”

Core Recycling for Mathematics and Reading

In 2009, PDE made a temporary change to the PSSA test plan for reading and mathematics in order to create required cost savings due to state-level budget concerns. A recycling plan was proposed and accepted that significantly decreased the volume of new item development over a two-year period in 2011 and 2012, and required that a portion of the core from the 2012 administration would be composed of items recycled from prior core administrations. Under this plan, the reduced number of new items in 2011 and 2012 resulted in a reduced number of field test forms in 2011 and 2012 from 9 down to 5. These changes impacted the test design for 2011.

The mathematics core for 2011 was built with the standard core-to-core links from the 2010 core and a special core-to-core link recycled from 2009. The remainder of the core was built from items appearing in the embedded field test positions from the 2010 embedded field test or from the existing item bank.

The reading core for 2011 was built with the standard core-to-core links from the 2010 core. The remainder of the core was built from items appearing in the embedded field test positions from the 2010 embedded field test or from the existing item bank.

The 2011 PSSA has five field test forms per grade, each with a normal core, normal core-to-core link, and normal equating block (per form). Equating block positions for math were reduced due to fewer forms; however due to the reduction in equating block items for math, core items from 2009 were added as a special set of core-to-core linking so that the total linking points remained unchanged.

More information regarding the 2011 operational layout and core recycling for mathematics and reading can be found in Chapter Three.

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 testing 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 standalone 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 standalone 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: *2010–2011 PSSA Assessment Handbook* and *2009–2010 PSSA Science Item and Scoring Sampler Supplement* (one per assessed grade level). These handbooks can be accessed at www.education.state.pa.us. On the left, select “Programs,” “Programs O–R,” “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 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 assessments 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 assessments.

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 testing window as in 2006.

Although the 2009, 2010, and 2011 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 testing 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: *2010–2011 PSSA Assessment Handbook* and *2009–2010 PSSA Writing Item and Scoring Sampler Supplement* (one per assessed grade level). These handbooks can be accessed at www.education.state.pa.us. On the left, select “Programs,” “Programs O–R,” “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 was 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. On the left, select "Programs," "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 2011 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 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 recall information from memory.

OPEN-ENDED TASKS FOR MATHEMATICS

Open-ended 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 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 at www.education.state.pa.us. On the left, select “Programs,” “Programs O–R,” Pennsylvania System of School Assessment (PSSA),” and then “Resource Materials.”

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 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 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 at www.education.state.pa.us. On the left, select “Programs,” “Programs O–R,” “Pennsylvania System of School Assessment (PSSA),” and then “Resource Materials.”

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 2011 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 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, standalone 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. Standalone 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 Sciences.

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 skills 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 Sciences. 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 at www.education.state.pa.us. On the left, select “Programs,” Programs O–R,” “Pennsylvania System of School Assessment (PSSA),” and then “Resource Materials.”

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 2011 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 only one 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 standalone field test in 2005 and in embedded field test positions in 2009, 2010, and 2011, 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 with 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	Standalone FT	Standalone 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
2011	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 2011, students in Grade 5 responded to two preselected 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 2011, 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 2011, 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 2011, 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 at www.education.state.pa.us. On the left, select “Programs,” “Programs O–R,” “Pennsylvania System of School Assessment (PSSA),” and then “Resource Materials.”

Table 2–2. Writing Prompt Operational Mode Summary

Administration	Operational Modes		
	Grade 5	Grade 8	Grade 11
2006	Narrative, Informational	Informational, Persuasive	Informational, Persuasive
2007	Informational, Persuasive	Informational, Persuasive	Informational, Persuasive
2008	Narrative, Persuasive	Informational, Persuasive	Informational, Persuasive
2009	Informational, Persuasive	Informational, Persuasive	Informational, Persuasive
2010	Narrative, Informational	Informational, Persuasive	Informational, Persuasive
2011	Narrative, Informational	Informational, Persuasive	Informational, Persuasive

Chapter Three: Item Development Process

The core portion of the 2011 PSSA operational administration is made up of items that were field tested primarily in the 2010 PSSA administration. Therefore the activities that led to the 2011 PSSA operational administration began with the development of the test items that appeared in the field test portion of the 2010 operational administration. In turn, items that appeared on the field test portion of the 2010 operational administration were developed during 2009 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 Admin Year	Events Occurring in Calendar Year					
	2007	2008	2009	2010	2011	2012
2008	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	
2011			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 2010 Field Test and 2011 Operational Assessment of Mathematics and Reading at Grades 3, 4, 5, 6, 7, 8, and 11

Time Frame	Assessment	Activity
Prior to 2009	2010 FT for 2011 OP	Item development for 2010 embedded field test
September 2009– January 2010	2010 OP & 2010 FT for 2011 OP	Forms construction for 2010 embedded field test
January– July 2010	2011 FT for 2012 OP	Item development for items to embed on 2010 operational assessment
March– May 2010	2010 FT for 2011 OP	2010 embedded field test in 2010 operational test
July 2010	2011 FT for 2012 OP	Item review for the embedded field test in 2011 operational assessment
August 2010	2010 FT for 2011 OP	Statistical review of 2010 field tested items
September 2010– April 2011	2011 OP & 2011 FT for 2012 OP	Forms construction for 2011 operational assessment
March– May 2011	2011 OP & 2011 FT for 2012 OP	2011 operational assessment

Note. FT = Field Test
OP = Operational

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 2011 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 2010; item review with data; and final selection of items to compose the 2011 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 2010 field test were developed by Data Recognition Corporation (DRC) and WestEd.

Test Content Blueprint for 2011 Mathematics and Reading Assessment

The 2011 PSSA is based on the Pennsylvania Academic Standards. The 2011 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 3–8 and 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 2011 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 2011.

Operational Layout and Core Recycling for 2011 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 4–8 and 11, the mathematics and reading assessments are combined in one test booklet and one separate answer booklet. The test booklet contains reading passages and mathematics and reading 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 2011 PSSA has five field test forms per grade with a normal core, normal core-to-core link, and normal equating block (per form). Equating block values for math have been reduced due to fewer forms; however due to the reduction in equating block items for math, core items from 2009 have been added as a special set of core-to-core linking so that the total linking points remains unchanged. 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 three tables display the design for reading and mathematics for forms 1 through 5. The column entries for these tables denote the following:

- Grade level
- Number of unique common, or core, MC items
- Number of core-to-core linking MC items
- Number of equating block MC items
- Number of embedded MC field test items
- Number of unique common, or core, OE items
- Number of core-to-core linking OE items

- Number of equating block OE items
- Number of embedded OE field test items
- Total number of MC and OE items in the form
- 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

Table 3–3. Mathematics Test Plan 2011 per 5 Operational Forms

Grade	Total Core MC per 5 Forms	Total Equating Block MC per 5 Forms*	Total Embedded Field Test MC per 5 Forms	Total MC (Core, EB, & Field Test) positions per 5 Forms	Total Core 4 point OE per 5 Forms	Total Equating Block OE per 5 Forms*	Total Embedded Field Test OE per 5 Forms	Total OE (Core, EB, & Field Test) per 5 Forms	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	60	10	50	120	3	0	5	8	72/4	72

* Some of the equating block items may not be unique.

Table 3–4. Mathematics Operational Recycled Core Test Plan 2011

Grade	Unique Core MC per Form	Recycled Core-to-Core Link MC from 2009	Core-to-Core Equating (from 2010) MC per Form	Unique Core 4 point OE per Form	Core-to-Core (from 2010) Equating OE per Form	Recycled Core-to-Core OE from 2009	Total Number of Core Items (MC/OE)	Total Core Points per Test
3, 4, 5, 6, 7, 8, and 11	36	8	16	1	2	0	60/3	72

The mathematics core for 2011 was built with the standard core-to-core links from the 2010 core and a special core-to-core link recycled from 2009. The remainder of the core was built from items appearing in the embedded field test positions from the 2010 embedded field test, or from the existing item bank. Specifically, eight MC items from the 2009 core were moved to the 2011 core. Sixteen MC items and two OE items were moved from the previous core to the current year core to serve as linking items. All core linking items appeared in the same relative position as they appeared in the most recent administration. Approximately ten MC items from 2010 (field test) were pulled forward into 2011 to form an Equating Block (EB). Two EB MC items appeared on each form. Some of the equating block items may not be unique. EB items did not contribute to student or school/district scores as the goal for the equating block is to increase the total available equating points.

Table 3–5. Reading Test Plan 2011 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	22–29 (3 passages)	11–18 (2 passages)	8* (1 passage)	10* (1 passage)	1	1	0	1	58/3	7	46
4, 5, and 11	22–29 (3 passages)	11–18 (2 passages)	8* (1 passage)	10* (1 passage)	2	2	0	1	58/5	7	52
6, 7, and 8	22–29 (4 passages)	11–18 (2 passages)	8* (1 passage)	10* (1 passage)	2	2	0	1	58/5	8	52

* Average

The reading core for 2011 was built with the standard core-to-core links from the 2010 core. The remainder of the core was built from items appearing in the embedded field test positions from the 2010 embedded field test or from the existing item bank. The core-to-core link consists of two reading passages with eleven to eighteen MC items and two OE items (one OE item at grade 3) moved from the previous core to the current year core to serve as linking items. Approximately sixteen MC items from the 2010 (field test) were pulled forward into 2011 to form an Equating Block (EB). One passage equal to approximately eight equating block MC items appeared on each form. Up to two equating block passages were alternated across the five forms. EB items did not contribute to student or school/district scores as the goal for the equating block is to increase the total available equating points.

Table 3–6. 2011 Mathematics and Reading Core Points

Content Area	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 Fifteen.

Linking for 2011 Mathematics and Reading Assessment

Linking provides a statistical bridge between assessment administrations. The 2011 administration is linked back to the 2010 administration through the use of linking items in the core (core-to-core linking items) and the equating block (equating items).

MULTIPLE-CHOICE ITEMS

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 11 to 18 core-to-core linking MC items and 16 equating block MC items per grade.

OPEN-ENDED ITEMS

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 3–7. 2011 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	8	16*	2 (4 pt)	0	32*
Reading	3	11–18	8*	1 (3 pt)	0	29*
	4, 5, 6, 7, 8, and 11	11–18	8*	2 (3 pt)	0	32*

*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 2011 Mathematics and Reading Assessment

The testing window for the 2011 operational assessment, including make-ups, extended from March 14 through April 15, 2011. 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 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 3–8. Reading and Mathematics—2011 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
1 Mathematics	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
2 Reading	80 to 105	15 to 20	55 to 85	19-24 MC 1 OE	19-24 MC 2 OE	19-24 MC 2 OE	19-24 MC 2 OE	19-24 MC 2 OE	19-24 MC 2 OE	19-24 MC 2 OE
3 Mathematics	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
4 Reading	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
5 Mathematics	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
6 Reading	60 to 100	15 to 20	45 to 80	16-21 MC 1 OE	16-21 MC 2 OE	16-21 MC 2 OE	16-21 MC 2 OE	16-21 MC 2 OE	16-21 MC 2 OE	16-21 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 2011 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 3–9. 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 3–10. 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 2011 Mathematics and Reading Assessment

For mathematics, there are 16 Assessment Anchor Content Standards (Assessment Anchors) that occur at all grade levels (Grades 3–8 and 11), although they are not all assessed at each grade level. More specifically, the number targeted for assessment by grade level is 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 in 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). The item pilots were also conducted to determine 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 “2006 Science Item Pilot” 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 3–11. Science Development Implementation Timeline

Year	Event
2003	STEE test put on hold
2004– 2005	New assessment plan developed by PDE
2006	Item Pilot (Cognitive Labs) to try out scenario-based science items
2007	Initial Standalone Field Test for Grades 4, 8, and 11
2008	Initial Operational Administration with core, matrix, and embedded field test positions
2009	Second Operational Administration with core, equating block, and embedded field test positions
2010– 2011	Continuation of Operational Administration with core, equating block, and embedded field test positions

Test Content Blueprint for the 2011 Operational Science Test

The PSSA is based on the Pennsylvania Academic Standards as defined by the Eligible Content. The PSSA science assessment for 2011 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.

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

Operational Layout for 2011 Science

The fourth operational administration of the PSSA science test took place in 2011. 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 PSSA science 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 (MC) items and at Grade 8 contains stimulus scenario text. The answer booklet contains scannable pages for 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 2011 PSSA science assessment is composed of 12 forms per grade. At Grade 11, the 2011 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 2011 operational test design for science.

Table 3–12. 2011 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 3–13. 2011 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 Fifteen.

Linking for 2011 Science Assessment

Linking provides a statistical bridge between assessment administrations. The 2011 administration is linked back to the 2010 administration through the use of linking items in the core (core-to-core linking items) and the equating block (equating items).

MULTIPLE-CHOICE ITEMS

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 ITEMS

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 3–14. 2011 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 2011 Science Assessment

The testing window for the 2011 operational assessment extended from April 4 through April 15, 2011, 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 3–15. Science – 2011 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 Sciences
- C. Physical Sciences
- D. Earth and Space Sciences

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

Table 3–16. Science Reporting Categories

Grade	Reporting Categories			
	A: Nature of Science	B: Biological Sciences	C: Physical Sciences	D: Earth & Space Sciences
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 2011 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 3–17.

Table 3–17. Participating Districts by Region

Region of Commonwealth	School District
Western	Athens Area Grove City Area Penn Hills Pittsburgh Public Schools
Central	Manheim Township Newport State College Area West Shore Wilkes-Barre Area
Eastern	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 Sciences, Physical Sciences, and Earth and Space Sciences). 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 2011 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 2011 followed this content blueprint and testing plan in order to reflect the Academic Standards.

Operational Layout for 2011 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 (PDE). 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 2011, see Chapter Five.

Forms

The 2011 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 3–18. 2011 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 (MC/OE)
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 3–19.

Table 3–19. 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 2011 Writing Assessment

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

Test Sessions and Timing

The testing window for the 2011 operational assessment was from March 28 through April 15, 2011, 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 3–20 outlines the assessment schedule and estimated times for each section.

Table 3–20. 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 2011 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 3–21. See also Appendix C for a summary by grade and subject.

Table 3–21. Core Points Distribution

Reporting Category	Composition	Revising and Editing	Total
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 Fifteen.

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* was 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 include 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 stereotype, gender, region/geography, ethnic group/culture, socioeconomic status/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 is clean and well organized.

A more extensive description of the application of the Principles of Universal Design is provided 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 judgment 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 later in this chapter. 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*.

In addition, every test question is brought before several different committees comprised of grade-level experts in the fields 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 raise issues of fairness or sensitivity.

TEST DEVELOPMENT PROCESS: ALL ASSESSMENTS

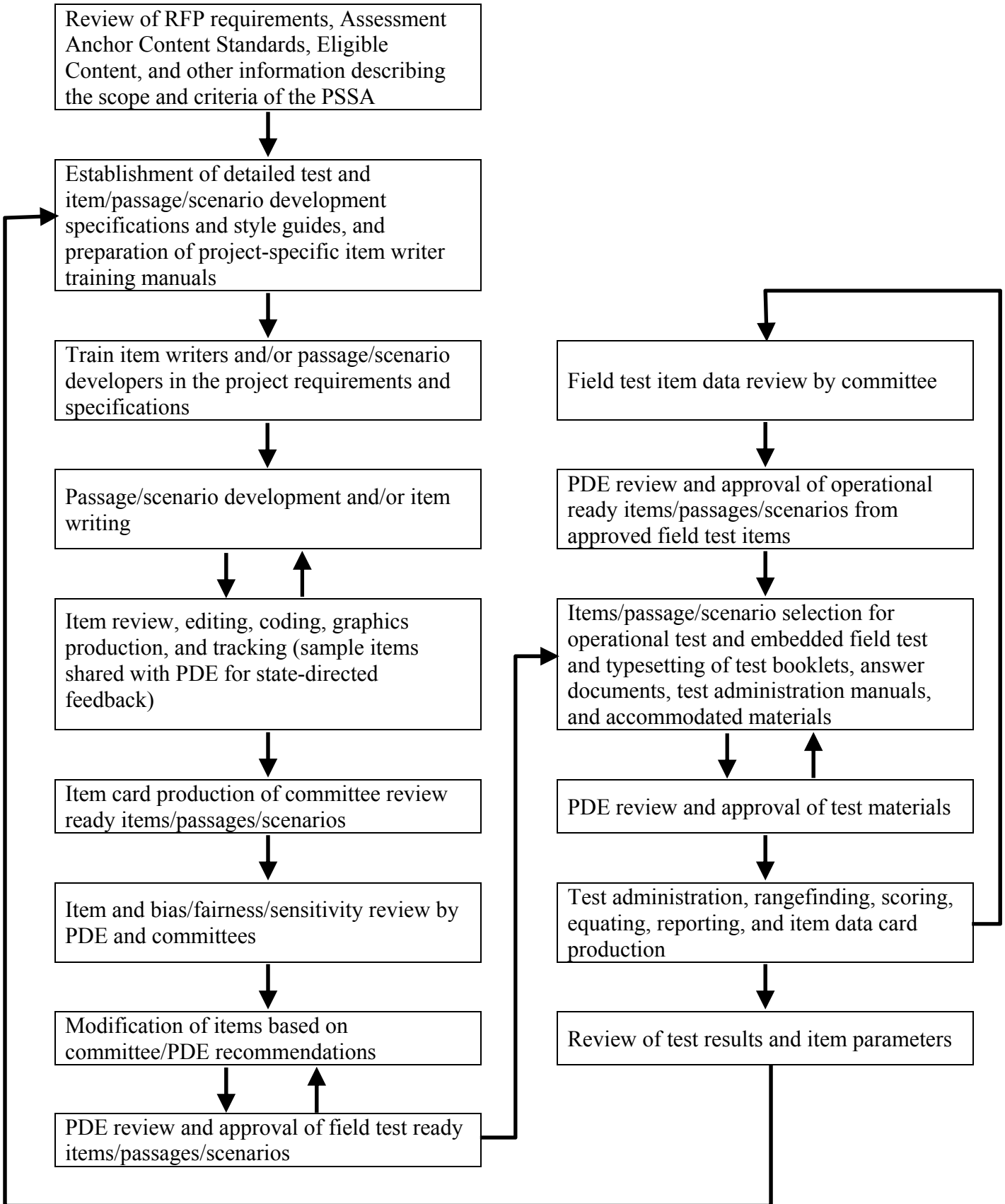
The item development process for items followed a logical timeline, which is outlined below in Figure 3–1. On the front end of the schedule, tasks were generally completed with the goal of presenting field test candidate items to committees of Pennsylvania educators. On the back-end of the schedule, all tasks led to the field test data review.

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
New Item Content Review	Summer/Fall	⇒	+/- 0 months
Post-review resolution and clean-up	Summer/Fall	↓	+1 to +2 months
Test Forms building	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
Field Test Item Data Review	Summer	⇒	+12 months
Operational items selection	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 2010 field test items used as operational items in the 2011 administration.

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 2011 operational administration, the initial planning meeting for the item authoring process for the 2010 field test occurred in fall 2008. Item authoring began early in 2009, with the item review meetings occurring in July 2009. 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 (i.e., 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 were needed were sought. Most passages acquired for the 2010 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, passages deemed potentially acceptable were reviewed by the Reading Content Committee and the 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 allow 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. 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 2010 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 included, but were 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). 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 Summer 2009: All Assessments

Prior to the 2010 field testing, all newly-developed test items were submitted to content committees for review. 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 July 22–24, 2009. 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 July 2009: All Assessments

Prior to 2010 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 from July 14–17, 2009 for mathematics, reading, and science, and July 28–29 for writing. 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 lead 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, ethnic group/culture, gender, region, religion, socioeconomic status, or stereotype. These categories were then the framework through which recommendations for modification or rejection of items occurred during the subsequent committee consensus process. The committee 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 3–22 shows the gender and race/ethnicity composition for the members of the bias committee who reviewed the PSSA items and passages for bias, fairness, and sensitivity.

Table 3–22. Demographic Composition of the 2009 Bias, Fairness, and Sensitivity Committee

Member #	Gender	Race/Ethnicity
1.	Male	Caucasian American
2.	Female	Hispanic American
3.	Female	African American
4.	Female	Asian American
5.	Male	Caucasian American
6.	Female	Caucasian American
7.	Female	Hispanic American
8.	Female	African American
9.	Male	African American
Totals	6 Females 3 Males	3 African Americans 3 Caucasian Americans 2 Hispanic Americans 1 Asian American

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

**Table 3–23. Number of Items—2009
Bias, Fairness, and Sensitivity Committee Review for Mathematics**

Grade	Mathematics Items			
	Total items reviewed per grade	Accepted As Is	Accepted With Revision	Rejected
3	112	105	6	1
4	112	105	6	1
5	112	110	2	0
6	112	107	5	0
7	112	99	13	0
8	112	110	2	0
11	112	110	2	0
Total	784	746	36	2

The results from the Bias, Fairness, and Sensitivity Committee review of reading are summarized in Table 3–24.

**Table 3–24. Number of Items—2009
Bias, Fairness, and Sensitivity Committee Review for Reading**

Grade	Reading Passages and Items			
	Total passages or items reviewed per grade	Accepted As Is	Accepted With Revision	Rejected
3	135	134	1	0
4	164	164	0	0
5	162	148	0	14
6	163	149	0	14
7	130	125	4	1
8	147	130	3	14
11	126	117	6	3
Total	1027	967	14	46

The results from the Bias, Fairness, and Sensitivity Committee review of science are summarized in Table 3–25.

**Table 3–25. Number of Items—2009
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	137	132	5	0
8	194	190	4	0
11	207	206	1	0
Total	538	528	10	0

The results from the Bias, Fairness, and Sensitivity Committee review of writing are summarized in Table 3–26.

**Table 3–26. Number of Items—2009
Bias, Fairness, and Sensitivity Committee Review for Writing**

Grade	Writing Items, Passages, and Prompts			
	Total items, passages, or prompts reviewed per grade	Accepted As Is	Accepted With Revision	Rejected
5	92	90	2	0
8	80	80	0	0
11	86	86	0	0
Total	258	256	2	0

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 apply not only to these groups of students but also 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 was 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 “Assessment Accommodations” later in this chapter.)

- **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 they attended to each aspect. For more information on the checklist, see the Universal Design section in Chapter Three.

- 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 were avoided may not be necessary (e.g., sidebars, overlays, callout boxes, visual crowding, shading) and that could be potentially distracting to students. 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 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 are 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. Accommodations manuals for the PSSA titled *PSSA*, *PSSA-M*, and *Keystone (paper/pencil) Accommodations Guidelines for Students with IEPs and Students with 504 Plans*, *Accommodations Guidelines for Students without IEPs and 504 Plans*, and *Accommodations Guidelines for English Language Learners* were developed for use with the 2011 PSSA.

The manuals can be accessed at www.education.state.pa.us. On the left, select “Programs,” “Programs O–R,” “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 2011 Core

Generally, all non-linking core items appearing on the 2011 assessment came from the 2010 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 2010 PSSA were selected for use as common or equating block items (equating items) in the 2011 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 multiple-choice (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 open-ended (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

As stated in the preceding section, “Statistical Analysis of Item Data,” test development content-area specialists used statistics from item and DIF analyses of the 2010 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 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. 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 11–12, 2010. The review for science took place on August 10, 2010. The review for writing took place on August 13, 2010. 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. 2010 Data Review Committee Results

Assessment	Grade	No. of Items in 2010 Field Test	Flagged Items in 2010 Field Test Examined at 2010 Data Review Committee					Flagged Items in 2010 Field Test Rejected by 2010 Data Review Committee		Items Classified as “Rejected” from 2010 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	47	9	5	56	56.6%	0	0.0%	0	0.0%
	4	99	26	7	5	33	33.3%	1	1.0%	2	2.0%
	5	99	19	9	4	28	28.3%	1	1.0%	3	3.0%
	6	99	17	9	1	26	26.3%	5	5.1%	8	8.1%
	7	99	11	8	0	19	19.2%	1	1.0%	4	4.0%
	8	99	19	9	4	28	28.3%	3	3.0%	5	5.1%
	11	99	29	9	1	38	38.4%	4	4.0%	9	9.1%
Reading	3	99	6	9	1	15	15.2%	0	0.0%	1	1.0%
	4	99	8	9	3	17	17.2%	1	1.0%	2	2.0%
	5	99	13	9	1	22	22.2%	2	2.0%	3	3.0%
	6	99	20	9	1	29	29.3%	3	3.0%	4	4.0%
	7	99	23	9	1	32	32.3%	2	2.0%	2	2.0%
	8	99	17	9	3	26	26.3%	3	3.0%	3	3.0%
	11	99	30	9	3	39	39.4%	1	1.0%	1	1.0%
Science	4	108	33	9	3	42	38.9%	13	12.0%	13	12.0%
	8	132	54	8	7	62	47.0%	1	0.8%	1	0.8%
	11	96	36	9	5	45	46.9%	8	8.3%	8	8.3%
Writing	5	54	9	6	5	15	27.8%	0	0.0%	2	3.7%
	8	54	8	6	5	14	25.9%	0	0.0%	6	11.1%
	11	54	11	6	3	17	31.5%	0	0.0%	8	14.8%
Totals		1884	436	167	61	603	32.0%	49	2.6%	85	4.5%

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 2011 PSSA field test items and maybe compared to the 2010 results.

The number of field test items in each DIF category across the two years was 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.¹

¹ 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														
		2010						2011						2010						2011									
		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	45	42	0	3	0	0	90	31	17	1	1	0	0	50	2	53	0	18	0	17	90	1	29	0	15	0	5	50
	4	55	34	1	0	0	0	90	20	28	1	1	0	0	50	10	53	0	18	0	9	90	4	27	0	17	0	2	50
	5	46	42	1	1	0	0	90	20	29	1	0	0	0	50	12	63	0	11	0	4	90	3	36	0	9	0	2	50
	6	57	28	2	3	0	0	90	28	20	0	1	0	1	50	15	63	0	11	0	1	90	4	36	0	9	0	1	50
	7	48	34	2	6	0	0	90	25	24	0	1	0	0	50	19	66	0	5	0	0	90	7	39	0	4	0	0	50
	8	48	39	2	2	0	0	91	23	25	2	0	0	0	50	15	62	1	9	0	4	91	9	36	1	3	0	1	50
11	37	46	1	6	0	1	91	22	25	1	2	0	0	50	17	67	0	6	0	1	91	15	32	0	3	0	0	50	
Reading	3	54	34	2	0	0	0	90	24	26	0	0	0	0	50	10	72	0	7	0	1	90	7	39	0	3	0	1	50
	4	57	29	2	0	0	2	90	29	19	0	2	0	0	50	5	77	0	6	0	2	90	5	41	0	4	0	0	50
	5	40	49	1	0	0	0	90	28	21	0	1	0	0	50	6	69	0	13	0	2	90	0	34	0	12	0	4	50
	6	47	41	0	1	0	1	90	29	19	1	0	0	1	50	12	68	0	6	0	4	90	10	32	0	8	0	0	50
	7	41	43	0	4	0	2	90	21	27	0	1	0	1	50	16	66	0	7	0	1	90	6	30	0	11	0	3	50
	8	33	51	1	3	0	2	90	26	24	0	0	0	0	50	6	75	0	4	0	5	90	11	36	0	2	0	1	50
11	40	46	2	2	0	0	90	21	25	0	3	0	1	50	10	54	3	18	0	5	90	7	34	0	5	0	4	50	
Science	4	48	44	1	3	0	0	96	49	46	1	0	0	0	96	15	69	0	11	0	1	96	11	72	0	10	0	3	96
	8	50	65	1	3	1	0	120	47	72	0	1	0	0	120	24	89	0	7	0	0	120	18	99	0	3	0	0	120
	11	19	53	1	7	0	0	80	32	43	2	2	0	1	80	17	60	0	3	0	0	80	19	60	0	1	0	0	80
Writing	5	25	23	0	0	0	0	48	24	24	0	0	0	0	48	3	36	0	4	0	5	48	3	33	0	12	0	0	48
	8	23	25	0	0	0	0	48	28	20	0	0	0	0	48	7	32	0	7	0	2	48	6	33	0	5	0	4	48
	11	20	27	0	1	0	0	48	27	21	0	0	0	0	48	3	31	0	9	0	5	48	4	35	0	8	0	1	48

Table 5–2B. DIF Summary—OE Items

	Grade	Male/Female														White/Black													
		2010							2011							2010						2011							
		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	5	4	0	0	0	0	9	4	1	0	0	0	0	5	0	3	0	4	0	2	9	0	3	0	0	0	2	5
	4	8	1	0	0	0	0	9	5	0	0	0	0	0	5	0	4	0	1	0	4	9	0	2	0	0	0	3	5
	5	6	2	1	0	0	0	9	5	0	0	0	0	0	5	0	8	0	0	0	1	9	0	3	0	1	0	1	5
	6	4	4	0	0	1	0	9	4	1	0	0	0	0	5	1	5	0	3	0	0	9	1	2	0	2	0	0	5
	7	7	2	0	0	0	0	9	1	3	0	0	1	0	5	1	3	0	3	0	2	9	0	4	0	1	0	0	5
	8	7	2	0	0	0	0	9	4	1	0	0	0	0	5	0	6	0	3	0	0	9	1	2	0	1	0	1	5
	11	3	5	1	0	0	0	9	2	2	0	1	0	0	5	1	7	0	1	0	0	9	0	5	0	0	0	0	5
Reading	3	6	0	2	0	1	0	9	3	2	0	0	0	0	5	4	5	0	0	0	0	9	1	1	0	2	0	1	5
	4	5	0	3	0	1	0	9	4	0	0	0	1	0	5	5	2	0	1	0	1	9	1	3	0	1	0	0	5
	5	3	0	4	0	2	0	9	3	0	2	0	0	0	5	3	4	0	1	0	1	9	1	2	0	1	0	1	5
	6	3	0	2	0	4	0	9	1	0	1	0	3	0	5	5	2	0	2	0	0	9	2	3	0	0	0	0	5
	7	0	0	4	0	5	0	9	2	0	2	0	1	0	5	7	2	0	0	0	0	9	3	2	0	0	0	0	5
	8	1	1	2	0	5	0	9	3	0	0	0	2	0	5	6	2	1	0	0	0	9	3	2	0	0	0	0	5
	11	2	0	1	0	6	0	9	4	0	1	0	0	0	5	1	7	0	1	0	0	9	1	3	0	0	0	1	5
Science	4	2	9	1	0	0	0	12	8	4	0	0	0	0	12	3	8	0	1	0	0	12	2	8	0	1	0	1	12
	8	5	7	0	0	0	0	12	8	3	0	1	0	0	12	1	5	0	1	0	5	12	0	7	0	1	0	4	12
	11	10	5	0	1	0	0	16	8	7	1	0	0	0	16	4	7	0	1	0	4	16	0	14	0	2	0	0	16
Writing	5	2	0	8	0	2	0	12	4	0	6	0	2	0	12	0	11	0	1	0	0	12	0	7	0	3	0	2	12
	8	3	0	5	0	4	0	12	6	0	5	0	1	0	12	1	9	0	1	0	1	12	0	10	0	2	0	0	12
	11	2	0	10	0	0	0	12	12	0	0	0	0	0	12	6	6	0	0	0	0	12	1	7	0	2	0	2	12

Chapter Six: Operational Forms Construction for 2011

FINAL SELECTION OF ITEMS AND 2011 PSSA FORMS CONSTRUCTION

By the time the final selection of items for the operational 2011 test had begun, the candidate items that emerged from the spring 2010 field test had undergone multiple reviews, including the following:

- 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 consisting of a multiethnic 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 test item. All items with an item status code of Acceptable/Active were candidates to be selected for the 2011 PSSA. To have an item status code of Acceptable/Active meant that an 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 level. 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 test.

For the common items, this meant that the combination of multiple-choice (MC) and open-ended (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 was either in the form of approval or recommendation to replace 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 2011 PSSA

Braille and Large Print

Students with visual impairments were able to respond to test materials 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, 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 completed by Second Language Testing, Incorporated. Second Language Testing, Incorporated used translators with varying cultural and regional backgrounds to create the Spanish versions of the mathematics and science assessments. The translations were then reviewed and verified by DRC's internal Spanish group. As part of the internal review, a Spanish style guide is maintained to document Spanish word choice from administration to administration and across grades within an administration. 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 was on the right-hand (facing) page.

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 1,263 students at Grades 3–8 and 11 in 2011. Spanish-translated versions of the science assessment were used by a total of 731 students at Grades 4, 8, and 11 in 2011.

Instructions for the appropriate use of these special forms are detailed in accommodation manuals titled *PSSA*, *PSSA-M*, and *Keystone (paper/pencil) Accommodations Guidelines for Students with IEPs and Students with 504 Plans*, *Accommodations Guidelines for Students without IEPs and 504 Plans*, and *Accommodations Guidelines for English Language Learners*. The manuals can be accessed at www.education.state.pa.us. On the left, select “Programs,” “Programs O–R,” “Pennsylvania System of School Assessment (PSSA),” and then “Testing Accommodations & Security.”

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.²

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.³

² report is available upon request from PDE at 1-717-705-2343.

³ This report is available upon request from PDE at 1-717-705-2343.

Chapter Seven: Test Administration Procedures

TEST SESSIONS, TEST SECTIONS, AND TEST TIMING

Some assessments utilized separate test booklets and answer booklets. An answer booklet was used to respond to the multiple-choice (MC) and open-ended (OE) 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
Mathematics & Reading	3			✓
	4	✓	✓	
	5	✓	✓	
	6	✓	✓	
	7	✓	✓	
	8	✓	✓	
	11	✓	✓	
Science	4	✓	✓	
	8	✓	✓	
	11			✓
Writing	5			✓
	8			✓
	11			✓

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 2011 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 two sections for Grades 4 and 8, and three sections for Grade 11. The writing assessments consisted of four sections. See 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, Grade 4 and 8	2	2
	Science, Grade 11	3	3

Table 7–3. PSSA Testing Load and Duration 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 Testing Load and Duration 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 appeared 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 a 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 assessments might impact the students' and school's performances.

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 are in Chapter Three.

TESTING WINDOW

The testing windows for the 2011 operational assessments were as follows:

- Mathematics and Reading – March 14 through March 25, 2011
- Writing – March 28 through April 1, 2011
- Science – April 4 through April 8, 2011
- Make-up – April 11 through April 15, 2011

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

SHIPPING, PACKAGING, AND DELIVERY OF MATERIALS

DRC sent two shipments for the 2011 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 February 14, 2011.
- 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 February 28, 2011.

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 3,501,164 assessment booklets and 173,064 *Directions for Administration Manuals* for 3,994 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 – March 14 through April 8, 2011
- Make-up return window – April 11 through April 15, 2011

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 3,370 signed test security affidavits sent to the testing sites participating in the 2011 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. On the left, select “Programs,” “Programs O–R,” “Pennsylvania System of School Assessment (PSSA)” and then “Test Administration.”

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 2011 PSSA. These manuals can be found at www.education.state.pa.us. On the left, select “Programs,” “Programs O–R,” “Pennsylvania System of School Assessment (PSSA),” and then “Testing Accommodations & Security.” 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 March 21, 2011, and concluded with all make-up tests on April 15, 2011. 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 sorted materials 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 formats. 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 receipt versus expected receipt. 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 returned 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 booklets.

The scannable documents were automatically fed into the image scanners where predefined 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 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 predefined 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 predefined 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 files. 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).

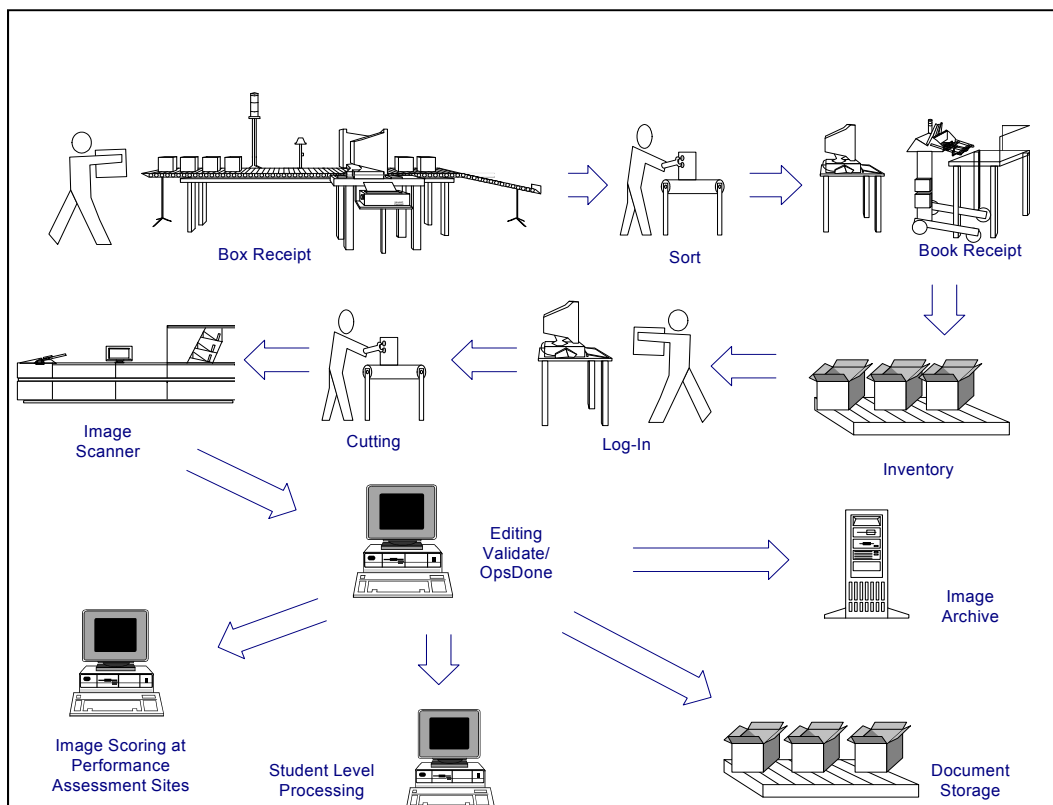
Table 8–1. Counts of 2011 PSSA Materials Received: Grades 3–8 and 11

	Answer Booklets Received	Used Answer Booklets Received	Test Booklets Received	Total Booklets Received	Total Booklets Shipped
Grade 3 MR	163,536	127,567	n/a*	163,536	163,606
Grade 4 MR	166,710	128,865	166,711	333,421	333,466
Grade 4 S	166,639	130,551	166,644	333,283	333,344
Grade 5 MR	168,403	130,285	168,406	336,809	336,900
Grade 5 W	167,382	132,419	n/a*	167,382	167,406
Grade 6 MR	165,053	130,376	165,051	330,104	330,152
Grade 7 MR	164,781	131,442	164,786	329,567	329,660
Grade 8 MR	165,355	131,528	165,380	330,735	330,834
Grade 8 S	165,160	130,413	165,138	330,298	330,400
Grade 8 W	164,485	133,691	n/a*	164,485	164,551
Grade 11 MR	170,452	133,192	170,451	340,903	341,064
Grade 11 S	169,705	131,597	n/a*	169,705	170,478
Grade 11 W	169,746	135,661	n/a*	169,746	169,303

* 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 for each subject. The score point ranges were represented by the following scoring guidelines:

- 0–4 item-specific scoring guidelines for math
- 0–3 item-specific scoring guidelines for reading
- 0–2 and 0–4 item-specific scoring guidelines for science
- 1–4 mode-specific composing and 1–4 revising and editing scoring guidelines for writing

Responses were pulled from the embedded field test portion of the PSSA for each subject. Once examples of all score points were selected for each item, sets were assembled for rangefinding. 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 were as follows:

- Reading Field Test Rangefinding, May 23–24, 2011, Sheraton, Harrisburg
- Math Field Test Rangefinding, May 25–26, 2011, Sheraton, Harrisburg
- Science Field Test Rangefinding, May 23–25, 2011, Sheraton, Harrisburg
- Writing Field Test Rangefinding, May 24–26, 2011, Sheraton, Harrisburg

Each rangefinding meeting began in a joint session with a review of the history of the assessment and then broke into subject/grade-specific groups. Sets of student responses were presented to the committees, one item at a time. Each committee initially reviewed and scored student samples as a group to ensure that everyone was interpreting the scoring guidelines consistently. Committee members then went on to score responses independently. For each student response, committee members' scores were discussed until a consensus was reached. Only those responses for which there was strong agreement among committee members were chosen for inclusion in training materials for DRC raters.

Discussions of student responses included the mandatory use of scoring guideline language. This ensured that committee members remained focused on the specific requirements of each score level. DRC PAS staff took notes addressing how and why the committees arrived at score point decisions, and this information was used by the scoring directors in rater training.

DRC and PDE discussed scoring guideline edits suggested by the rangefinding committees. Changes approved by PDE were then incorporated into the scoring guidelines by DRC Test Development staff. The edited scoring guidelines were used in the preparation of materials and the training of raters.

RATER RECRUITMENT/QUALIFICATIONS

DRC retains a number of raters from year to year. This pool of experienced raters was drawn from to staff the scoring of the 2011 PSSA. To complete the rater staffing for this project, DRC placed advertisements in local newspapers and utilized a variety of web sites. Open houses were held and applications for rater positions were screened by DRC's recruiting staff. Candidates were personally interviewed by DRC staff. In addition, each candidate was required to provide an on-demand writing sample, an on-demand math sample, 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 degrees emphasizing expertise in mathematics, reading, science, or writing. Thus, the rater pool consisted of educators and other professionals with content-specific backgrounds. These individuals were valued for their content-specific knowledge, but they were required to set aside their own biases about student performance and accept the scoring standards outlined in the PSSA.

LEADERSHIP RECRUITMENT/QUALIFICATIONS

Scoring directors and team leaders were selected by content specialists from a pool of employees who displayed expertise as raters and leaders on previous DRC projects. These individuals had strong backgrounds in mathematics, reading, science, or writing and demonstrated organizational, leadership, and management skills. A majority of scoring directors and team leaders had at least five years of leadership experience working on large-scale assessments, including the PSSA. All scoring directors, team leaders, and raters were required to sign confidentiality agreements before handling secure materials.

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

Team leaders assisted the scoring director with rater training by leading their teams in small group discussions and answering individual questions that raters may not have felt comfortable asking in a large group. Once raters were qualified, team leaders were responsible for maintaining the accuracy and workload of each team member. Ongoing monitoring identified those individuals having difficulty scoring accurately. These raters received one-on-one retraining from the team leader. Any rater who could not be successfully retrained had his/her scores dropped and was released from the project.

TRAINING

As part of preparation for the 2011 mathematics, reading, science, and writing assessments, DRC's PAS staff assembled the PDE-approved scoring guidelines and scored student responses approved by rangefinding committees into sets used for training raters. The item-specific scoring guidelines (and the revising and editing writing guidelines) served as the raters' constant reference. Responses that were relevant in terms of the scoring concepts they illustrated were annotated and included in an anchor set. The full range of each score point was clearly represented and annotated in the anchor set, which was used for reference by raters throughout the project.

Training sets and qualifying sets contained student responses reviewed by rangefinding committee members. Raters were instructed on how to apply the scoring guidelines and were required to demonstrate a clear comprehension of each anchor set by performing well on the associated training materials. Responses were selected for training to show raters the range of each score point (e.g., high, mid, and low 2s). Examples of 0s were also included for all mathematics, reading, and science items. This process helped raters recognize the various ways that a student could respond in order to earn each score point outlined and defined in the item-specific scoring guidelines.

The scoring director conducted a team leader training session before training the raters. This session followed the same procedures as rater training, but qualifying standards were more stringent due to the extra responsibilities required of team leaders. During team leader training, all PSSA materials were reviewed and discussed. Team leaders were required to annotate all of their training materials with committee justifications from the rangefinding meetings. To facilitate scoring consistency, it was imperative that all team leaders imparted the same rationale for each response. Once the team leaders were qualified, leadership responsibilities were reviewed and team assignments were given. A ratio of one team leader per each 8–10 raters ensured a sufficient monitoring rate for each team member.

The 2011 assessment included the opportunity for students to respond in Spanish to mathematics and science items. The scoring director responsible for overseeing this is a native Spanish language speaker who has a strong mathematics and science background and has worked with the PSSA for over ten years. All Spanish raters were bilingual and hired specifically to score the Spanish portion of the assessment. They were required to meet the same training and scoring standards set for the raters of the English version of the assessment.

Rater training began with the scoring director providing an intensive review of the scoring guidelines and anchor papers. Next, raters practiced by independently scoring the responses in the training sets. After each training set, the scoring director or team leaders led a thorough discussion of the responses, either in a large-group or small-group setting.

Once the scoring guidelines, anchor sets, and training sets were thoroughly discussed, each rater was required to demonstrate understanding of the scoring criteria by qualifying (i.e., scoring with acceptable agreement to the true scores) on at least one of the qualifying sets. Raters who failed to achieve 70 percent exact agreement on the first qualifying set were given additional, individual training. Raters 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 individuals were removed from the pool of potential raters in DRC's imaging system and released from the project.

HANDSCORING PROCESS

Student responses were scored independently. All responses were scored once, and ten percent of the responses were scored a second time. The data collected from the ten percent double read portion was used to calculate the exact and adjacent agreement rates in the Scoring Summary Reports. The responses that were used for the ten percent read behind were randomly chosen by the imaging system at the item level. Additional read behinds by the team leaders and scoring directors were done to further ensure reliability.

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

To handle possible alerts (i.e., student responses indicating potential issues related to students' safety and well-being that sometimes require attention at the state or local level), DRC's imaging system allows raters to forward responses needing attention to the scoring director. These alerts are reviewed by the project director, who then notifies the students' schools and PDE of the occurrences. However, PDE does not receive students' responses or any other identifying information about the students. At no time in the alerts process do raters acquire any knowledge concerning a student's personal identity.

HANDSCORING VALIDITY PROCESS

One of the training tools PAS utilized to ensure rater 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 raters score student responses in a manner consistent with statewide standards both within a single administration of the PSSA and across consecutive administrations. In scoring the 2011 PSSA, this scoring consistency was maintained, in part, through the validity process.

The validity process began with the selection of scored responses from the initial field test. The content specialist for each subject selected 40 validity papers for each core constructed response (CR) item. These 40 papers were drawn from a pool of exemplars (responses that are representative of a particular score point and have been verified by the scoring director and the content specialist). The scores on validity papers are considered true scores.

The validity papers were then implemented to test rater accuracy. The responses were scanned into the imaging system and dispersed intermittently to the raters. By the end of the project, raters had scored all 40 validity papers for any items they were qualified to score. Raters were unaware that they were being dealt 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 raters who received validity papers had already successfully completed the training/qualifying process.

Next, the scores that the raters assigned to the validity papers were compared to the true scores in order to determine the validity of the raters' 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 sort of data was also computed for each specific rater. This data was accessed through the Validity Reader Detail Report. Both of these may be run as daily or cumulative reports.

The Validity Reader Detail Report was used to identify particular raters for retraining. If a rater 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. Any time a rater's validity agreement rate fell below 70 percent, the scoring director was cued to examine that rater's scoring. First, the scoring director attempted to ascertain what kind of validity papers the rater was scoring incorrectly. This was done to determine whether there was any sort of a trend (e.g., trending low on the 1–2 line). Once the source of the low agreement was determined, the rater was retrained. If it was determined that the rater 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 raters.

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 3 was given a score of 2 by a significant number of raters within the room, 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 re-training, usually in the form of an annotated handout or a short set of papers without printed scores given to raters as a recalibration test.

Validity was employed on all core mathematics, reading, and science CR items and for all operational writing prompts. Each 40-paper validity set was formulated to mirror 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 raters were tested on the full spectrum of response types.

The exact rater 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, mid, and low 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 score points that are so close to the adjacent score point that raters 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 response might teach would apply only to that particular paper. 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 typically generated during operational scoring.

QUALITY CONTROL

Rater accuracy was monitored throughout the scoring session by means of daily and on-demand reports. These reports ensured that an acceptable level of scoring accuracy was maintained throughout the project. Inter-rater 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 scoring centers, where they 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 items:

The Scoring Summary Report (includes two related reports)

1. The Reader Monitor Report monitored how often raters 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 ten 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 reports showed how many 0s, 1s, 2s, 3s, and 4s a rater had given to all the responses scored at the time the report was produced. It also indicated the number of responses read by each rater 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., not read, complete, awaiting supervisor review, etc.). 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 rater. This report was useful if any responses needed rescoring because of possible rater drift.

The Validity Reports (addressed on previous page) tracked how raters performed by comparing pre-scored responses to raters' scores for the same responses. If a rater's scoring fell below the 70 percent determined agreement rate, remediation occurred. Raters 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 rater reliability. Team leaders read randomly-selected, scored items from each team member. If the team leader disagreed with a rater'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 rater.

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

Table 8–2 shows exact and adjacent agreement rates of raters on the core open-ended responses for the mathematics items in the 2011 PSSA. All student responses were read once, and ten percent of the responses were read a second time. The data collected from this ten percent double read was used to calculate the exact and adjacent agreement rates.

**Table 8–2. Inter-rater Agreement for 2011 PSSA
Mathematics Grades 3–8 and 11
Open-Ended Response Items and Validity**

Mathematics	Common Item	% Exact Agreement	% Adjacent Agreement	% Exact + Adjacent Agreement	% Exact Validity Agreement
Grade 3	1	92	8	100	96
	2	85	15	100	91
	3	86	14	100	95
Grade 4	1	94	6	100	96
	2	93	7	100	92
	3	93	7	100	95
Grade 5	1	93	7	100	94
	2	87	13	100	90
	3	94	6	100	97
Grade 6	1	93	7	100	96
	2	86	14	100	87
	3	87	13	100	86
Grade 7	1	86	14	100	95
	2	86	14	100	87
	3	85	15	100	91
Grade 8	1	90	10	100	97
	2	86	14	100	95
	3	81	19	100	82
Grade 11	1	89	11	100	95
	2	89	11	100	97
	3	92	8	100	96

Note. 0–4 possible score points

Table 8–3 shows the distribution of scores for the mathematics items. All mathematics items are scored with a 0–4 score point range.

**Table 8–3. Percentages Awarded for Each Possible Score Point
2011 PSSA Mathematics Grades 3–8 and 11**

Mathematics	Common Item	%0	%1	%2	%3	%4	%B/NS*
Grade 3	1	8	25	18	25	23	0
	2	5	19	35	19	23	0
	3	7	14	20	32	27	0
Grade 4	1	6	12	25	40	16	1
	2	12	13	20	44	9	2
	3	8	17	15	34	26	1
Grade 5	1	3	10	57	24	5	1
	2	14	35	23	20	6	2
	3	6	23	26	29	14	1
Grade 6	1	4	11	13	49	22	1
	2	12	33	17	19	16	3
	3	10	39	32	12	5	1
Grade 7	1	14	31	34	16	3	2
	2	16	10	24	28	18	5
	3	3	29	32	21	14	2
Grade 8	1	19	38	9	24	8	2
	2	11	36	24	16	10	4
	3	9	26	26	21	16	2
Grade 11	1	31	25	14	13	14	3
	2	8	12	34	22	19	5
	3	21	34	23	15	4	3

*B=blank and NS=non-scoreable

Table 8–4 shows exact and adjacent agreement rates of raters on the core open-ended responses for the reading items in the 2011 PSSA. All student responses were read once, and ten percent of responses were read a second time. The data collected from this ten percent double read was used to calculate the exact and adjacent agreement rates.

**Table 8–4. Inter-rater Agreement for 2011 PSSA
Reading Grades 3–8 and 11
Open-Ended Response Items and Validity**

Reading	Common Item	% Exact Agreement	% Adjacent Agreement	% Exact + Adjacent Agreement	% Exact Validity Agreement
Grade 3	1	75	24	99	80
	2	73	26	99	84
Grade 4	1	85	15	100	88
	2	86	14	100	87
	3	85	15	100	88
	4	85	15	100	90
Grade 5	1	84	16	100	92
	2	85	15	100	93
	3	85	15	100	93
	4	84	16	100	90
Grade 6	1	77	23	100	76
	2	78	22	100	79
	3	80	20	100	84
	4	77	23	100	85
Grade 7	1	76	24	100	74
	2	78	22	100	85
	3	77	23	100	86
	4	75	25	100	77
Grade 8	1	78	22	100	83
	2	75	25	100	77
	3	77	23	100	81
	4	72	28	100	71
Grade 11	1	78	22	100	88
	2	83	17	100	85
	3	78	22	100	87
	4	80	20	100	76

Note. 0–3 possible score points

Table 8–5 shows the distribution of scores for the reading items. All reading items are scored with a 0–3 score point range.

**Table 8–5. Percentages Awarded for Each Possible Score Point
2011 PSSA Reading Grades 3–8 and 11**

Reading	Common Item	%0	%1	%2	%3	%B/NS*
Grade 3	1	12	42	36	8	1
	2	5	38	45	11	1
Grade 4	1	7	19	43	29	2
	2	11	17	24	47	2
	3	4	36	44	14	2
	4	3	25	45	25	2
Grade 5	1	3	48	34	12	3
	2	2	19	65	12	2
	3	11	27	50	10	2
	4	4	33	43	17	2
Grade 6	1	4	14	58	22	3
	2	2	16	63	17	2
	3	2	30	42	25	2
	4	6	37	42	14	2
Grade 7	1	5	28	49	17	2
	2	4	29	50	16	2
	3	8	34	37	19	2
	4	12	34	40	11	2
Grade 8	1	2	15	56	26	2
	2	6	31	46	15	2
	3	1	17	58	22	2
	4	6	30	49	12	2
Grade 11	1	3	23	48	24	3
	2	5	39	39	13	3
	3	3	16	55	22	3
	4	2	14	49	32	3

*B=blank and NS=non-scoreable

Table 8–6 shows exact and adjacent agreement rates of raters on the core open-ended responses for the science items in the 2011 PSSA. All student responses were read once, and ten percent of responses were read a second time. The data collected from this 10 percent double read was used to calculate the exact and adjacent agreement rates.

**Table 8–6. Inter-rater Agreement for 2011 PSSA
Science Grades 4, 8, and 11
Open-Ended Response Items and Validity**

Science	Common Item	% Exact Agreement	% Adjacent Agreement	% Exact + Adjacent Agreement	% Exact Validity Agreement
Grade 4	1	90	9	99	96
	2	91	9	100	95
	3	89	11	100	92
	4	93	6	99	95
	5	89	11	100	95
Grade 8	1	89	11	100	97
	2	86	14	100	94
	3	88	11	99	93
	4	85	15	100	93
	5	89	11	100	98
Grade 11	1	90	10	100	92
	2a	85	15	100	96
	2b	82	18	100	90
	3a	92	8	100	94
	3b	83	17	100	93
	4	84	15	99	95
	5	86	14	100	93
	6	84	16	100	85
	7a	84	16	100	93
	7b	91	9	100	98
	8	82	18	100	85
	9	87	13	100	94

Note. 0–2 possible score points

Table 8–7 shows the distribution of scores for the science items. All science items are scored with a 0–2 score point range for reporting purposes. However, Grade 11’s scenario items, designated in this table by a 2-point part a and a 2-point part b, are considered to be 0–4 score point items with regard to test design.

**Table 8–7. Percentages Awarded for Each Possible Score Point
2011 PSSA Science Grades 4, 8, and 11**

Science	Common Item	%0	%1	%2	%B/NS*
Grade 4	1	14	24	61	0
	2	2	31	66	1
	3	13	26	60	1
	4	6	34	59	1
	5	21	28	50	1
Grade 8	1	21	45	32	1
	2	22	64	12	3
	3	18	40	40	3
	4	40	37	19	3
	5	25	21	52	2
Grade 11	1	43	46	5	6
	2a	43	36	13	8
	2b	34	50	8	8
	3a	34	37	22	7
	3b	14	33	46	7
	4	27	34	31	7
	5	50	25	12	14
	6	49	29	13	9
	7a	45	32	13	10
	7b	37	37	16	10
	8	40	34	18	9
9	17	37	34	11	

*B=blank and NS=non-scoreable

Table 8–8 shows exact and adjacent agreement rates of raters on the core open-ended responses for the writing items in the 2011 PSSA. All student responses were read once, and ten percent of responses were read a second time. The data collected from this ten percent double read was used to calculate the exact and adjacent agreement rates.

Table 8–8. Inter-rater Agreement for 2011 PSSA Writing Grades 5, 8, and 11 Open-Ended Response Items and Validity

Writing		Composition % Agreement			Revising and Editing % Agreement		
Grade	Prompt	Exact	Adjacent	Exact + Adjacent	Exact	Adjacent	Exact + Adjacent
5	1	81	19	100	80	20	100
	2	84	16	100	81	19	100
	1 Validity	86	14	100	86	14	100
	2 Validity	81	19	100	80	20	100
8	1	84	16	100	83	17	100
	2	80	20	100	78	22	100
	1 Validity	81	19	100	78	22	100
	2 Validity	82	18	100	82	18	100
11	1	83	17	100	80	20	100
	2	81	19	100	79	21	100
	1 Validity	85	15	100	79	21	100
	2 Validity	82	18	100	78	12	100

Note. 1–4 possible score points

Table 8–9 shows the distribution of scores for the writing items. 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 2011 PSSA 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	4	34	53	7	0	5	35	53	8	0
	2	5	42	47	5	0	6	38	49	6	0
8	1	3	32	56	7	1	3	33	55	7	1
	2	4	36	52	7	1	5	36	51	7	1
11	1	4	19	63	11	2	4	19	62	12	2
	2	4	23	58	12	2	4	22	58	13	2

* 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 processes; 3) analyses used for item banking; and 4) analyses for the technical report. Detailed information regarding the attributes of students used for Adequate Yearly Progress (AYP) reporting is provided in Chapter Ten.⁴

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 students to complete a minimum of five items (multiple-choice (MC) or open-ended (OE)) 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.

⁴ This data file was delivered to PDE on August 24, 2011.

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 representative of the entire state for these quality checks. Available student data typically suffices as long as there is reasonable variability in the total test scores of students.

For 2011 this data included all public school students who 1) had their MC items scanned and scored by April 9 (mathematics/reading), April 15 (writing), or April 20 (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 18. The state reporting criteria were preliminary, meaning that attributions and final PIMS⁵ 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 point⁶). This data file was used to provide impact results to the Technical Advisory Committee (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 20. 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 August 18⁷ 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.

⁵ Pennsylvania Information Management System

⁶ Historically, PSSA has retained all students who met the stated criteria in the calibration data set, even those who had testing accommodations.

⁷ The AYP reporting file was delivered to PDE on August 24, 2011. 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.⁸

Table 9–1. Data Source N-Counts

		Key Validation	Calibration	Item Bank	Final
Mathematics	3	76878	124750	124752	124749
	4	58841	125562	125600	125604
	5	52644	126563	126578	126578
	6	49190	126604	126606	126630
	7	54167	126953	126959	126993
	8	47245	126732	126750	126786
	11	53905	127816	127794	127797
Reading	3	76663	124679	124681	124678
	4	58215	124500	124530	124535
	5	52238	125952	125963	125963
	6	48926	126148	126150	126170
	7	54038	126869	126871	126902
	8	47266	127075	127088	127125
	11	53989	128020	127998	127997
Science	4	73149	128103	128104	128103
	8	56261	127068	127076	127075
	11	75389	125357	125318	125307
Writing	5	99824	128827	128827	128833
	8	103460	129586	129588	129619
	11	102291	128808	128771	128775

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.

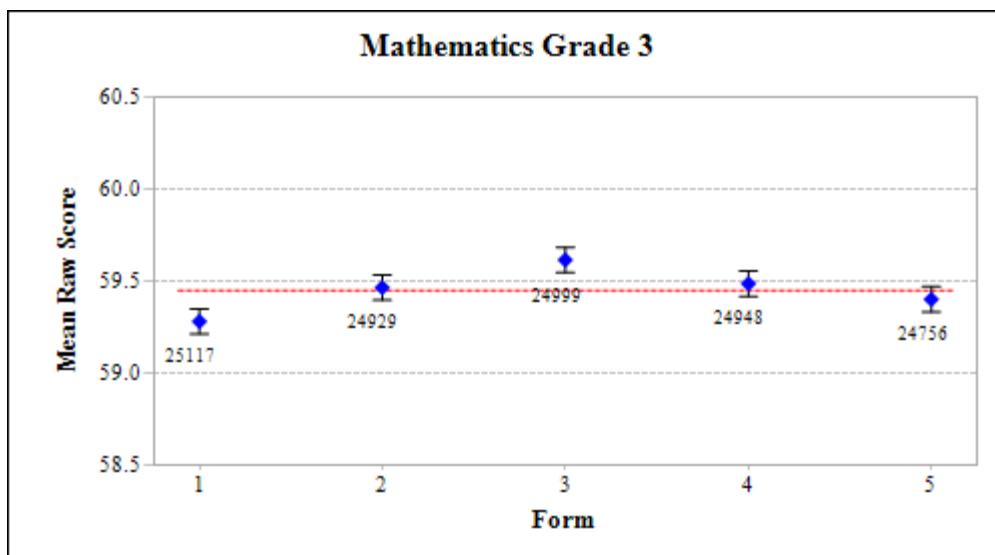
Appendix H provides summary statistics for all test forms for each grade and subject area test. The tables provide the form number (Form), the number of students (N), test length in items (L), total points (Pts.), the minimum (Min) score, the maximum (Max) score, the mean (Mean) score, the median score (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.

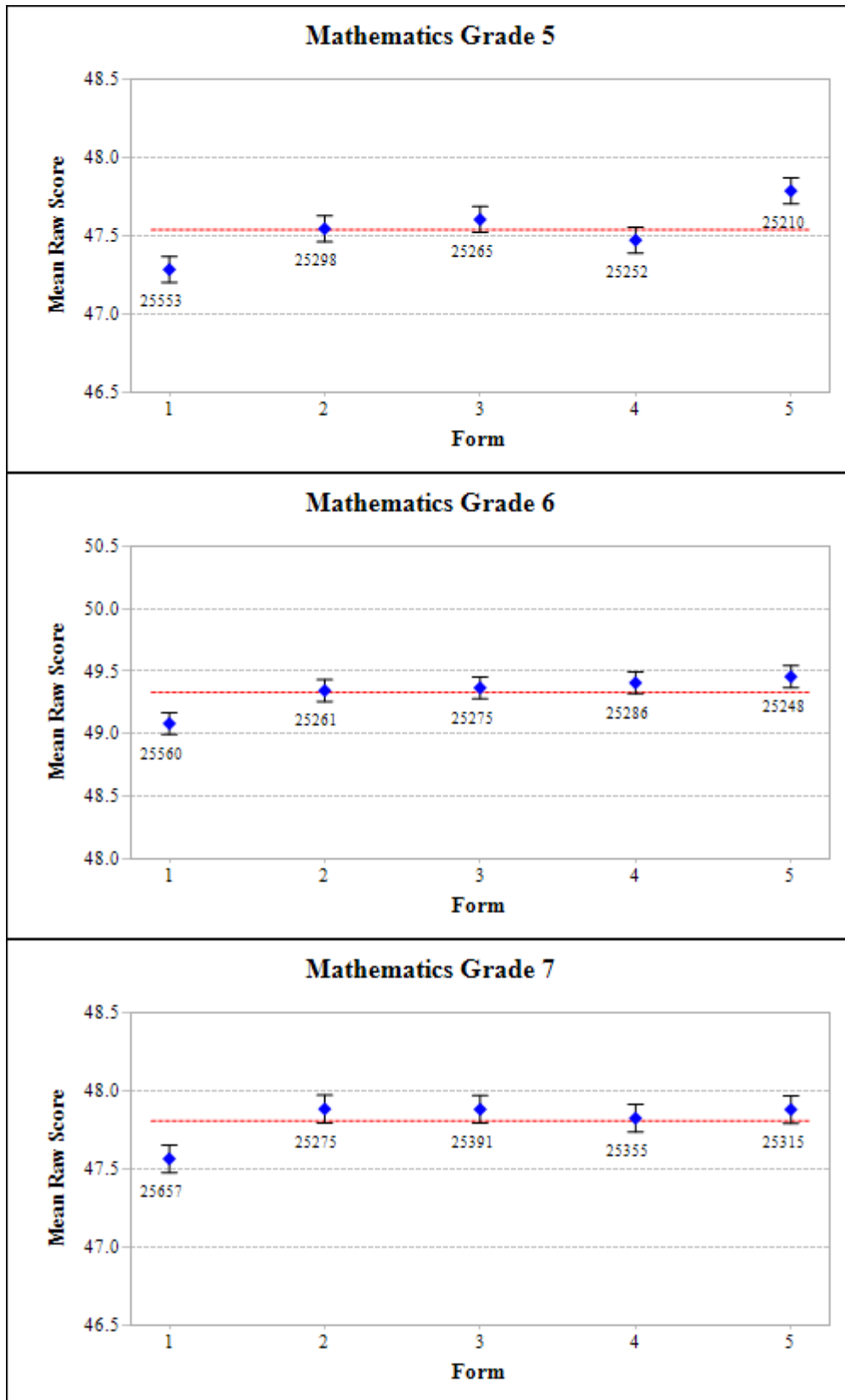
⁸ For this reason, the final count may be smaller than the calibration count in any given year.

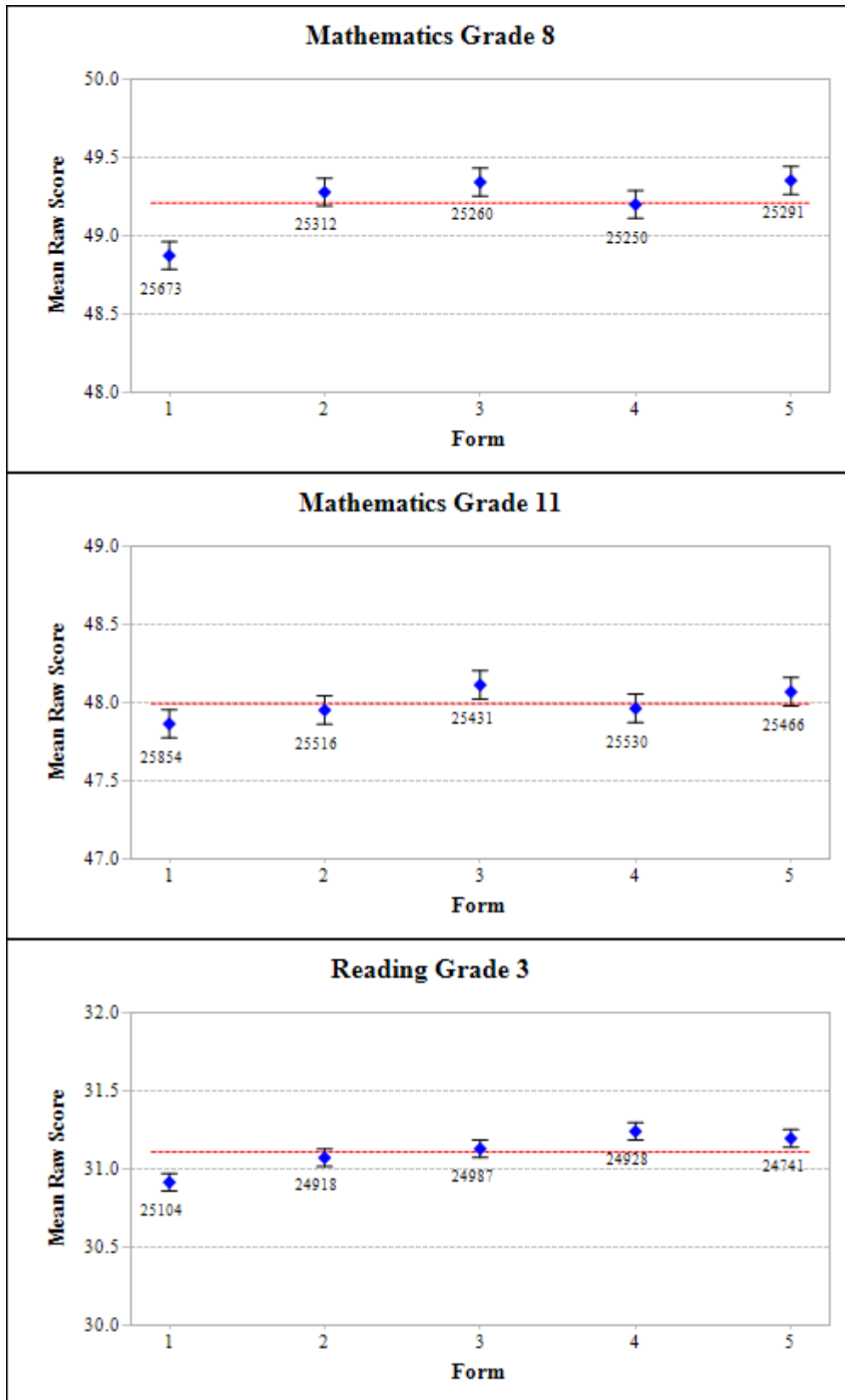
In Figure 9–1, the form means are plotted (diamond-shaped marker) with standard error (SE) lines. *N*-counts for each form are shown below the markers. For each form, the standard error was computed by taking the standard deviation of all student scores (assumed as the population standard deviation divided 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.

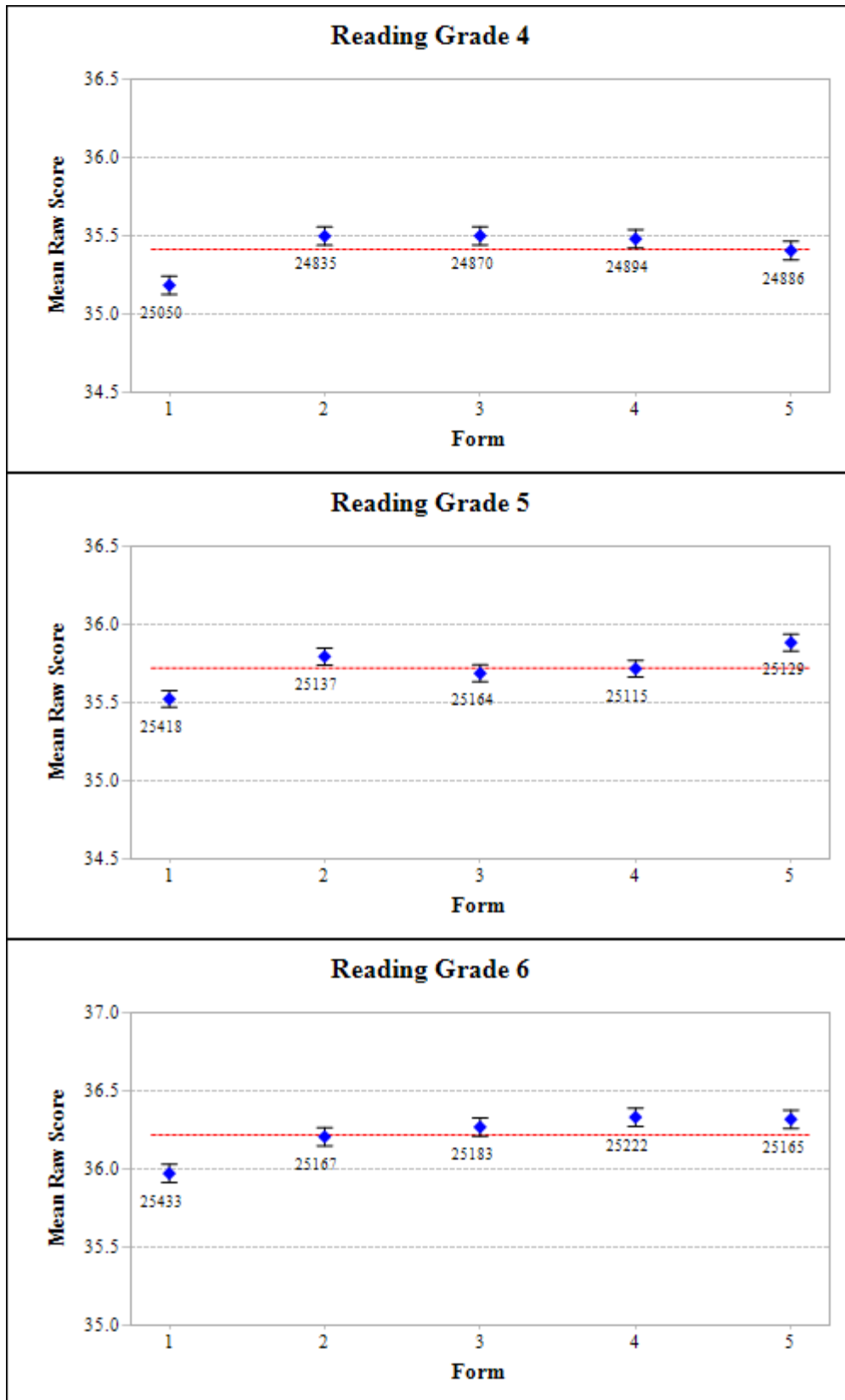
One exception occurring frequently across grades involves Form 1. Form 1 was used to generate accommodated versions (e.g., Large Print and Braille) of the operational form; thus, the averages for these forms are somewhat lower because its sample is not entirely derived from the spiraling process.

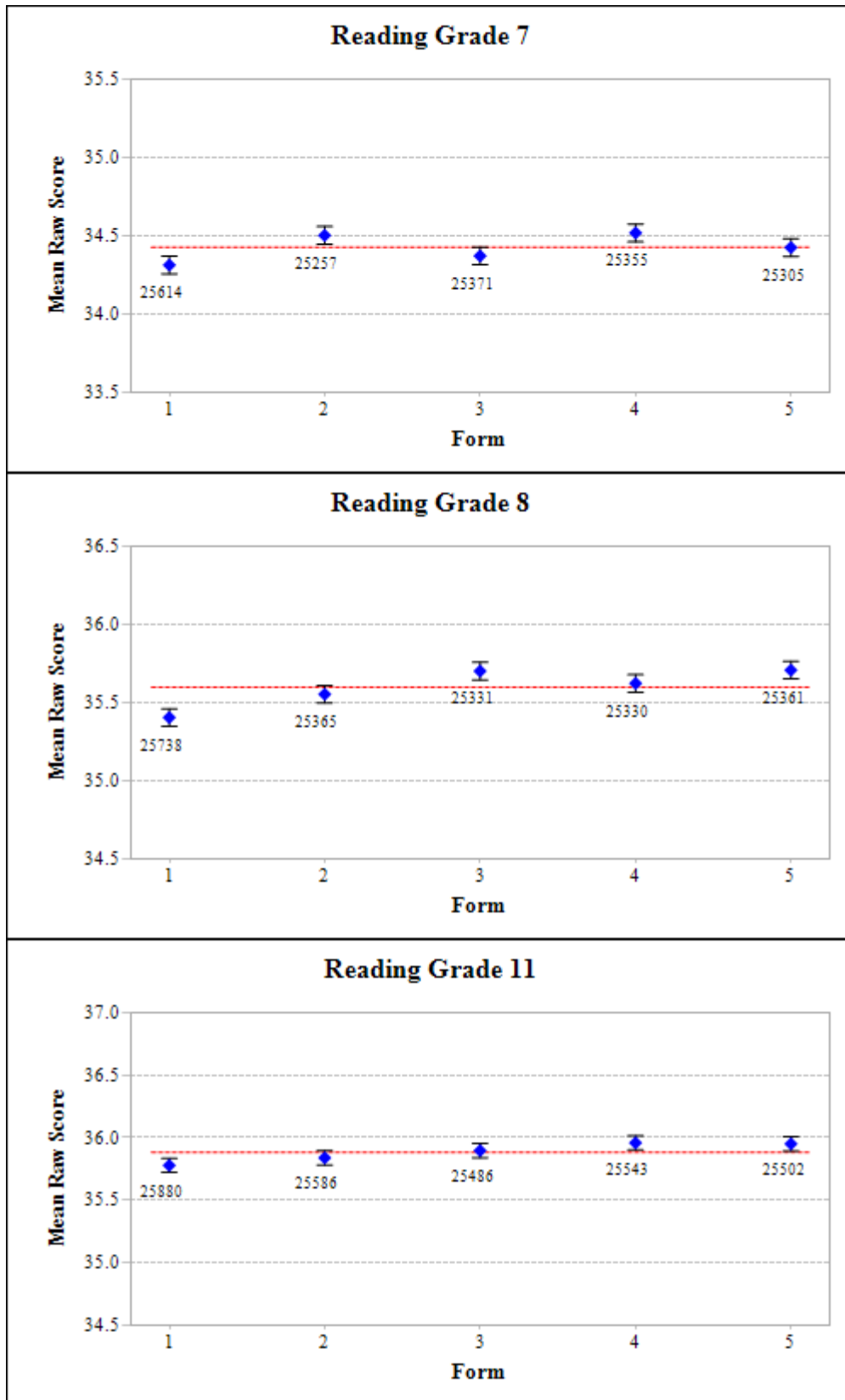
Figure 9–1. Form Mean Scores with +/- One Standard Error (SE) Bands

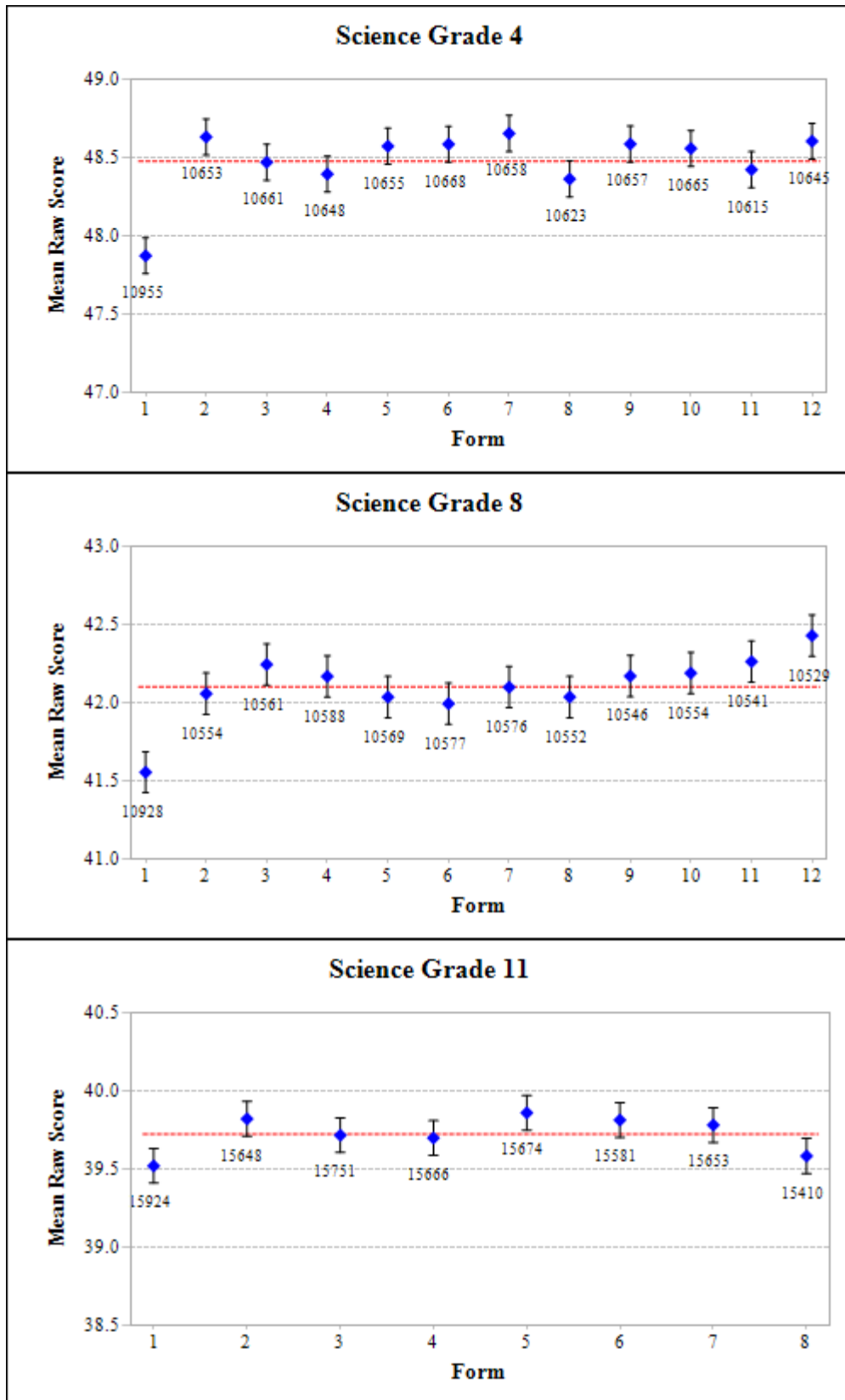


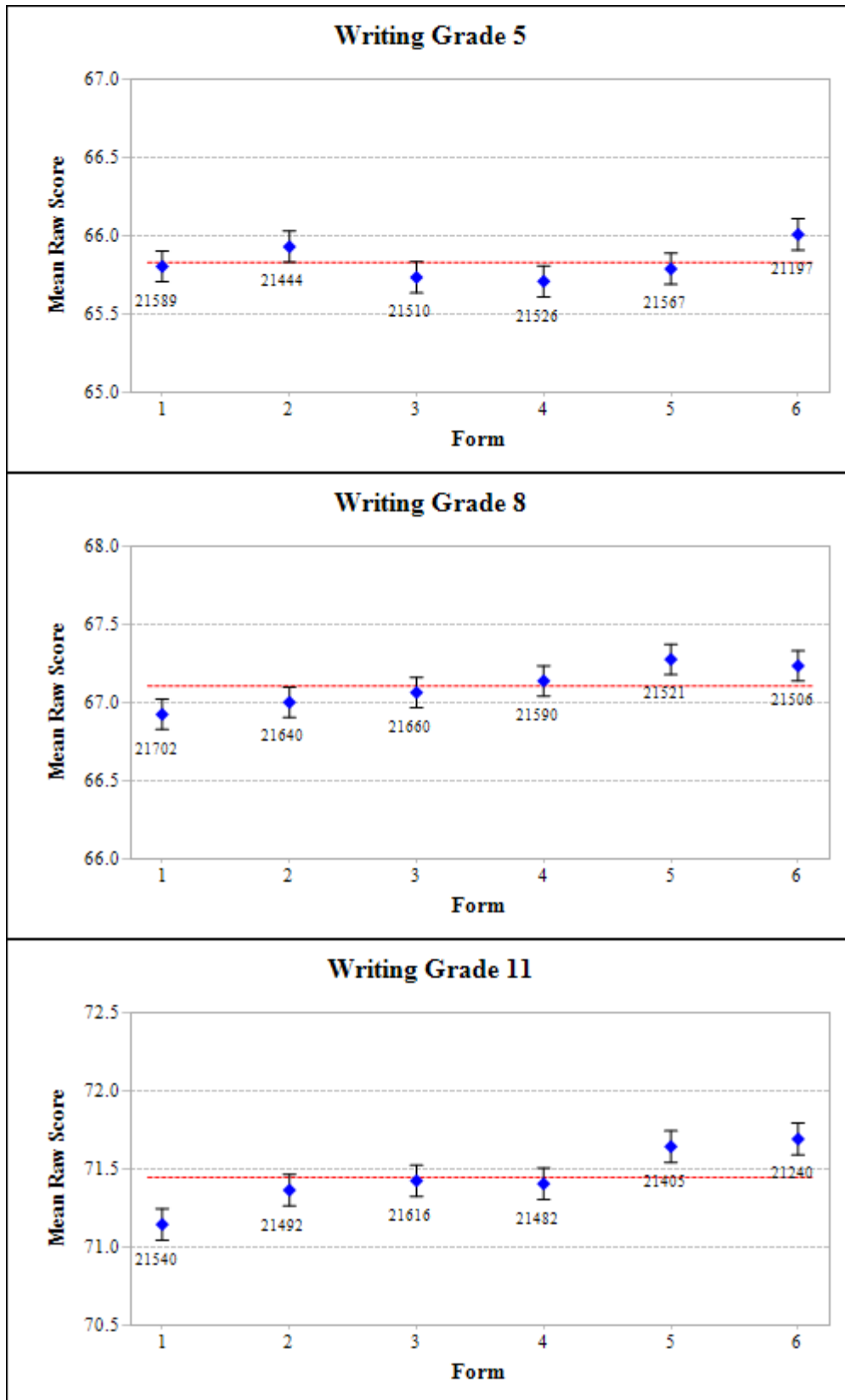












Chapter Ten: Summary Demographic, Program, and Accommodation Data for the 2011 PSSA

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 (fewer than 700 students per grade level) that elected to participate. Also included were home-schooled students (fewer than 100 per grade) and a small number of foreign exchange students (fewer than 20 per grade through Grade 8) who are most often enrolled at Grade 11 (fewer than 150). 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 mathematics, reading, 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) participated in the general education curriculum that differed markedly in form and substance from that of other students. (See the *2010–2011 PSSA Handbook for Assessment Coordinators: Reading and Mathematics, Writing, Science, PDE*, 2011, p.11.)

In 2011 the PSSA modified assessment (PSSA-M) was expanded beyond mathematics, which was introduced in 2010, 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 at www.education.state.pa.us. On the left side, select “Programs,” “Programs S–Z,” and then “Special Education.” From the “Special Education” page select “Assessment” to access the relevant documents.

Results for this chapter are presented in sets of tables for the four PSSA subject areas (mathematics, reading, science, and writing). Accompanying each numbered table is a letter (M, R, S, or W) to designate the subject area. Table set 10–1M 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 2011 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 (M through W). (See the section of this chapter entitled “Composition of Sample Used in Subsequent Tables” for additional explanation.)

Noteworthy in the 2011 assessment is the slightly lower number of students taking the PSSA mathematics, reading, and science relative to those taking writing. This departure from previous years is due to the advent of the modified assessment (PSSA-M) in mathematics (Grades 4–8, and 11), implemented for the first time in 2010, and in reading (Grades 4–8, and 11) and science (Grades 8 and 11), which were implemented in 2011. Combining all students who were assessed by either the PSSA or the PSSA-M whose scores contributed to state summary statistics at a given grade level, the median percentage taking the PSSA-M was about 2.9 percent, 3.0 percent, and 2.6 percent, respectively, for mathematics, reading, and science. Since all students taking a modified assessment have an IEP, the PSSA demographics are also slightly affected as discussed in Appendix O of the *2011 Modified PSSA Technical Report*.

Table 10–1M. Students Assessed on the 2011 PSSA: Mathematics

	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
Number of non-blank answer documents processed	127,555	128,297	129,312	129,307	130,104	129,975	131,912
Students with a mathematics score	127,338 99.8	128,036 99.8	129,015 99.8	128,959 99.7	129,497 99.5	129,241 99.4	130,274 98.8
Number processed but not assessed (without a total score)	217 0.2	261 0.2	297 0.2	348 0.3	607 0.5	734 0.6	1,638 1.2
Students with a mathematics score used in state summaries	124,749	125,604	126,578	126,630	126,993	126,786	127,797

Table 10–1R. Students Assessed on the 2011 PSSA: Reading

	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
Number of non-blank answer documents processed	127,555	127,276	128,734	128,937	130,089	130,455	132,285
Students with a reading score	126,953 99.5	126,662 99.5	128,129 99.5	128,306 99.5	129,151 99.3	129,323 99.1	130,341 98.5
Number processed but not assessed (without a total score)	602 0.5	614 0.5	605 0.5	631 0.5	938 0.7	1,132 0.9	1,944 1.5
Students with a reading score used in state summaries	124,678	124,535	125,963	126,170	126,902	127,125	127,997

This report can be found at www.education.state.pa.us.

Table 10–1S. Students Assessed on the 2011 PSSA: Science

	Gr. 4		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
Number of non-blank answer documents processed	130,542		130,406		131,554	
Students with a science score	130,077	99.6	129,097	99.0	127,395	96.8
Number processed but not assessed (without a total score)	465	0.4	1,309	1.0	4,159	3.2
Students with a science score used in state summaries	128,103		127,075		125,307	

Table 10–1W. Students Assessed on the 2011 PSSA: Writing

	Gr. 5		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
Number of non-blank answer documents processed	132,411		133,681		135,596	
Students with a writing score	130,937	98.9	131,749	98.6	130,982	96.6
Number processed but not assessed (without a score)	1,474	1.1	1,932	1.4	4,614	3.4
Students with a writing score used in state summaries	128,833		129,619		128,775	

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

- 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 (reading and writing only)
- Medical emergency
- Other reasons (includes 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 10–2M through 10–2W.

Table 10–2M. Counts of Students without Scores on the 2011 PSSA: Mathematics

Reason for Non-Assessment	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
Extended Absence from School	16 7.4	12 4.6	23 7.7	40 11.5	81 13.3	101 13.8	336 20.5
Absent Without Make-up	14 6.5	25 9.6	31 10.4	34 9.8	51 8.4	79 10.8	249 15.2
Non-Attempt	90 41.5	130 49.8	132 44.4	119 34.2	242 39.9	237 32.3	493 30.1
Medical Emergency	44 20.3	50 19.2	63 21.2	94 27.0	137 22.6	163 22.2	245 15.0
Other Reasons	53 24.4	44 16.8	48 16.2	61 17.5	96 15.8	154 21.0	315 19.2
Total Not Assessed	217	261	297	348	607	734	1,638

Table 10–2R. Counts of Students without Scores on the 2011 PSSA: Reading

Reason for Non-Assessment	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
Extended Absence from School	16 2.7	12 2.0	23 3.8	43 6.8	83 8.8	104 9.2	338 17.4
Absent Without Make-up	22 3.7	27 4.4	32 5.3	43 6.8	70 7.5	92 8.1	282 14.5
Non-Attempt	180 29.9	187 30.5	161 26.6	201 31.9	311 33.2	368 32.5	630 32.4
ELL in First Year in U.S. Schools	283 47.0	293 47.7	269 44.5	188 29.8	235 25.1	235 20.8	124 6.4
Medical emergency	46 7.6	53 8.6	64 10.6	96 15.2	140 14.9	169 14.9	247 12.7
Other Reasons	55 9.1	42 6.8	56 9.3	60 9.5	99 10.6	164 14.5	323 16.6
Total Not Assessed	602	614	605	631	938	1,132	1,944

Table 10–2S. Counts of Students without Scores on the 2011 PSSA: Science

Reason for Non-Assessment	Gr. 4		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
Extended Absence from School	64	13.8	271	20.7	884	21.3
Absent Without Make-up	36	7.7	117	8.9	850	20.4
Non-Attempt	204	43.9	393	30.0	1,445	34.7
Medical Emergency	65	14.0	213	16.3	355	8.5
Other Reasons	96	20.6	315	24.1	625	15.0
Total Not Assessed	465		1,309		4,159	

Table 10–2W. Counts of Students without Scores on the 2011 PSSA: Writing

Reason for Non-Assessment	Gr. 5		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
Extended Absence from School	48	3.3	216	11.2	704	15.3
Absent Without Make-up	49	3.3	131	6.8	616	13.4
Non-Attempt	1,105	75.0	1,032	53.4	2,311	50.1
ELL in First Year in U.S. Schools	69	4.7	38	2.0	27	0.6
Medical Emergency	87	5.9	213	11.0	332	7.2
Other Reasons	116	7.9	302	15.6	624	13.5
Total Not Assessed	1,474		1,932		4,614	

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 Adequate Yearly Progress (AYP) individual student data file provided to the Pennsylvania Department of Education on August 29, 2011. Students not included in the present state summary data were those who were 1) enrolled in a Pennsylvania school after October 1, 2010, 2) coded as ELL and enrolled after May 7, 2010, 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 are presented separately for each subject area in Tables 10–3M, 10–3R, 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 (Tables 10–4R, 10–5R, 10–6R, and 10–7R) were calculated for those students having a reading score.

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 10–3M through 10–3W. Percentages are based on students with scores 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 10–3M. Demographic Characteristics of Students Taking the 2011 PSSA: Mathematics

Demographic or Educational Characteristic	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
Gender							
Female	60,792 48.7	61,552 49.0	62,037 49.0	61,989 49.0	62,065 48.9	62,491 49.3	63,357 49.6
Male	63,930 51.2	64,015 51.0	64,504 51.0	64,601 51.0	64,885 51.1	64,243 50.7	64,321 50.3
Race/Ethnicity							
American Indian or Alaskan Native	189 0.2	180 0.1	193 0.2	192 0.2	189 0.1	167 0.1	194 0.2
Asian or Pacific Islander	4,236 3.4	4,249 3.4	4,172 3.3	3,858 3.0	3,915 3.1	3,882 3.1	3,802 3.0
Black/African American non-Hispanic	19,204 15.4	19,007 15.1	19,003 15.0	19,218 15.2	18,824 14.8	18,755 14.8	17,793 13.9
Latino/Hispanic	10,652 8.5	10,480 8.3	9,978 7.9	10,174 8.0	10,028 7.9	9,597 7.6	7,911 6.2
White non-Hispanic	88,261 70.8	89,777 71.5	91,376 72.2	91,471 72.2	92,304 72.7	92,963 73.3	96,963 75.9
Multi-Racial/Ethnic	2,167 1.7	1,863 1.5	1,814 1.4	1,664 1.3	1,677 1.3	1,366 1.1	1,021 0.8
Educational Category and Other Demographic Groups							
IEP (not gifted)	18,260 14.6	17,816 14.2	17,309 13.7	16,803 13.3	16,260 12.8	15,968 12.6	14,290 11.2
Student exited IEP in last 2 years	2,374 1.9	2,926 2.3	3,305 2.6	3,381 2.7	2,877 2.3	2,241 1.8	1,221 1.0
Title I	47,756 38.3	45,736 36.4	42,891 33.9	35,676 28.2	28,667 22.6	27,563 21.7	19,231 15.0
Title III Served	2,438 2.0	2,086 1.7	1,778 1.4	1,579 1.2	1,568 1.2	1,455 1.1	1,098 0.9
Title III Not Served	1,315 1.1	1,210 1.0	1,010 0.8	940 0.7	920 0.7	903 0.7	742 0.6
Migrant Student	51 0.0	51 0.0	74 0.1	47 0.0	59 0.0	61 0.0	41 0.0
ELL (enrolled after 5-7-10)	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
ELL (enrolled before 5-7-10)	3,768 3.0	3,321 2.6	2,824 2.2	2,554 2.0	2,501 2.0	2,366 1.9	1,863 1.5

Table 10–3M (continued). Demographic Characteristics of Students Taking the 2011 PSSA: Mathematics

Demographic or Educational Characteristic	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
Educational Category and Other Demographic Groups (continued)							
Exited ESL/bilingual program and in first year of monitoring	1,187 1.0	1,290 1.0	1,001 0.8	742 0.6	510 0.4	483 0.4	303 0.2
Exited ESL/bilingual program and in second year of monitoring	370 0.3	871 0.7	974 0.8	635 0.5	539 0.4	418 0.3	291 0.2
Former ELL no longer monitored	422 0.3	746 0.6	1,243 1.0	1,807 1.4	2,024 1.6	2,001 1.6	1,439 1.1
Economically Disadvantaged	55,041 44.1	53,887 42.9	52,626 41.6	51,862 41.0	50,774 40.0	48,728 38.4	39,876 31.2
Enrollment							
Current Enrollment in school of residence after 10-1-10	2,974 2.4	2,898 2.3	2,696 2.1	2,628 2.1	2,868 2.3	3,041 2.4	3,160 2.5
Current Enrollment in district of residence after 10-1-10	1,606 1.3	1,559 1.2	1,522 1.2	1,595 1.3	1,764 1.4	1,940 1.5	2,031 1.6
Current Enrollment as PA resident after 10-1-10	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
Enrolled in school of residence after 10-1-09 but on/before 10-1-10	16,152 12.9	16,466 13.1	19,475 15.4	31,014 24.5	25,764 20.3	12,991 10.2	12,400 9.7
Enrolled in district of residence after 10-1-09 but on/before 10-1-10	10,085 8.1	9,516 7.6	9,781 7.7	10,526 8.3	10,492 8.3	9,252 7.3	8,102 6.3
Education in Non-Traditional Settings							
Court/agency placed	46 0.0	46 0.0	77 0.1	105 0.1	197 0.2	372 0.3	680 0.5
Students with mathematics scores used in state summaries	124,749	125,604	126,578	126,630	126,993	126,786	127,797

Table 10–3R. Demographic Characteristics of Students Taking the 2011 PSSA: Reading

Demographic or Educational Characteristic	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
Gender							
Female	60,772 48.8	61,296 49.2	61,945 49.2	61,967 49.1	62,126 49.0	62,763 49.4	63,552 49.7
Male	63,880 51.2	63,202 50.8	63,980 50.8	64,163 50.9	64,736 51.0	64,309 50.6	64,324 50.3
Race/Ethnicity							
American Indian or Alaskan Native	189 0.2	179 0.1	192 0.2	191 0.2	189 0.1	166 0.1	193 0.2
Asian or Pacific Islander	4,230 3.4	4,233 3.4	4,159 3.3	3,855 3.1	3,899 3.1	3,876 3.0	3,795 3.0
Black/African American non-Hispanic	19,187 15.4	18,873 15.2	18,939 15.0	19,173 15.2	18,878 14.9	18,831 14.8	17,785 13.9
Latino/Hispanic	10,636 8.5	10,408 8.4	9,943 7.9	10,134 8.0	9,975 7.9	9,604 7.6	7,897 6.2
White non-Hispanic	88,236 70.8	88,938 71.4	90,885 72.2	91,106 72.2	92,230 72.7	93,222 73.3	97,191 75.9
Multi-Racial/Ethnic	2,161 1.7	1,857 1.5	1,802 1.4	1,659 1.3	1,675 1.3	1,371 1.1	1,023 0.8
Educational Category and Other Demographic Groups							
IEP (not gifted)	18,237 14.6	16,777 13.5	16,715 13.3	16,395 13.0	16,216 12.8	16,383 12.9	14,617 11.4
Student exited IEP in last 2 years	2,372 1.9	2,928 2.4	3,303 2.6	3,378 2.7	2,874 2.3	2,240 1.8	1,219 1.0
Title I	47,724 38.3	45,376 36.4	42,710 33.9	35,566 28.2	28,610 22.5	27,582 21.7	19,245 15.0
Title III Served	2,429 1.9	2,044 1.6	1,767 1.4	1,566 1.2	1,542 1.2	1,446 1.1	1,092 0.9
Title III Not Served	1,309 1.0	1,198 1.0	996 0.8	923 0.7	912 0.7	902 0.7	738 0.6
Migrant Student	50 0.0	52 0.0	72 0.1	48 0.0	59 0.0	64 0.1	40 0.0
ELL (enrolled after 5-7-10)	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
ELL (enrolled before 5-7-10)	3,753 3.0	3,268 2.6	2,798 2.2	2,524 2.0	2,464 1.9	2,356 1.9	1,853 1.4
Exited ESL/bilingual program and in first year of monitoring	1,184 0.9	1,287 1.0	998 0.8	738 0.6	507 0.4	485 0.4	299 0.2

Table 10–3R (continued). Demographic Characteristics of Students Taking the 2011 PSSA: Reading

Demographic or Educational Characteristic	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
Educational Category and Other Demographic Groups (continued)							
Exited ESL/bilingual program and in second year of monitoring	370 0.3	869 0.7	974 0.8	634 0.5	535 0.4	419 0.3	289 0.2
Former ELL no longer monitored	421 0.3	743 0.6	1,238 1.0	1,815 1.4	2,020 1.6	2,005 1.6	1,446 1.1
Economically Disadvantaged	54,988 44.1	53,309 42.8	52,347 41.6	51,636 40.9	50,724 40.0	48,873 38.4	39,916 31.2
Enrollment							
Current Enrollment in school of residence after 10-1-10	2,965 2.4	2,876 2.3	2,696 2.1	2,625 2.1	2,877 2.3	3,036 2.4	3,157 2.5
Current Enrollment in district of residence after 10-1-10	1,601 1.3	1,543 1.2	1,523 1.2	1,592 1.3	1,768 1.4	1,936 1.5	2,037 1.6
Current Enrollment as PA resident after 10-1-10	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
Enrolled in school of residence after 10-1-09 but on/before 10-1-10	16,126 12.9	16,332 13.1	19,401 15.4	30,870 24.5	25,734 20.3	12,962 10.2	12,414 9.7
Enrolled in district of residence after 10-1-09 but on/before 10-1-10	10,063 8.1	9,436 7.6	9,762 7.7	10,497 8.3	10,490 8.3	9,236 7.3	8,116 6.3
Education in Non-Traditional Settings							
Court/agency placed	44 0.0	47 0.0	72 0.1	105 0.1	199 0.2	363 0.3	682 0.5
Students with reading scores used in state summaries	124,678	124,535	125,963	126,170	126,902	127,125	127,997

Table 10–3S. Demographic Characteristics of Students Taking the 2011 PSSA: Science

Demographic or Educational Characteristic	Gr. 4		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
Gender						
Female	62,588	48.9	62,666	49.3	62,175	49.6
Male	65,475	51.1	64,340	50.6	63,013	50.3
Race/Ethnicity						
American Indian or Alaskan Native	187	0.1	164	0.1	194	0.2
Asian or Pacific Islander	4,371	3.4	3,974	3.1	3,809	3.0
Black/African American non-Hispanic	19,489	15.2	18,734	14.7	16,468	13.1
Latino/Hispanic	10,927	8.5	9,693	7.6	7,508	6.0
White non-Hispanic	91,171	71.2	93,061	73.2	96,212	76.8
Multi-Racial/Ethnic	1,907	1.5	1,361	1.1	985	0.8
Educational Category and Other Demographic Groups						
IEP (not gifted)	20,140	15.7	16,595	13.1	14,223	11.4
Student exited IEP in last 2 years	2,930	2.3	2,232	1.8	1,185	0.9
Title I	46,706	36.5	27,530	21.7	17,643	14.1
Title III - Served	2,433	1.9	1,641	1.3	1,193	1.0
Title III - Not Served	1,406	1.1	1,042	0.8	771	0.6
Migrant Student	63	0.0	65	0.1	40	0.0
ELL (enrolled after 5-7-10)	440	0.3	349	0.3	239	0.2
ELL (enrolled before 5-7-10)	3,424	2.7	2,349	1.8	1,753	1.4
Exited ESL/bilingual program – 1 yr	1,288	1.0	481	0.4	294	0.2
Exited ESL/bilingual program – 2 yr	874	0.7	417	0.3	284	0.2
Former ELL no longer monitored	745	0.6	2,000	1.6	1,362	1.1
Economically Disadvantaged	55,479	43.3	48,848	38.4	38,111	30.4
Enrollment						
Current Enrollment in school of residence after 10-1-10	2,964	2.3	2,935	2.3	2,819	2.2
Current Enrollment in district of residence after 10-1-10	1,601	1.2	1,887	1.5	1,897	1.5
Current Enrollment as PA resident after 10-1-10	0	0.0	0	0.0	0	0.0

Table 10–3S (continued). Demographic Characteristics of Students Taking the 2011 PSSA: Science

Demographic or Educational Characteristic	Gr. 4		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
Enrollment (continued)						
Enrolled in school of residence after 10-1-09 but on/before 10-1-10	17,136	13.4	13,108	10.3	11,993	9.6
Enrolled in district of residence after 10-1-09 but on/before 10-1-10	10,019	7.8	9,413	7.4	7,979	6.4
Education in Non-Traditional Settings						
Court/agency placed	57	0.0	332	0.3	622	0.5
Students with science scores used in state summaries	128,103		127,075		125,307	

Table 10–3W. Demographic Characteristics of Students Taking the 2011 PSSA: Writing

Demographic or Educational Characteristic	Gr. 5		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
Gender						
Female	63,084	49.0	63,705	49.1	63,790	49.5
Male	65,697	51.0	65,846	50.8	64,854	50.4
Race/Ethnicity						
American Indian or Alaskan Native	201	0.2	165	0.1	198	0.2
Asian or Pacific Islander	4,177	3.2	3,882	3.0	3,753	2.9
Black/African American non-Hispanic	19,432	15.1	19,222	14.8	17,294	13.4
Latino/Hispanic	10,144	7.9	9,778	7.5	7,795	6.1
White non-Hispanic	92,997	72.2	95,098	73.4	98,575	76.5
Multi-Racial/Ethnic	1,820	1.4	1,384	1.1	1,017	0.8
Educational Category and Other Demographic Groups						
IEP (not gifted)	20,108	15.6	19,538	15.1	17,456	13.6
Student exited IEP in last 2 years	3,288	2.6	2,218	1.7	1,181	0.9
Title I	43,447	33.7	27,846	21.5	18,430	14.3
Title III - Served	1,807	1.4	1,475	1.1	1,049	0.8
Title III - Not Served	997	0.8	888	0.7	673	0.5
Migrant Student	73	0.1	58	0.0	37	0.0

Table 10–3W (continued). Demographic Characteristics of Students Taking the 2011 PSSA: Writing

Demographic or Educational Characteristic	Gr. 5		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
Educational Category and Other Demographic Groups (continued)						
ELL (enrolled after 5-7-10)	0	0.0	0	0.0	0	0.0
ELL (enrolled before 5-7-10)	2,837	2.2	2,371	1.8	1,741	1.4
Exited ESL/bilingual program – 1 yr	1,008	0.8	487	0.4	298	0.2
Exited ESL/bilingual program – 2 yr	978	0.8	426	0.3	297	0.2
Former ELL no longer monitored	1,252	1.0	2,031	1.6	1,421	1.1
Economically Disadvantaged	53,980	41.9	50,243	38.8	40,012	31.1
Enrollment						
Current Enrollment in school of residence after 10-1-10	2,689	2.1	2,955	2.3	2,877	2.2
Current Enrollment in district of residence after 10-1-10	1,517	1.2	1,912	1.5	1,929	1.5
Current Enrollment as PA resident after 10-1-10	0	0.0	0	0.0	0	0.0
Enrolled in school of residence after 10-1-09 but on/before 10-1-10	19,753	15.3	13,168	10.2	12,251	9.5
Enrolled in district of residence after 10-1-09 but on/before 10-1-10	9,904	7.7	9,390	7.2	8,056	6.3
Education in Non-Traditional Settings						
Court/agency placed	67	0.1	335	0.3	629	0.5
Students with writing scores used in state summaries	128,833		129,619		128,775	

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, PSSA-M, and Keystone (paper/pencil) Accommodations Guidelines for Students with IEPs and Students with 504 Plans* was updated for use with the 2011 PSSA. The manual can be accessed at www.education.state.pa.us. On the left, select “Programs,” “Programs O–R,” “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 10–4M 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 2011 PSSA varied by subject as follows: mathematics and science, 13; reading, 9; and writing, 11. As depicted in Tables 10–4M through 10–4W, the actual frequencies were quite low, generally representing less than two-tenths of one percent of assessed students statewide (70 to 79 percent of the instances depending on subject area). Frequencies of less than one-tenth of one percent ranged from 44 to 54 percent. The most notable exceptions were test directions read aloud (each subject), test items read aloud (mathematics and science), and writing prompts read aloud (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 2011 PSSA varied by subject as follows: mathematics and science, 12, reading, 9, and writing, 8. Summarized in Tables 10–5M through 10–5W is the frequency with which these accommodations were utilized, most of which are quite low. Frequencies less than two-tenths of one percent ranged from 72 to 92 percent of the instances; frequencies less than one-tenth of one percent ranged from 52 to 69 percent.

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 2011 PSSA. As depicted in Tables 10–6M through 10–6W, the most common accommodation was small group testing with frequencies that often doubled that of testing in a separate setting, which was also heavily used. For mathematics and reading 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 2011 PSSA for each subject area. As depicted in Tables 10–7M through 10–7W, the most common accommodations were scheduled extended time and requested extended time. For mathematics and reading, usage of scheduled extended time peaked at Grade 5 while requested scheduled time steadily increased from Grade 3 to 5 then leveled out to a fairly even pattern. Science and Writing demonstrated a clear and consistent pattern as scheduled extended time diminished across grades while usage of requested scheduled time peaked at Grade 8.

Table 10–4M. Incidence of Presentation Accommodations Received on the 2011 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	7 0.0	7 0.0	5 0.0	7 0.0	6 0.0	9 0.0	4 0.0
Large Print Format	104 0.1	77 0.1	103 0.1	74 0.1	72 0.1	61 0.0	55 0.0
Audio CD	1 0.0	16 0.0	10 0.0	0 0.0	1 0.0	2 0.0	0 0.0
Electronic Screen Reader	1 0.0	3 0.0	2 0.0	5 0.0	0 0.0	2 0.0	1 0.0
Test directions read aloud (provided by live reader)	6,840 5.5	6,489 5.2	5,830 4.6	4,163 3.3	2,983 2.3	2,559 2.0	1,427 1.1
Test directions signed, interpreted for ELL student, or recorded	223 0.2	157 0.1	147 0.1	126 0.1	113 0.1	92 0.1	101 0.1
Test items/questions read aloud (provided by live reader) or signed	12,963 10.4	11,767 9.4	10,694 8.4	6,909 5.5	4,315 3.4	3,273 2.6	800 0.6
Test items/questions interpreted for ELL student	214 0.2	154 0.1	147 0.1	97 0.1	131 0.1	109 0.1	53 0.0
Amplification device	65 0.1	30 0.0	33 0.0	38 0.0	16 0.0	15 0.0	7 0.0
Magnification device	8 0.0	7 0.0	14 0.0	14 0.0	9 0.0	8 0.0	10 0.0
Reading windows, reading guides	258 0.2	275 0.2	180 0.1	97 0.1	40 0.0	15 0.0	6 0.0
Other (per <i>Accommodations Guidelines</i>)	306 0.2	331 0.3	302 0.2	218 0.2	167 0.1	216 0.2	102 0.1
Spanish version for mathematics	93 0.1	119 0.1	152 0.1	191 0.2	230 0.2	245 0.2	233 0.2

Table 10–4R. Incidence of Presentation Accommodations Received on the 2011 PSSA: Reading

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	8 0.0	6 0.0	5 0.0	8 0.0	7 0.0	9 0.0	6 0.0
Large Print Format	102 0.1	75 0.1	94 0.1	69 0.1	73 0.1	66 0.1	56 0.0
Electronic Screen Reader	0 0.0	3 0.0	3 0.0	5 0.0	0 0.0	4 0.0	1 0.0
Test directions read aloud (provided by live reader)	5,790 4.6	5,271 4.2	4,993 4.0	3,661 2.9	2,724 2.1	2,462 1.9	1,365 1.1
Test directions signed, interpreted for ELL student, or recorded	147 0.1	107 0.1	101 0.1	80 0.1	92 0.1	66 0.1	93 0.1
Amplification device	73 0.1	56 0.0	41 0.0	48 0.0	19 0.0	21 0.0	8 0.0
Magnification device	13 0.0	9 0.0	20 0.0	13 0.0	6 0.0	9 0.0	9 0.0
Reading windows, reading guides	964 0.8	634 0.5	414 0.3	222 0.2	79 0.1	52 0.0	12 0.0
Other (per <i>Accommodations Guidelines</i>)	338 0.3	345 0.3	350 0.3	212 0.2	193 0.2	256 0.2	122 0.1

Table 10–4S. Incidence of Presentation Accommodations Received on the 2011 PSSA: Science

Type of Presentation Accommodation	Gr. 4		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
Braille Format	8	0.0	6	0.0	6	0.0
Large Print Format	76	0.1	54	0.0	48	0.0
Audio CD	11	0.0	1	0.0	0	0.0
Electronic Screen Reader	0	0.0	3	0.0	1	0.0
Test directions read aloud (provided by live reader)	5,897	4.6	2,127	1.7	1,087	0.9
Test directions signed, interpreted for ELL student, or recorded	161	0.1	82	0.1	94	0.1
Test items/questions read aloud (provided by live reader) or signed	12,073	9.4	2,578	2.0	629	0.5
Test items/questions interpreted for ELL student	140	0.1	50	0.0	35	0.0
Amplification device	45	0.0	12	0.0	6	0.0
Magnification device	8	0.0	6	0.0	5	0.0
Reading windows, reading guides	165	0.1	8	0.0	5	0.0
Other (per <i>Accommodations Guidelines</i>)	172	0.1	130	0.1	78	0.1
Spanish version for science	177	0.1	299	0.2	255	0.2

Table 10–4W. Incidence of Presentation Accommodations Received on the 2011 PSSA: Writing

Type of Presentation Accommodation	Gr. 5		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
Braille Format	7	0.0	6	0.0	8	0.0
Large Print Format	85	0.1	67	0.1	58	0.0
Electronic Screen Reader	3	0.0	3	0.0	5	0.0
Test directions read aloud (provided by live reader)	5,260	4.1	2,704	2.1	1,409	1.1
Test directions signed, interpreted for ELL student, or recorded	73	0.1	78	0.1	97	0.1
Writing prompts read aloud	8,156	6.3	3,232	2.5	1,382	1.1
Writing prompts signed, interpreted for ELL student, or recorded	53	0.0	42	0.0	54	0.0
Amplification device	22	0.0	13	0.0	10	0.0
Magnification device	13	0.0	9	0.0	13	0.0
Reading windows, reading guides	169	0.1	20	0.0	9	0.0
Other	232	0.2	221	0.2	137	0.1

**Table 10–5M. Incidence of Response Accommodations
Received on the 2011 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	N / Pct	N / Pct	N / Pct	N / Pct
Test administrator marked multiple-choice responses	214 0.2	531 0.4	433 0.3	264 0.2	155 0.1	158 0.1	34 0.0
Test administrator scribed open-ended responses at student’s direction	1,135 0.9	803 0.6	591 0.5	342 0.3	178 0.1	125 0.1	49 0.0
Test administrator transcribed student responses	427 0.3	452 0.4	446 0.4	292 0.2	243 0.2	180 0.1	79 0.1
Qualified interpreter for ELL student	30 0.0	15 0.0	32 0.0	14 0.0	23 0.0	17 0.0	46 0.0
Typewriter, word processor, or computer	11 0.0	30 0.0	39 0.0	42 0.0	44 0.0	45 0.0	12 0.0
Braille/Notetaker	3 0.0	3 0.0	2 0.0	5 0.0	3 0.0	3 0.0	4 0.0
Augmentative communication device	2 0.0	3 0.0	1 0.0	1 0.0	1 0.0	2 0.0	0 0.0
Audio recording of student responses	1 0.0	0 0.0	1 0.0	0 0.0	0 0.0	0 0.0	1 0.0
Electronic Screen Reader	0 0.0	1 0.0	0 0.0	2 0.0	0 0.0	1 0.0	2 0.0
Manipulative	415 0.3	176 0.1	90 0.1	52 0.0	10 0.0	22 0.0	1 0.0
Translation dictionary for ELL student	35 0.0	70 0.1	52 0.0	73 0.1	100 0.1	89 0.1	227 0.2
Other (approved by PDE)	78 0.1	118 0.1	121 0.1	87 0.1	80 0.1	92 0.1	38 0.0

**Table 10–5R. Incidence of Response Accommodations
Received on the 2011 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	214 0.2	475 0.4	417 0.3	266 0.2	166 0.1	157 0.1	38 0.0
Test administrator scribed open-ended	1,209 1.0	806 0.6	715 0.6	399 0.3	219 0.2	168 0.1	50 0.0
Test administrator transcribed student responses	467 0.4	501 0.4	542 0.4	359 0.3	324 0.3	269 0.2	120 0.1
Typewriter, word processor, or computer	24 0.0	57 0.0	136 0.1	109 0.1	136 0.1	149 0.1	60 0.0
Braille/Notetaker	3 0.0	3 0.0	3 0.0	5 0.0	2 0.0	5 0.0	7 0.0
Augmentative communication device	2 0.0	3 0.0	2 0.0	2 0.0	2 0.0	1 0.0	0 0.0
Audio recording of student responses	1 0.0	0 0.0	0 0.0	1 0.0	1 0.0	0 0.0	1 0.0
Electronic Screen Reader	0 0.0	2 0.0	1 0.0	2 0.0	0 0.0	1 0.0	3 0.0
Other (approved by PDE)	90 0.1	112 0.1	131 0.1	86 0.1	82 0.1	104 0.1	43 0.0

**Table 10–5S. Incidence of Response Accommodations
Received on the 2011 PSSA: Science**

Type of Response Accommodation	Gr. 4		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
Test administrator marked multiple-choice responses at student’s direction	672	0.5	134	0.1	37	0.0
Test administrator scribed open-ended responses at student’s direction	1,018	0.8	131	0.1	45	0.0
Test administrator transcribed student responses	579	0.5	161	0.1	83	0.1
Qualified interpreter for ELL student	15	0.0	19	0.0	23	0.0
Typewriter, word processor, or computer	28	0.0	88	0.1	36	0.0
Braille/Notetaker	5	0.0	3	0.0	3	0.0
Augmentative communication device	1	0.0	1	0.0	1	0.0
Audio recording of student responses	0	0.0	0	0.0	1	0.0
Electronic Screen Reader	0	0.0	2	0.0	1	0.0
Manipulative	1	0.0	5	0.0	0	0.0
Translation dictionary for ELL student	50	0.0	96	0.1	138	0.1
Other (approved by PDE)	57	0.0	68	0.1	36	0.0

**Table 10–5W. Incidence of Response Accommodations
Received on the 2011 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	145	0.1	111	0.1	31	0.0
Test administrator transcribed student responses	1,077	0.8	494	0.4	282	0.2
Typewriter, word processor, or computer	348	0.3	306	0.2	206	0.2
Braille/Notetaker	5	0.0	4	0.0	7	0.0
Augmentative communication device	2	0.0	0	0.0	4	0.0
Audio recording of student responses	4	0.0	0	0.0	4	0.0
Electronic Screen Reader	1	0.0	3	0.0	17	0.0
Other (approved by PDE)	105	0.1	118	0.1	60	0.0

**Table 10–6M. Incidence of Setting Accommodations
Received on the 2011 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	63 0.1	44 0.0	55 0.0	64 0.1	63 0.0	55 0.0	102 0.1
Separate Setting	8,615 6.9	8,344 6.6	7,593 6.0	5,302 4.2	4,079 3.2	3,914 3.1	2,502 2.0
Small Group Testing	16,788 13.5	16,479 13.1	15,007 11.9	11,908 9.4	10,075 7.9	9,603 7.6	6,639 5.2
Other (PDE Approved)	100 0.1	112 0.1	184 0.1	138 0.1	75 0.1	102 0.1	36 0.0

**Table 10–6R. Incidence of Setting Accommodations
Received on the 2011 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	58 0.0	41 0.0	52 0.0	64 0.1	66 0.1	57 0.0	96 0.1
Separate Setting	8,649 6.9	7,931 6.4	7,362 5.8	5,185 4.1	4,078 3.2	4,019 3.2	2,545 2.0
Small Group Testing	16,575 13.3	15,439 12.4	14,393 11.4	11,562 9.2	10,069 7.9	9,804 7.7	6,799 5.3
Other (PDE Approved)	99 0.1	118 0.1	189 0.2	141 0.1	79 0.1	110 0.1	38 0.0

**Table 10–6S. Incidence of Setting Accommodations
Received on the 2011 PSSA: Science**

Type of Setting Accommodation	Gr. 4		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
Hospital/Home Testing	42	0.0	47	0.0	71	0.1
Separate Setting	7,982	6.2	3,736	2.9	2,105	1.7
Small Group Testing	14,943	11.7	8,418	6.6	6,037	4.8
Other (PDE Approved)	64	0.0	90	0.1	11	0.0

**Table 10–6W. Incidence of Setting Accommodations
Received on the 2011 PSSA: Writing**

Type of Setting Accommodation	Gr. 5		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
Hospital/Home Testing	43	0.0	49	0.0	81	0.1
Separate Setting	7,313	5.7	4,508	3.5	2,770	2.2
Small Group Testing	13,515	10.5	10,001	7.7	7,706	6.0
Other (PDE Approved)	70	0.1	87	0.1	32	0.0

**Table 10–7M. Incidence of Timing Accommodations
Received on the 2011 PSSA: Mathematics**

Type of Timing 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
Scheduled Extended Time	4,659 3.7	4,660 3.7	5,342 4.2	4,272 3.4	3,762 3.0	3,682 2.9	3,079 2.4
Requested Extended Time	1,190 1.0	2,042 1.6	4,204 3.3	3,449 2.7	4,254 3.3	4,349 3.4	4,735 3.7
Multiple Test Sessions	786 0.6	755 0.6	952 0.8	805 0.6	795 0.6	883 0.7	633 0.5
Changed Test Schedule	355 0.3	285 0.2	260 0.2	217 0.2	230 0.2	237 0.2	196 0.2

**Table 10–7R. Incidence of Timing Accommodations
Received on the 2011 PSSA: Reading**

Type of Timing 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
Scheduled Extended Time	4,865 3.9	4,568 3.7	5,254 4.2	4,254 3.4	3,491 2.8	3,485 2.7	3,042 2.4
Requested Extended Time	1,961 1.6	2,671 2.1	3,875 3.1	4,024 3.2	3,885 3.1	4,033 3.2	3,775 2.9
Multiple Test Sessions	784 0.6	717 0.6	906 0.7	825 0.7	807 0.6	912 0.7	659 0.5
Changed Test Schedule	373 0.3	310 0.2	276 0.2	208 0.2	222 0.2	230 0.2	202 0.2

Table 10–7S. Incidence of Timing Accommodations Received on the 2011 PSSA: Science

Type of Timing Accommodation	Gr. 4		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
Scheduled Extended Time	3,845	3.0	2,589	2.0	1,789	1.4
Requested Extended Time	1,567	1.2	3,117	2.5	1,396	1.1
Multiple Test Sessions	656	0.5	610	0.5	444	0.4
Changed Test Schedule	172	0.1	152	0.1	181	0.1

Table 10–7W. Incidence of Timing Accommodations Received on the 2011 PSSA: Writing

Type of Timing Accommodation	Gr. 5		Gr. 8		Gr. 11	
	N	Pct	N	Pct	N	Pct
Scheduled Extended Time	4,457	3.5	3,207	2.5	2,508	1.9
Requested Extended Time	4,333	3.4	5,222	4.0	2,745	2.1
Multiple Test Sessions	842	0.7	932	0.7	593	0.5
Changed Test Schedule	256	0.2	210	0.2	188	0.1

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 10–8M 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: mathematics and science, 33, reading, 26, 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 10–8M 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 Grade 3 mathematics test (see Table 10–8M), 9.8 percent received an accommodation of some type as contrasted with 58.7 percent of IEP students. For mathematics and reading, the percentage of accommodated IEP students reached a peak at Grade 5 before diminishing slightly through Grade 11. Science and writing, displayed similar size usage drops when compared with corresponding grade levels of the other two subject areas.

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
Non-IEP Students	106,489	107,788	109,269	109,827	110,733	110,818	113,507
Non-Accommodated	96,086 90.2	97,692 90.6	98,558 90.2	102,498 93.3	104,280 94.2	104,322 94.1	107,417 94.6
Accommodated	10,403 9.8	10,096 9.4	10,711 9.8	7,329 6.7	6,453 5.8	6,496 5.9	6,090 5.4
IEP Students	18,260	17,816	17,309	16,803	16,260	15,968	14,290
Non-Accommodated	7,541 41.3	6,979 39.2	6,077 35.1	6,460 38.4	6,339 39.0	6,620 41.5	7,421 51.9
Accommodated	10,719 58.7	10,837 60.8	11,232 64.9	10,343 61.6	9,921 61.0	9,348 58.5	6,869 48.1

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
Non-IEP Students	106,441	107,758	109,248	109,775	110,686	110,742	113,380
Non-Accommodated	96,578 90.7	97,868 90.8	99,569 91.1	102,182 93.1	104,916 94.8	104,767 94.6	108,301 95.5
Accommodated	9,863 9.3	9,890 9.2	9,679 8.9	7,593 6.9	5,770 5.2	5,975 5.4	5,079 4.5
IEP Students	18,237	16,777	16,715	16,395	16,216	16,383	14,617
Non-Accommodated	7,672 42.1	6,931 41.3	6,172 36.9	6,428 39.2	6,477 39.9	6,846 41.8	7,623 52.2
Accommodated	10,565 57.9	9,846 58.7	10,543 63.1	9,967 60.8	9,739 60.1	9,537 58.2	6,994 47.8

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
Non-IEP Students	107,693		110,480		111,084	
Non-Accommodated	100,486	93.1	105,578	95.6	108,647	97.8
Accommodated	7,477	6.9	4,902	4.4	2,437	2.2
IEP Students	20,140		16,595		14,223	
Non-Accommodated	8,620	42.8	8,019	48.3	8,194	57.6
Accommodated	11,520	57.2	8,576	51.7	6,029	42.4

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
Non-IEP Students	108,725		110,081		111,319	
Non-Accommodated	100,710	92.6	103,250	93.8	107,739	96.8
Accommodated	8,015	7.4	6,831	6.2	3,580	3.2
IEP Students	20,108		19,538		17,456	
Non-Accommodated	8,186	40.7	9,008	46.1	9,517	54.5
Accommodated	11,922	59.3	10,530	53.9	7,939	45.5

THE INCIDENCE OF ACCOMMODATIONS AND IEP AND ELL STATUS

As noted in Tables 10–8M 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 10–4M through 10–7W, the most frequently occurring accommodations for assessed students were as follows:

- 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 10–9M 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 May 7, 2010. 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 May 7, 2010 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 may 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 10–9M 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 10–9M through 10–9W. Among the accommodations requested extended time displayed the least differentiation among the four comparison groups. Scheduled extended time was the only accommodation that had the largest frequency at all seven grades. A similar pattern was observed for mathematics test items/questions read aloud or signed and scheduled extended time were the only accommodations with the largest frequency at all seven grades.

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, mathematics with six accommodations displayed and seven assessed grade levels results in 42 possible instances. There are 35 instances for reading, 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 students, neither IEP nor ELL, 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 15 of 42 instances for mathematics and in 13 of 35 instances for reading. Similar results were observed for the other subject areas: science (12 of 18 instances, mainly Grades 8 and 11), and writing (12 of 18 instances, mainly Grades 8 and 11).
- The IEP and non-ELL students generally had the second largest percentage of these accommodations. The pattern for mathematics was largest in 10 instances and second largest in 27 instances. For reading, largest in 11 and second largest percentage in 18 instances. A similar pattern was observed for science in which the second largest percentage occurred in 10 instances, and largest or tied for largest in two instances. In the case of writing (largest or tied for largest in eight instances, and second largest in seven instances).
- The ELL and non-IEP students received a larger percentage 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 (27 of 35), mathematics (35 of 42), science (14 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 percentage of these accommodations for mathematics in which the largest percentage occurred in 30 of 42 instances, tied for largest in two instances and second largest percentage in eight instances. Reading was largest percentage in 22 of 35 instances, tied for largest in two instances and second largest percentage in eight instances. Science (largest percentage in 12 of 18 instances, tied for largest in one instance, and second largest in three instances). Writing (largest percentage in seven of 18 instances, tied for largest in five instances and second largest in four instances).

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

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	1,335	1.3	4,780	27.0	515	16.0	210	38.9
Test items/questions read aloud or signed	4,091	4.0	7,543	42.6	1,029	31.9	300	55.6
Tested in separate setting	2,716	2.6	4,996	28.2	717	22.2	186	34.4
Small group testing	5,993	5.8	9,164	51.7	1,269	39.3	362	67.0
Scheduled extended time	1,132	1.1	3,121	17.6	277	8.6	129	23.9
Requested extended time	712	0.7	367	2.1	95	2.9	16	3.0
Column N for Gr. 3	103,261		17,720		3,228		540	
Gr. 4	N	Pct	N	Pct	N	Pct	N	Pct
Test directions read aloud	1,118	1.1	4,836	28.1	332	12.1	203	34.5
Test items/questions read aloud or signed	3,292	3.1	7,352	42.7	776	28.4	347	59.0
Tested in separate setting	2,688	2.6	4,923	28.6	524	19.2	209	35.5
Small group testing	5,840	5.6	9,205	53.4	1,039	38.0	395	67.2
Scheduled extended time	994	0.9	3,198	18.6	282	10.3	186	31.6
Requested extended time	1,355	1.3	556	3.2	101	3.7	30	5.1
Column N for Gr. 4	105,055		17,228		2,733		588	
Gr. 5	N	Pct	N	Pct	N	Pct	N	Pct
Test directions read aloud	713	0.7	4,622	27.6	312	13.7	183	33.4
Test items/questions read aloud or signed	2,730	2.6	7,079	42.2	586	25.7	299	54.6
Tested in separate setting	2,059	1.9	4,990	29.8	378	16.6	166	30.3
Small group testing	4,401	4.1	9,425	56.2	824	36.2	357	65.1
Scheduled extended time	1,543	1.4	3,395	20.3	259	11.4	145	26.5
Requested extended time	3,246	3.0	822	4.9	95	4.2	41	7.5
Column N for Gr. 5	106,993		16,761		2,276		548	
Gr. 6	N	Pct	N	Pct	N	Pct	N	Pct
Test directions read aloud	468	0.4	3,417	21.0	171	8.4	107	20.7
Test items/questions read aloud or signed	1,155	1.1	5,284	32.4	298	14.6	172	33.3
Tested in separate setting	1,316	1.2	3,669	22.5	208	10.2	109	21.1

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

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. 6 (continued)	N	Pct	N	Pct	N	Pct	N	Pct
Small group testing	2,642	2.5	8,513	52.3	476	23.4	277	53.6
Scheduled extended time	1,157	1.1	2,784	17.1	219	10.8	112	21.7
Requested extended time	2,438	2.3	875	5.4	96	4.7	40	7.7
Column N for Gr. 6	107,790		16,286		2,037		517	
Gr. 7	N	Pct	N	Pct	N	Pct	N	Pct
Test directions read aloud	276	0.3	2,502	15.9	120	6.1	85	16.1
Test items/ questions read aloud or signed	462	0.4	3,483	22.1	201	10.2	169	32.0
Tested in separate setting	725	0.7	3,089	19.6	152	7.7	113	21.4
Small group testing	1,376	1.3	8,060	51.2	389	19.7	250	47.3
Scheduled extended time	1,188	1.1	2,313	14.7	155	7.9	106	20.1
Requested extended time	2,985	2.7	1,113	7.1	106	5.4	50	9.5
Column N for Gr. 7	108,760		15,732		1,973		528	
Gr. 8	N	Pct	N	Pct	N	Pct	N	Pct
Test directions read aloud	242	0.2	2,168	13.9	102	5.1	47	12.2
Test items/questions read aloud or signed	310	0.3	2,726	17.5	137	6.9	100	26.0
Tested in separate setting	717	0.7	2,969	19.1	165	8.3	63	16.4
Small group testing	1,407	1.3	7,665	49.2	370	18.7	161	41.9
Scheduled extended time	1,208	1.1	2,196	14.1	215	10.8	63	16.4
Requested extended time	3,133	2.9	1,050	6.7	116	5.9	50	13.0
Column N for Gr. 8	108,836		15,584		1,982		384	
Gr. 11	N	Pct	N	Pct	N	Pct	N	Pct
Test directions read aloud	60	0.1	1,244	8.8	109	6.2	14	12.2
Test items/ questions read aloud or signed	53	0.0	687	4.8	52	3.0	8	7.0
Tested in separate setting	308	0.3	2,053	14.5	131	7.5	10	8.7
Small group testing	802	0.7	5,477	38.6	326	18.6	34	29.6
Scheduled extended time	1,005	0.9	1,880	13.3	184	10.5	10	8.7
Requested extended time	3,526	3.2	829	5.8	367	21.0	13	11.3
Column N for Gr. 11	111,759		14,175		1,748		115	

Table 10–9R. Incidence of IEP and ELL Students Receiving Selected Accommodations: 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	935	0.9	4,265	24.1	393	12.2	197	36.6
Tested in separate setting	2,759	2.7	5,020	28.4	685	21.3	185	34.4
Small group testing	5,924	5.7	9,063	51.2	1,230	38.3	358	66.5
Scheduled extended time	1,281	1.2	3,162	17.9	293	9.1	129	24.0
Requested extended time	1,355	1.3	464	2.6	127	4.0	15	2.8
Column N for Gr. 3	103,226		17,699		3,215		538	
Gr. 4	N	Pct	N	Pct	N	Pct	N	Pct
Test directions read aloud	867	0.8	3,992	24.6	241	8.9	171	31.3
Tested in separate setting	2,755	2.6	4,467	27.5	524	19.3	185	33.8
Small group testing	5,755	5.5	8,303	51.2	1,030	37.9	351	64.2
Scheduled extended time	1,072	1.0	3,030	18.7	293	10.8	173	31.6
Requested extended time	1,872	1.8	642	4.0	120	4.4	37	6.8
Column N for Gr. 4	105,037		16,230		2,721		547	
Gr. 5	N	Pct	N	Pct	N	Pct	N	Pct
Test directions read aloud	528	0.5	4,053	25.0	253	11.2	159	29.8
Tested in separate setting	2,124	2.0	4,714	29.1	362	16.0	162	30.3
Small group testing	4,343	4.1	8,918	55.1	788	34.8	344	64.4
Scheduled extended time	1,523	1.4	3,322	20.5	266	11.7	143	26.8
Requested extended time	2,938	2.7	784	4.8	120	5.3	33	6.2
Column N for Gr. 5	106,984		16,181		2,264		534	
Gr. 6	N	Pct	N	Pct	N	Pct	N	Pct
Test directions read aloud	416	0.4	3,016	19.0	151	7.4	78	15.7
Tested in separate setting	1,354	1.3	3,527	22.2	205	10.1	99	19.9
Small group testing	2,601	2.4	8,222	51.7	474	23.4	265	53.3
Scheduled extended time	1,204	1.1	2,725	17.1	218	10.8	107	21.5
Requested extended time	2,983	2.8	893	5.6	105	5.2	43	8.7
Column N for Gr. 6	107,748		15,898		2,027		497	

Table 10–9R (continued). Incidence of IEP and ELL Students Receiving Selected Accommodations: 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. 7	N	Pct	N	Pct	N	Pct	N	Pct
Test directions read aloud	244	0.2	2,303	14.7	104	5.3	73	14.5
Tested in separate setting	768	0.7	3,057	19.5	146	7.4	107	21.3
Small group testing	1,405	1.3	8,039	51.2	390	19.9	235	46.7
Scheduled extended time	912	0.8	2,307	14.7	165	8.4	107	21.3
Requested extended time	2,704	2.5	1,044	6.6	93	4.7	44	8.7
Column N for Gr. 7	108,725		15,713		1,961		503	
Gr. 8	N	Pct	N	Pct	N	Pct	N	Pct
Test directions read aloud	215	0.2	2,120	13.3	82	4.2	45	11.6
Tested in separate setting	711	0.7	3,082	19.3	157	8.0	69	17.7
Small group testing	1,397	1.3	7,885	49.3	361	18.4	161	41.4
Scheduled extended time	1,042	1.0	2,172	13.6	209	10.6	62	15.9
Requested extended time	2,845	2.6	1,027	6.4	121	6.2	40	10.3
Column N for Gr. 8	108,775		15,994		1,967		389	
Gr. 11	N	Pct	N	Pct	N	Pct	N	Pct
Test directions read aloud	60	0.1	1,217	8.4	76	4.4	12	10.3
Tested in separate setting	312	0.3	2,094	14.4	130	7.5	9	7.7
Small group testing	815	0.7	5,628	38.8	323	18.6	33	28.2
Scheduled extended time	977	0.9	1,886	13.0	170	9.8	9	7.7
Requested extended time	2,675	2.4	759	5.2	328	18.9	13	11.1
Column N for Gr. 11	111,644		14,500		1,736		117	

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

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. 4	N	Pct	N	Pct	N	Pct	N	Pct
Test directions read aloud	709	0.7	4,700	24.2	270	8.6	218	29.4
Test items/questions read aloud or signed	2,799	2.7	8,149	42.0	752	24.1	373	50.3
Tested in separate setting	1,929	1.8	5,354	27.6	454	14.5	245	33.1
Small group testing	3,848	3.7	9,745	50.2	927	29.7	423	57.1
Scheduled extended time	558	0.5	2,879	14.8	241	7.7	167	22.5
Requested extended time	1,014	1.0	448	2.3	76	2.4	29	3.9
Column N for Gr. 4	104,840		19,399		3,123		741	
Gr. 8	N	Pct	N	Pct	N	Pct	N	Pct
Test directions read aloud	148	0.1	1,815	11.2	115	5.1	49	11.4
Test items/questions read aloud or signed	210	0.2	2,157	13.3	123	5.4	88	20.5
Tested in separate setting	627	0.6	2,875	17.8	165	7.3	69	16.0
Small group testing	1,034	1.0	6,925	42.8	308	13.6	151	35.1
Scheduled extended time	759	0.7	1,600	9.9	169	7.5	61	14.2
Requested extended time	2,135	2.0	804	5.0	138	6.1	40	9.3
Column N for Gr. 8	108,212		16,165		2,268		430	
Gr. 11	N	Pct	N	Pct	N	Pct	N	Pct
Test directions read aloud	55	0.1	953	6.8	65	3.5	14	12.6
Test items/questions read aloud or signed	34	0.0	555	3.9	31	1.6	9	8.1
Tested in separate setting	233	0.2	1,759	12.5	108	5.7	5	4.5
Small group testing	627	0.6	5,171	36.6	202	10.7	37	33.3
Scheduled extended time	322	0.3	1,362	9.7	97	5.2	8	7.2
Requested extended time	813	0.7	384	2.7	196	10.4	3	2.7
Column N for Gr. 11	109,203		14,112		1,881		111	

Table 10–9W. Incidence of IEP and ELL Students Receiving Selected Accommodations: 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	393	0.4	4,542	23.3	166	7.6	159	24.8
Prompts read aloud	986	0.9	6,611	34.0	315	14.3	244	38.1
Tested in separate setting	1,518	1.4	5,415	27.8	203	9.2	177	27.7
Small group testing	2,727	2.6	9,987	51.3	467	21.3	334	52.2
Scheduled extended time	1,000	0.9	3,181	16.3	161	7.3	115	18.0
Requested extended time	3,446	3.2	804	4.1	64	2.9	19	3.0
Column N for Gr. 5	106,528		19,468		2,197		640	
Gr. 8	N	Pct	N	Pct	N	Pct	N	Pct
Test directions read aloud	165	0.2	2,395	12.6	79	4.2	65	13.6
Prompts read aloud	304	0.3	2,725	14.3	102	5.4	101	21.1
Tested in separate setting	699	0.6	3,603	18.9	118	6.2	88	18.4
Small group testing	1,019	0.9	8,545	44.8	249	13.2	188	39.2
Scheduled extended time	1,041	1.0	1,979	10.4	124	6.6	63	13.2
Requested extended time	3,982	3.7	1,113	5.8	82	4.3	45	9.4
Column N for Gr. 8	108,189		19,059		1,892		479	
Gr. 11	N	Pct	N	Pct	N	Pct	N	Pct
Test directions read aloud	62	0.1	1,258	7.3	76	4.8	13	8.4
Prompts read aloud	53	0.0	1,267	7.3	45	2.8	17	11.0
Tested in separate setting	241	0.2	2,430	14.0	92	5.8	7	4.5
Small group testing	699	0.6	6,723	38.9	234	14.7	50	32.5
Scheduled extended time	547	0.5	1,850	10.7	99	6.2	12	7.8
Requested extended time	1,928	1.8	665	3.8	144	9.1	8	5.2
Column N for Gr. 11	109,732		17,302		1,587		154	

GLOSSARY OF ACCOMMODATION TERMS

Table 10–10 provides brief descriptions of accommodation terms as they are used in the PSSA and PSSA-M. 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 of each accommodation abstracted from the *PSSA, PSSA-M, and Keystone (paper/pencil) Accommodations Guidelines for Students with IEPs and Students with 504 Plans*. This manual can be found at www.education.state.pa.us. On the left, select “Programs,” “Programs O–R,” “Pennsylvania System of School Assessment (PSSA),” and then “Testing Accommodations & Security.”

Table 10–10. Glossary of Accommodation Terms as Applied in the PSSA and PSSA-M

Type of Testing Accommodation	Explanation
Student used the following Presentation Accommodations	
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. The interpreter may translate, but not define, specific words or test questions on the mathematics and science tests. On the reading test, the interpreter 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.
Audio CD Format	An audio CD version of mathematics and science test items/questions may be taken by students with severe hearing disabilities as documented by their IEP.

**Table 10–10 (continued). Glossary of Accommodation Terms
as Applied in the PSSA and PSSA-M**

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.
Student used the following Response Accommodations	
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, it may only be used without a thesaurus, spelling 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 dictates 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 and the test administrator will mark 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 assessments, 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 the 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.)

Table 10–10 (continued). Glossary of Accommodation Terms as Applied in the PSSA and PSSA-M

Type of Testing Accommodation	Explanation
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.
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.
Student used the following Setting Accommodations	
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.
Student used the following Timing Accommodations	
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 whether 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 of students 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. Therefore, this is also the proportion correct for the item, or the p -value. In theory, p -values can range from 0.00⁹ 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. (As a result of this, some assert that this index would be more accurately referred to as the item's easiness.)

⁹ 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 discrimination¹⁰ 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.¹¹ 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., the items 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.

¹⁰ 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.

¹¹ 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 including the following:

- Minimum and maximum values are listed.
- Mean scores are indicated by the red dot.
- P_{25} , P_{50} , and P_{75} are indicated by the red lines.
- 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 0.61 to 0.87, while the mean proportion-correct values for the OE items ranged from about 0.39 to 0.74. Most means were generally close to their historic values¹² 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.

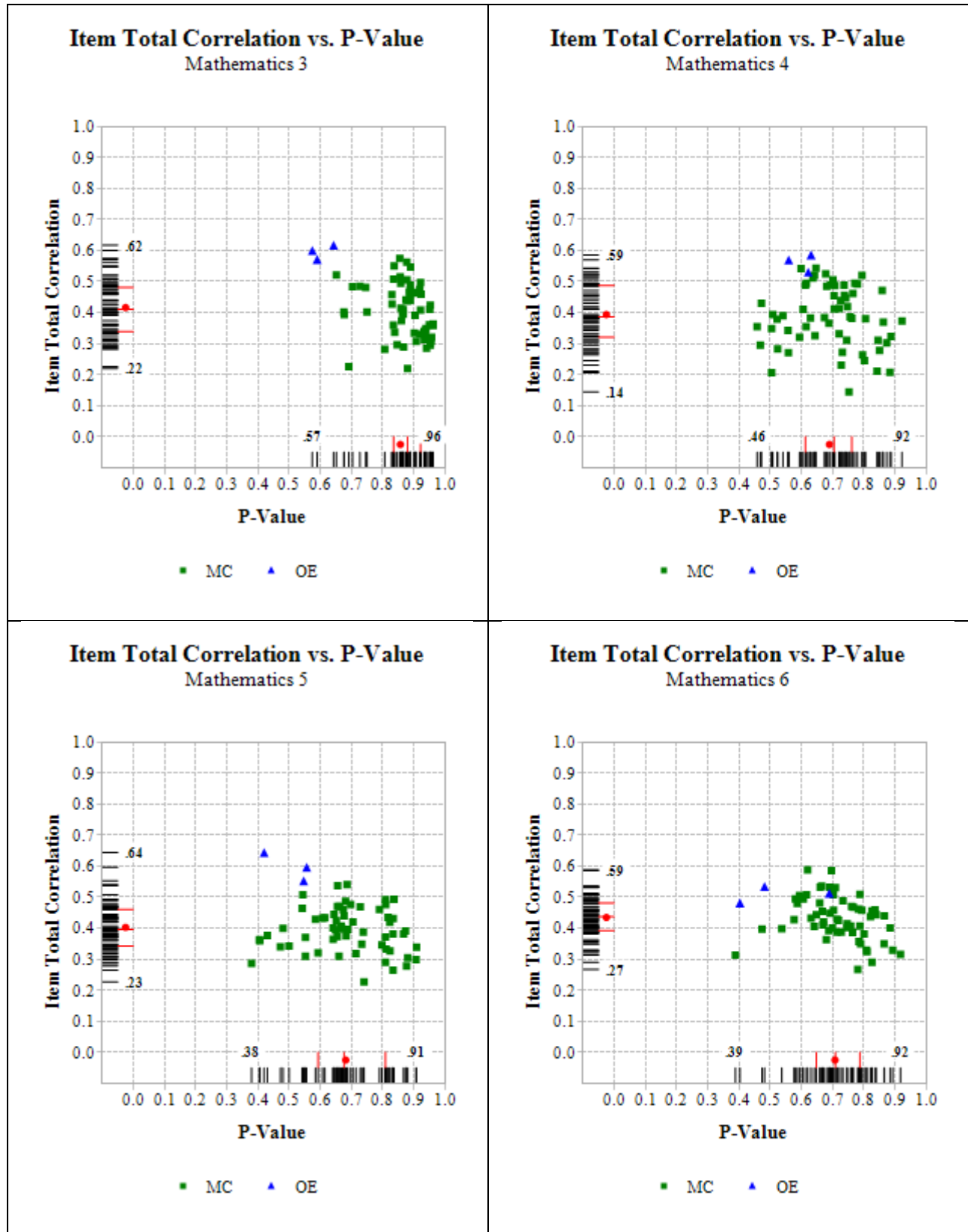
The mean item-test correlations ranged from roughly 0.32 to 0.43 and 0.42 to 0.71 for the MC and OE items, respectively. Again, these were similar to historic trends. The writing MC item-test correlations were generally the lowest, but even here were in the mid 0.30s. The writing MC items were correlated 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.

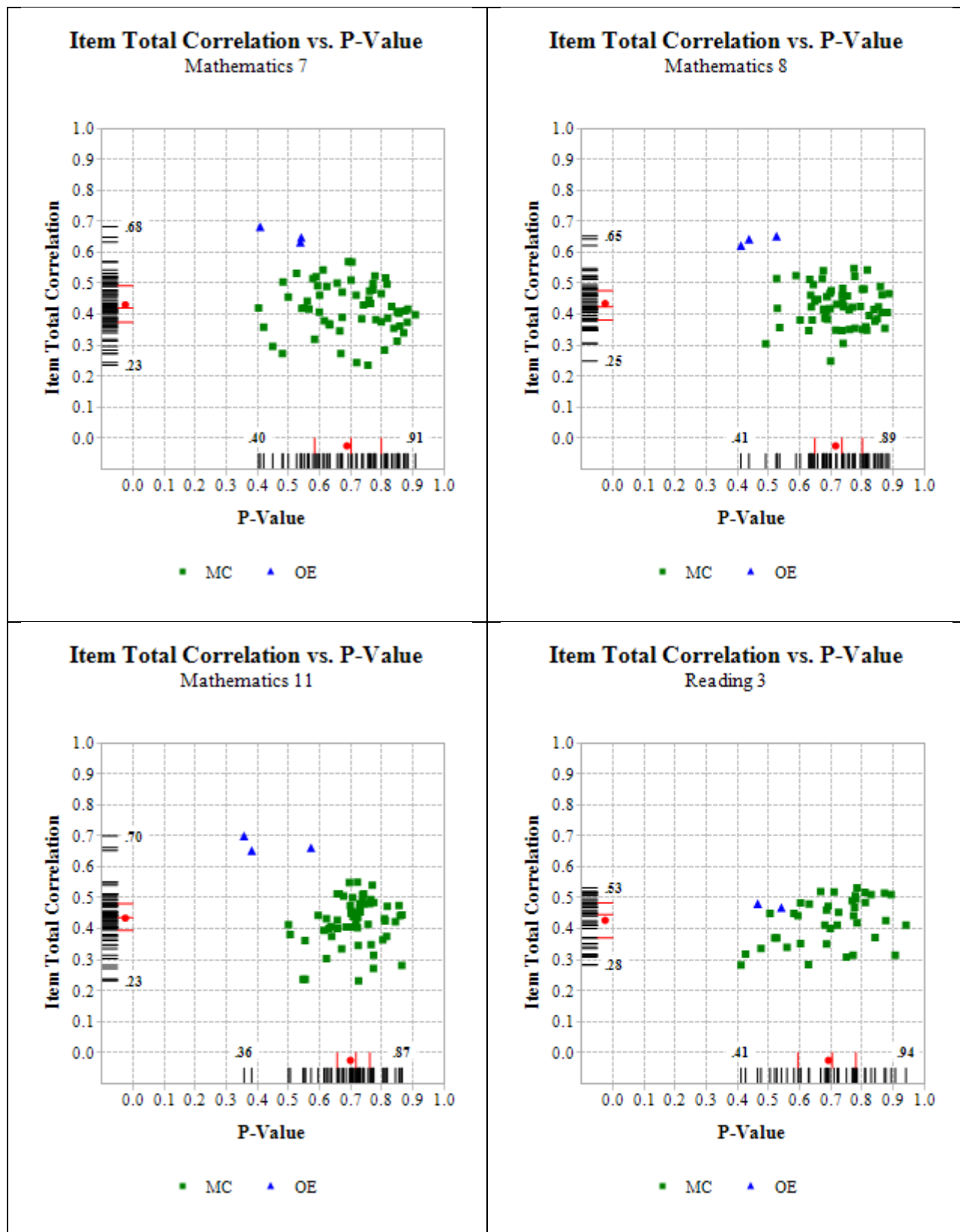
It is difficult to make global conclusions about overall test quality from these item statistics alone. With that caveat in mind, the results presented in this chapter indicate that the PSSA item difficulty and discrimination were in expected and acceptable ranges when using historic trends as a guide.¹³

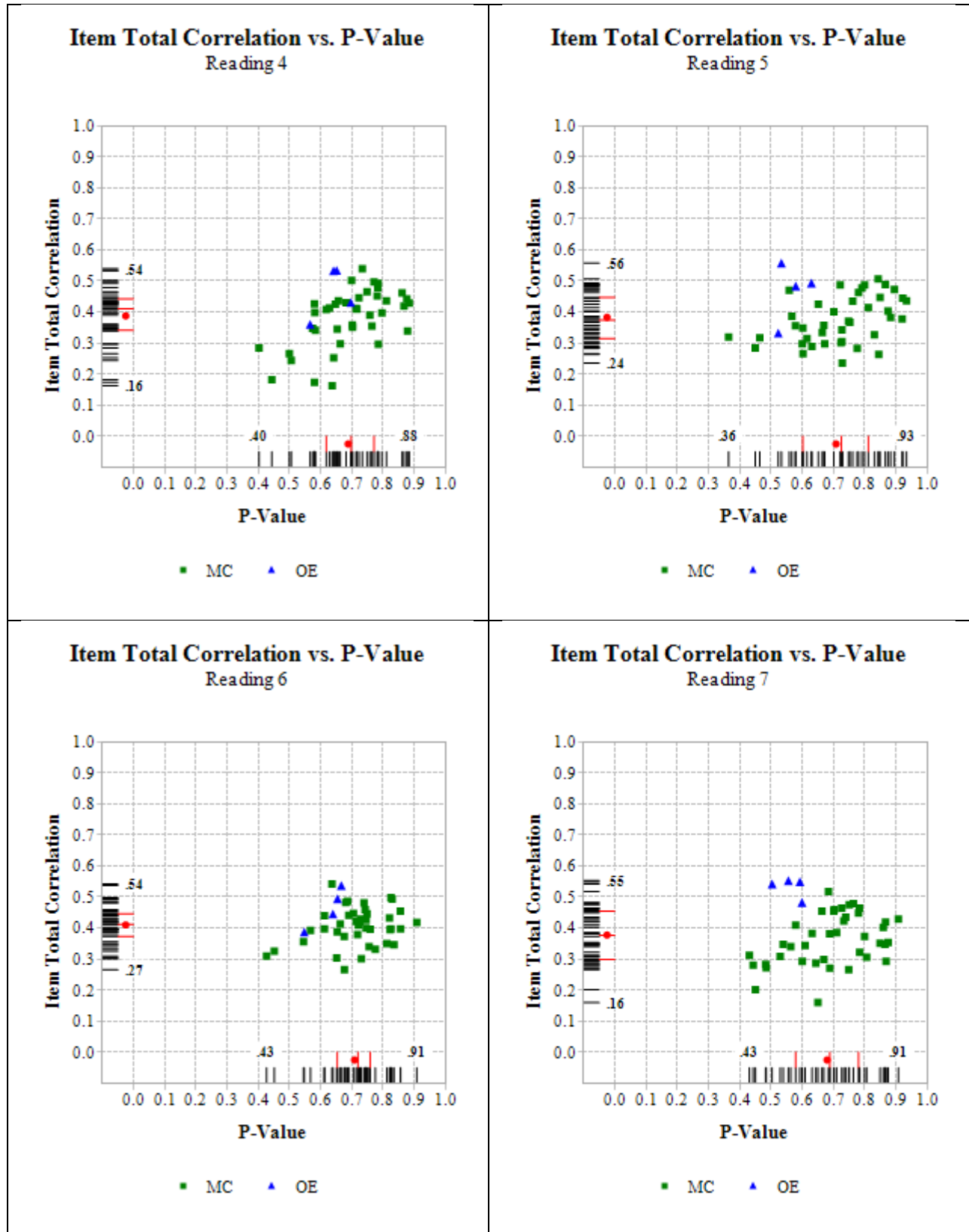
¹² Historically, average item difficulties have ranged from mid 0.60s to low 0.70s for most PSSA tests.

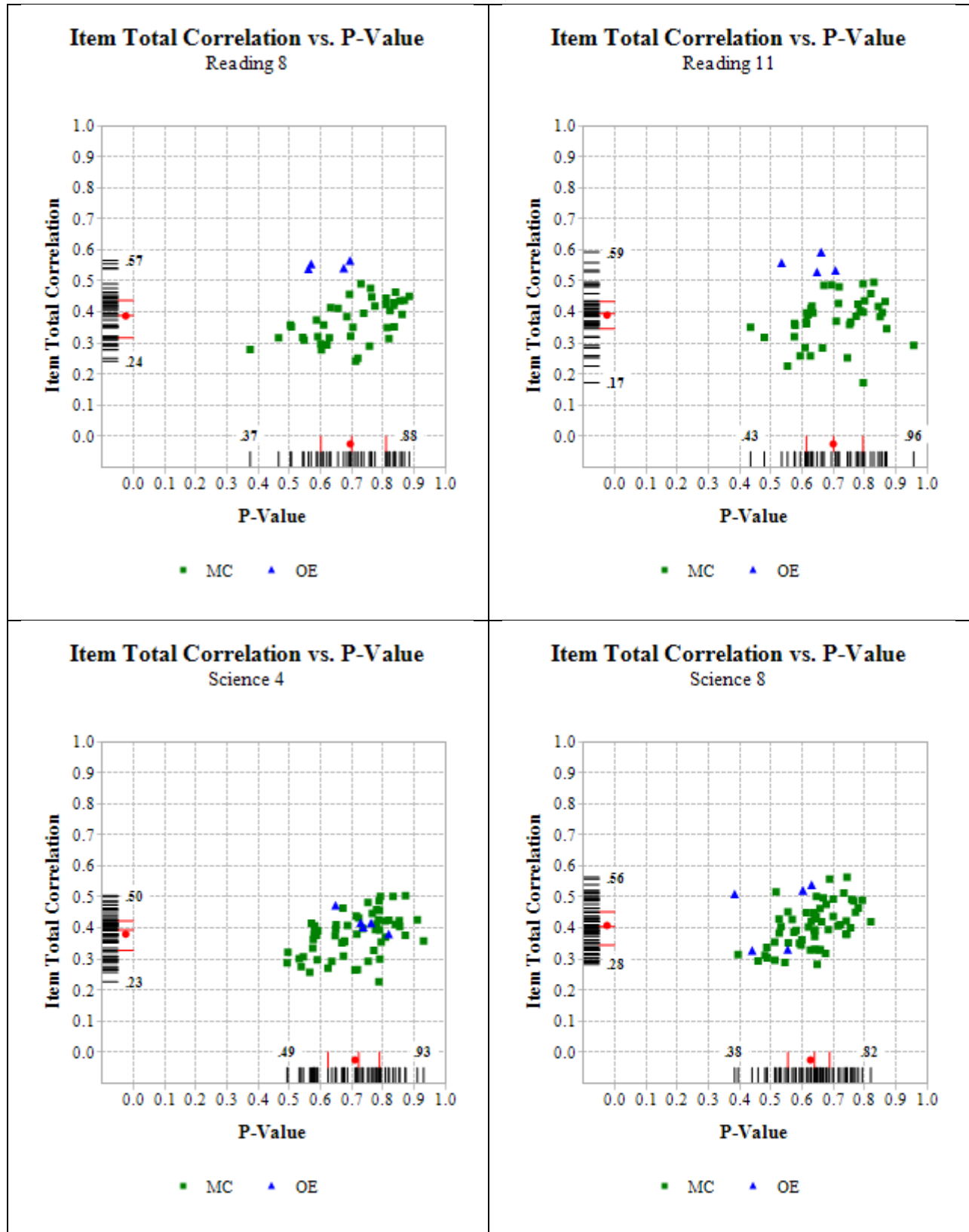
¹³ Every year each PSSA test is built to the same content and statistical specifications. Since the average item difficulty and discrimination indices are similar, the historic trend is expected.

Figure 11–1. Discrimination on Difficulty Scatterplots









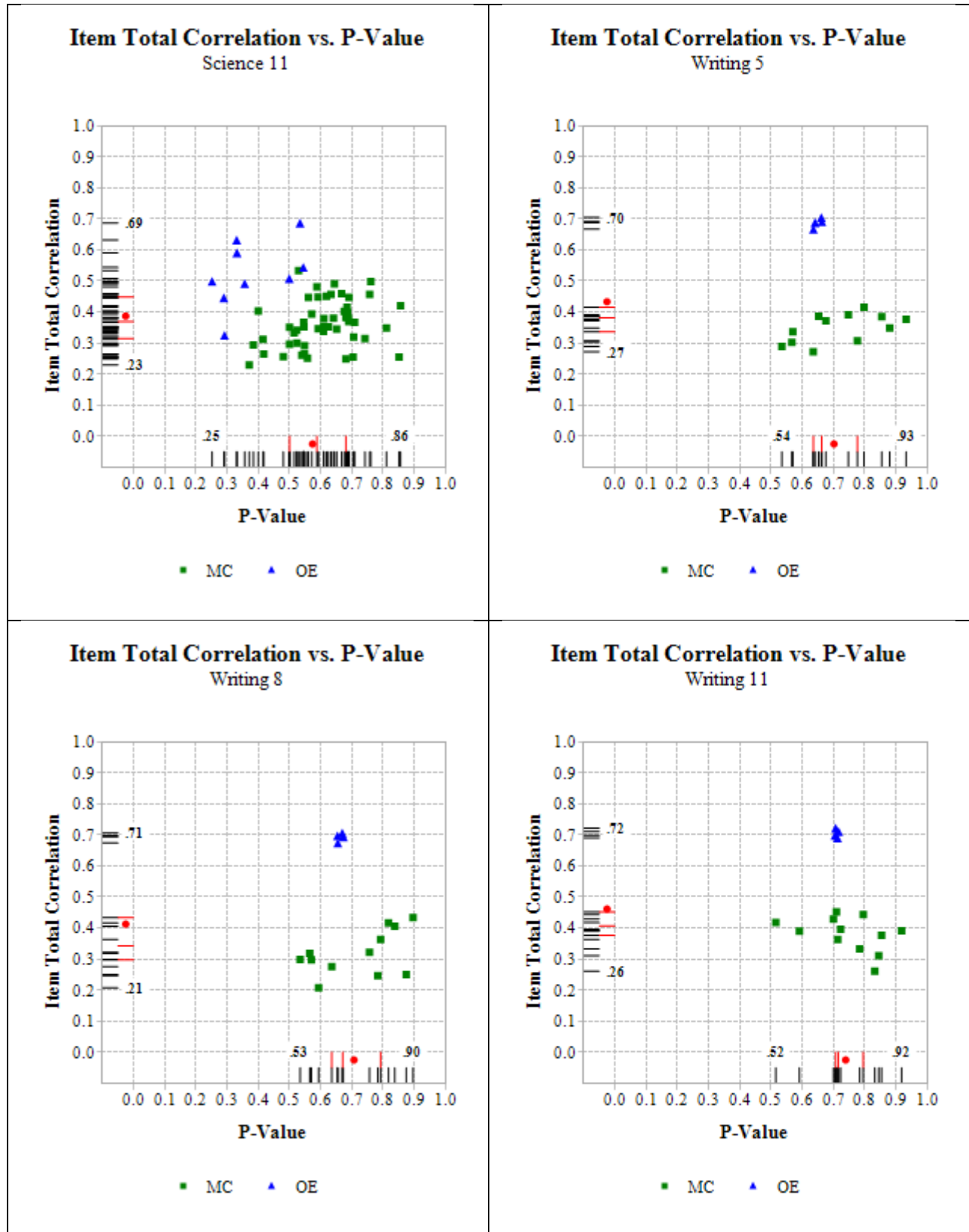


Table 11–1. Sum and Mean Statistics for MC and OE Items

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	52.217	0.870	0.407	12	7.231	0.603	0.596
	4	60	41.668	0.694	0.385	12	7.252	0.604	0.562
	5	60	41.444	0.691	0.393	12	6.092	0.508	0.598
	6	60	43.035	0.717	0.431	12	6.299	0.525	0.510
	7	60	41.854	0.698	0.419	12	5.954	0.496	0.655
	8	60	43.715	0.729	0.424	12	5.498	0.458	0.639
	11	60	42.744	0.712	0.422	12	5.247	0.437	0.671
Reading	3	40	28.090	0.702	0.425	6	3.020	0.503	0.475
	4	40	27.739	0.693	0.380	12	7.673	0.639	0.464
	5	40	28.921	0.723	0.374	12	6.800	0.567	0.467
	6	40	28.694	0.717	0.404	12	7.527	0.627	0.466
	7	40	27.671	0.692	0.362	12	6.757	0.563	0.532
	8	40	28.101	0.703	0.371	12	7.500	0.625	0.550
	11	40	28.231	0.706	0.373	12	7.652	0.638	0.554
Science	4	58	41.083	0.708	0.377	10	7.391	0.739	0.418
	8	58	36.881	0.636	0.405	10	5.221	0.522	0.446
	11	50	30.461	0.609	0.362	24	9.260	0.386	0.524
Writing	5	12	8.630	0.719	0.348	16	10.412	0.651	0.687
	8	12	8.665	0.722	0.319	16	10.611	0.663	0.693
	11	12	8.987	0.749	0.380	16	11.375	0.711	0.705

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 result.

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 it has been the methodology continually 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 related to dimensionality, local independence, and model-data fit. Resulting inferences derived from any application of IRT rests strongly on the degree to which the underlying assumptions are met.

This chapter 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 all items 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, and science 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; Wright and Masters, 1982) was used to calibrate PSSA items because both multiple-choice (MC) and open-ended (OE) items were part of the assessment. 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 θ_n represents a student's proficiency (ability) level, and D_{ij} is the step difficulty of the j^{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, the Rasch model provides estimates of a person's ability 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.)

Software and Estimation Algorithm

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

Sample Characteristics

The characteristics of calibration samples are reported in Chapter Nine. These samples only include the students who attempted the tests. All omits (no response) and multiple responses (more than one response selected) were scored as incorrect answers (coded as 0s) for calibration.

CHECKING RASCH ASSUMPTIONS

Since 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 were met and how well the model fits the test data. Therefore, it is important to check these assumptions. This section evaluates the dimensionality of the data, local item independence, and item fit. Though a variety of methods are available for assessing these issues, the Rasch analyses and criteria available from WINSTEPS were used here. It should be noted that only operational items were analyzed since they are the basis of student scores.

Unidimensionality

Rasch models assume that one dominant dimension determines the difference among students' performances. WINSTEPS provides results from a Principal Components Analysis (PCA) that can be used to assess the unidimensionality assumption. Different from standard applications of PCA, WINSTEPS conducts its PCA on the response residuals, not the original observations. That is, the primary dimension from the Rasch model is removed first and then the residual variance is analyzed. The purpose of the analysis is to verify whether any other dominant component(s) exist among the residuals (i.e., they account for a practically significant amount of residual variance). If any other dimensions are found, the unidimensionality assumption would be violated.

WINSTEPS provides three PCA residuals: raw, standardized, and logit. All three should yield similar results. The default "standardized residual" setting in WINSTEPS PCA was used for these analyses.

Tables 12–1 to 12–3 present the PCA results for the mathematics, reading, and science tests, respectively. The results include the total raw variance, raw variance explained by the model, unexplained total variance, and unexplained variance in the first component (both eigenvalue units and percentage values are tabled). In addition, the modeled column provides variance components that would be explained if the data complied with the Rasch definition of unidimensionality.

As can be seen in Table 12–1, for PSSA mathematics the primary dimension in the Rasch model explained about 41 percent to 55 percent of the total variance across Grades 3–8 and 11. If the data fit the model in such a way that only random noise was present, about 41 percent to 55 percent of the variance would be explained. The empirical and model-based percentages were quite close, suggesting that the estimation of a primary Rasch dimension was successful. The unexplained variance ranged from approximately 45 percent to 59 percent for all the mathematics tests. This included the Rasch-predicted randomness and any departures in the data from the Rasch model (e.g., departure from unidimensionality).

The most important variance for evaluating dimensionality is in the row named “unexplained variance in 1st contrast.” The eigenvalues of unexplained total variance were 63 for all the mathematics tests, which equals the total number of the operational items on each test. The eigenvalues of the first contrast (again, this is the second dimension beyond the first Rasch model dimension in WINSTEPS PCA) ranged from 1.7 to 2.1. This indicates that the second dimension accounted for only 1.7 to 2.1 units out of 63 units of item residual variance. Overall, WINSTEPS PCA suggests that there is one clearly dominant dimension for all mathematics tests¹⁴.

For the PSSA reading tests (see Table 12–2), the primary Rasch dimension explained about 37 percent to 55 percent of the total variance, with the unexplained variance ranging from about 46 percent to 63 percent. The second dimension accounted for only 1.6 to 1.9 units out of 42 or 44 units of item residual variance. These results also suggest that each reading test essentially measures a single dominant dimension.

For the PSSA science tests (see Table 12–3), the primary Rasch dimension explained about 35 percent to 42 percent of the total variance, and the unexplained variance ranged from about 58 percent to 65 percent. The second dimension accounted for only 1.6 to 1.8 units out of 59 or 63 units of item residual variance. This, too, suggests that one dominant dimension was measured by each science test.

¹⁴ According to Reckase (1979), the variance explained by the primary dimension should be greater than 20% to indicate unidimensionality. Smith and Miao (1994) showed in simulation studies that eigenvalues less than 1.4 are at the random level while Raïche (2005) suggested that, on occasion, eigenvalues as high as 2.0 are at the random level.

Table 12–1. Results from PCA of Residuals in WINSTEPS - Mathematics

		Eigenvalue	Empirical	Modeled	
Mathematics	3	Total raw variance in observations	140.3	100.0%	100.0%
		Raw variance explained by measures	77.3	55.1%	53.8%
		Raw unexplained variance (total)	63.0	44.9%	46.2%
		Unexplained variance in 1st contrast	1.8	1.3%	
	4	Total raw variance in observations	106.9	100.0%	100.0%
		Raw variance explained by measures	43.9	41.1%	41.5%
		Raw unexplained variance (total)	63.0	58.9%	58.5%
		Unexplained variance in 1st contrast	2.1	2.0%	
	5	Total raw variance in observations	124.3	100.0%	100.0%
		Raw variance explained by measures	61.3	49.3%	49.0%
		Raw unexplained variance (total)	63.0	50.7%	51.0%
	Unexplained variance in 1st contrast	1.7	1.4%		
6	Total raw variance in observations	124.1	100.0%	100.0%	
	Raw variance explained by measures	61.1	49.2%	48.6%	
	Raw unexplained variance (total)	63.0	50.8%	51.4%	
	Unexplained variance in 1st contrast	1.8	1.5%		
7	Total raw variance in observations	133.2	100.0%	100.0%	
	Raw variance explained by measures	70.2	52.7%	52.8%	
	Raw unexplained variance (total)	63.0	47.3%	47.2%	
	Unexplained variance in 1st contrast	1.8	1.3%		
8	Total raw variance in observations	129.6	100.0%	100.0%	
	Raw variance explained by measures	66.6	51.4%	50.6%	
	Raw unexplained variance (total)	63.0	48.6%	49.4%	
	Unexplained variance in 1st contrast	2.1	1.6%		
11	Total raw variance in observations	130.3	100.0%	100.0%	
	Raw variance explained by measures	67.3	51.7%	51.2%	
	Raw unexplained variance (total)	63.0	48.3%	48.8%	
	Unexplained variance in 1st contrast	1.9	1.5%		

Table 12–2. Results from PCA of Residuals in WINSTEPS - Reading

		Eigenvalue	Empirical	Modeled	
Reading	3	Total raw variance in observations	92.2	100.0%	100.0%
		Raw variance explained by measures	50.2	54.5%	52.9%
		Raw unexplained variance (total)	42.0	45.5%	47.1%
		Unexplained variance in 1st contrast	1.6	1.8%	
	4	Total raw variance in observations	70.1	100.0%	100.0%
		Raw variance explained by measures	26.1	37.2%	36.2%
		Raw unexplained variance (total)	44.0	62.8%	63.8%
		Unexplained variance in 1st contrast	1.8	2.6%	
	5	Total raw variance in observations	82.8	100.0%	100.0%
		Raw variance explained by measures	38.8	46.9%	45.5%
		Raw unexplained variance (total)	44.0	53.1%	54.5%
		Unexplained variance in 1st contrast	1.6	1.9%	
6	Total raw variance in observations	74.4	100.0%	100.0%	
	Raw variance explained by measures	30.4	40.9%	40.0%	
	Raw unexplained variance (total)	44.0	59.1%	60.0%	
	Unexplained variance in 1st contrast	1.6	2.2%		
7	Total raw variance in observations	74.6	100.0%	100.0%	
	Raw variance explained by measures	30.6	41.0%	40.5%	
	Raw unexplained variance (total)	44.0	59.0%	59.5%	
	Unexplained variance in 1st contrast	1.6	2.2%		
8	Total raw variance in observations	73.7	100.0%	100.0%	
	Raw variance explained by measures	29.7	40.3%	40.0%	
	Raw unexplained variance (total)	44.0	59.7%	60.0%	
	Unexplained variance in 1st contrast	1.9	2.5%		
11	Total raw variance in observations	77.1	100.0%	100.0%	
	Raw variance explained by measures	33.1	42.9%	42.2%	
	Raw unexplained variance (total)	44.0	57.1%	57.8%	
	Unexplained variance in 1st contrast	1.9	2.5%		

Table 12–3. Results from PCA of Residuals in WINSTEPS - Science

		Eigenvalue	Empirical	Modeled	
Science	4	Total raw variance in observations	97.2	100.0%	100.0%
		Raw variance explained by measures	34.2	35.2%	34.5%
		Raw unexplained variance (total)	63.0	64.8%	65.5%
		Unexplained variance in 1st contrast	1.8	1.8%	
	8	Total raw variance in observations	97.4	100.0%	100.0%
		Raw variance explained by measures	34.4	35.3%	34.8%
		Raw unexplained variance (total)	63.0	64.7%	65.2%
		Unexplained variance in 1st contrast	1.8	1.8%	
	11	Total raw variance in observations	101.2	100.0%	100.0%
		Raw variance explained by measures	42.2	41.7%	41.0%
		Raw unexplained variance (total)	59.0	58.3%	59.0%
		Unexplained variance in 1st contrast	1.6	1.6%	

Local Independence

Local independence (LI) is a fundamental assumption of IRT. No relationship should exist between examinees' responses to different items after accounting for the abilities measured by a test. In formal statistical terms, a test X that is comprised of items X_1, X_2, \dots, X_n is locally independent with respect to the latent variable θ if, for all $x = (x_1, x_2, \dots, x_n)$ and θ ,

$$P(\mathbf{X} = \mathbf{x} | \theta) = \prod_{i=1}^I P(X_i = x_i | \theta).$$

This formula essentially states that the probability of any pattern of responses across all items (\mathbf{x}), after conditioning on the abilities (θ) measured by the test, should be equal to the product of the conditional probabilities across each item (cf. the multiplication rule for independent events where the joint probabilities are equal to the product of the associated marginal probabilities).

The equation above shows the condition after satisfying the strong form of local independence. A weak form of local independence (WLI) was proposed by McDonald (1979). The distinction is important as many indicators of local dependency are actually framed by WLI. The requirement would be for the conditional covariances of all pairs of item responses, conditioned on the abilities, to be equal to zero. When this assumption is met, the joint probability of responses to an item pair, conditioned on abilities, is the product of the probabilities of responses to these two items, as shown below. (This is a weaker form because higher-order dependencies among items are allowed.) Based on the WLI, the following expression can be derived:

$$P(X_i = x_i, X_j = x_j | \theta) = P(X_i = x_i | \theta)P(X_j = x_j | \theta).$$

Marais and Andrich (2008) pointed out that local item dependence in the Rasch model can occur in two ways that some may not distinguish. The first way occurs when the assumption of unidimensionality is violated. Here, other nuisance dimensions besides a dominant dimension determine student performance (this can be called "trait dependence"). The second violation occurs when responses to an item depend on responses to another. This is a violation of statistical independence and can be called response dependence. Many people treat the assumptions of unidimensionality and local independence as one phenomenon and believe that once unidimensionality holds, that local independence also holds. By distinguishing the two sources of local dependence, one can see that while local independence can be related to unidimensionality, the two are different assumptions and therefore, require different tests.

Residual item correlations provided in WINSTEPS for each item pair were used to assess the local dependence among the PSSA items. In general, these residuals are computed as follows. First, expected item performance based on the Rasch model is determined using ability and item parameter estimates. Next, deviations (residuals) between the examinees' expected and observed performance is determined for each item. Finally, for each item pair, a correlation between the respective deviations is computed.

As mentioned before, three types of residual correlations are available in WINSTEPS: raw, standardized, and logit. It should be noted that the raw score residual correlation essentially corresponds to Yen's Q_3 index, a popular LI statistic. The expected value for the Q_3 statistic is approximately $-1/(k-1)$ when no local dependence exists, where k is test length (Yen, 1993). Thus, the expected Q_3 values should be approximately -0.02 for the PSSA tests (since most of the PSSA tests had more than 50 core items). Index values that are greater than 0.20 indicate a degree of local dependence that probably should be examined by test developers (Chen & Thissen, 1997).

Since the three residual correlations are very similar, the default “standardized residual correlation” in WINSTEPS was used for these analyses. Table 12–4 shows the summary statistics—mean, SD, minimum, maximum, and several percentiles (P₁₀, P₂₅, P₅₀, P₇₅, P₉₀) — for all the residual correlations for each test. The total number of item pairs (N) and the number of pairs with the residual correlations greater than 0.20 are also reported in this table. The mean residual correlations were slightly negative and the values were close to -0.02. The vast majority of the correlations were very small, suggesting local item independence generally holds for the PSSA reading, mathematics, and science tests.

Table 12–4. Summary of Item Residual Correlations for PSSA Mathematics, Reading, and Science

Statistic	Mathematics						
	3	4	5	6	7	8	11
N	1953	1953	1953	1953	1953	1953	1953
Mean	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
SD	0.03	0.03	0.02	0.03	0.02	0.03	0.03
Minimum	-0.13	-0.10	-0.08	-0.11	-0.08	-0.09	-0.20
P ₁₀	-0.03	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
P ₂₅	-0.02	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
P ₅₀	-0.01	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
P ₇₅	0.00	0.00	0.00	0.00	0.00	0.00	0.00
P ₉₀	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Maximum	0.38	0.24	0.22	0.32	0.27	0.28	0.23
>0.20	5	4	2	8	3	1	2

Statistic	Reading						
	3	4	5	6	7	8	11
N	861	946	946	946	946	946	946
Mean	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
SD	0.02	0.03	0.02	0.02	0.02	0.03	0.03
Minimum	-0.08	-0.12	-0.10	-0.11	-0.10	-0.12	-0.11
P ₁₀	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05
P ₂₅	-0.04	-0.04	-0.04	-0.03	-0.03	-0.03	-0.03
P ₅₀	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
P ₇₅	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
P ₉₀	0.00	0.01	0.01	0.00	0.00	0.00	0.01
Maximum	0.12	0.16	0.10	0.12	0.15	0.19	0.22
>0.20	0	0	0	0	0	0	1

Table 12–4 (continued). Summary of Item Residual Correlations for PSSA Mathematics, Reading, and Science

Statistic	Science		
	4	8	11
N	1953	1953	1711
Mean	-0.01	-0.02	-0.02
SD	0.02	0.02	0.02
Minimum	-0.08	-0.10	-0.08
P ₁₀	-0.03	-0.04	-0.04
P ₂₅	-0.03	-0.03	-0.03
P ₅₀	-0.02	-0.02	-0.02
P ₇₅	-0.01	-0.01	-0.01
P ₉₀	0.01	0.01	0.01
Maximum	0.18	0.23	0.10
>0.20	0	1	0

Item Fit

WINSTEPS provides two item fit statistics (infit and outfit) for evaluating the degree to which the Rasch model predicts the observed item responses. Each fit statistic can be expressed as a mean square (MnSq) statistic or on a standardized metric (Zstd with mean = 0 and variance = 1). MnSq values are more oriented toward practical significance, while Zstd values are more oriented toward statistical significance. Though both are informative, the Zstd values are very likely too sensitive to the large sample sizes observed on the PSSA. In this situation it is recommended that the Zstd values be ignored if the MnSq values are acceptable (Linacre, 2009).

Both infit and outfit MnSq are the average of standardized residual variance (the difference between the observed score and the Rasch estimated score divided by the square root of the Rasch model variance). The difference is that the outfit statistic gives all examinees equal weight in computing the fit and tends to be affected more by unexpected responses far from the person, item, or rating scale category measure (i.e., it is more sensitive to outlying, off-target, low information responses). The infit statistic is weighted by the examinee locations relative to item difficulty and tends to be affected more by unexpected responses close to the person, item, or rating scale category measure (i.e., informative, on-target responses). Some feel that extreme infit values are a greater threat to the measurement process than extreme outfit since most tests intend to measure the on-target population rather than extreme outliers.

The expected MnSq value is 1.0 and can range from 0 to infinity. Deviation in excess of the expected value can be interpreted as noise or lack of fit between the items and the model. Values lower than the expected value can be interpreted as item redundancy or overfitting items (too predictable, too much redundancy), and values greater than the expected value indicate underfitting items (too unpredictable, too much noise). Rules of thumb regarding “practically significant” MnSq values vary. More conservative users might prefer items with MnSq values that range from 0.8 to 1.2. Others believe reasonable test results can be achieved with values from 0.5 to 1.5. In the results below, values outside of 0.7 to 1.3 are given practical importance.

Table 12–5 presents the summary statistics of infit and outfit mean square statistics for the PSSA reading, mathematics, and science tests, including the mean, SD, and minimum and maximum values. The number of items within the range of [0.7, 1.3] is also reported in Table 12–5. As can be seen, the mean values for both fit statistics were close to 1.00 for all tests. Almost all the items had infit values falling in the range of [0.7, 1.3]. Though more outfit values fell outside this range than infit values, most of the extreme values were just barely above 1.3 or below 0.7. Overall, these results indicate that the Rasch model fits the PSSA item data well.

Table 12–5. Summary of Infit and Outfit Mean Square Statistics for PSSA Mathematics, Reading, and Science

		Infit Mean Square					Outfit Mean Square				
		Mean	SD	Min	Max	[0.7,1.3]	Mean	SD	Min	Max	[0.7,1.3]
Mathematics	3	1.00	0.10	0.82	1.30	63/63	0.96	0.22	0.55	1.58	52/63
	4	1.00	0.10	0.84	1.23	63/63	1.01	0.19	0.64	1.48	58/63
	5	1.00	0.08	0.84	1.16	63/63	0.99	0.16	0.68	1.53	60/63
	6	1.00	0.10	0.82	1.43	62/63	0.98	0.16	0.74	1.48	60/63
	7	0.99	0.10	0.84	1.21	63/63	1.00	0.23	0.69	2.11	56/63
	8	0.99	0.08	0.83	1.21	63/63	0.97	0.15	0.68	1.51	60/63
	11	0.99	0.09	0.84	1.27	63/63	0.98	0.17	0.68	1.47	59/63
Reading	3	0.99	0.10	0.81	1.18	42/42	0.95	0.21	0.44	1.31	37/42
	4	0.99	0.11	0.84	1.36	43/44	0.97	0.17	0.68	1.42	40/44
	5	0.99	0.09	0.84	1.23	44/44	0.96	0.20	0.53	1.39	37/44
	6	0.99	0.08	0.84	1.22	44/44	0.96	0.14	0.69	1.23	43/44
	7	1.00	0.09	0.86	1.24	44/44	0.99	0.15	0.59	1.33	42/44
	8	0.99	0.08	0.87	1.14	44/44	0.98	0.15	0.63	1.30	43/44
	11	0.98	0.08	0.85	1.16	44/44	0.96	0.15	0.71	1.41	43/44
Science	4	0.99	0.08	0.84	1.16	63/63	0.97	0.15	0.61	1.29	60/63
	8	0.99	0.08	0.82	1.26	63/63	0.97	0.12	0.68	1.27	62/63
	11	0.99	0.07	0.84	1.11	59/59	0.98	0.11	0.70	1.20	59/59

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 arbitrarily sets 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

difficulty 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 content 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 12–6 summarizes the Rasch logit difficulties of the operational items on each test. Within each content area, most grades had similar mean logits. The mean logit of the reading items for most grades was around 0.00, and Grade 8 had a relatively high mean logit value, 0.52. The spread of the item mean difficulties for PSSA mathematics tests was a little more extreme. Here, Grade 5 had the largest mean logit value, 0.73, whereas Grade 11 had the lowest mean logit value, -0.31. The minimum and maximum values and standard deviations suggest that the PSSA items covered a relatively wide range of difficulties.

Table 12–6. Summary of Rasch Item Difficulties for PSSA Mathematics, Reading, and Science

		N	Mean	SD	Min	Max
Mathematics	3	63	0.39	0.91	-1.12	2.46
	4	63	0.40	0.72	-1.46	1.66
	5	63	0.73	0.83	-0.99	2.40
	6	63	0.27	0.72	-1.49	2.10
	7	63	0.27	0.86	-1.43	2.03
	8	63	0.22	0.69	-1.08	1.94
	11	63	-0.31	0.63	-1.49	1.75
Reading	3	42	-0.05	0.90	-2.27	1.59
	4	44	0.09	0.68	-1.29	1.60
	5	44	0.09	0.88	-1.80	1.99
	6	44	-0.07	0.63	-1.64	1.50
	7	44	0.12	0.77	-1.57	1.45
	8	44	0.58	0.74	-0.73	2.31
	11	44	-0.06	0.74	-2.51	1.38
Science	4	63	0.12	0.69	-1.75	1.32
	8	63	-0.07	0.54	-1.24	1.16
	11	59	0.11	0.72	-1.57	1.83

Note. The mean logit values not necessarily 0.0 because the items have been placed on a scale that was developed in prior years.

VISUALIZING THE *P*-VALUE-LOGIT RELATIONSHIP

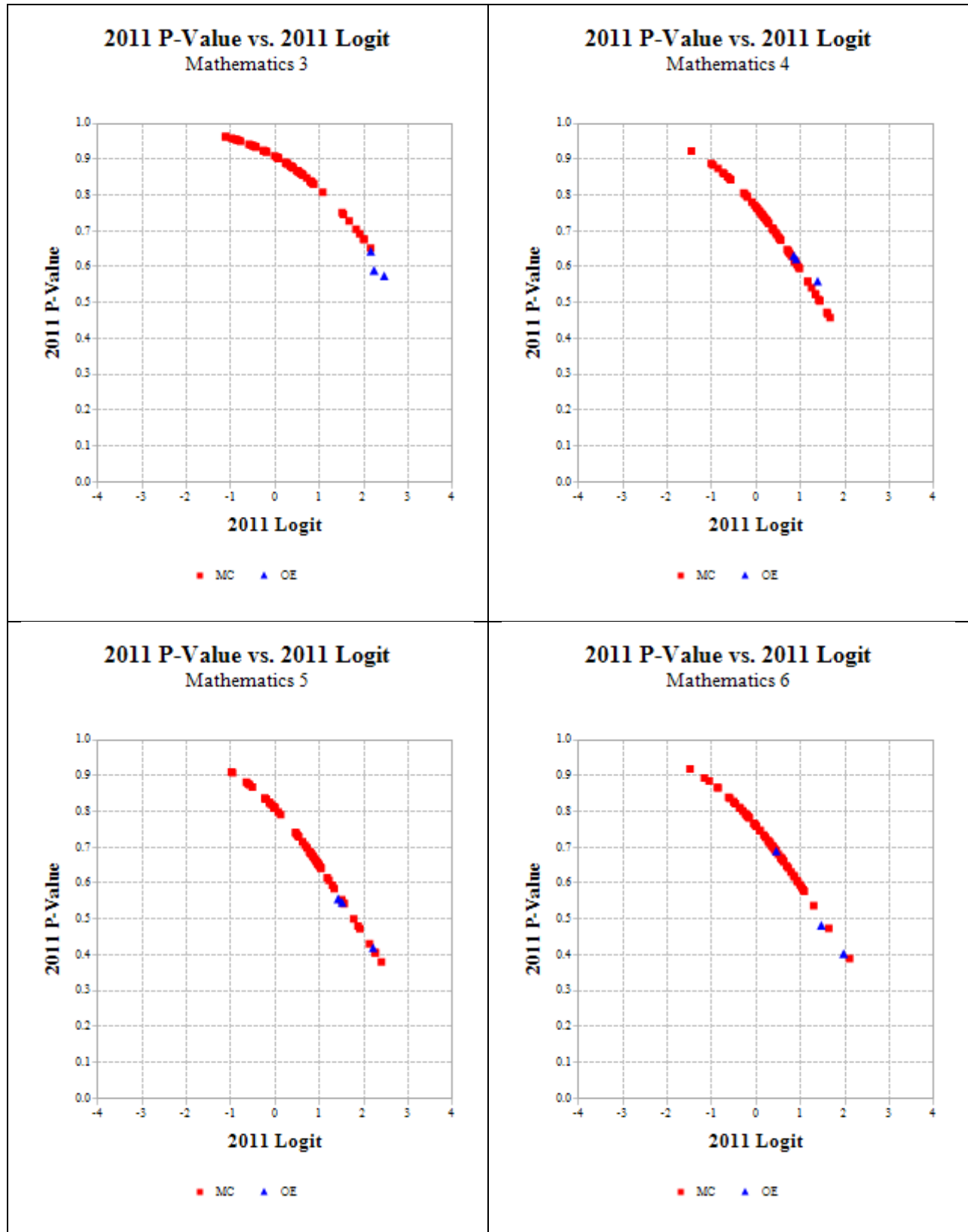
During the PSSA administration, test forms were spiraled within classrooms. In effect, students were administered the same set of common items but different nonoperational items (e.g., field test item sets). Cross checks can be made to ensure the calibration and linking processes are reasonable across 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. As a result 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.

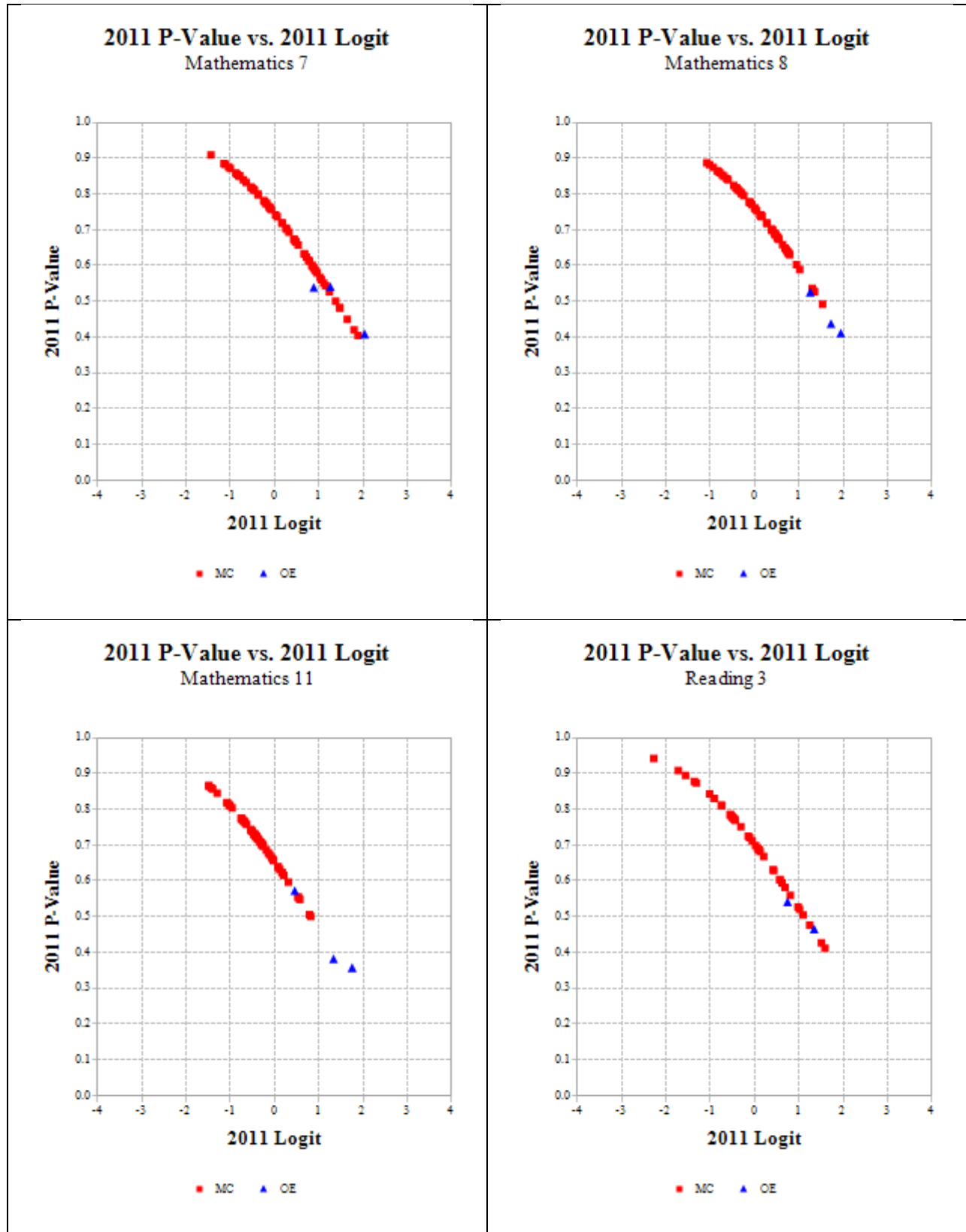
Figure 12–1 shows plots of the *p*-value-logit relationship for the operational items. The curves are nearly linear in the center but curve towards asymptotes of one and zero, respectively, on the left and right. The graphs show that items with lower *p*-values (indicating a more difficult item that fewer students answered correctly) had higher logit difficulties and that items with higher *p*-values had lower logit difficulties (i.e., the *p*-value and logit scales were inversely related).

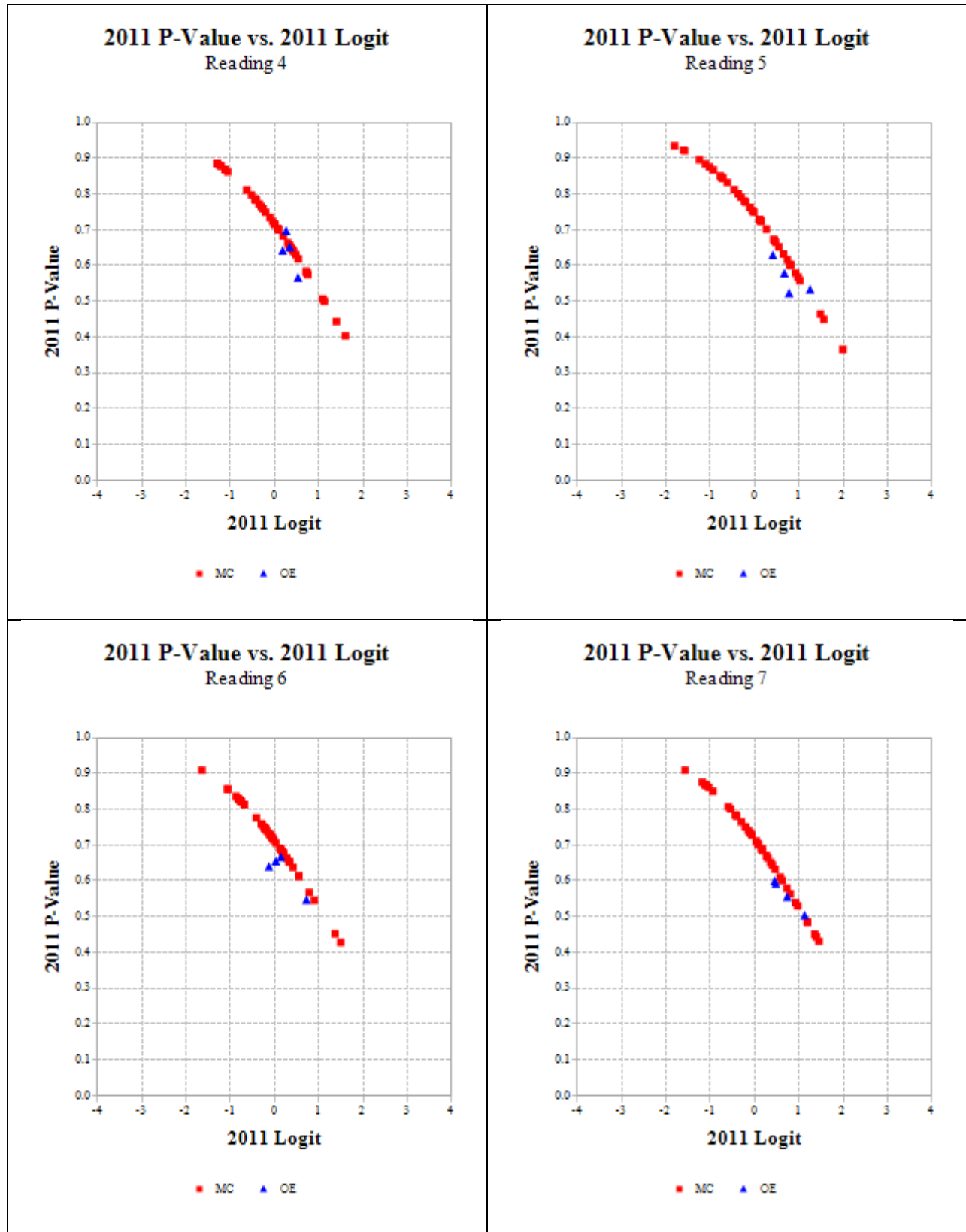
The spread of the graph points is indicative of the dispersion of item difficulties in the operational items. The dispersion and coordinates of items are roughly similar across grades for mathematics, reading, and science. (Again, a notable exception would be Grade 3 mathematics, which had a relatively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

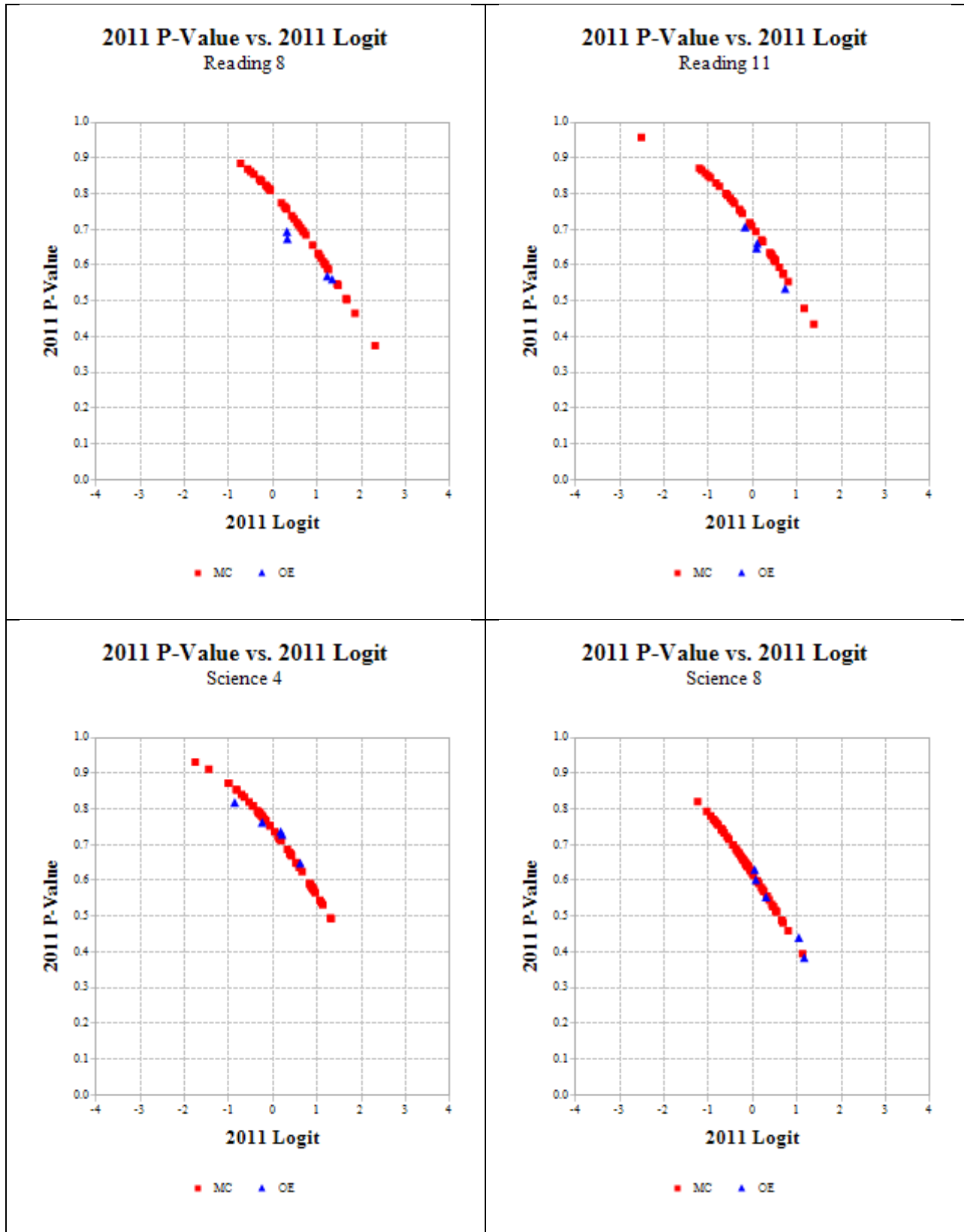
Common OE items are also graphed in Figure 12–1. These items appear with triangle-shaped markers. The OE items generally fall on the same curve as the MC, items but subtle differences can occur. The OE items were placed on the MC item difficulty (*p*-value) scale, which ranges from 0.00 to 1.00, by dividing 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.

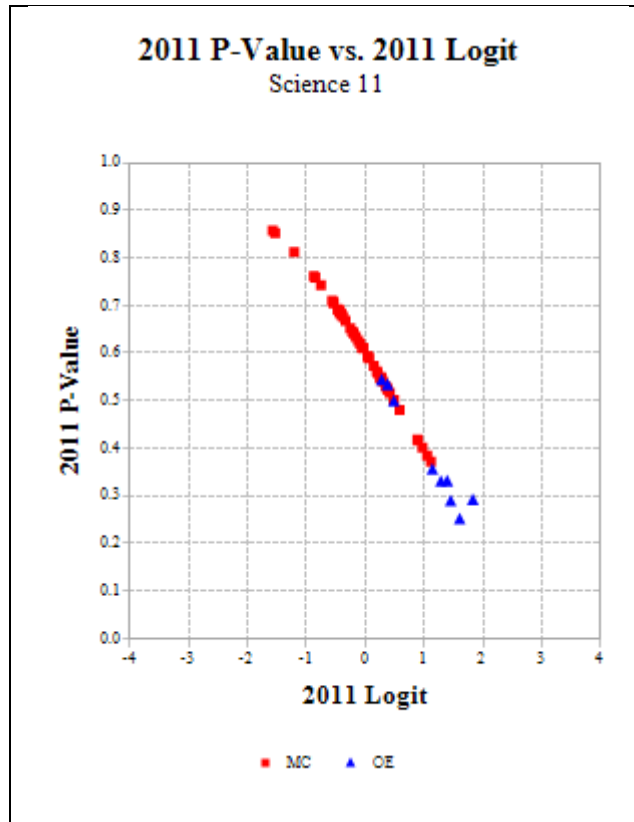
Figure 12–1. 2011 P-Values on 2011 Logit Values









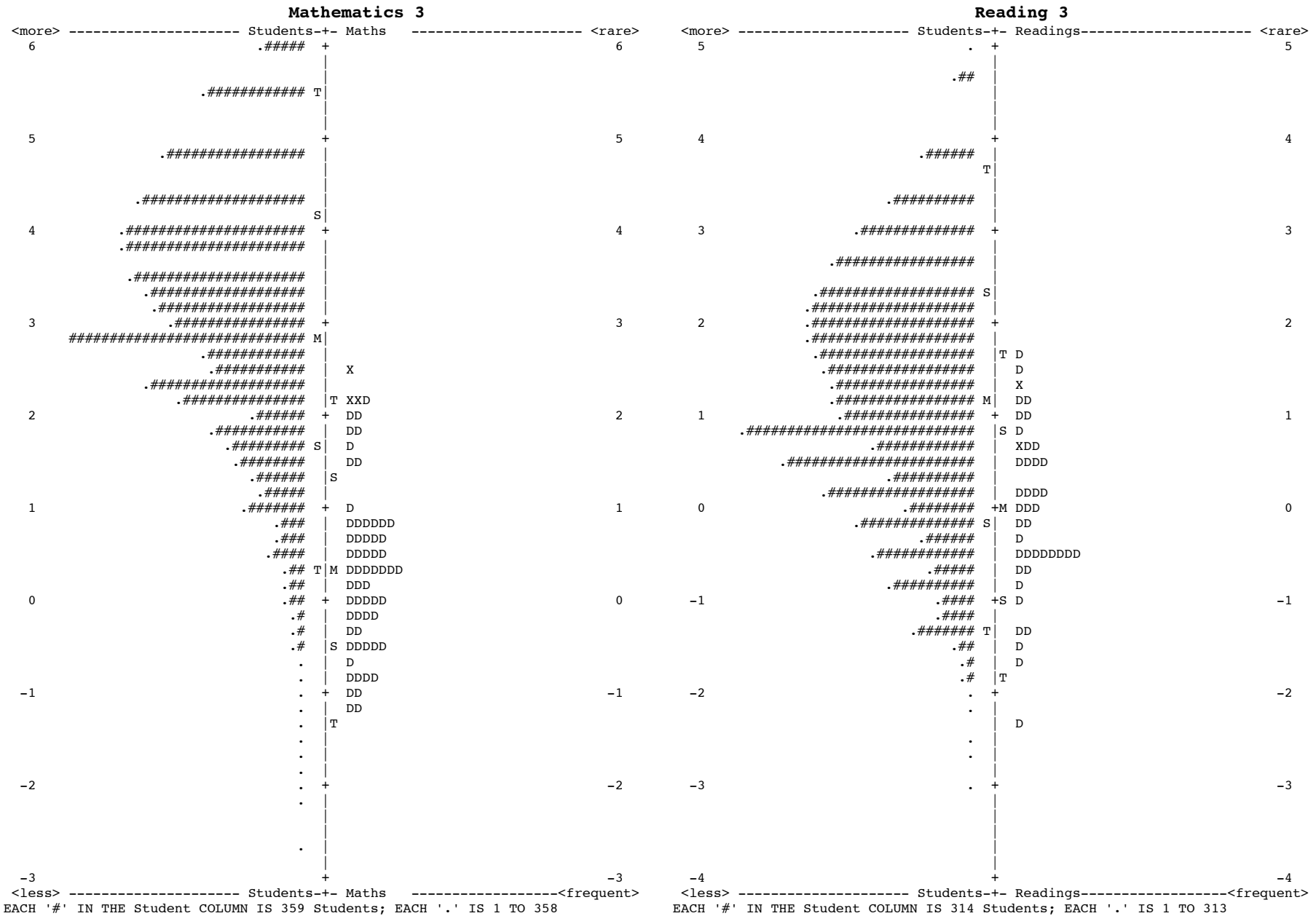


Item Difficulty-Student Ability Maps

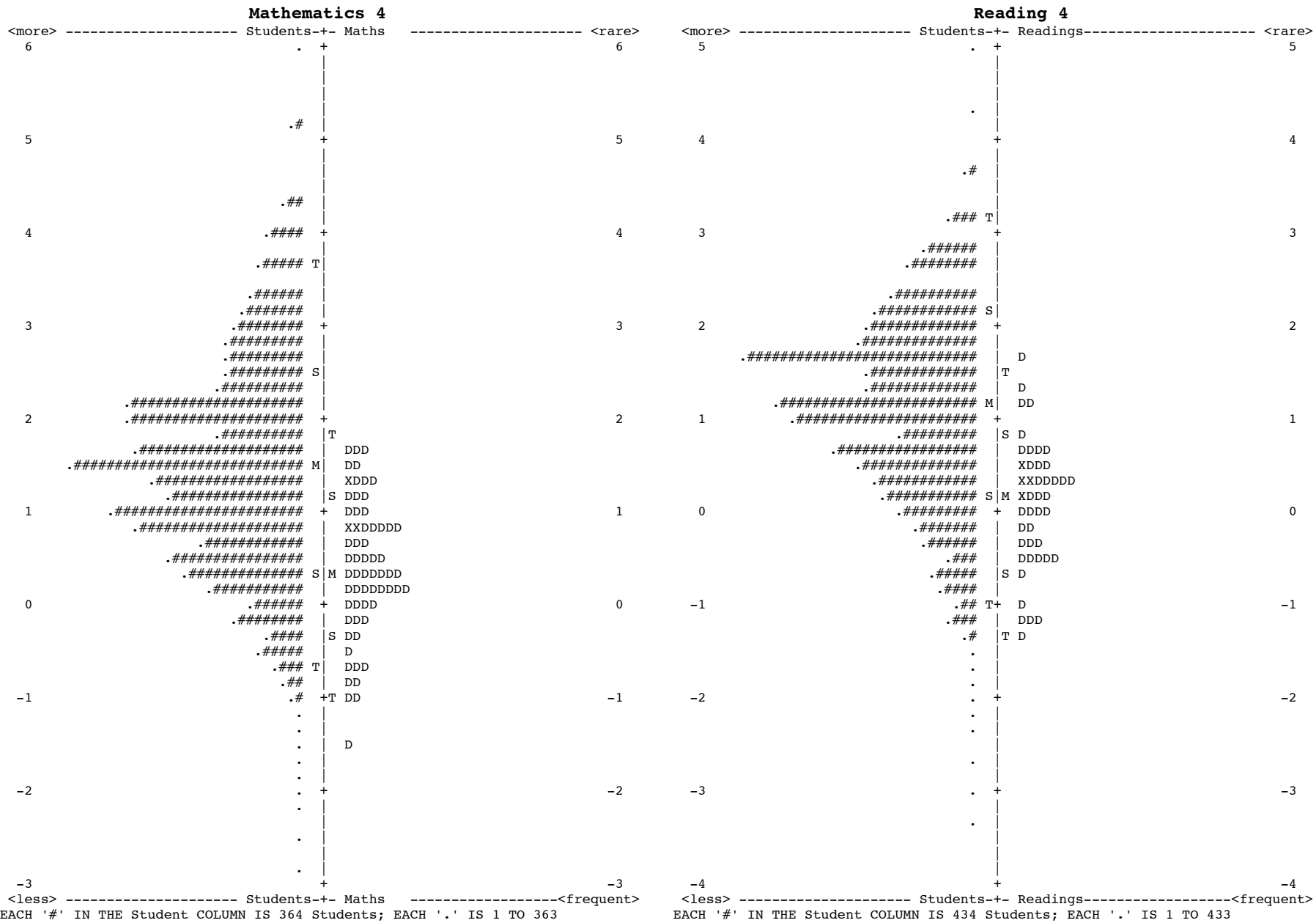
The distributions of the Rasch item logits (item difficulty estimates) are shown on the item difficulty-student ability maps presented in Figure 12–2. In each item-student map, markers on the left-hand side represent student ability values, whereas markers on the right hand side represent item difficulty 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. 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).

Overall, the most predominant pattern seen across all maps was for students to have relatively higher ability and for items to be relatively easier. It is also important to understand where the items are providing more accurate measurement (e.g., near the cutscores or away from the cutscores). This issue is addressed more fully in Chapter Eighteen (see Figure 18–2).

Figure 12–2. Item-Student Maps



Chapter Twelve: Rasch Item Calibration



Chapter Twelve: Rasch Item Calibration

	Mathematics 5			Reading 5	
<more>	----- Students+-- Maths	-----<rare>	<more>	----- Students+-- Readings	-----<rare>
6	. + .#	6	6	. +	6
5	.## + .### .#####	5	5	. +	5
4	.##### T .##### +	4	4	.# + T	4
3	.##### .##### S+ .#####	3	3	.##### + .##### S	3
2	.##### T D .##### DD .##### XD +	2	2	.##### T .##### DD .##### M X	2
1	.##### M DD .##### D .##### S XDDDD .##### X .##### DDD .##### D +	1	1	.##### +S DDD .##### XDDD .##### XDD .##### DDDD .##### XD .##### S M DDDDD .##### + DD	1
0	.##### M DDD .##### DDD S .##### DD +	0	0	.##### DDD .##### DD .##### D .##### DDD .##### T S D .##### + DD .##### DD	0
-1	.##### DD .##### S DDDDD .##### D +	-1	-1	.##### D .##### T D .##### D +	-1
-2	.##### DD .##### +	-2	-2	.##### + .#####	-2
<less>	----- Students+-- Maths	-----<frequent>	<less>	----- Students+-- Readings	-----<frequent>

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EACH '#' IN THE Student COLUMN IS 464 Students; EACH '.' IS 1 TO 463

Chapter Twelve: Rasch Item Calibration

Mathematics 6				Reading 6			
<more>	Students	Maths	<rare>	<more>	Students	Readings	<rare>
6	.	+	6	5	.	+	5
	.				.#		
5	##	+	5	4	##	+	4
	###				#####	T	
4	#####	T+	4	3	#####	+	3
	#####				#####		
	#####				#####	S	
3	#####	+	3	2	#####	+	2
	#####				#####		
	#####	S			#####		
	#####				#####	D	
2	#####	+	2	1	#####	+	1
	#####				#####		
	#####	T D			#####	DD	
	#####	M X			#####	X	
	#####	D			#####	S DDD	
	#####	D			#####	DDD	
1	#####	+S	1	0	#####	+S+M	0
	#####				#####	XDDDD	
	#####				#####	XDDDDDDD	
	#####				#####	DDD	
	#####	S M			#####	S DD	
	#####	DDDD			#####	DDDDD	
0	#####	+ DDDD	0	-1	#####	+ DD	-1
	#####	DDDDDDD			#####	T	
	#####	DDD			.#	T	
	#####	S DDD			.#		
	#####	DD			.#	D	
-1	###	T+	-1	-2	.	+	-2
	##	T D			.		
	#	D			.		
	.				.		
-2	.	+	-2	-3	.	+	-3
	.				.		
	.				.		
	.				.		
-3	.	+	-3	-4	.	+	-4
	.				.		

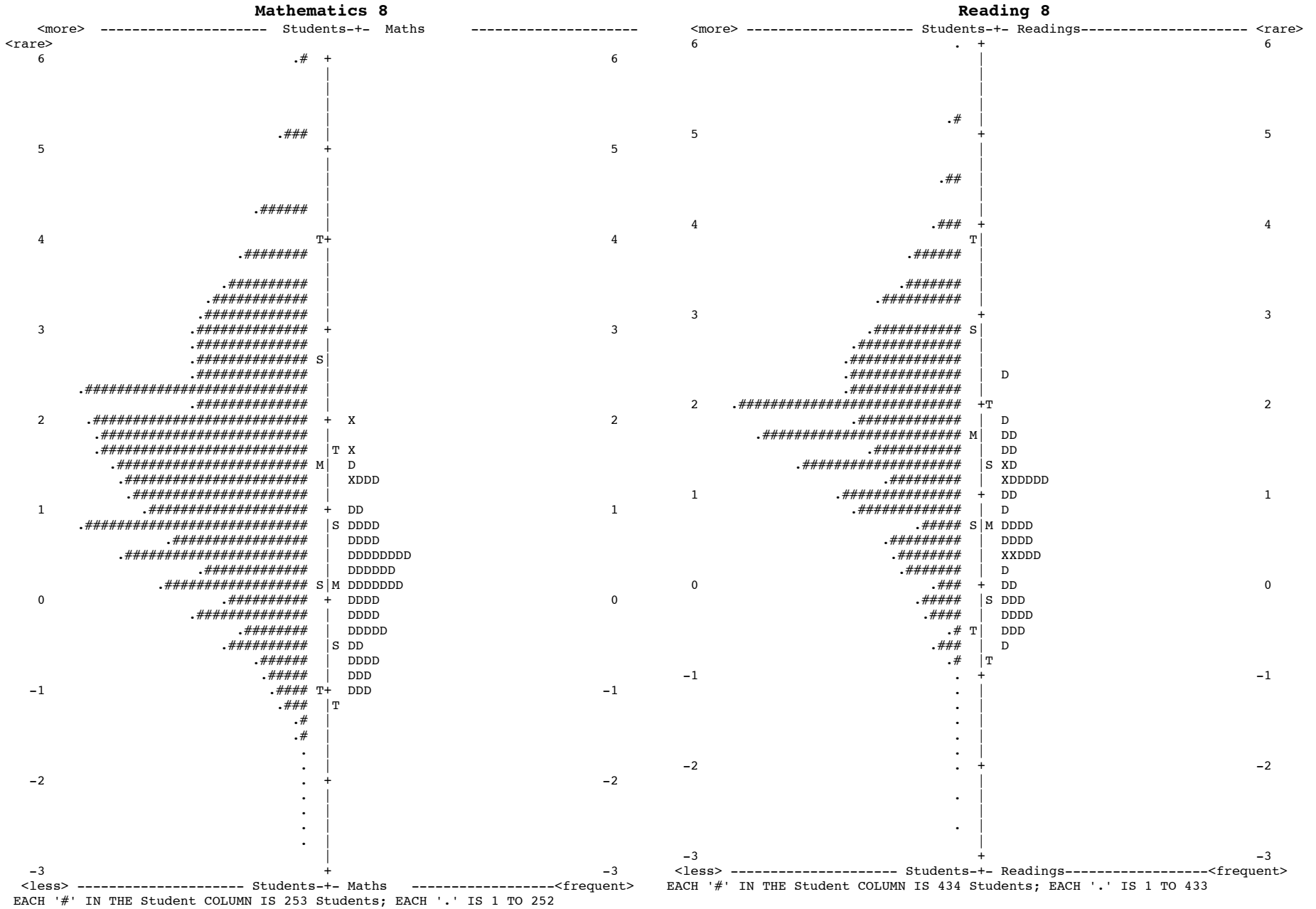
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Chapter Twelve: Rasch Item Calibration

Mathematics 7				Reading 7			
<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	
	.#####				.#####		
	.#####				.#####		
2		+	2	1	.#####	+	1
	.#####	T			.#####	T	
	.#####	X			.#####	X	
	.#####				.#####		
	.#####				.#####		
	.#####	M			.#####	M	
	.#####				.#####		
	.#####				.#####		
1		+	1	0	.#####	+	0
	.#####	S			.#####	S	
	.#####				.#####		
	.#####				.#####		
	.#####				.#####		
	.#####	M			.#####	M	
	.#####				.#####		
	.#####				.#####		
0		+	0	-1	.#####	+	-1
	.#####	S			.#####	S	
	.#####				.#####		
	.#####				.#####		
	.#####				.#####		
	.#####	M			.#####	M	
	.#####				.#####		
	.#####				.#####		
-1		+	-1	-2	.##	+	-2
	.##	T			.##	T	
	.##				.##		
	.				.		
	.	T			.	T	
	.	D			.	D	
	.				.		
-2		+	-2	-3	.	+	-3
	.				.		
	.				.		
	.				.		
	.				.		
-3		+	-3	-4	.	+	-4

<less> ----- Students+- Maths -----<frequent> <less> ----- Students+- Readings-----<frequent>
 EACH '#' IN THE Student COLUMN IS 276 Students; EACH '.' IS 1 TO 275 EACH '#' IN THE Student COLUMN IS 408 Students; EACH '.' IS 1 TO 407

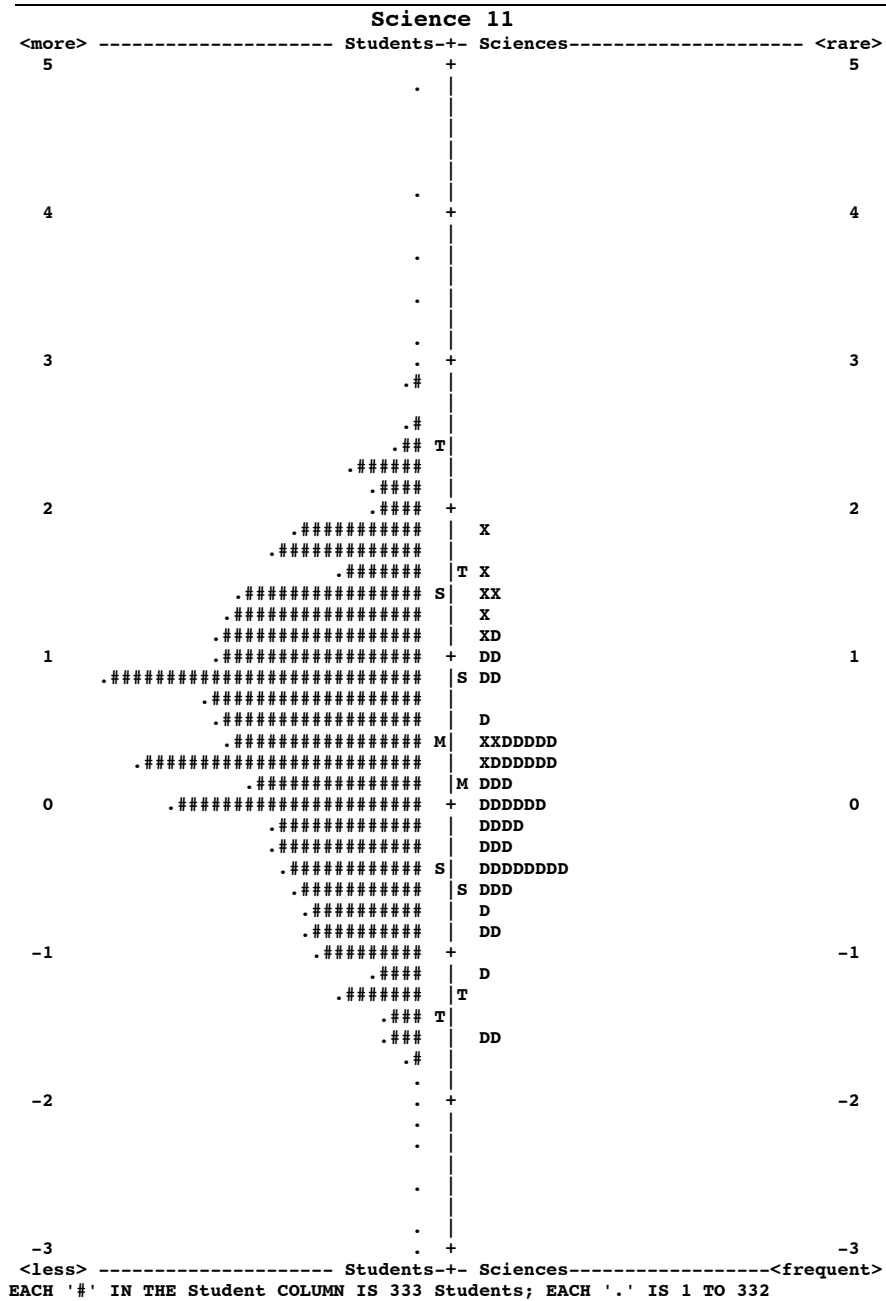
Chapter Twelve: Rasch Item Calibration



Chapter Twelve: Rasch Item Calibration

Mathematics 11		Reading 11	
<more>	Students+- Maths	<more>	Students+- Readings--<rare>
5	.# +	5	. +
	.###		.#
4	.####	4	.### +
	.##### T		.#### T
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1	.##### +T	1	.##### M+
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	.##### XDDD		.##### DDDDD
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	.##### D		.##### XXDD
0	.##### +	0	.##### S+M
	.##### DDDDD		.##### XD
	.##### DDD		.##### DDD
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	.##### DDDDDDDDD		.##### S DD
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EACH '#'	IN THE Student COLUMN IS 286 Students;	EACH '#'	IN THE Student COLUMN IS 424 Students;
EACH '.'	IS 1 TO 285	EACH '.'	IS 1 TO 423

Chapter Twelve: Rasch Item Calibration



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 note. 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

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

Note. 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 (θ) Metric Cut Scores by Grade and Subject Area

Subject	Grade	θ 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	Scaled 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.

Since 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 earlier, 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 produce 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 scaled score (LOSS) of 700. The exception is Grade 3 mathematics and reading, which have LOSS values of 750 and 1000, 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 scaled 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 ¹				Max ²
		Min	BB/B	B/P	P/A	
Mathematics	3	750	1044	1180	1370	1832
	4	700	1156	1246	1445	2467
	5	700	1158	1312	1483	2470
	6	700	1174	1298	1476	2476
	7	700	1183	1298	1472	2545
	8	700	1171	1284	1446	2310
	11	700	1167	1304	1509	2425
Reading	3	1000	1168	1235	1442	1942
	4	700	1112	1255	1469	2286
	5	700	1137	1275	1497	2344
	6	700	1121	1278	1456	2332
	7	700	1131	1279	1470	2387
	8	700	1146	1280	1473	2639
	11	700	1112	1257	1492	2511
Science	4	1050	1150	1275	1483	2234
	8	925	1150	1275	1464	2283
	11	1050	1150	1275	1347	1822
Writing	5	700	745	1236	1909	2294
	8	700	914	1236	1748	2329
	11	700	952	1236	1806	2364

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 θ metric), Intercept, and Slope by Grade and Subject Area

Subject	Grade	θ 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

STRAND (REPORTING CATEGORY) SCORE STRENGTH PROFILE

Strength profiles for strand (reporting category) scores have been provided since 2009. The following process was followed to derive the profile:

- The items for each strand were identified.
- WINSTEPS runs were undertaken that anchored the logit values for each strand's items to get the raw-to-logit score table for each strand. 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 strand scaled scores.

The strand scaled 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 strand scaled score was converted to H in cases where no strand scaled score equaled or exceeded the Advanced scaled score cut. See Chapter Sixteen for more information on strand 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. 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 a 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 sample responses from 2010 ($N \sim 1,000$ students)¹⁵ and create a data file including the selected students' MC and OE response scores (from 2010 raters).
 - Have the new (2011) raters score the selected OE responses.
 - Calibrate the difficulty parameters for OE items based on the 2011 scores. (This is done separately for each OE item.)
 - Calibrate all MC items (from the 2010 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 2011 and 2010 rater raw score means as the true/expected raw scores.
 - Using expected score = $f(\theta)$ for the 2010 rater scores, determine the two theta values that map to the two expected raw scores (i.e., the 2011 and 2010 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.

¹⁵ This sample is generally stratified on 2010 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 has a different set of nonoperational items (i.e., items that are 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 2011 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 were not altered in any way, they appeared in about the same position in the booklet, and they were 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., they contribute to student test scores) and EB items were external anchor items (i.e., they did not contribute to student test scores).

Since LK items were in the tests’ operational sections, they were common across all test forms within a 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 2011 PSSA tests were pulled from the 2010 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 12 to 24 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 3 contained one set, while Forms 4 through 5 contained the second set.¹⁶ 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 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.

¹⁶ In other words, Forms 1, 2, and 3 had the same set of EB MC items, while Forms 4 and 5 shared a different set of EB MC items.

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. 2011 PSSA Linking Designs: Mathematics, Reading, and Science Mathematics Grades 3–8 and 11

N _i	Core		Core Links		Form Blocks				
	MCs (1 pt)	OEs (4 pts)	MC(1)	OE(4)	EB1	EB2	EB3	EB4	EB5
N ₁	36-37	1	23-24	2	2				
N ₂	36-37	1	23-24	2		2			
N ₃	36-37	1	23-24	2			2		
N ₄	36-37	1	23-24	2				2	
N ₅	36-37	1	23-24	2					2

Notes. Table 15–2 presents the 2011 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: 5
Core MC Links: 23-24
Core OE Links: 2 (4pts)
EB MC Links: 2 (per form)
Total Core MC: 60
Total Core OE: 3 (4pts)

Table 15–2 (continued). 2011 PSSA Linking Designs: Mathematics, Reading, and Science Reading Grade 3

N _i	Core		Core Links		Form Passage-EBs				
	MCs (1 pt)	OEs (3 pts)	MC(1)	OE(3)	EB1	EB2	EB3	EB4	EB5
N ₁	25	1	15	1	P1-8				
N ₂	25	1	15	1		P1-8			
N ₃	25	1	15	1			P1-8		
N ₄	25	1	15	1				P2-8	
N ₅	25	1	15	1					P2-8

Grade: 3
Form Blocks: 5 (two passage sets)
Core MC Links: 15
Core OE Links: 1 (3pts)
EB MC Links: 8 (per passage set)
Total Core MC: 40
Total Core OE: 2 (3pts)

Reading Grades 4–8 and 11

N _i	Core		Core Links		Form Passage-EBs				
	MCs (1 pt)	OEs (3 pts)	MC(1)	OE(3)	EB1	EB2	EB3	EB4	EB5
N ₁	23-28	2	12–17	2	P1-8				
N ₂	23-28	2	12–17	2		P1-8			
N ₃	23-28	2	12–17	2			P1-8		
N ₄	23-28	2	12–17	2				P2-8	
N ₅	23-28	2	12–17	2					P2-8

Grades: 4–8 and 11
Form Blocks: 5 (two passage sets)
Core MC Links: 12-17
Core OE Links: 2 (3pts)
EB MC Links: 8 (per passage set)
Total Core MC: 40
Total Core OE: 4 (3pts)

**Table 15–2 (continued). 2011 PSSA Linking Designs: Mathematics, Reading, and Science
Grade 4**

N _i	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 ₁	42	3	16	2	2												
N ₂	42	3	16	2		2											
N ₃	42	3	16	2			2										
N ₄	42	3	16	2				2									
N ₅	42	3	16	2					2								
N ₆	42	3	16	2						2							
N ₇	42	3	16	2							2						
N ₈	42	3	16	2								2					
N ₉	42	3	16	2									2				
N ₁₀	42	3	16	2										2			
N ₁₁	42	3	16	2											2		
N ₁₂	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)

**Table 15–2 (continued). 2011 PSSA Linking Designs: Mathematics, Reading, and Science
Science Grade 8**

N _i	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 ₁	42	3	16	2	2												
N ₂	42	3	16	2		2											
N ₃	42	3	16	2			2										
N ₄	42	3	16	2				2									
N ₅	42	3	16	2					2								
N ₆	42	3	16	2						2							
N ₇	42	3	16	2							2						
N ₈	42	3	16	2								2					
N ₉	42	3	16	2									2				
N ₁₀	42	3	16	2										2			
N ₁₁	42	3	16	2											2		
N ₁₂	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
 Total Core OE: 5 (2pts)

Science Grade 11

N _i	Core		Core Links		Form Blocks								
	MCs (1 pt)	OE (2/4 pts)	MC(1)	OE(3)	EB1	EB2	EB3	EB4	EB5	EB6	EB7	EB8	
N ₁	34	4/3	16	2	1								
N ₂	34	4/3	16	2		2							
N ₃	34	4/3	16	2			2						
N ₄	34	4/3	16	2				2					
N ₅	34	4/3	16	2					2				
N ₆	34	4/3	16	2						2			
N ₇	34	4/3	16	2							2		
N ₈	34	4/3	16	2								2	

Grade: 11
 Form Blocks: 8
 Core MC Links: 16
 Core OE Links: 2 (2pts)
 EB MC Links: 1-2 (per form)
 Total Core MC: 50
 Total Core OE: 6 (2pts) + 3(4pts)

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 2011 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.¹⁷ At this point all OP and EB item parameters were on a unique scale for 2011. Between-year linking was required to place these items on the bank scale.

Between-year linking utilized the 2011 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 2011 and banked parameters was then determined. The mean of the differences was then used to statistically adjust the 2011 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 2010 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 2011 raters. Thus, the selected students' responses had scores from 2010 and 2011 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. Two LK/EB items were dropped overall. 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).

¹⁷ 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	0.2789	0.2789	0.9911
	4	34	2	34	2	0.3193	0.3193	0.9738
	5	34	2	34	2	0.6555	0.6555	0.9812
	6	34	2	34	2	0.1780	0.1780	0.9764
	7	34	2	34	2	0.2459	0.2459	0.9872
	8	34	2	34	2	0.1558	0.1558	0.9319
	11*	34	2	33	2	-0.3416	-0.3212	0.9698
Reading	3	31	1	31	1	-0.1369	-0.1369	0.9944
	4	31	2	31	2	0.0765	0.0765	0.9873
	5	33	2	33	2	0.0742	0.0742	0.9937
	6	28	2	28	2	-0.1098	-0.1098	0.9881
	7	30	2	30	2	0.0858	0.0858	0.9906
	8	28	2	28	2	0.5796	0.5796	0.9899
	11	32	2	32	2	-0.1082	-0.1082	0.9884
Science	4	40	2	40	2	0.1541	0.1541	0.9732
	8	35	2	35	2	-0.0432	-0.0432	0.9740
	11*	32	2	31	2	0.0278	0.0462	0.9886
Writing	5	12	2	12	2	1.8419	1.8419	0.9842
	8	12	2	12	2	1.8139	1.8139	0.9741
	11	12	2	12	2	1.2122	1.2122	0.9386

*Some 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 (2011) item data:

1. Scatterplot of new-year p -values (2011) on old-year p -values (2010 generally).
2. Scatterplot of new-year logits (2011) on old-year logits (2010 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 a year. Using spiraled forms within a 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.

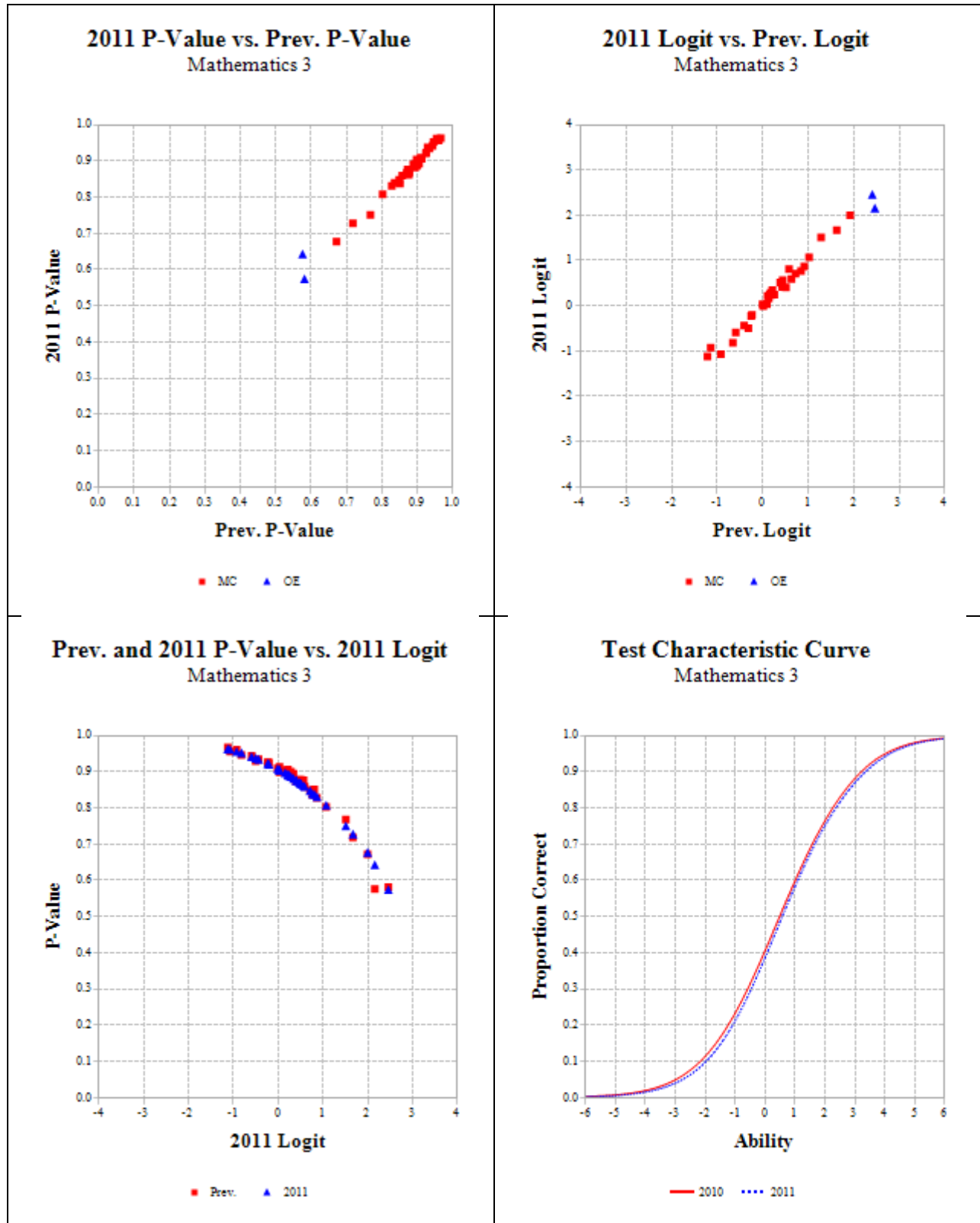
To bolster the number of linking items, different sets of EB linking items were included on different forms. Because the forms were spiraled within classrooms, the samples generated are randomly equivalent and the same *p*-values would be expected to translate into roughly the same logit, with some random 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.

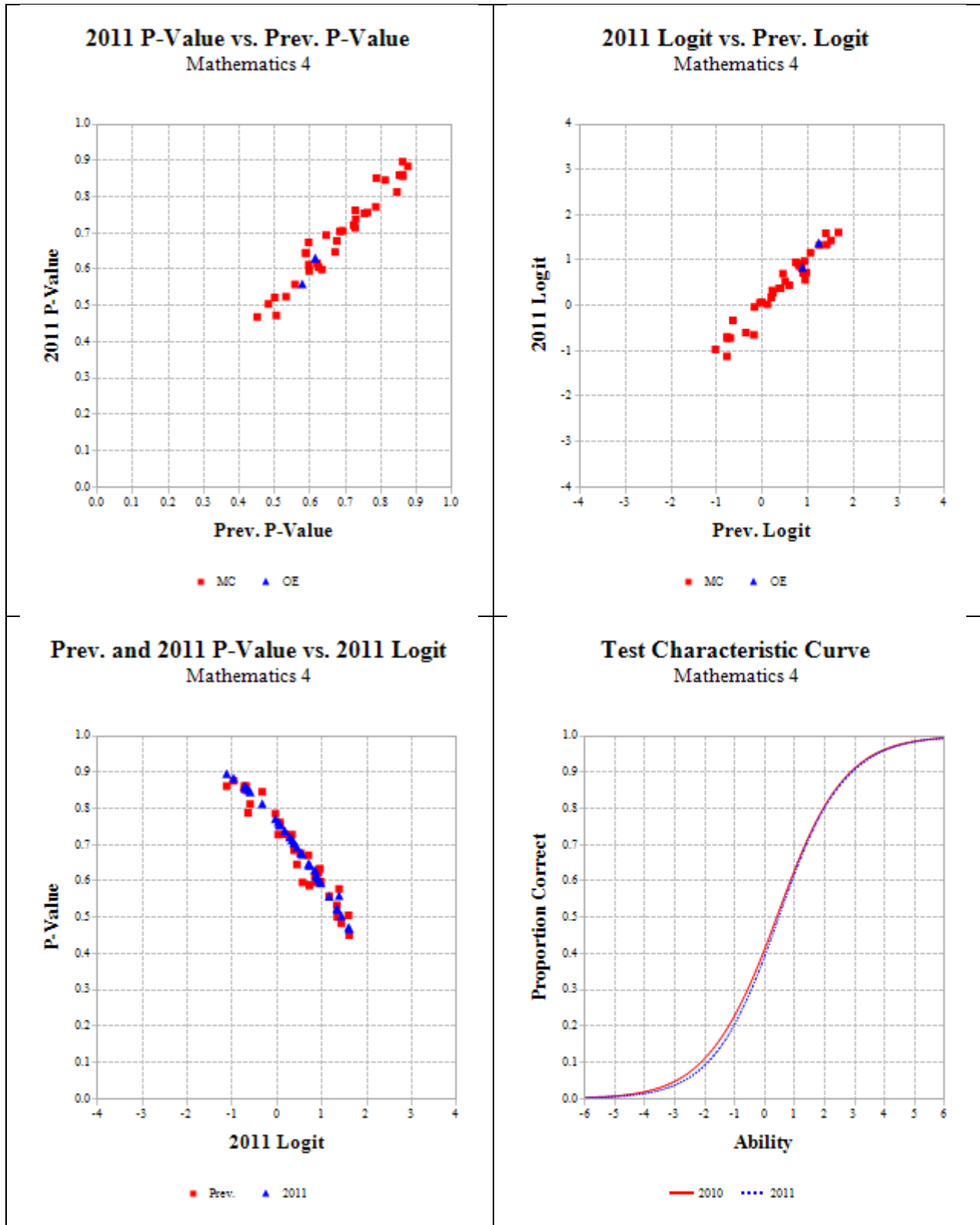
TEST CHARACTERISTIC CURVES

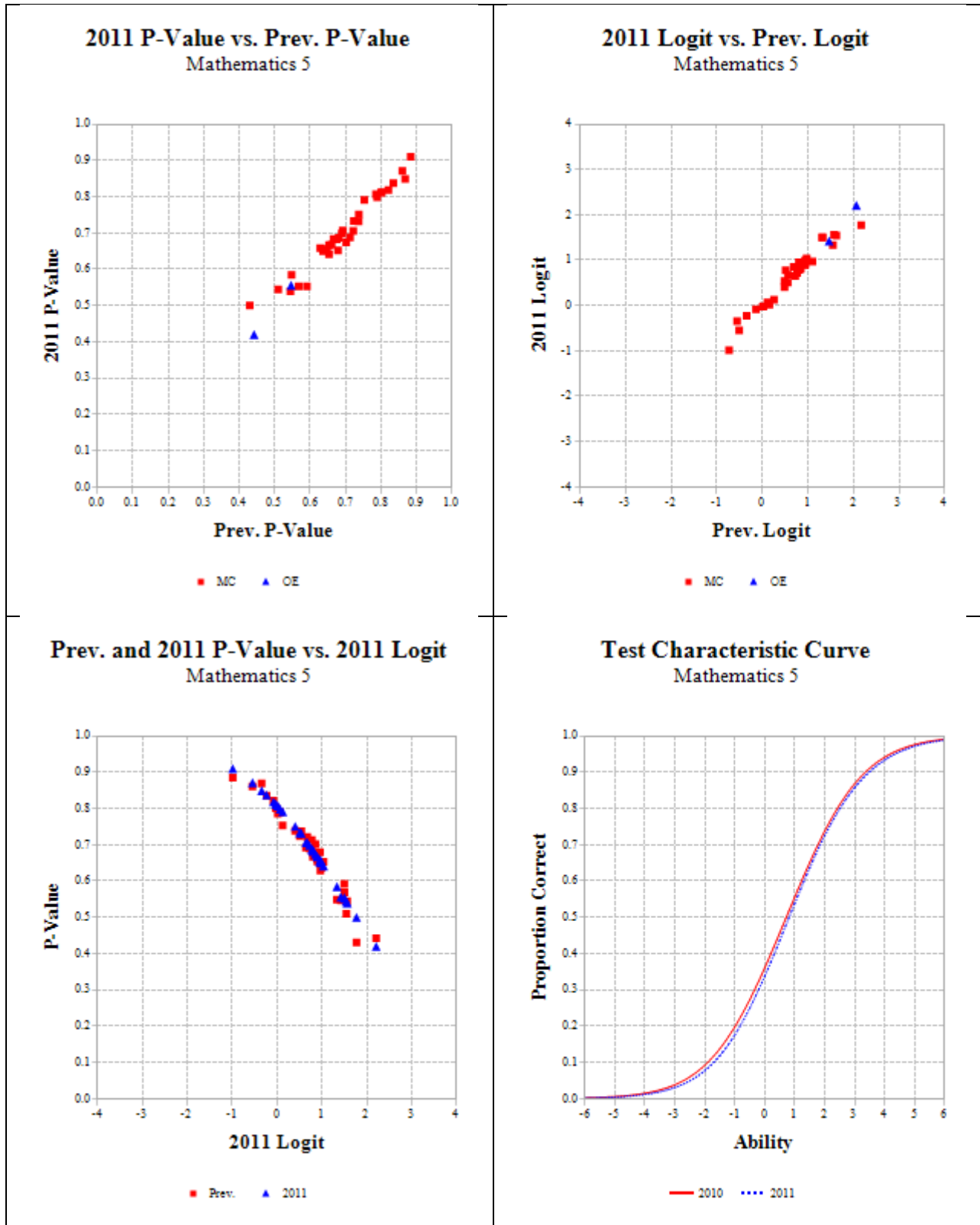
The old and new-year Test Characteristic Curves (TCCs) by grade and subject are shown in the bottom right-hand plot figures.¹⁸ The TCCs show the similarity between the new- and old-year tests in terms of difficulty in the logit metric (new-year results are for the final, linked values). Assuming equal 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.

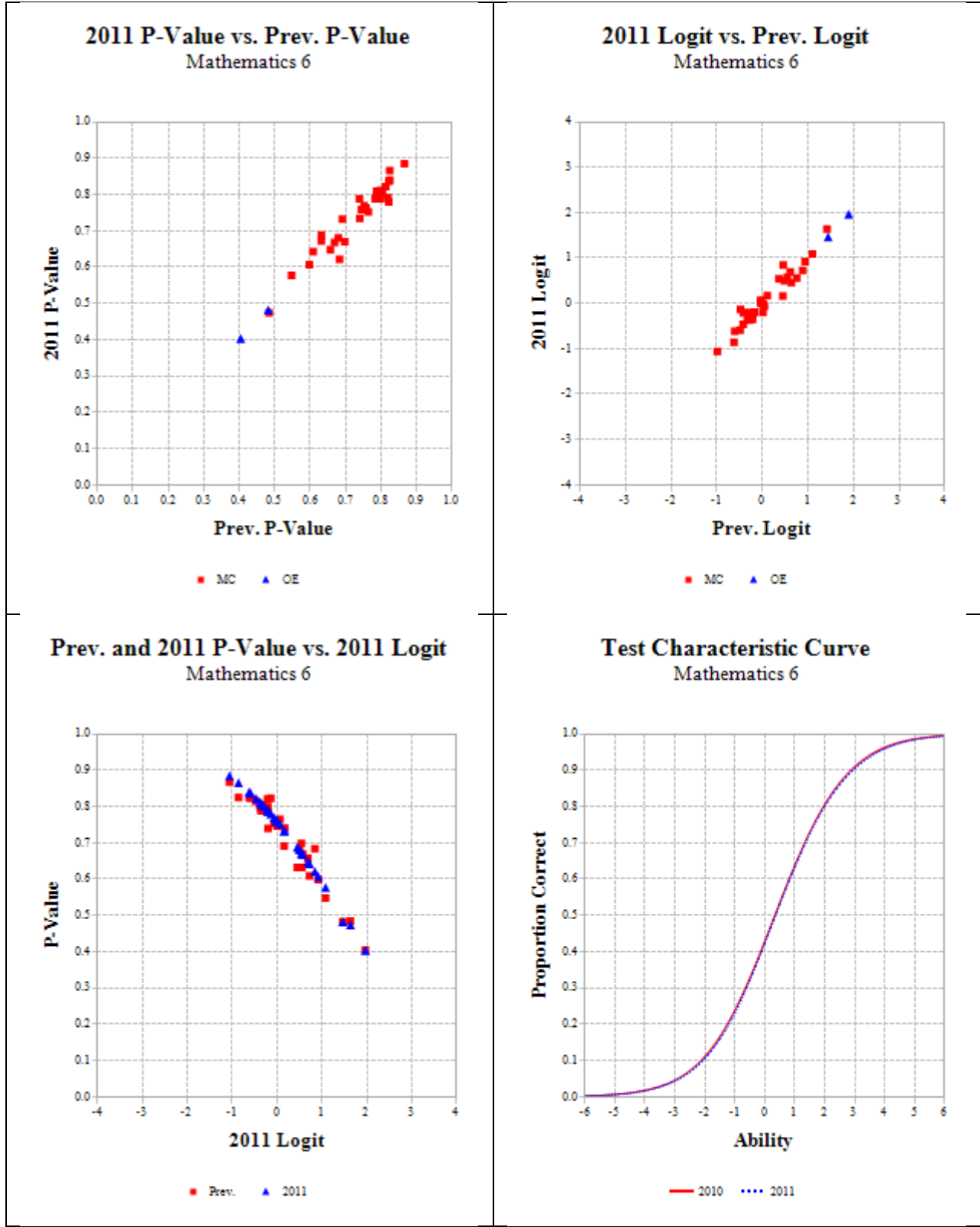
¹⁸ In the TCC figures, the *y*-axis *Probability* represents total test raw score expressed on a proportion-correct metric.

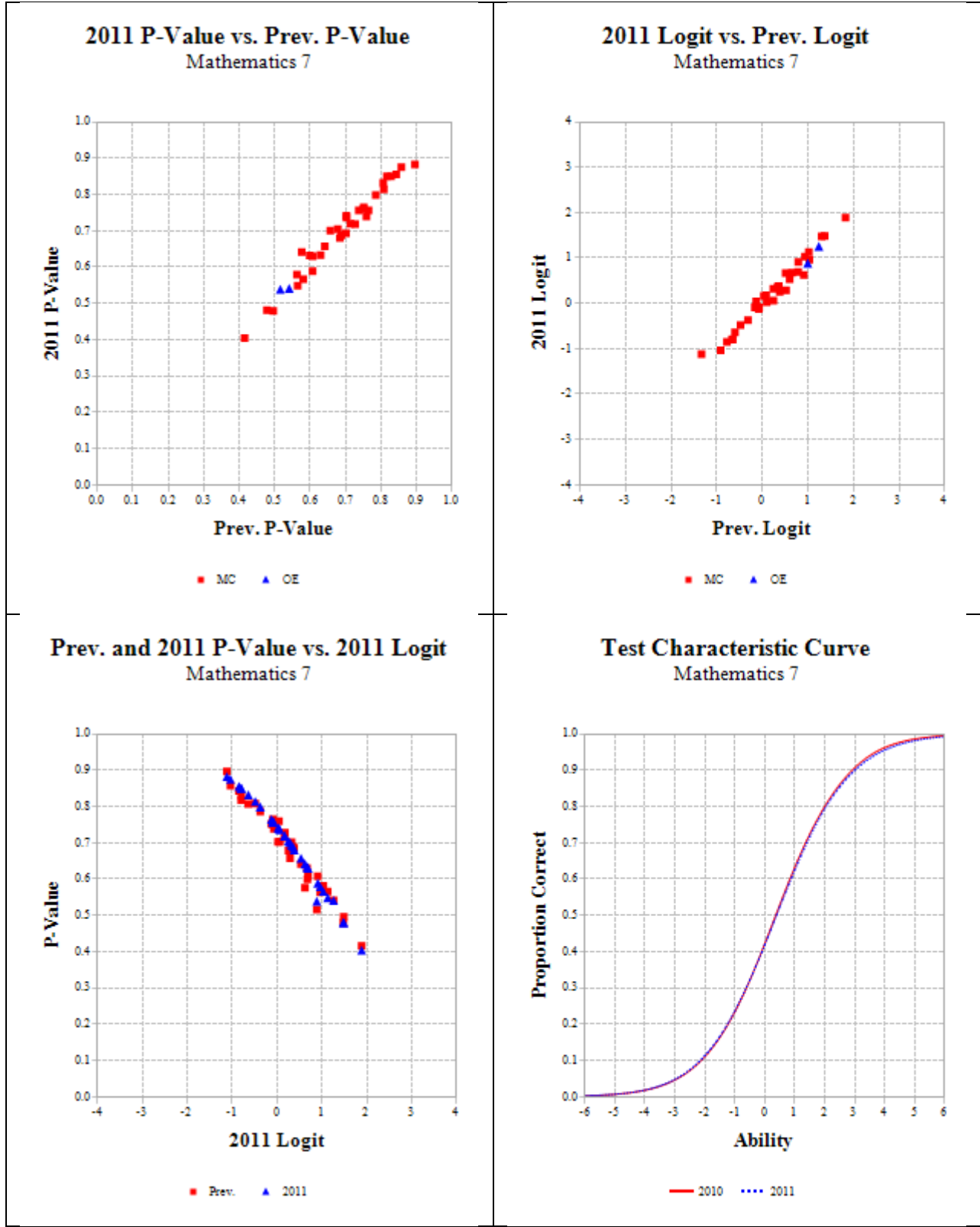
Figure 15–1. Item Stability Plots and Test Characteristic Curves

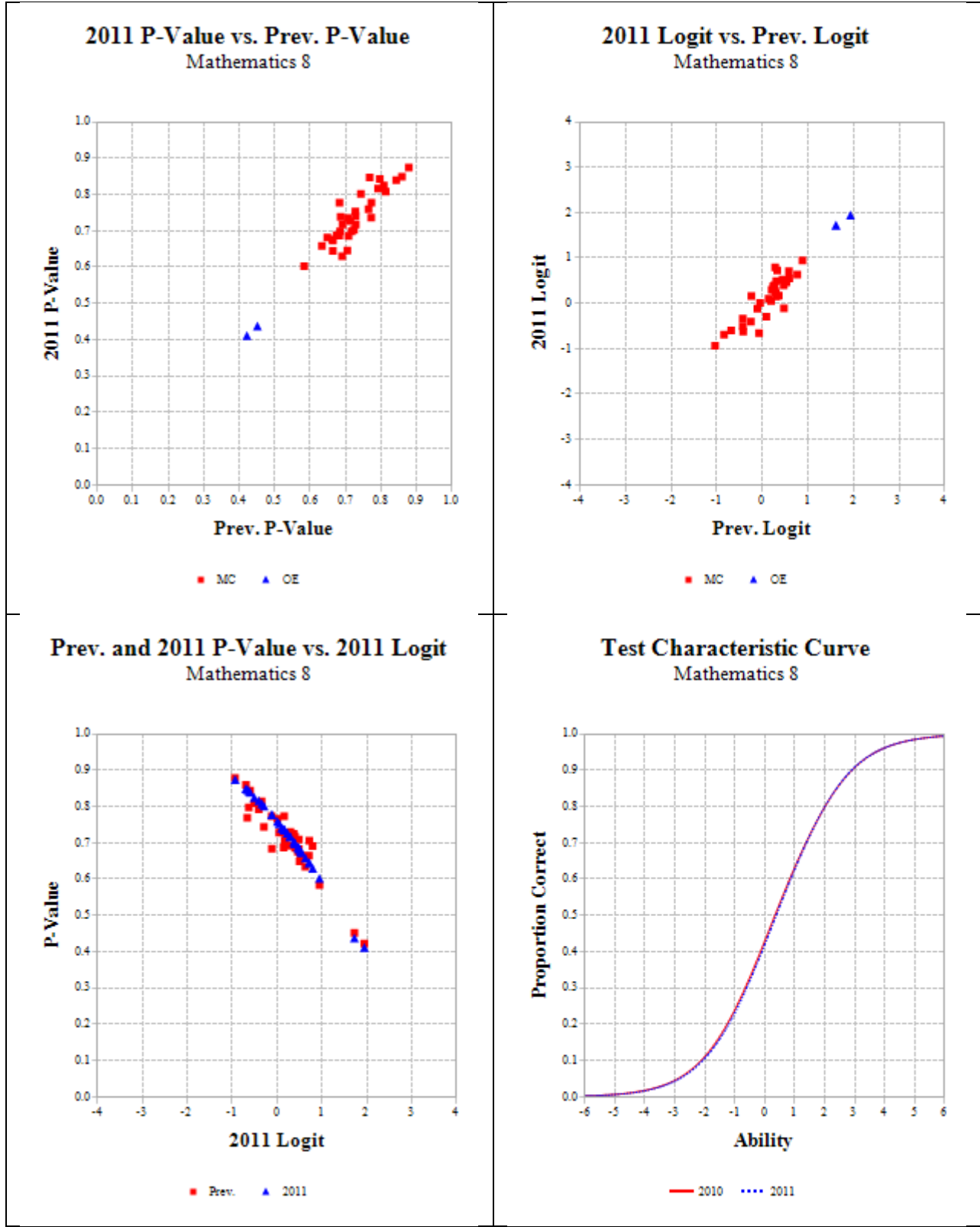


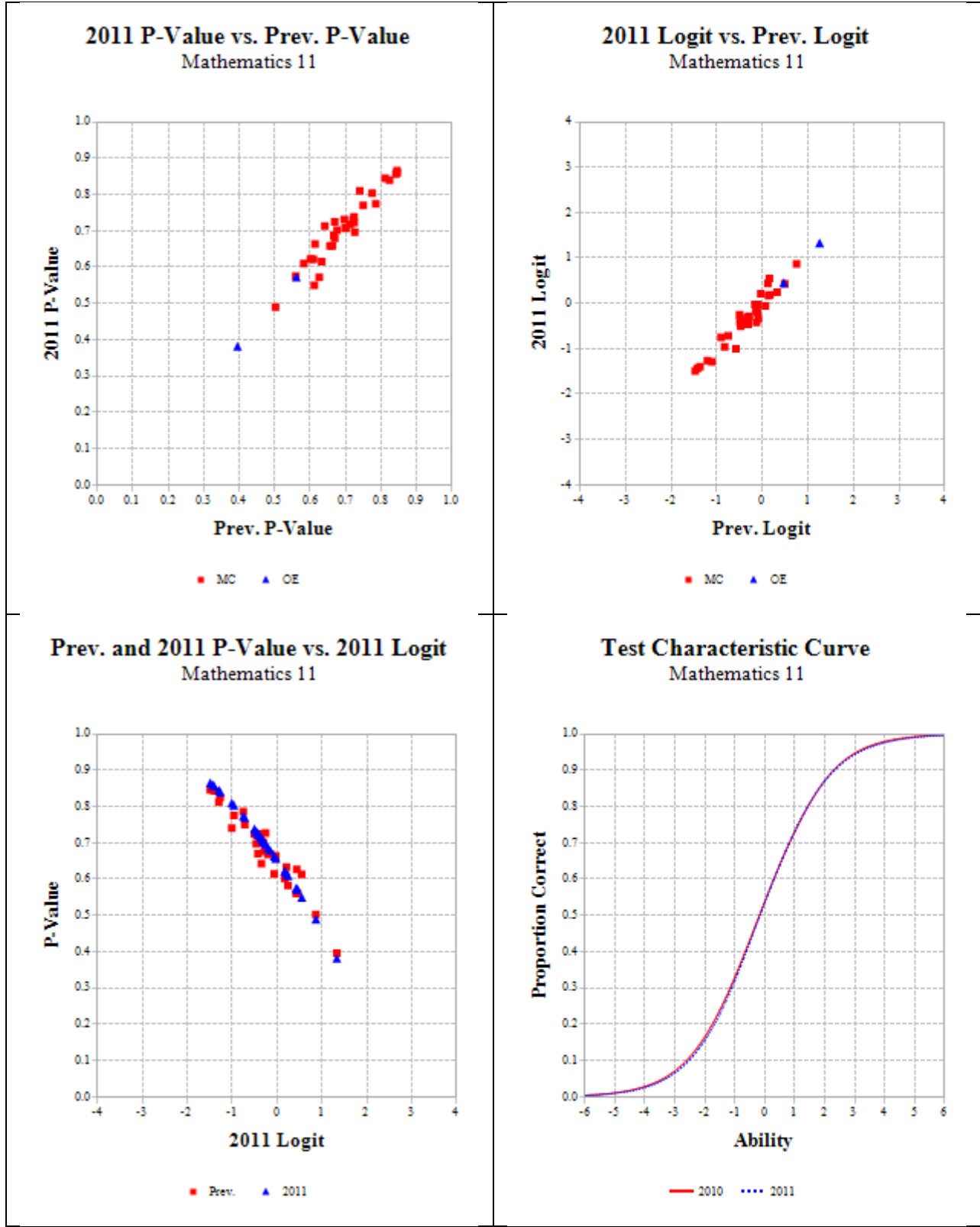


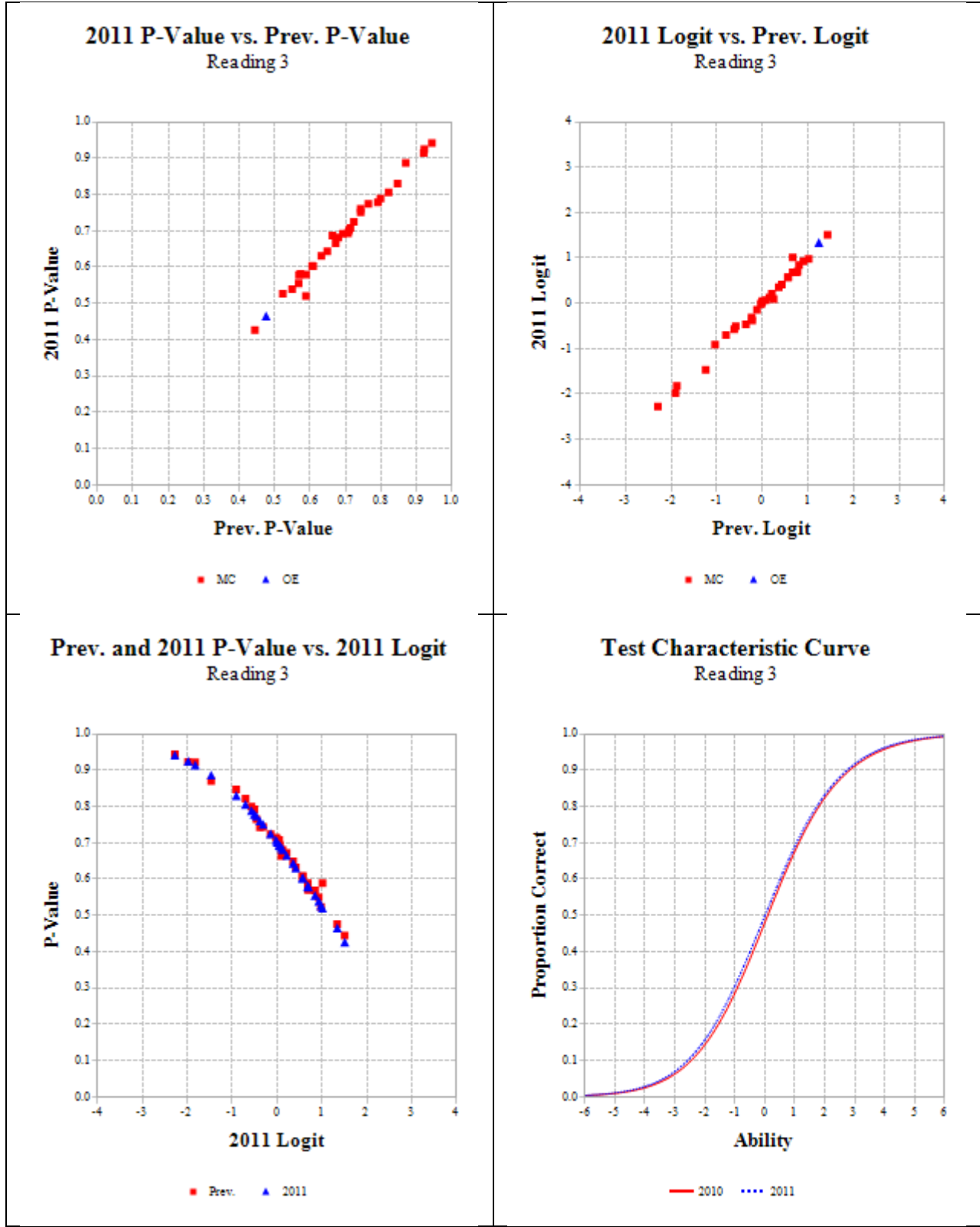


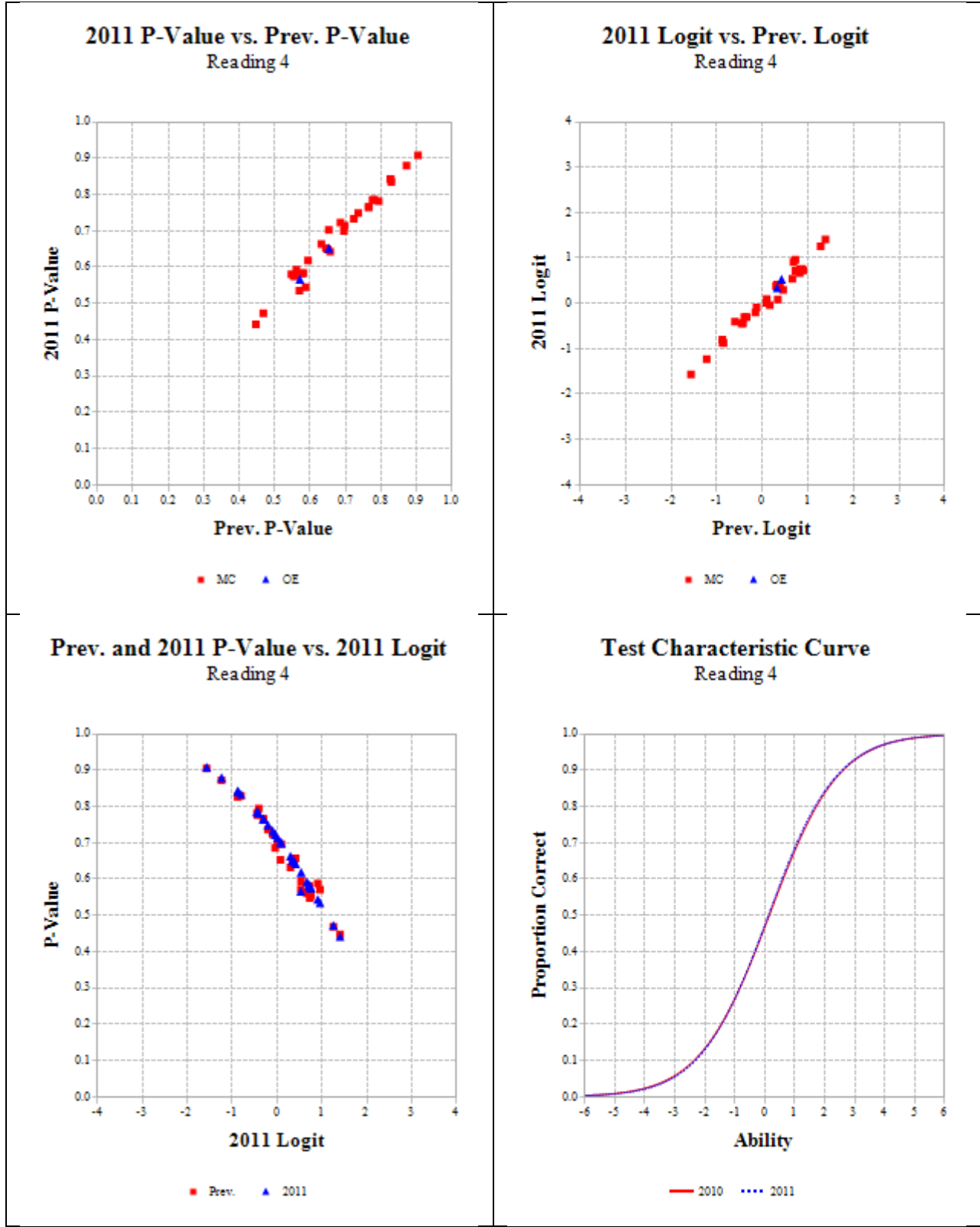


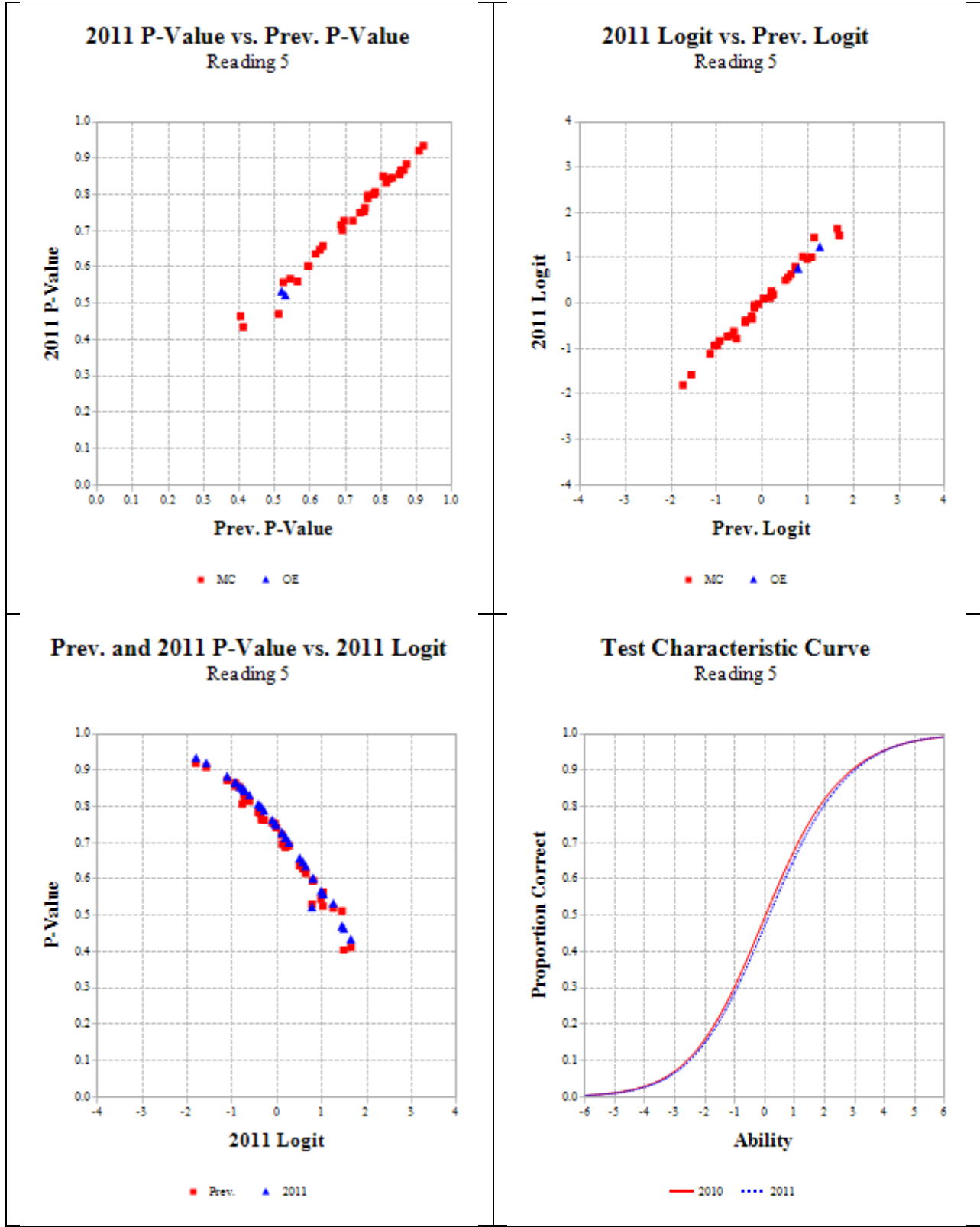


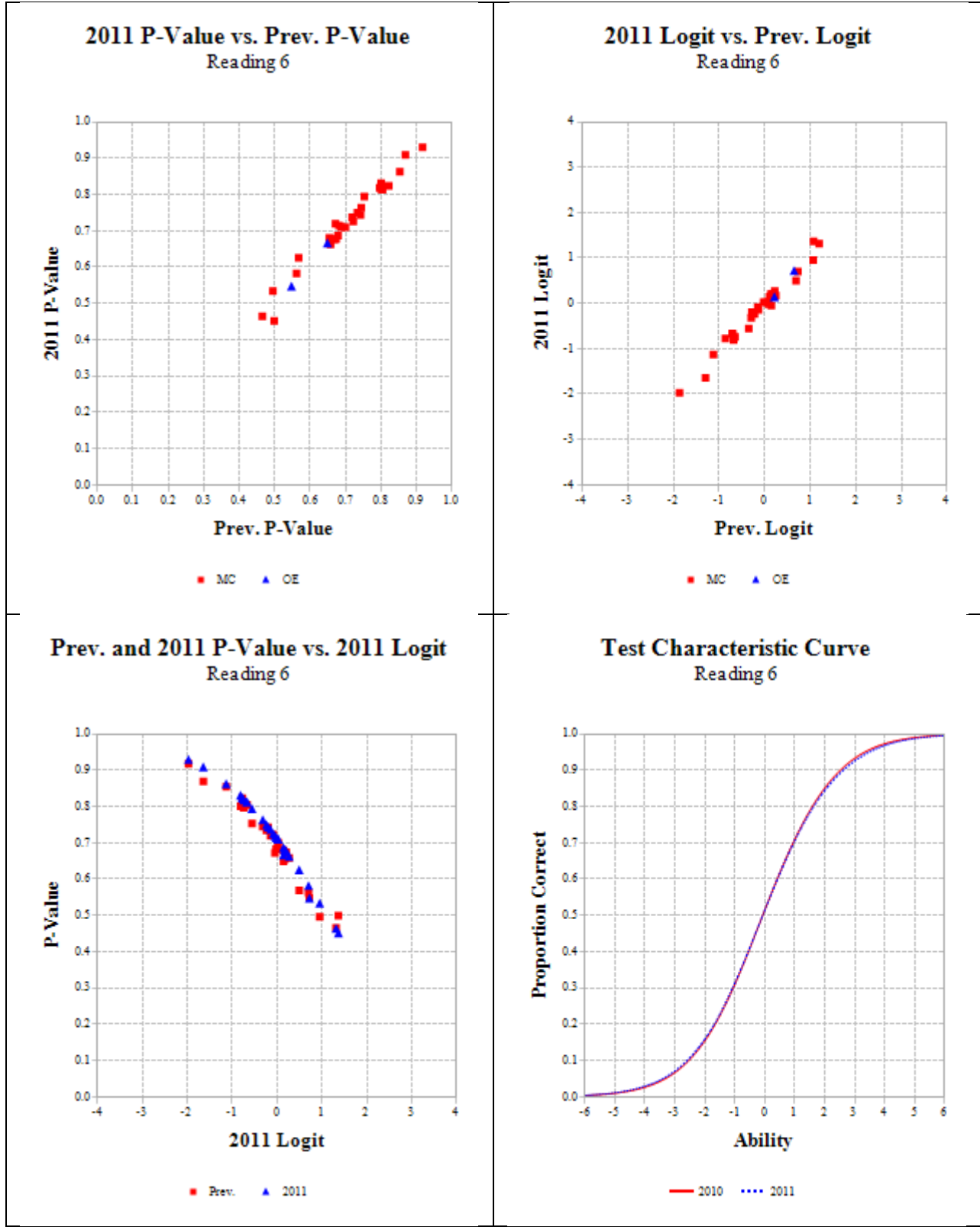


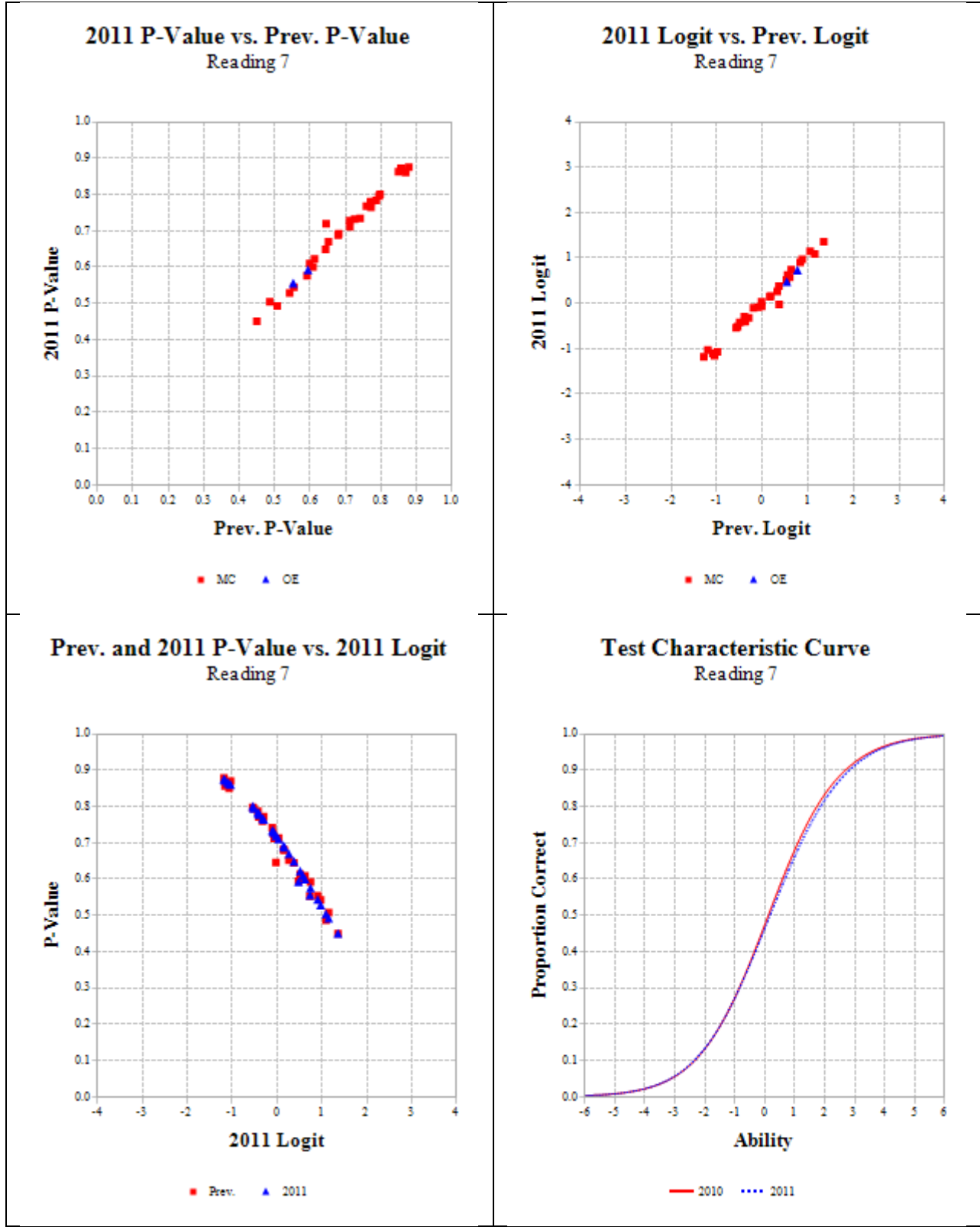


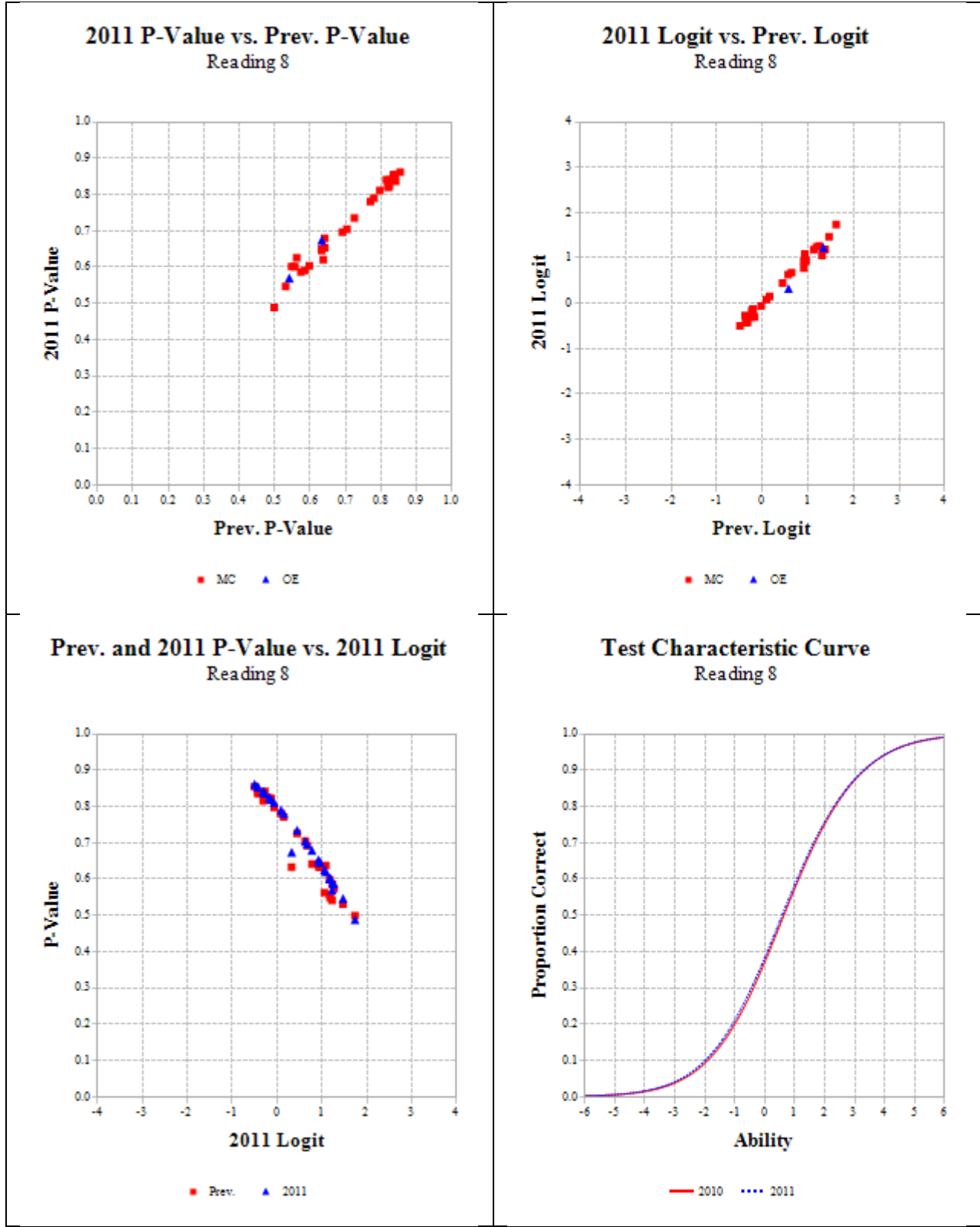


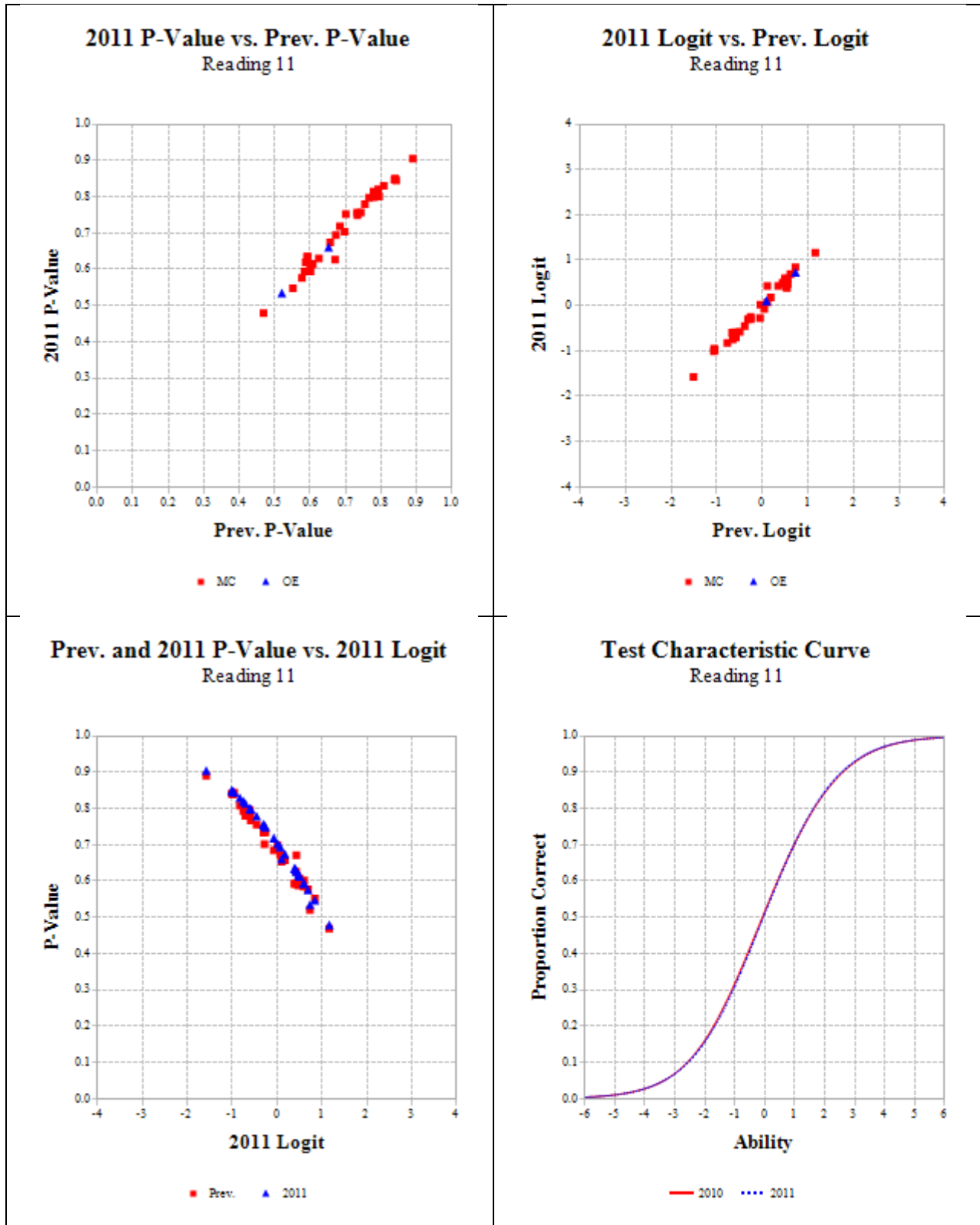


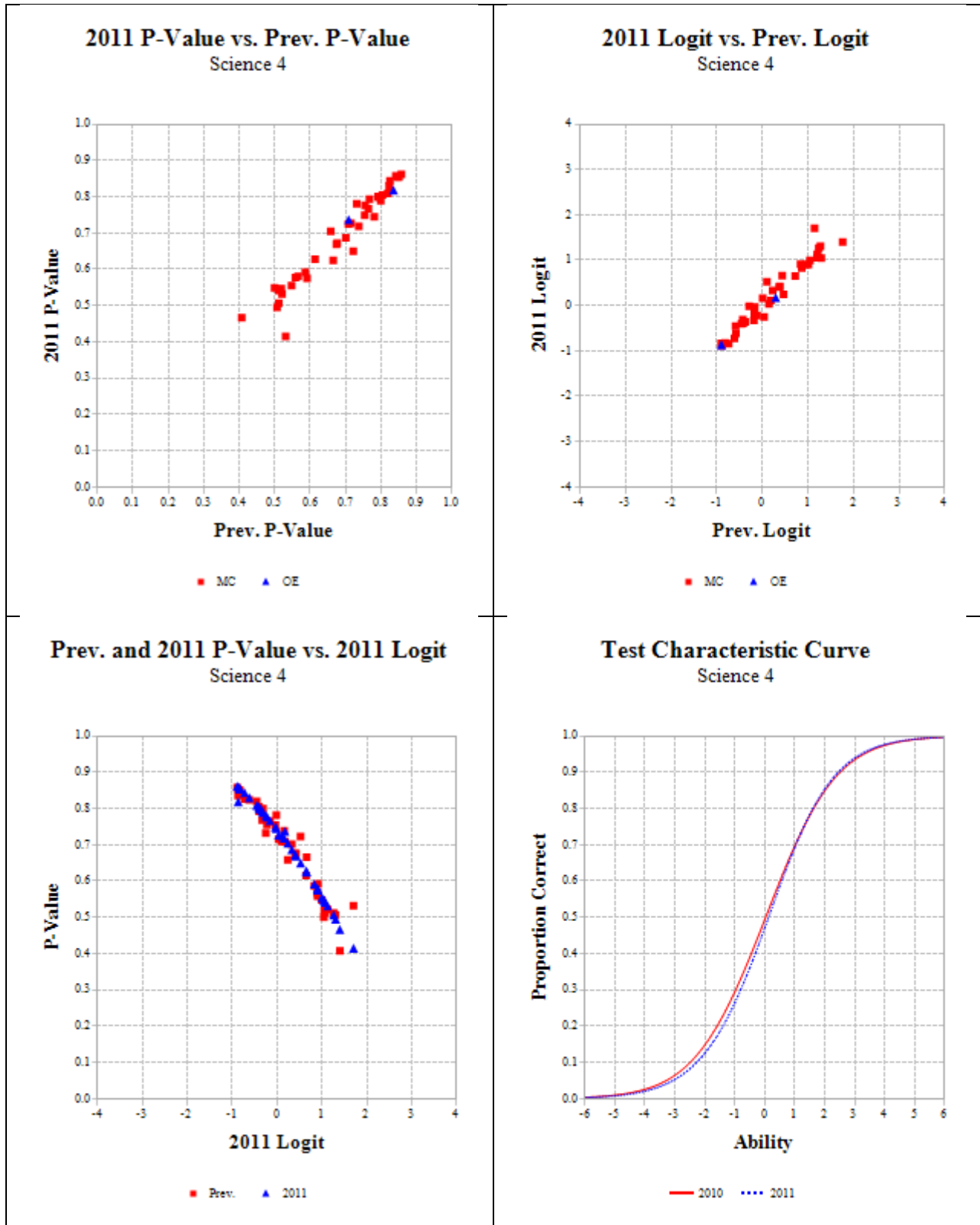


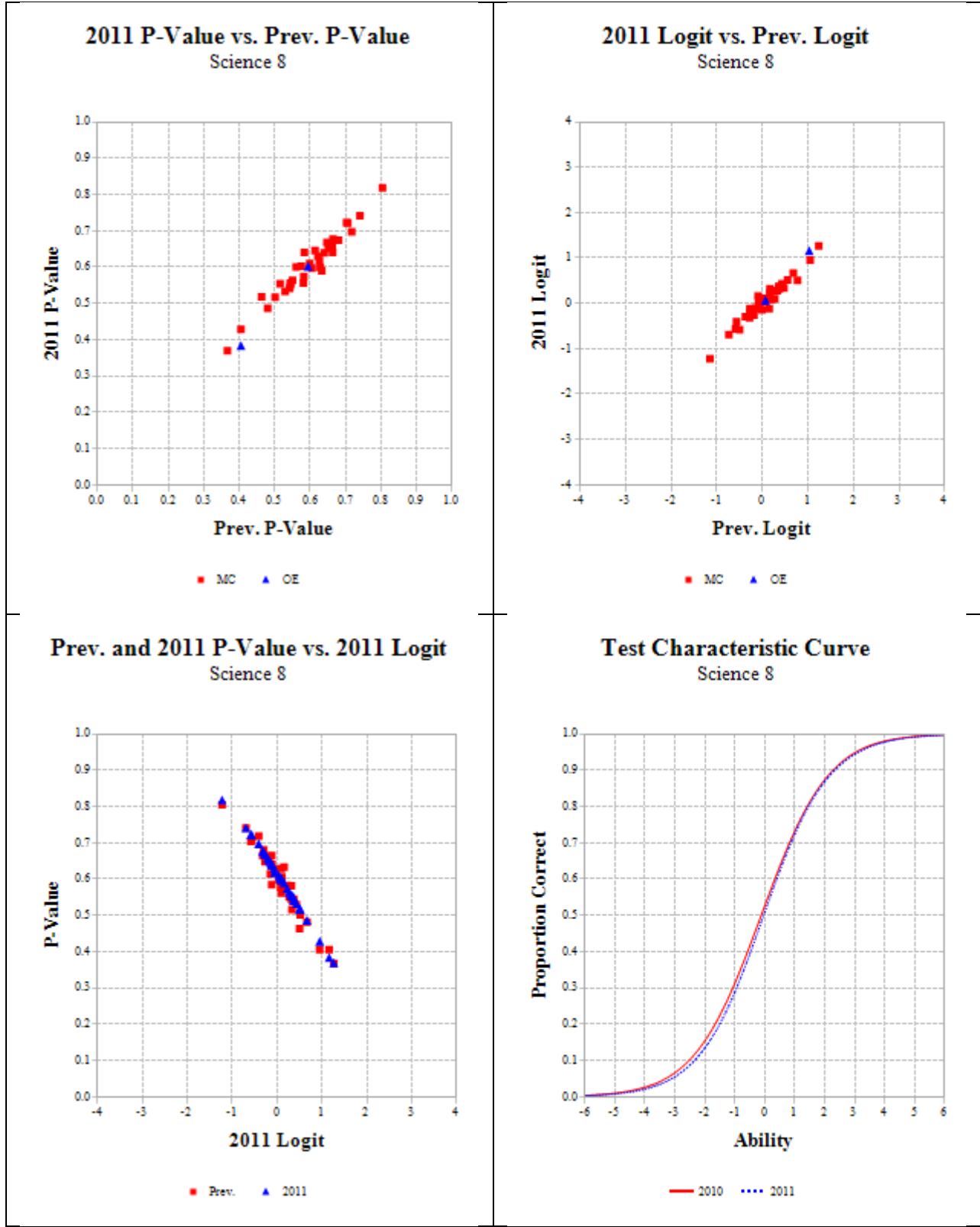


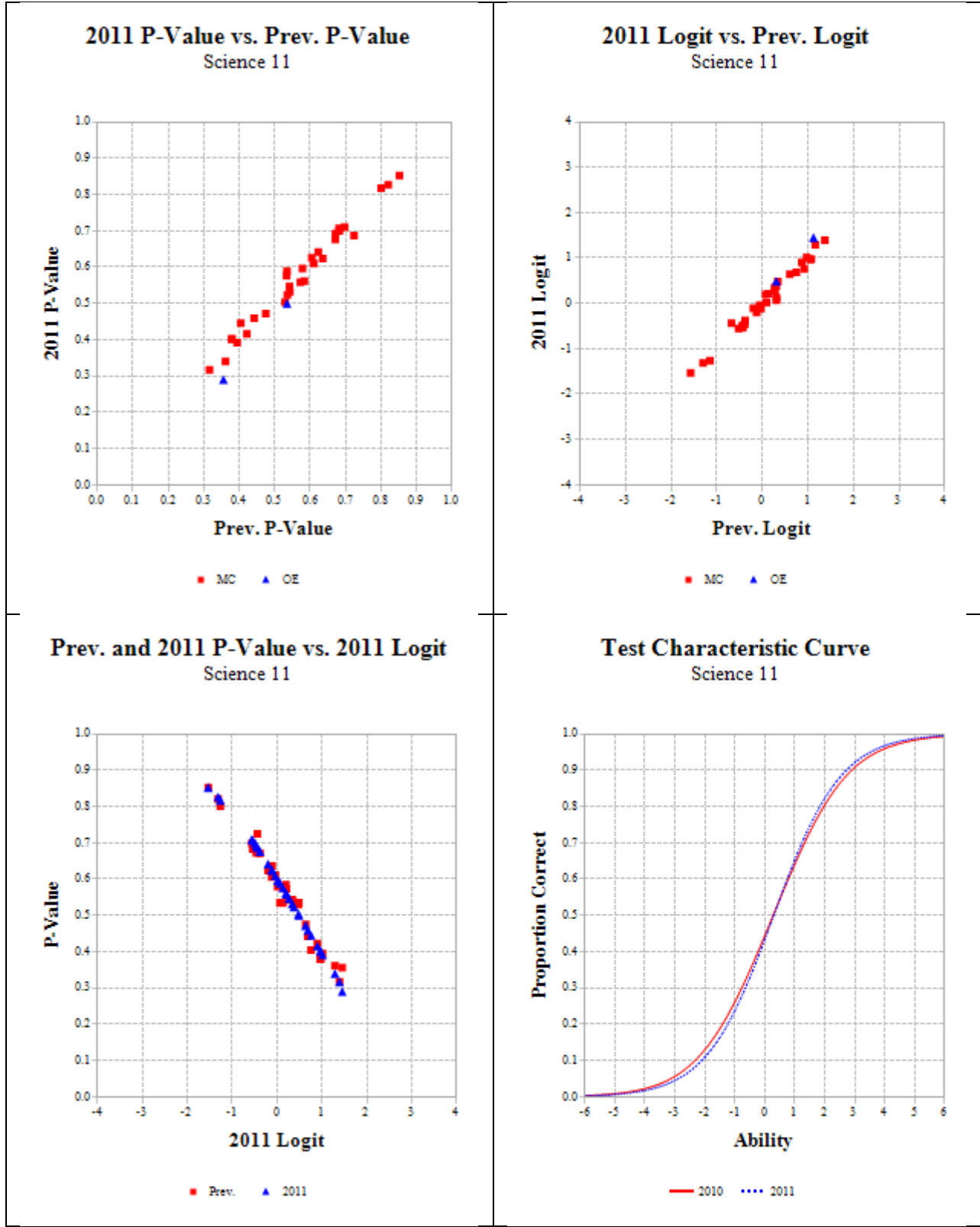












WRITING

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 2011 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.¹⁹ 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. 2011 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.

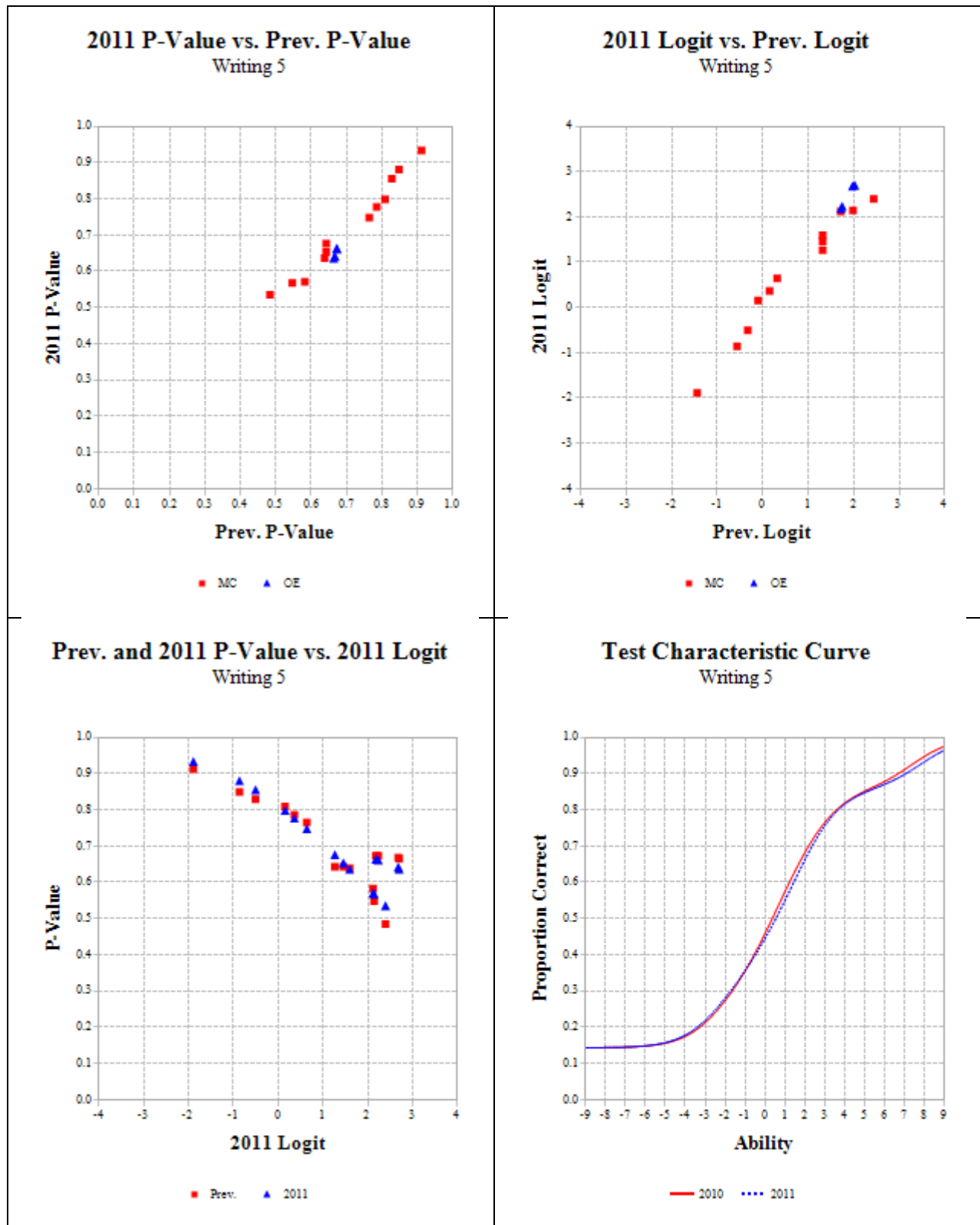
Graphs

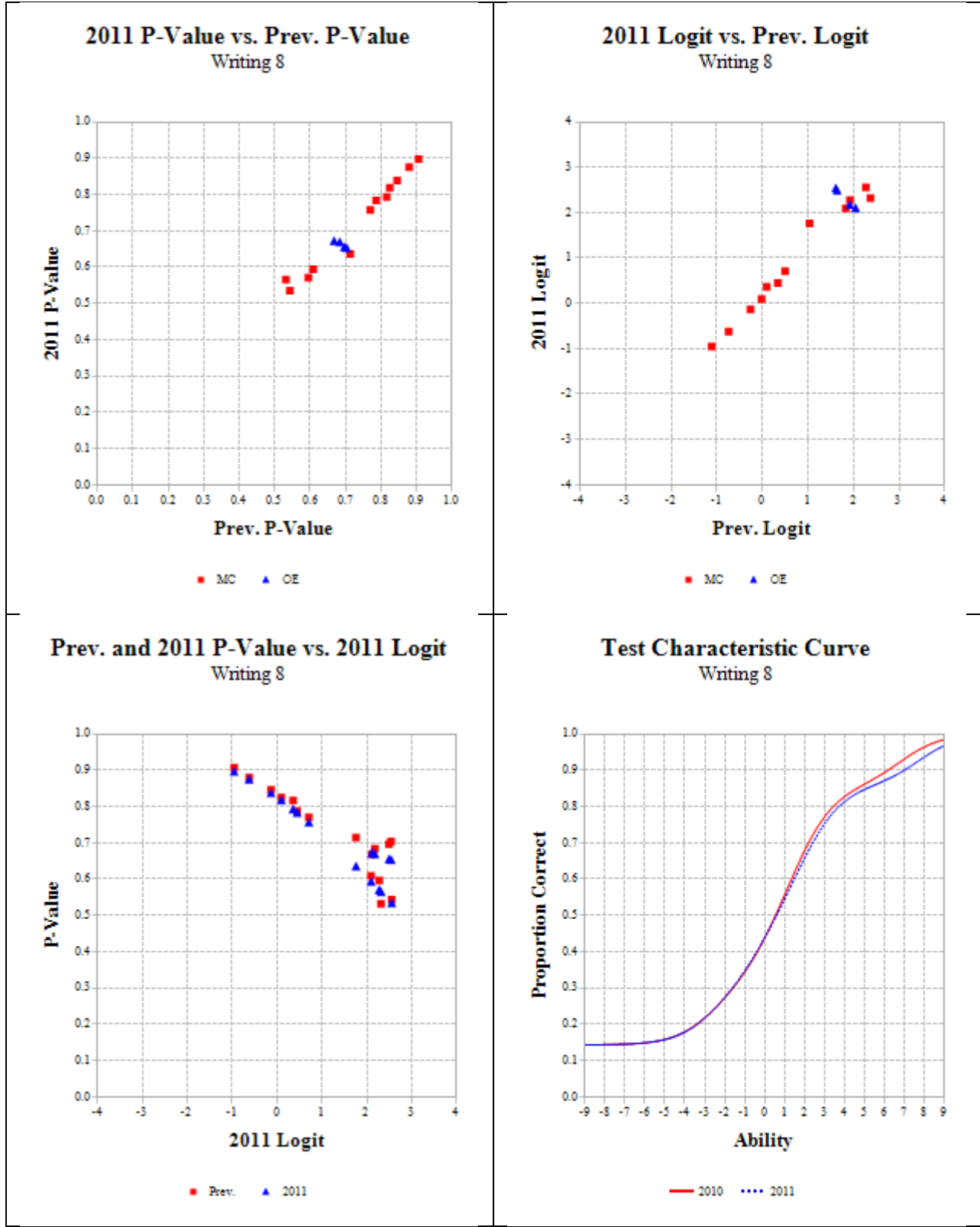
Graphs, similar to those presented for other subject areas, are provided for writing in Figure 15–2. The TCCs for writing are less parallel and more irregular than those for the other subjects. This is likely due to the weighting that was used to score the writing test. Recall that the raw scores on mode are weighted by 10 to get a total possible score of 100 points.

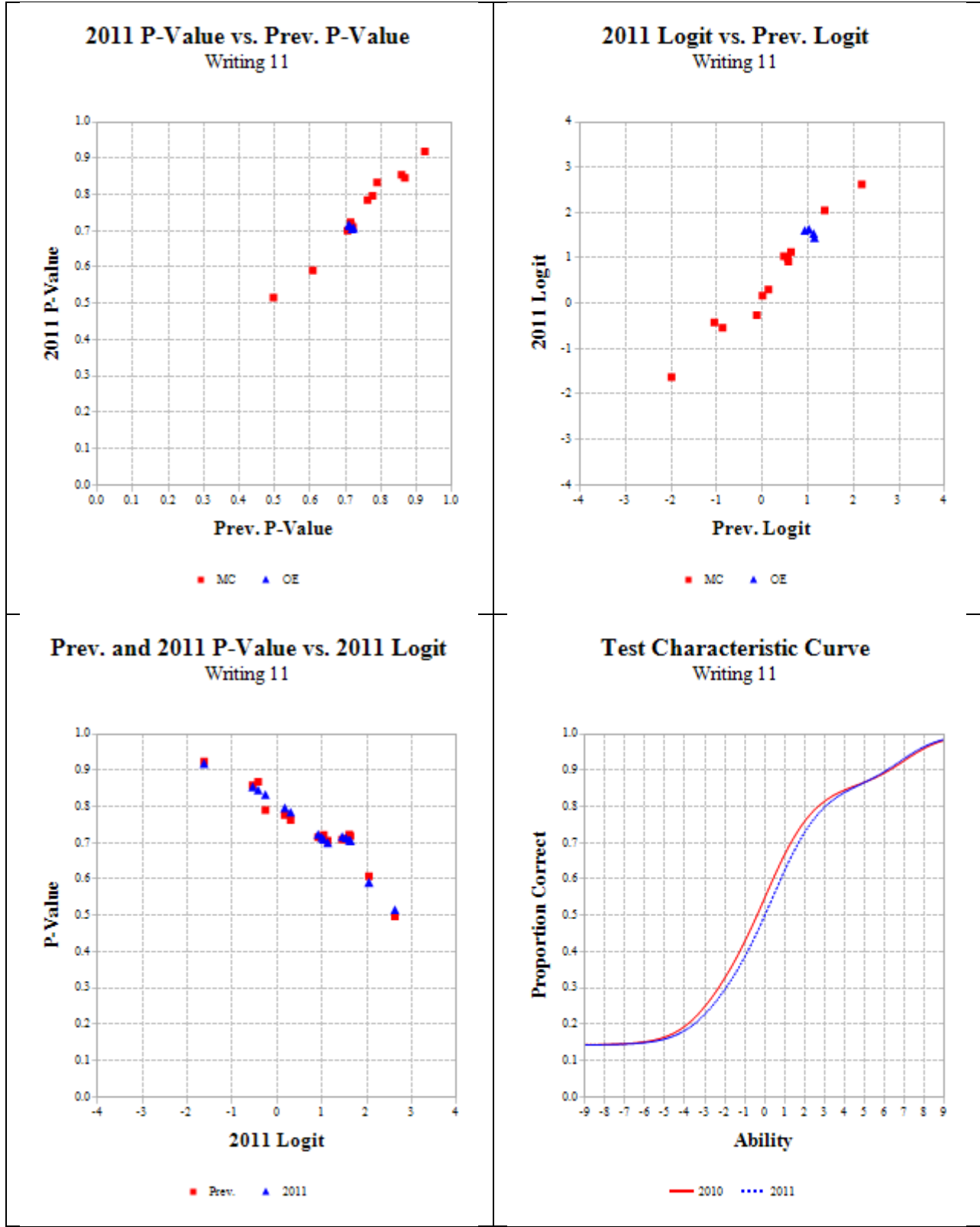
Overall, the plots suggest that the writing results are less stable than the other content areas. The nature of the construct (with MC and weighted WP items contributing to the student scores) may have partial responsibility for this.

¹⁹ 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 (MC) and open-ended (OE) 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 a student's overall 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 is 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 of 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 2011 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;²⁰ 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.

²⁰ 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 ¹			Max ²
			BB/B	B/P	P/A	
Mathematics	3	750	1044	1180	1370	1832
	4	700	1156	1246	1445	2467
	5	700	1158	1312	1483	2470
	6	700	1174	1298	1476	2476
	7	700	1183	1298	1472	2545
	8	700	1171	1284	1446	2310
	11	700	1167	1304	1509	2425
Reading	3	1000	1168	1235	1442	1942
	4	700	1112	1255	1469	2286
	5	700	1137	1275	1497	2344
	6	700	1121	1278	1456	2332
	7	700	1131	1279	1470	2387
	8	700	1146	1280	1473	2639
	11	700	1112	1257	1492	2511
Science	4	1050	1150	1275	1483	2234
	8	925	1150	1275	1464	2283
	11	1050	1150	1275	1347	1822
Writing	5	700	745	1236	1909	2294
	8	700	914	1236	1748	2329
	11	700	952	1236	1806	2364

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.

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 STRAND (REPORTING CATEGORY) SCORES

The following types of scores are provided for PSSA strand scores:

- Strand (Reporting Category) Scores
- Strength Profile

Strand (Reporting Category) Scores

A strand (reporting category) score describes performance of a student, school, or district on a particular strand (content standard defined in the test). For the PSSA, strand scores are raw scores, indicating the points a student or a school/district earned for that strand. (Attributes of raw scores are described earlier in this chapter.)

Strand scores cannot be compared across years because they are not statistically linked nor are they interval scores. Also, it is not advisable to compare strand raw scores even within the same form because some strands may contain items that are easier or more difficult than other strands (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, strand 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 strand scores of a school against the scores of another reference group (e.g., the state average). Hence, strand 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 strands. 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 strand 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 strands 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 Proficient on the PSSA. A High score on the strength profile indicates performance that is comparable to Advanced.

APPROPRIATE SCORE USES

Individual Students

Scaled scores on the PSSA indicate a student's achievement of 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 Item Response Theory (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 percentage of students at or above the Proficient standard.

Strand 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 2500²¹ and a student achieved this score, it could not 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 do 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 are deliberately used instead 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 categories should not be interpreted in 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 strands 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.

²¹ 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 strands 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 only on the variances of the strand scores, but also on the covariances among the strand scores. (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 to which 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 considered.

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, 2011. This score report provided parents and students with their first glimpse of performance on the spring 2011 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 Parents:

I am pleased to provide you with information about your child's performance on the 2011 Pennsylvania System of School Assessment (PSSA) exam. The annual PSSA is a standards-based assessment used to measure a student's attainment of the academic standards while also determining the degree to which school programs enable students to attain academic proficiency.

For additional information about the PSSA, visit the Pennsylvania Department of Education's website at *Education.state.pa.us*, or contact your child's school.

Sincerely,
 Ronald J. Tomalis
 Secretary of Education



Student Name:	
PA Student ID:	
School:	
District:	
Test Date:	
Grade:	

MATHEMATICS			
How did perform OVERALL?			
Performance Level:	Advanced		Score: 1528
	Below Basic	Basic	Proficient
	700	1167	1304
			1509
			2425
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: 1462–1594.			
How did perform by REPORTING CATEGORY?			
Reporting Categories	Student's Points	Total Points Possible	
Numbers and Operations	9	11	
Measurement	11	11	
Geometry	10	13	
Algebraic Concepts	22	27	
Data Analysis and Probability	7	10	

WRITING			
How did perform OVERALL?			
Performance Level:	Advanced		Score: 1918
	Below Basic	Basic	Proficient
	700	952	1236
			1806
			2364
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: 1875–1961.			
How did perform by REPORTING CATEGORY?			
Reporting Categories	Student's Points	Total Points Possible	
Composition	70	80	
Informational	40	40	
Persuasive	30	40	
Revising and Editing	18	20	
Informational	4	4	
Persuasive	3	4	
Multiple Choice	11	12	

READING			
How did perform OVERALL?			
Performance Level:	Proficient		Score: 1429
	Below Basic	Basic	Proficient
	700	1112	1257
			1492
			2511
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: 1343–1515.			
How did perform by REPORTING CATEGORY?			
Reporting Categories	Student's Points	Total Points Possible	
Comprehension and Reading Skills	17	22	
Interpretation and Analysis of Fictional and Nonfictional Text	22	30	

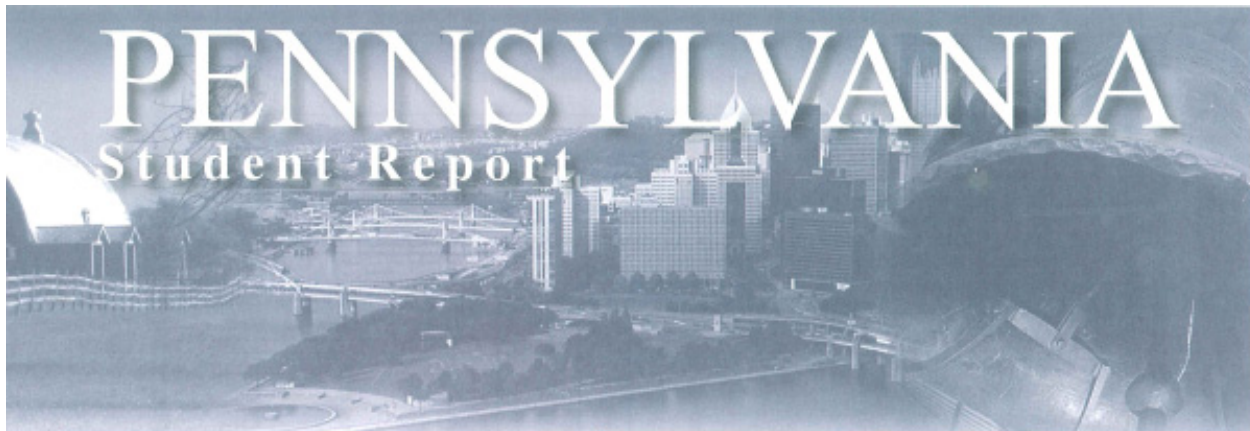
SCIENCE			
How did perform OVERALL?			
Performance Level:	Proficient		Score: 1330
	Below Basic	Basic	Proficient
	1050	1150	1275
			1347
			1822
Your student's score is indicated by the . If your student were to test again, his or her score would likely remain in the following range: 1302–1358.			
How did perform by REPORTING CATEGORY?			
Reporting Categories	Student's Points	Total Points Possible	
The Nature of Science	27	38	
Biological Sciences	7	12	
Physical Sciences	10	14	
Earth and Space Sciences	9	10	

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

An individual student report is provided for all students who took the PSSA. This report was delivered to Pennsylvania school districts on September 7, 2011. Districts are responsible for sending the reports 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

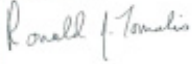
Student Report

Dear Parents:

The following report is designed to provide you with specific information about your child's strengths and needs as measured by the 2011 Grade 11 Pennsylvania System of School Assessment (PSSA). The PSSA is an annual exam designed to measure a student's attainment of academic standards. I encourage you to use this information to talk with your child's teacher(s) to develop methods to enhance your student's education.

For additional information about the PSSA, visit the Pennsylvania Department of Education's website at www.education.state.pa.us, or contact your child's school.

Sincerely,



Ronald J. Tomalis
Secretary of Education

Student Name: [REDACTED]

PA Student ID: ****[REDACTED]

School: [REDACTED]

District: [REDACTED]

Test Date: Spring 2011

Grade: 11

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..... Making the Most of Your Senior Year!

An Interpretation Guide for this report is available at www.education.state.pa.us (Type "student report guide" in the search box) or see your local school district.



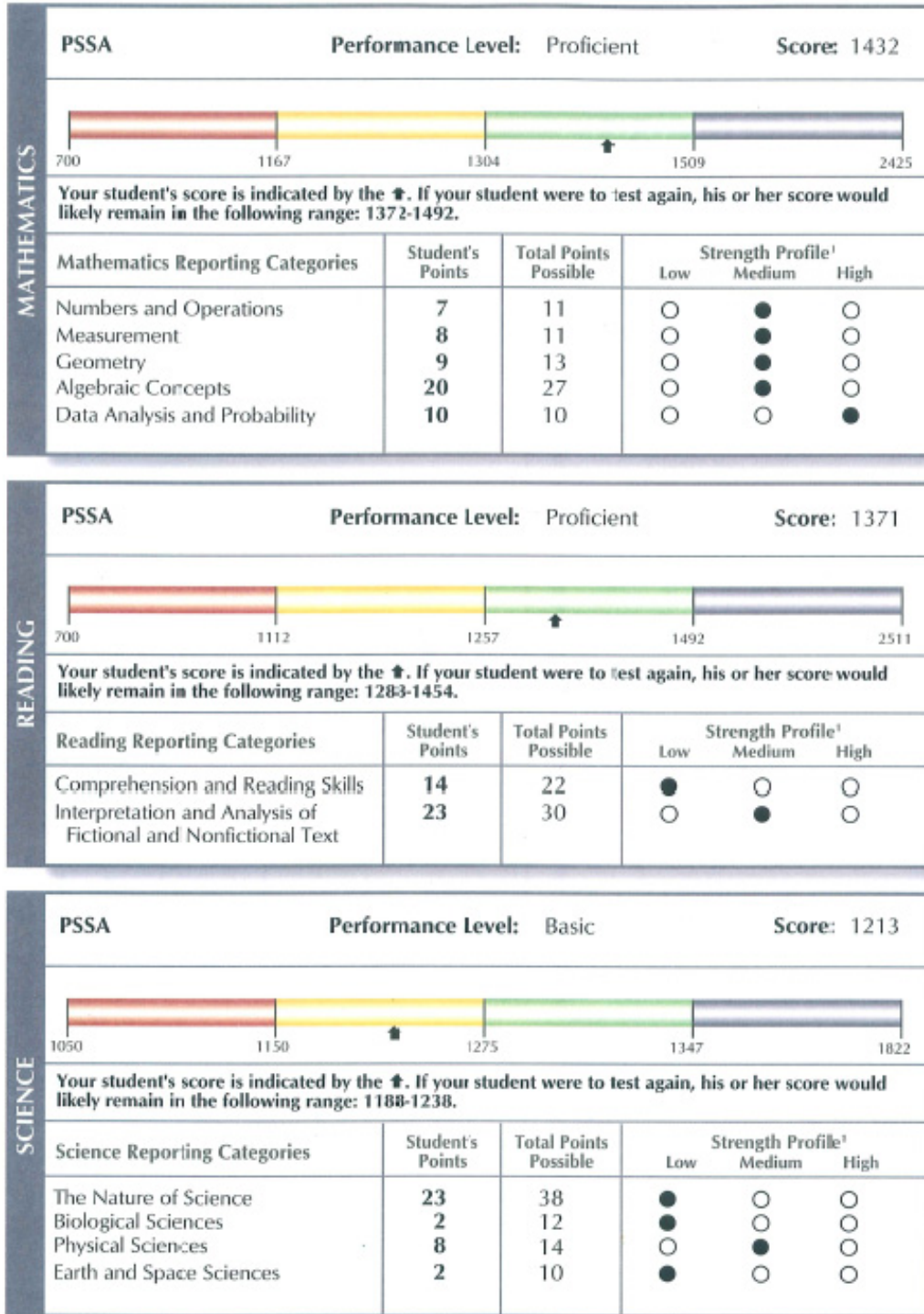
pennsylvania
DEPARTMENT OF EDUCATION

The Pennsylvania System of School Assessment page 1

www.education.state.pa.us

Figure 16–3. Page 2 of the Individual Student Report

The Pennsylvania System of School Assessment



page 2

Figure 16–4. Page 3 of the Individual Student Report

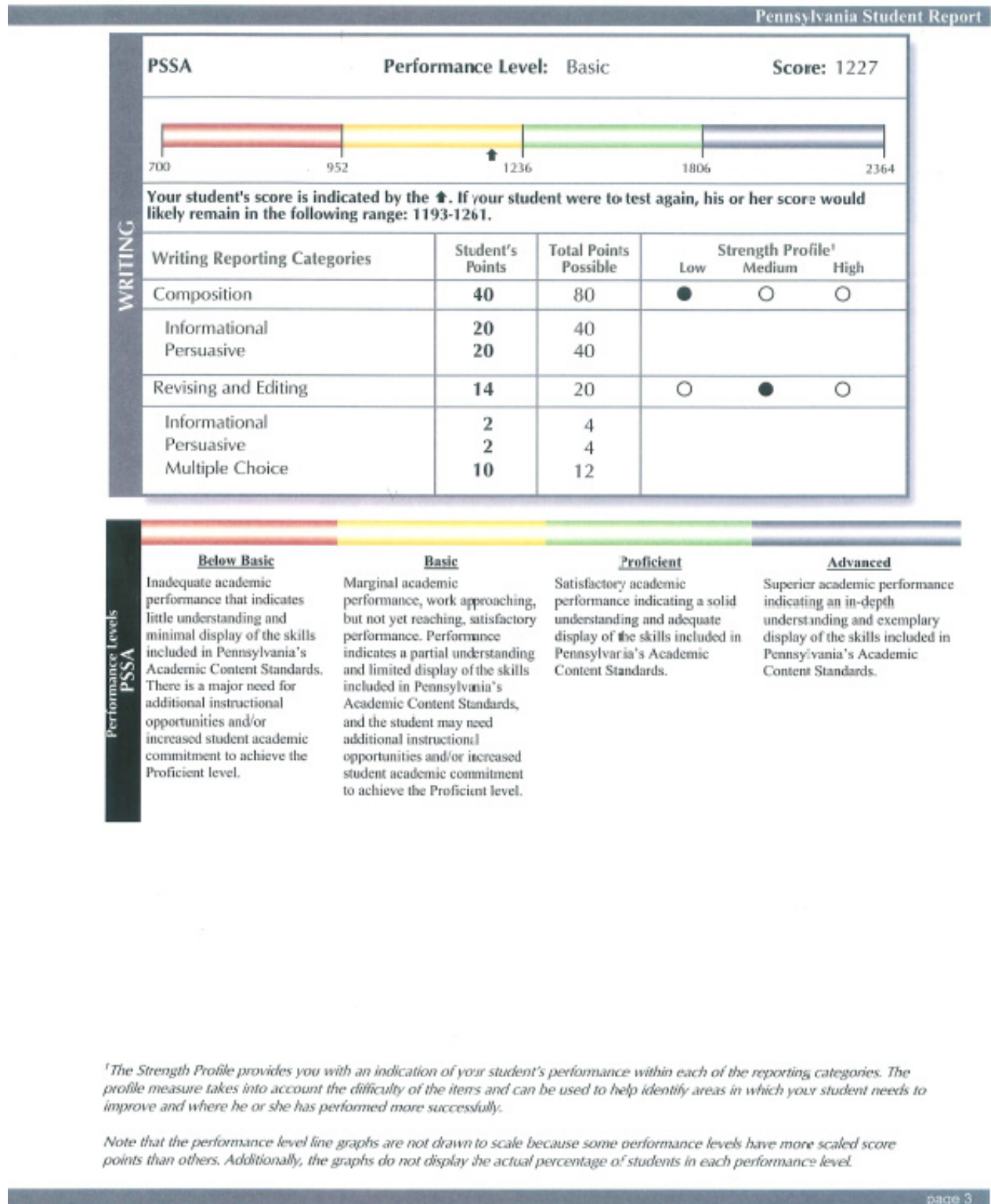
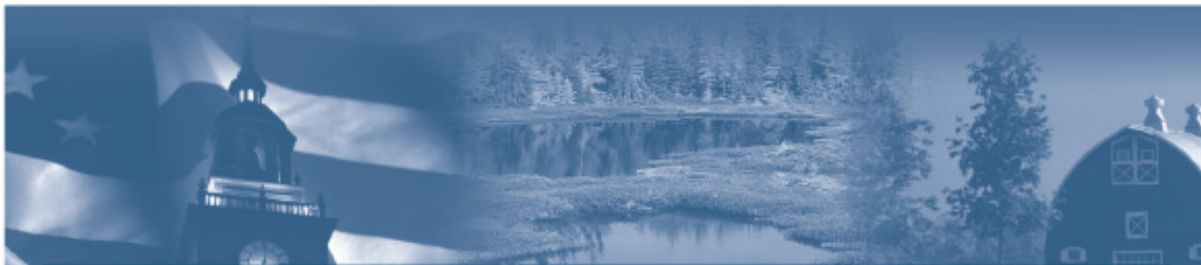


Figure 16–5. Page 4 of the Individual Student Report



How can you help your student achieve success?

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 to learn about Pennsylvania’s POWER Library Initiative or to find a library near you.

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.

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/>

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

Early career planning
 Free printed materials and career exploration CDs from Pennsylvania Higher Education Assistance Agency (PHEAA) are available by visiting: www.educationplanner.org

Resources for parents and students
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 presented in Chapter Eleven (classical item statistics) and Chapter 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 2011 PSSA

Subject	Grade	Percentage in Each Performance Level			
		Below Basic	Basic	Proficient	Advanced
Mathematics	3	5.1	11.4	37.3	46.2
Reading		13.1	9.6	48.9	28.3
Mathematics	4	7.1	7.6	31.0	54.2
Reading		11.3	15.3	37.9	35.4
Science		5.6	11.5	38.0	44.9
Mathematics	5	7.7	16.0	30.1	46.2
Reading		14.6	18.2	44.9	22.4
Writing		1.9	31.0	64.9	2.2
Mathematics	6	10.1	11.0	25.0	53.8
Reading		13.1	17.0	30.5	39.4
Mathematics	7	10.8	10.6	24.9	53.7
Reading		9.2	14.8	32.7	43.3
Mathematics	8	11.4	11.7	26.7	50.2
Reading		8.9	9.3	24.1	57.7
Science		22.9	18.9	34.0	24.3
Writing		2.8	24.1	62.1	11.0
Mathematics	11	21.6	18.0	31.5	28.8
Reading		15.9	14.9	33.0	36.1
Science		18.8	40.4	26.7	14.1
Writing		1.7	13.6	66.0	18.7

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 caveats regarding interpretation of scale scores.

Table 17–2. Means and Standard Deviations for the 2011 PSSA Scaled Scores

Grade	Mathematics		Reading		Science		Writing	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
3	1345.7	176.6	1346.5	155.9				
4	1476.9	221.6	1379.5	205.8	1452.4	181.9		
5	1474.1	222.2	1354.3	214.5			1351.3	277.7
6	1499.2	248.0	1396.4	234.0				
7	1503.8	249.7	1418.3	210.7				
8	1448.7	225.4	1513.0	260.4	1312.5	203.2	1415.5	272.1
11	1379.0	264.0	1381.6	273.4	1244.8	96.5	1536.8	298.6

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

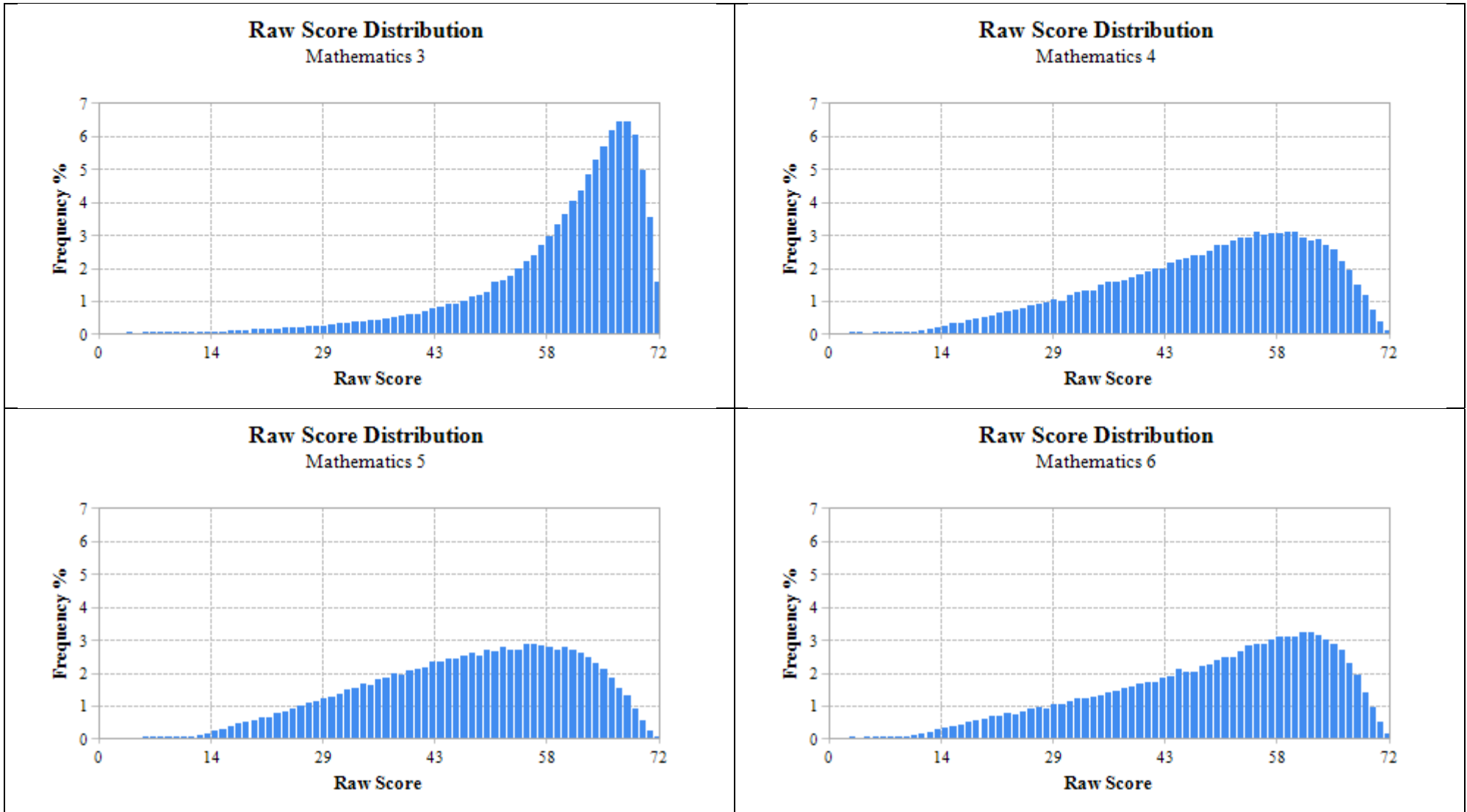
Summary Statistics

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.)

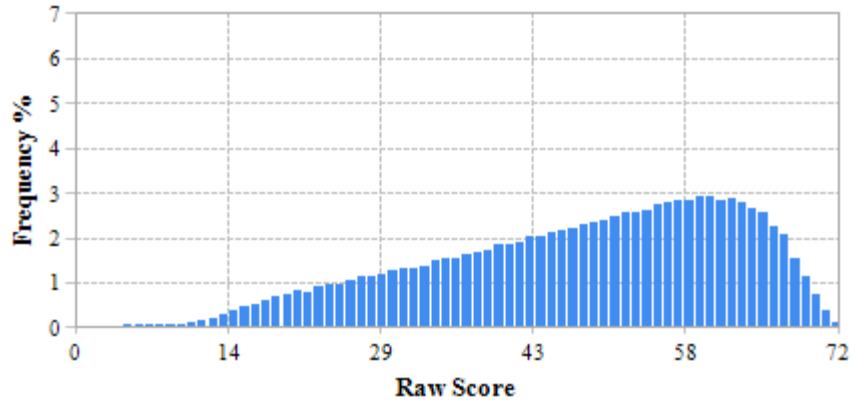
Score Distributions

Raw score relative-frequency (rf) distributions are provided 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 (because of the differential weighting given to the writing prompt scores).

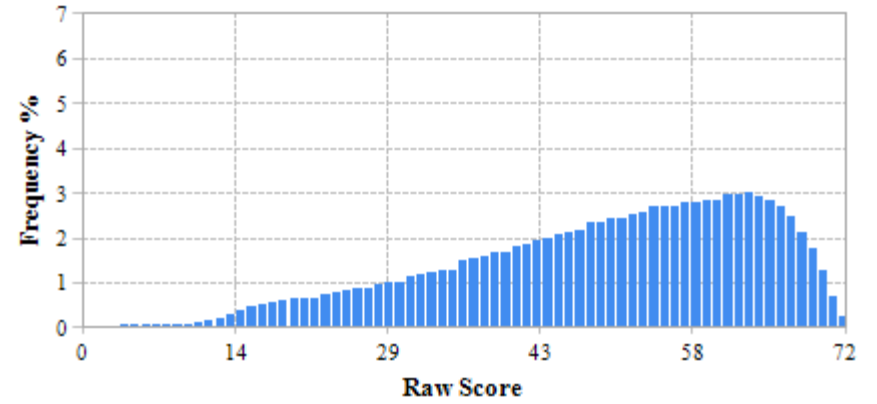
Figure 17–1. 2011 PSSA Raw Score Distributions



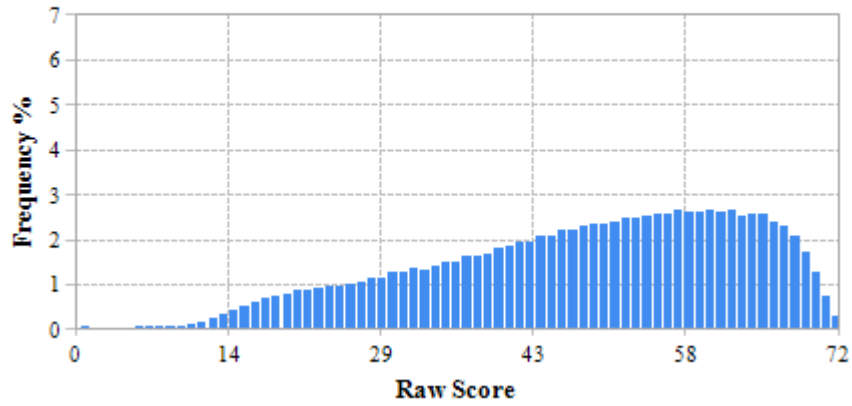
Raw Score Distribution
Mathematics 7



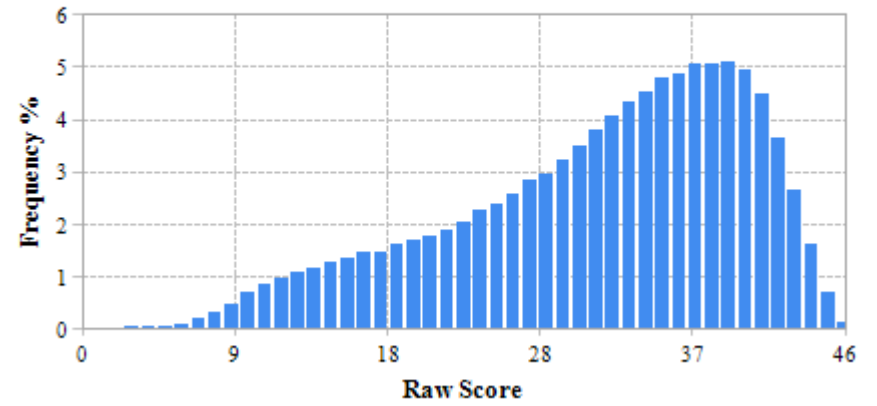
Raw Score Distribution
Mathematics 8



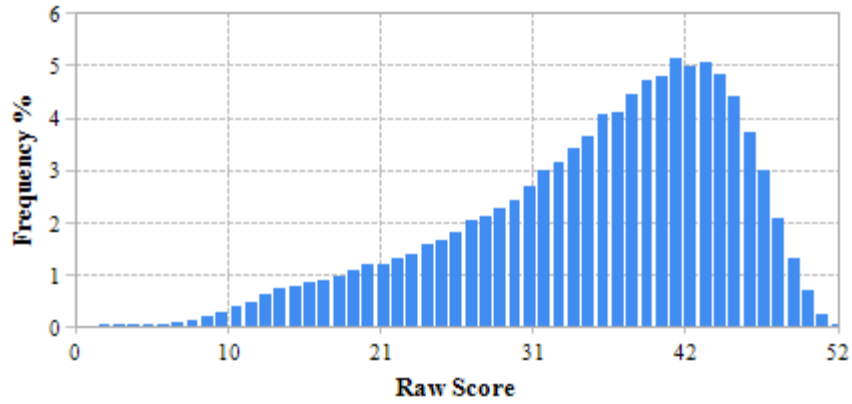
Raw Score Distribution
Mathematics 11



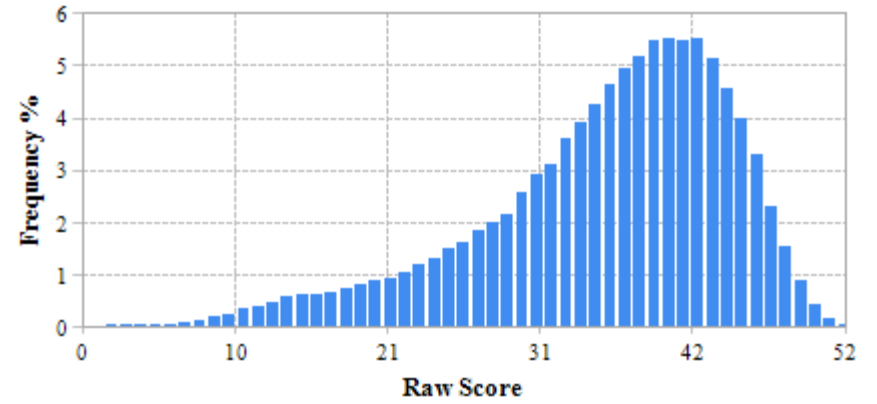
Raw Score Distribution
Reading 3



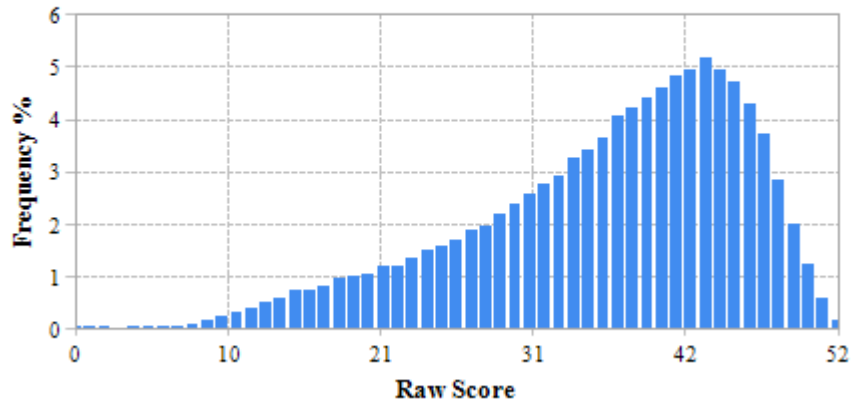
Raw Score Distribution
Reading 4



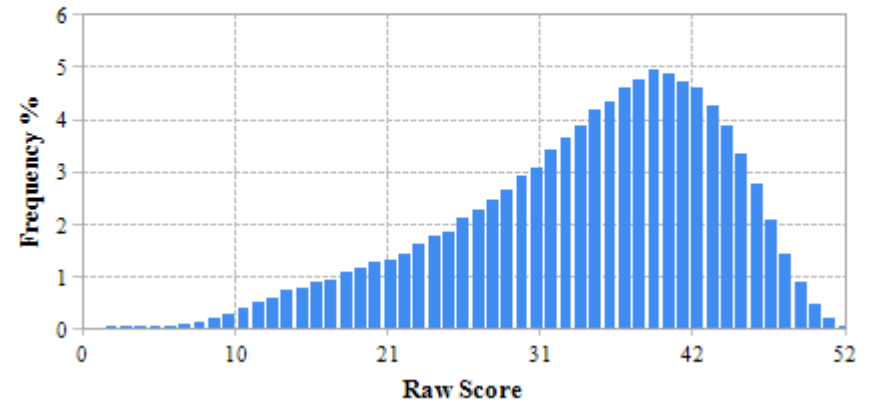
Raw Score Distribution
Reading 5



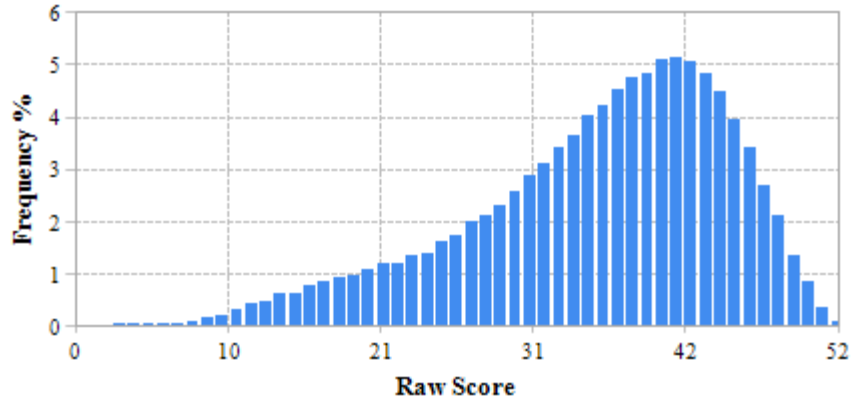
Raw Score Distribution
Reading 6



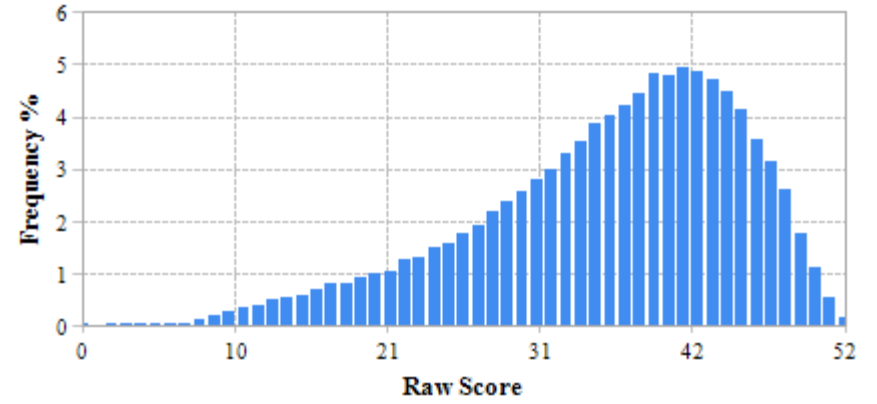
Raw Score Distribution
Reading 7



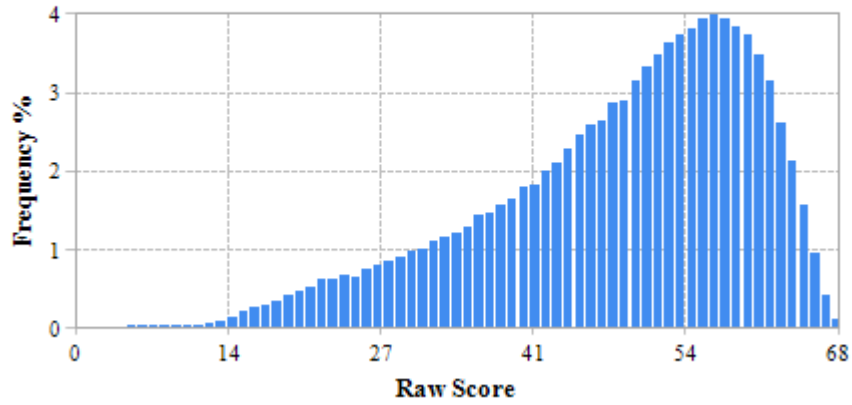
Raw Score Distribution
Reading 8



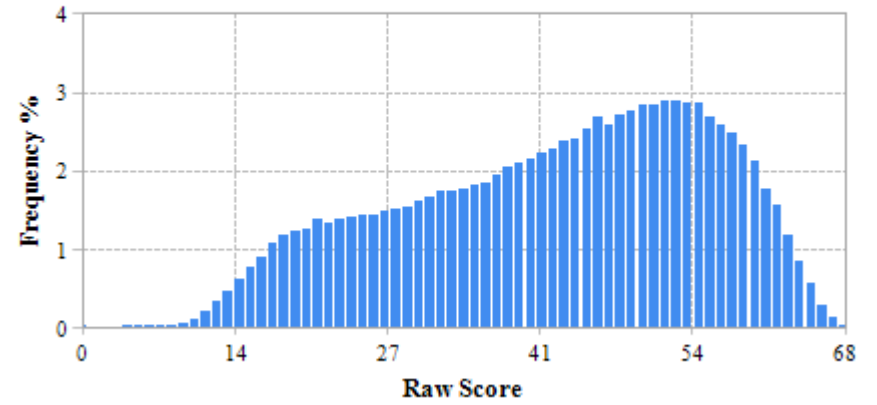
Raw Score Distribution
Reading 11



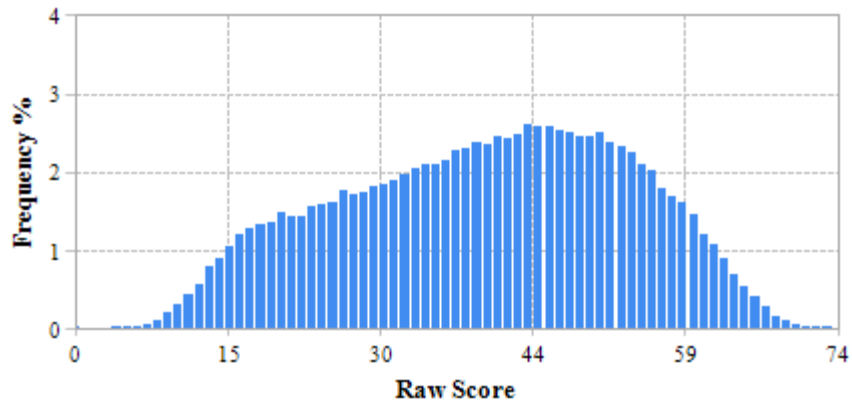
Raw Score Distribution
Science 4



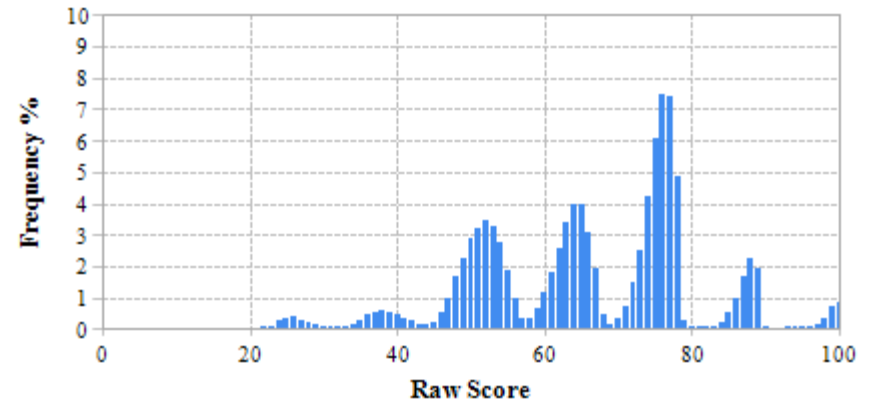
Raw Score Distribution
Science 8



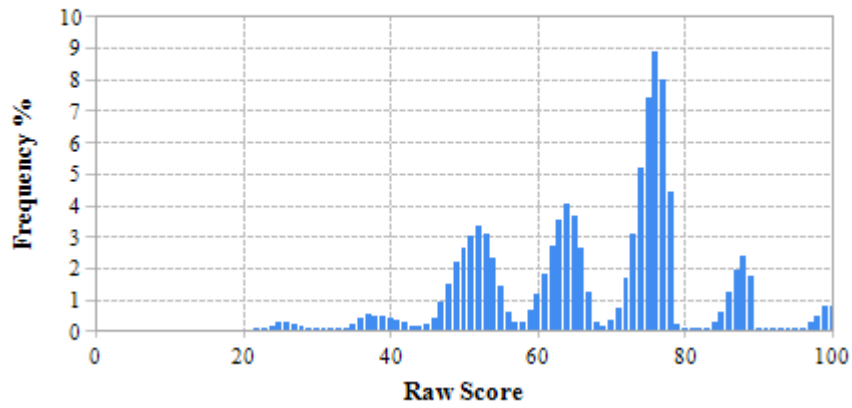
Raw Score Distribution
Science 11



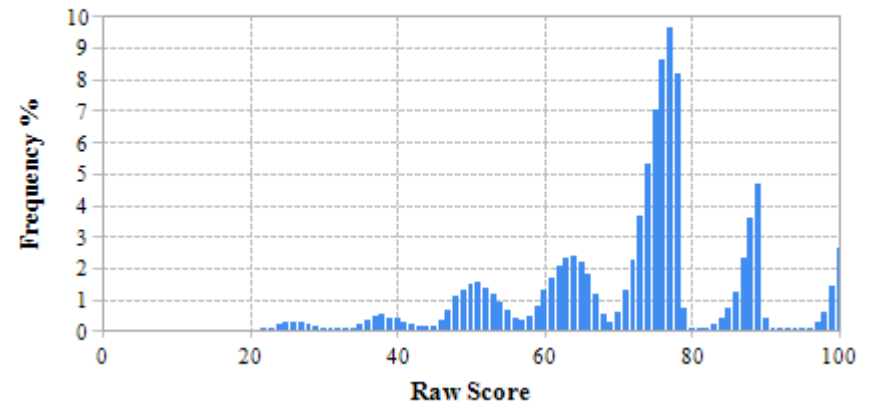
Raw Score Distribution
Writing 5



Raw Score Distribution
Writing 8



Raw Score Distribution
Writing 11



Chapter Eighteen: Reliability

This chapter²² 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 is too. Generally, there is more error variance when considering the absolute scores of examinees, which in turn suggests lower reliability.

²² Please note that some of the material in this chapter is technical in nature.

As suggested, reliability is a complex, nonunitary 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.²³

$$\rho_X^2 = \frac{\sigma_T^2}{\sigma_X^2} = \frac{\sigma_T^2}{\sigma_T^2 + \sigma_E^2}$$

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 one most frequently reported 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.)

²³ 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 could be 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 was 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}

Notes. 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), σ_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 assessment 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., multiple-choice (MC) and open-ended (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

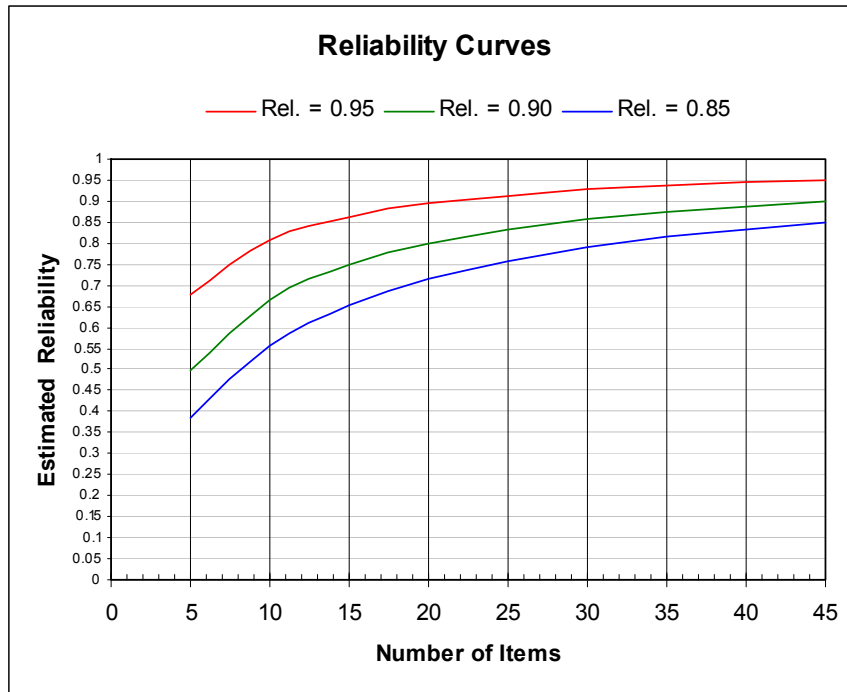
As emphasized in earlier sections, Coefficient Alpha only takes into account measurement error that arises from the selection of items used on a particular test form. There are other sources of random inaccuracy. One is due to the occasion of testing. Other various random conditions that might affect 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 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. Any internal consistency reliability index could understate the overall problem of measurement error because it ignores such sources or random error.

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., is state and district levels) are also provided on PSSA score reports, but the reliability of those scores is not specifically calculated here. However, as a general rule, 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 a 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.

The reliability of writing assessments (and many other performance-based tests) tends 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

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,²⁴ 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 deviation²⁵ 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.

$$SEM = SD\sqrt{1 - reliability}$$

This formula 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 test 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.²⁶ 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.)

²⁴ True score is the score the person would receive if the measurement process were perfect.

²⁵ 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.

²⁶ 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 is that a confidence interval represents the possible score range 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 are 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 (θ) 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

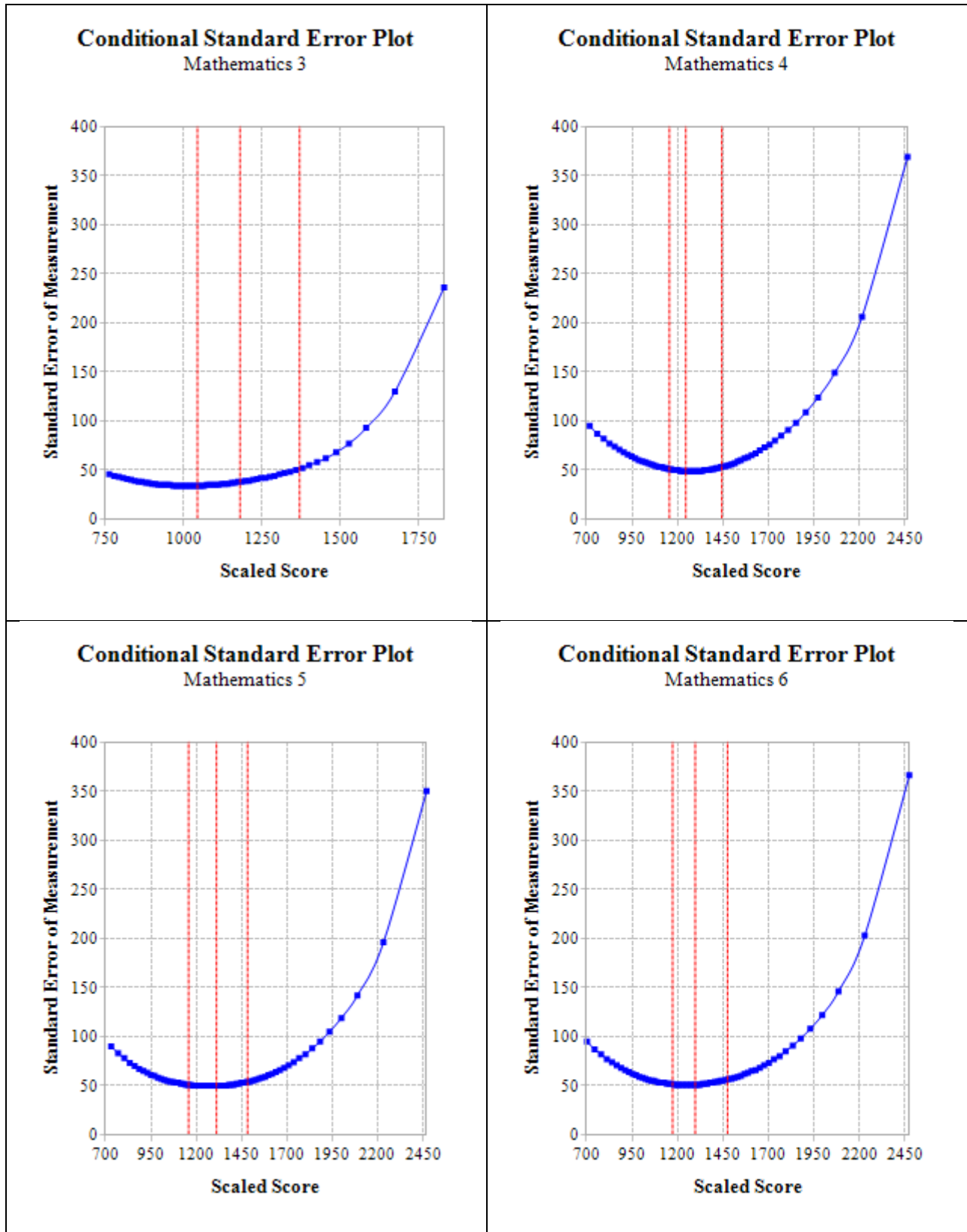
The SEMs documented on the PSSA score reports are the Rasch-based conditional standard errors of measurement described above. These are provided by the WINSTEPS scaling program described in Chapter Twelve. As noted earlier, these CSEMs are based on the concept of statistical information. For the purpose 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.²⁷ Score report content is considered in greater detail in Chapter Sixteen.

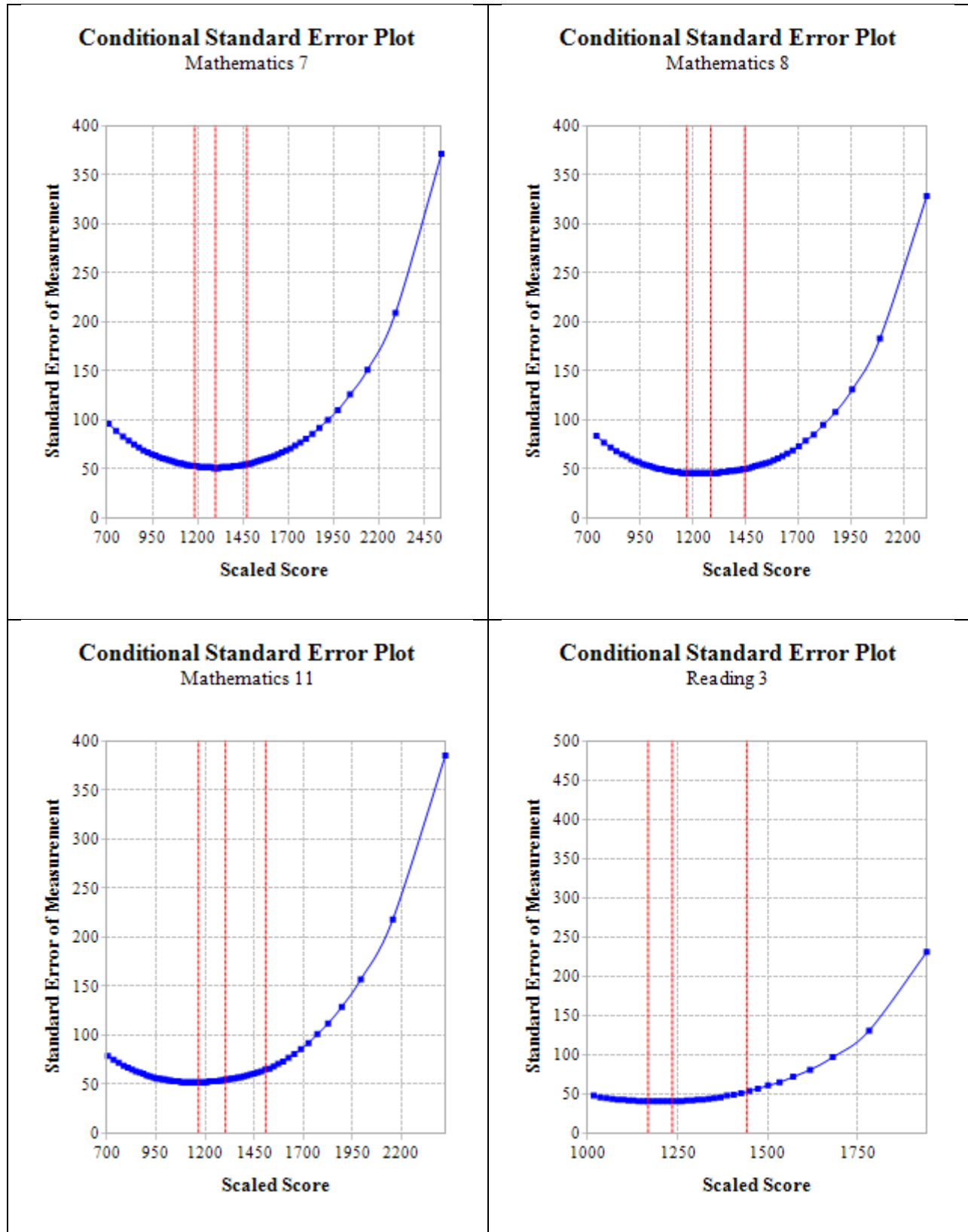
RESULTS AND OBSERVATIONS

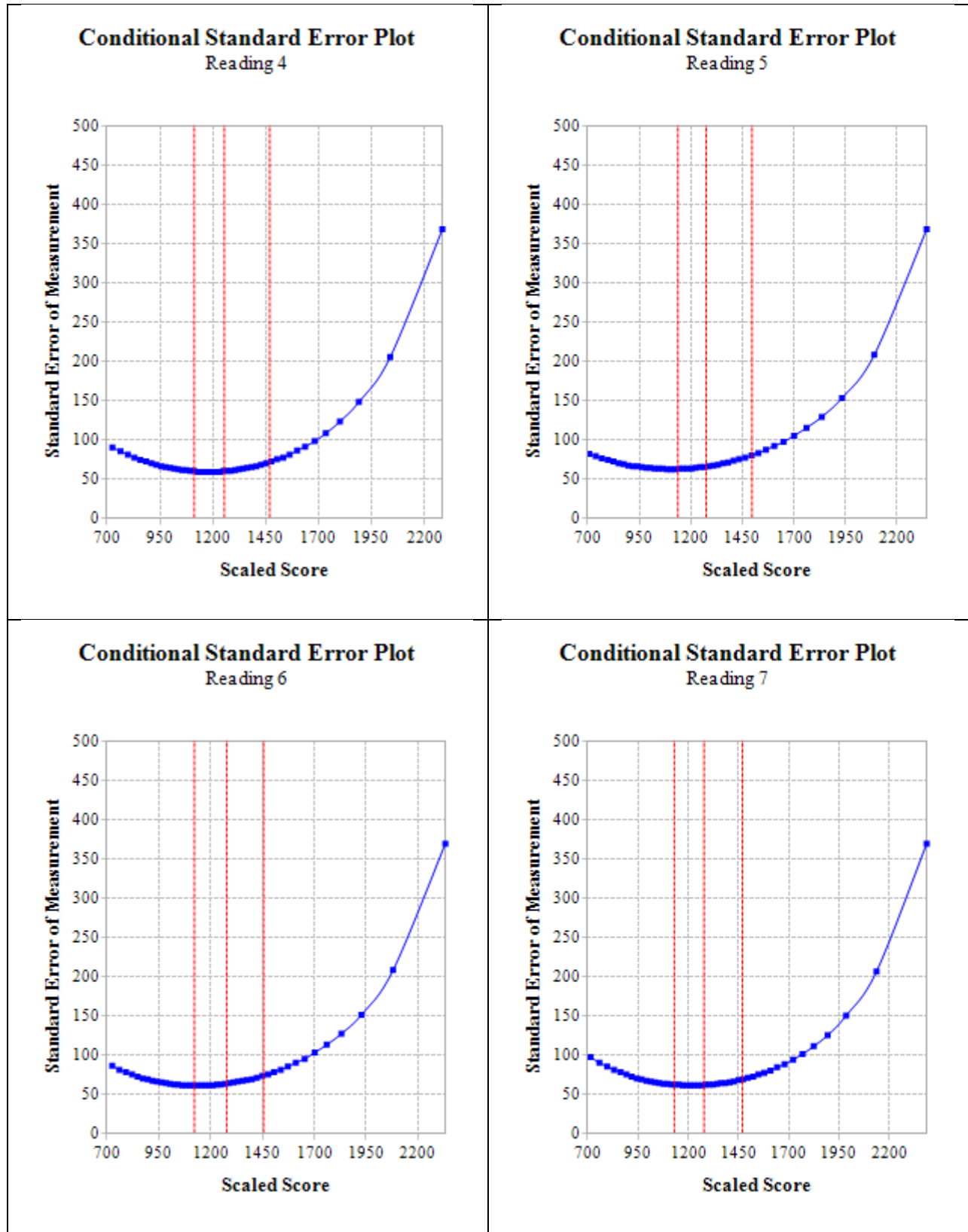
Figure 18–2 shows the Rasch CSEMs associated with each scaled score level. (This information is also provided in tabular form in Appendix N.) Values were derived using the calibration data file described in Chapter Nine. The values are fairly consistent across a noticeably large range of the scaled scores, 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.

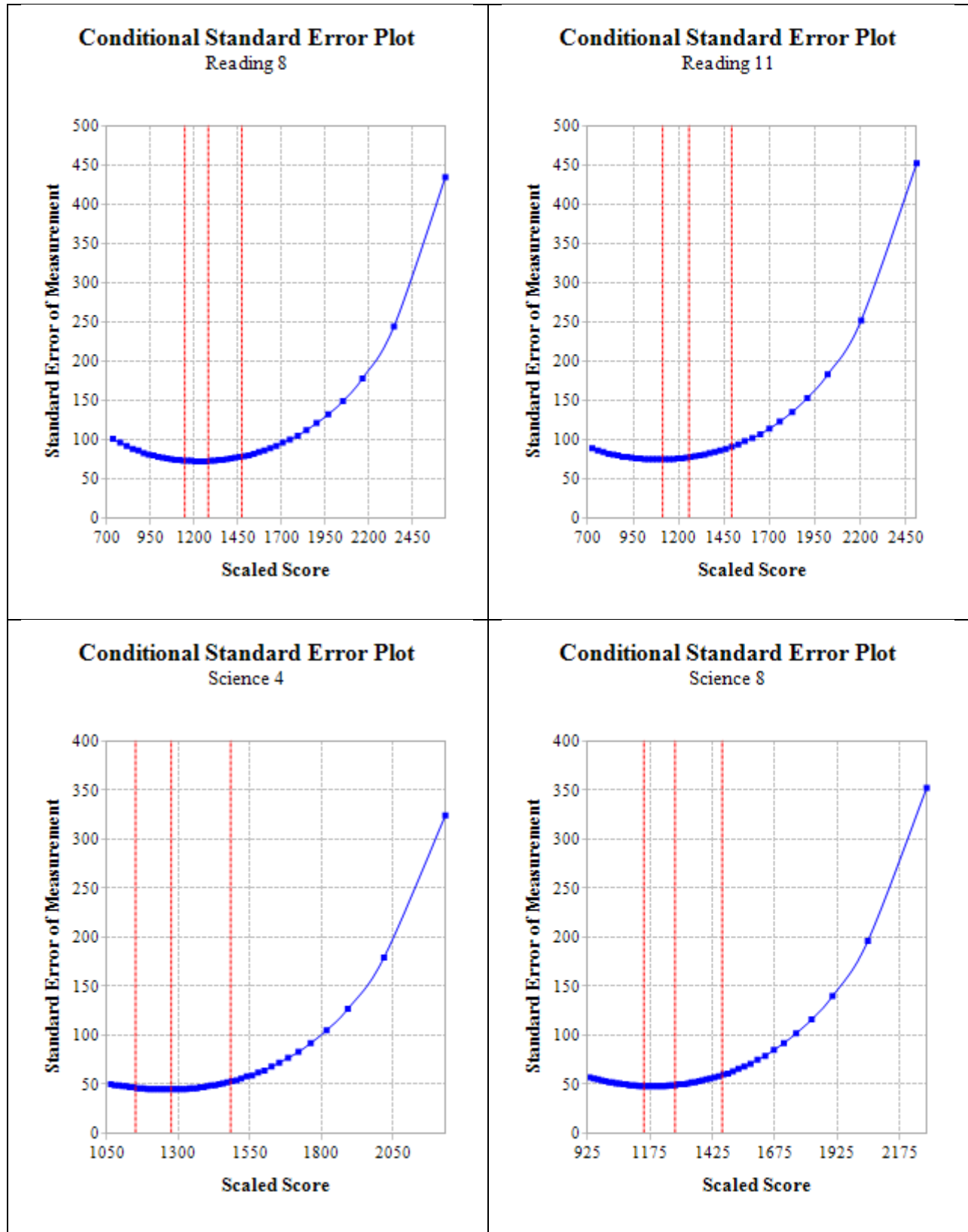
²⁷ Because IRT CSEMs are based on statistical information, it is questionable whether they account for error variance due to items. However, it seems difficult to construct a simple explanation of IRT CSEMs for the general public.

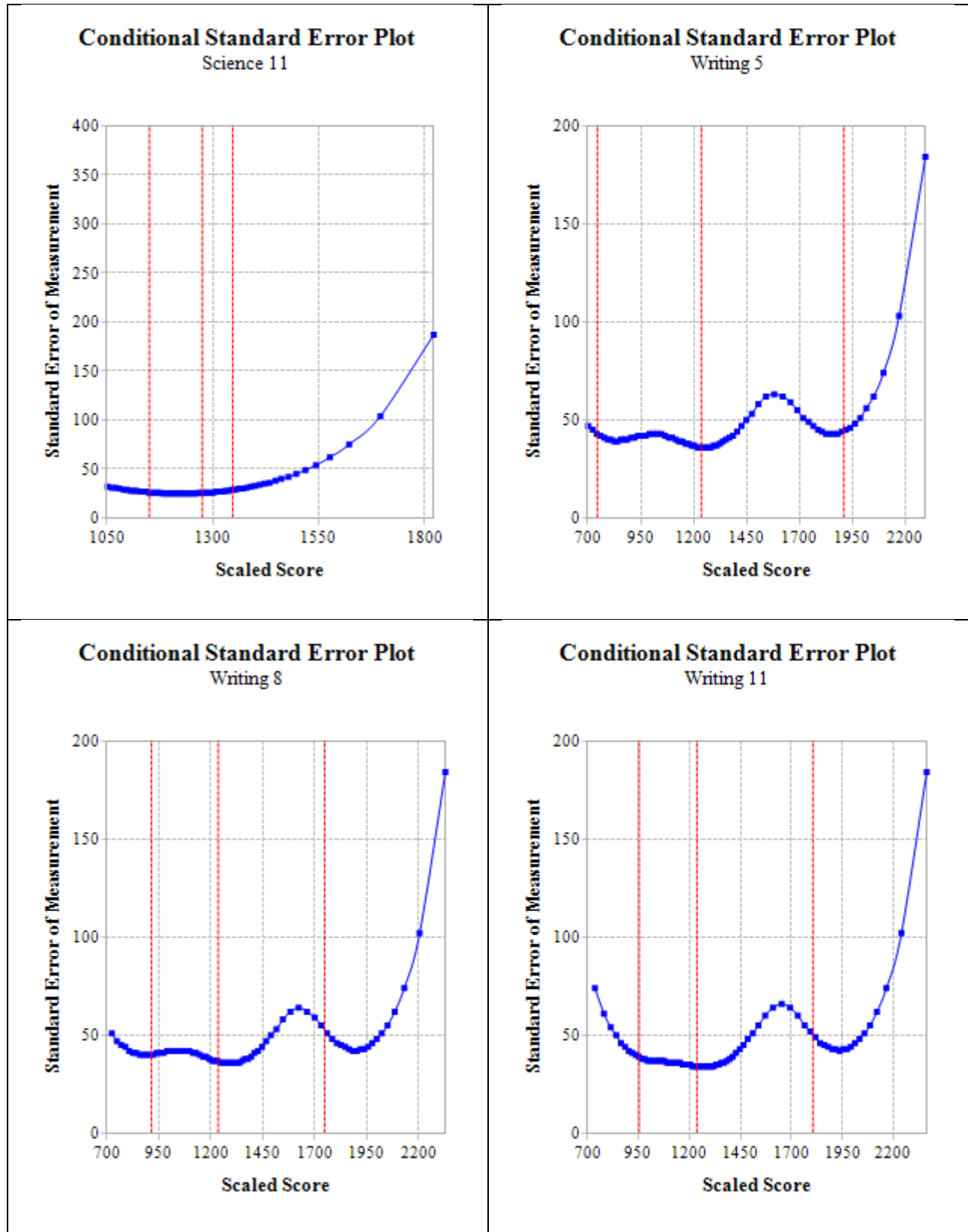
Figure 18–2. Conditional Standard Error Plots for Each Grade and Subject











DECISION CONSISTENCY

Classification consistency refers to the degree to 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	φ_{11}	φ_{12}	$\varphi_{1\bullet}$
	LEVEL II	φ_{21}	φ_{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	φ_{11}	φ_{12}	φ_{13}	φ_{14}	$\varphi_{1\bullet}$
	LEVEL II	φ_{21}	φ_{22}	φ_{23}	φ_{24}	$\varphi_{2\bullet}$
	LEVEL III	φ_{31}	φ_{32}	φ_{33}	φ_{34}	$\varphi_{3\bullet}$
	LEVEL IV	φ_{41}	φ_{42}	φ_{43}	φ_{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, φ , 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 signifies 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

	Grade	Method	Overall	BBas/Bas	Bas/Prof	Prof/Adv
Mathematics	3	HB	0.76	0.98	0.94	0.85
		LL	0.75	0.97	0.94	0.84
	4	HB	0.79	0.96	0.93	0.89
		LL	0.79	0.96	0.93	0.88
	5	HB	0.76	0.95	0.91	0.89
		LL	0.76	0.95	0.91	0.89
	6	HB	0.79	0.95	0.93	0.90
		LL	0.78	0.95	0.93	0.90
	7	HB	0.78	0.95	0.93	0.90
		LL	0.78	0.95	0.93	0.90
	8	HB	0.77	0.95	0.92	0.90
		LL	0.77	0.95	0.92	0.89
	11	HB	0.74	0.92	0.90	0.90
		LL	0.73	0.92	0.90	0.90
Reading	3	HB	0.73	0.94	0.91	0.86
		LL	0.72	0.94	0.91	0.86
	4	HB	0.69	0.94	0.90	0.84
		LL	0.68	0.94	0.90	0.84
	5	HB	0.64	0.93	0.88	0.83
		LL	0.64	0.93	0.88	0.83
	6	HB	0.70	0.94	0.90	0.86
		LL	0.70	0.94	0.89	0.86
	7	HB	0.71	0.95	0.90	0.85
		LL	0.70	0.95	0.90	0.85
	8	HB	0.75	0.95	0.92	0.87
		LL	0.75	0.95	0.92	0.86
	11	HB	0.68	0.92	0.89	0.85
		LL	0.67	0.92	0.88	0.85
Science	4	HB	0.77	0.97	0.93	0.87
		LL	0.77	0.97	0.93	0.87
	8	HB	0.72	0.92	0.90	0.90
		LL	0.72	0.92	0.90	0.90
	11	HB	0.73	0.92	0.89	0.92
		LL	0.73	0.92	0.89	0.92

Table 18–6 (continued). Decision Consistency Results

	Grade	Method	Overall	BBas/Bas	Bas/Prof	Prof/Adv
Writing	5	HB	0.84	0.99	0.88	0.98
		LL	0.78	0.98	0.82	0.97
	8	HB	0.78	0.98	0.89	0.92
		LL	0.70	0.97	0.84	0.89
	11	HB	0.81	0.99	0.93	0.89
		LL	0.72	0.98	0.90	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 81 percent to 94 percent for mathematics, 72 percent to 86 percent for reading, 82 percent to 93 percent for science, and 78 percent to 84 percent for writing. Mathematics had validity ranging from 82 percent to 97 percent; reading had validity ranging from 71 percent to 93 percent; and science had validity ranging from 85 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 mid 0.90s. Reading correlations range from the high 0.60s to low 0.80s. Science correlations range from the low 0.70s to mid 0.80s. Correlations for the writing prompt scores are reported in Table 18–14 and range from the mid 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	92	8	96	8	25	18	25	23	0
	2	85	15	91	5	19	35	19	23	0
	3	86	14	95	7	14	20	32	27	0
4	1	94	6	96	6	12	25	40	16	1
	2	93	7	92	12	13	20	44	9	2
	3	93	7	95	8	17	15	34	26	1
5	1	93	7	94	3	10	57	24	5	1
	2	87	13	90	14	35	23	20	6	2
	3	94	6	97	6	23	26	29	14	1
6	1	93	7	96	4	11	13	49	22	1
	2	86	14	87	12	33	17	19	16	3
	3	87	13	86	10	39	32	12	5	1
7	1	86	14	95	14	31	34	16	3	2
	2	86	14	87	16	10	24	28	18	5
	3	85	15	91	3	29	32	21	14	2
8	1	90	10	97	19	38	9	24	8	2
	2	86	14	95	11	36	24	16	10	4
	3	81	19	82	9	26	26	21	16	2
11	1	89	11	95	31	25	14	13	14	3
	2	89	11	97	8	12	34	22	19	5
	3	92	8	96	21	34	23	15	4	3

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	75	24	80	12	42	36	8	1
	2	73	26	84	5	38	45	11	1
4	1	85	15	88	7	19	43	29	2
	2	86	14	87	11	17	24	47	2
	3	85	15	88	4	36	44	14	2
	4	85	15	90	3	25	45	25	2
5	1	84	16	92	3	48	34	12	3
	2	85	15	93	2	19	65	12	2
	3	85	15	93	11	27	50	10	2
	4	84	16	90	4	33	43	17	2
6	1	77	23	76	4	14	58	22	3
	2	78	22	79	2	16	63	17	2
	3	80	20	84	2	30	42	25	2
	4	77	23	85	6	37	42	14	2
7	1	76	24	74	5	28	49	17	2
	2	78	22	85	4	29	50	16	2
	3	77	23	86	8	34	37	19	2
	4	75	25	77	12	34	40	11	2
8	1	78	22	83	2	15	56	26	2
	2	75	25	77	6	31	46	15	2
	3	77	23	81	1	17	58	22	2
	4	72	28	71	6	30	49	12	2
11	1	78	22	88	3	23	48	24	3
	2	83	17	85	5	39	39	13	3
	3	78	22	87	3	16	55	22	3
	4	80	20	76	2	14	49	32	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	90	9	96	14	24	61	0
	2	91	9	95	2	31	66	1
	3	89	11	92	13	26	60	1
	4	93	6	95	6	34	59	1
	5	89	11	95	21	28	50	1
8	1	89	11	97	21	45	32	1
	2	86	14	94	22	64	12	3
	3	88	11	93	18	40	40	3
	4	85	15	93	40	37	19	3
	5	89	11	98	25	21	52	2
11	1	90	10	92	43	46	5	6
	2a	85	15	96	43	36	13	8
	2b	82	18	90	34	50	8	8
	3a	92	8	94	34	37	22	7
	3b	83	17	93	14	33	46	7
	4	84	15	95	27	34	31	7
	5	86	14	93	50	25	12	14
	6	84	16	85	49	29	13	9
	7a	84	16	93	45	32	13	10
	7b	91	9	98	37	37	16	10
	8	82	18	85	40	34	18	9
9	87	13	94	17	37	34	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 %				
		Exact	Adjacent	1	2	3	4	NT/NS
5	1 (Com)	81	19	4	34	53	7	0
	1 (R&E)	80	20	5	35	53	8	0
	2 (Com)	84	16	5	42	47	5	0
	2 (R&E)	81	19	6	38	49	6	0
8	1 (Com)	84	16	3	32	56	7	1
	1 (R&E)	83	17	3	33	55	7	1
	2 (Com)	80	20	4	36	52	7	1
	2 (R&E)	78	22	5	36	51	7	1
11	1 (Com)	83	17	4	19	63	11	2
	1 (R&E)	80	20	4	19	62	12	2
	2 (Com)	81	19	4	23	58	12	2
	2 (R&E)	79	21	4	22	58	13	2

Note. NT = not taken; NS = non-scoreable.

Table 18–11. Mathematics Mean Scores and Correlations

Grade	Item ID	N	2010 Mean	2011 Mean	Corr.
3	1	1000	2.27	2.28	0.96
	2	1000	2.27	2.27	0.95
4	1	1000	2.35	2.34	0.93
	2	1000	2.42	2.37	0.93
5	1	1000	1.85	1.73	0.92
	2	1000	2.09	2.16	0.96
6	1	1000	1.96	1.95	0.92
	2	1000	1.72	1.70	0.89
7	1	1000	2.23	2.26	0.92
	2	1000	1.92	1.98	0.86
8	1	1000	1.74	1.73	0.95
	2	1000	1.84	1.83	0.92
11	1	998	1.62	1.60	0.95
	2	1000	2.31	2.29	0.93

Table 18–12. Reading Mean Scores and Correlations

Grade	Item ID	N	2010 Mean	2011 Mean	Corr.
3	1	997	1.45	1.41	0.68
4	1	999	1.94	1.94	0.82
	2	1000	1.57	1.57	0.70
5	1	998	1.51	1.44	0.72
	2	998	1.57	1.57	0.77
6	1	997	1.88	1.97	0.71
	2	1000	1.60	1.61	0.75
7	1	1000	1.71	1.69	0.73
	2	1000	1.67	1.71	0.80
8	1	1000	1.60	1.65	0.69
	2	999	1.75	1.92	0.71
11	1	999	1.51	1.50	0.71
	2	998	1.87	1.89	0.73

Table 18–13. Science Mean Scores and Correlations

Grade	Item ID	N	2010 Mean	2011 Mean	Corr.
4	1	1000	1.42	1.44	0.84
	2	999	1.57	1.59	0.75
8	1	1000	1.24	1.27	0.80
	2	998	0.83	0.81	0.77
11	1	1000	1.14	1.17	0.78
	2	996	0.77	0.59	0.71

Table 18–14. Writing Mean Scores and Correlations

Grade	Item ID	N	2010 Mean	2011 Mean	Corr.
5	1-A	999	2.65	2.47	0.68
	1-B	999	2.67	2.51	0.67
	2-A	1000	2.69	2.55	0.73
	2-B	1000	2.70	2.55	0.69
8	1-A	999	2.79	2.60	0.69
	1-B	999	2.81	2.62	0.65
	2-A	997	2.67	2.58	0.74
	2-B	997	2.74	2.58	0.70
11	1-A	1000	2.86	2.70	0.72
	1-B	1000	2.84	2.73	0.68
	2-A	1000	2.88	2.76	0.71
	2-B	1000	2.90	2.77	0.68

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 Item Response Theory (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. This 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 summarizes and synthesizes the evidence based on the *Standards*’ framework. The purposes and intended uses of PSSA test scores are reviewed first, 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 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

Results from principle components analyses conducted using WINSTEPS were presented in Chapter Twelve. The PSSA mathematics, reading and science tests were essentially unidimensional, providing evidence supporting interpretations based on the total scores for the respective PSSA tests. (Writing was not studied for reasons discussed in Chapter Twelve. However, one might expect some dimensionality issues because the writing MC items and Prompt tasks are so different.)

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 strands (denoted by M.A, M.B, M.C, M.D, and M.E), the PSSA reading tests have two strands (denoted by R.A and R.B), the PSSA science tests have four strands (denoted by S.A, S.B, S.C, and S.D), and the PSSA writing tests include two strands (denoted by W.A and W.B).

For each grade, Pearson's correlation coefficients between these strands 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

	M.A	M.B	M.C	M.D	M.E	R.A	R.B
M.A							
M.B	0.70						
M.C	0.61	0.50					
M.D	0.73	0.58	0.51				
M.E	0.75	0.57	0.54	0.59			
R.A	0.65	0.56	0.52	0.57	0.55		
R.B	0.66	0.56	0.51	0.58	0.55	0.82	

Table 19–1b. Correlations between Mathematics, Reading, and Science Strands for Grade 4

	M.A	M.B	M.C	M.D	M.E	R.A	R.B	S.A	S.B	S.C	S.D
M.A											
M.B	0.70										
M.C	0.62	0.51									
M.D	0.77	0.62	0.57								
M.E	0.70	0.59	0.51	0.65							
R.A	0.70	0.58	0.54	0.66	0.62						
R.B	0.63	0.52	0.52	0.61	0.57	0.77					
S.A	0.69	0.60	0.53	0.64	0.65	0.76	0.68				
S.B	0.58	0.50	0.46	0.54	0.54	0.66	0.59	0.77			
S.C	0.58	0.51	0.45	0.53	0.53	0.62	0.55	0.71	0.64		
S.D	0.57	0.51	0.45	0.52	0.52	0.62	0.55	0.71	0.65	0.61	

Table 19–1c. Correlations between Mathematics, Reading, and Writing Strands for Grade 5

	M.A	M.B	M.C	M.D	M.E	R.A	R.B	W.A	W.B
M.A									
M.B	0.74								
M.C	0.67	0.59							
M.D	0.75	0.65	0.57						
M.E	0.72	0.61	0.57	0.62					
R.A	0.68	0.58	0.55	0.59	0.60				
R.B	0.68	0.58	0.55	0.59	0.62	0.79			
W.A	0.49	0.44	0.38	0.42	0.43	0.55	0.54		
W.B	0.66	0.57	0.53	0.57	0.59	0.72	0.72	0.74	

Table 19–1d. Correlations between Mathematics and Reading Strands for Grade 6

	M.A	M.B	M.C	M.D	M.E	R.A	R.B
M.A							
M.B	0.71						
M.C	0.70	0.68					
M.D	0.76	0.66	0.67				
M.E	0.76	0.67	0.68	0.72			
R.A	0.69	0.61	0.64	0.68	0.68		
R.B	0.68	0.60	0.63	0.68	0.68	0.82	

Table 19–1e. Correlations between Mathematics and Reading Strands for Grade 7

	M.A	M.B	M.C	M.D	M.E	R.A	R.B
M.A							
M.B	0.74						
M.C	0.73	0.67					
M.D	0.78	0.75	0.72				
M.E	0.76	0.70	0.70	0.74			
R.A	0.67	0.65	0.65	0.69	0.67		
R.B	0.62	0.61	0.60	0.65	0.62	0.80	

Table 19–1f. Correlations between Mathematics, Reading, Science, and Writing Strands for Grade 8

	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
M.A													
M.B	0.71												
M.C	0.67	0.69											
M.D	0.75	0.75	0.72										
M.E	0.72	0.71	0.69	0.76									
R.A	0.63	0.62	0.57	0.68	0.67								
R.B	0.64	0.63	0.58	0.69	0.68	0.82							
S.A	0.68	0.67	0.63	0.71	0.69	0.73	0.75						
S.B	0.60	0.59	0.54	0.61	0.61	0.65	0.67	0.77					
S.C	0.59	0.58	0.55	0.61	0.60	0.65	0.66	0.78	0.70				
S.D	0.58	0.57	0.55	0.59	0.60	0.64	0.65	0.76	0.69	0.69			
W.A	0.47	0.47	0.43	0.52	0.52	0.59	0.61	0.53	0.47	0.46	0.46		
W.B	0.60	0.59	0.55	0.65	0.64	0.72	0.73	0.69	0.62	0.61	0.60	0.75	

Table 19–1g. Correlations between Mathematics, Reading, Science, and Writing Strands for Grade 11

	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
M.A													
M.B	0.66												
M.C	0.73	0.72											
M.D	0.77	0.73	0.82										
M.E	0.62	0.64	0.66	0.68									
R.A	0.59	0.59	0.64	0.67	0.58								
R.B	0.62	0.60	0.67	0.71	0.59	0.80							
S.A	0.64	0.63	0.68	0.71	0.60	0.73	0.73						
S.B	0.58	0.54	0.60	0.62	0.51	0.65	0.63	0.76					
S.C	0.60	0.55	0.62	0.64	0.52	0.62	0.61	0.76	0.70				
S.D	0.47	0.47	0.50	0.50	0.44	0.55	0.51	0.67	0.64	0.61			
W.A	0.46	0.44	0.51	0.54	0.43	0.54	0.64	0.56	0.45	0.45	0.34		
W.B	0.59	0.57	0.64	0.68	0.55	0.70	0.75	0.71	0.59	0.59	0.48	0.76	

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 2011 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 weaknesses 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 0.78 to 1.05 and the correlations between R.A and R.B was 1.00. In contrast, the correlations between the two reading strands with the five mathematics strands only range from 0.68 to 0.87. 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

	M.A	M.B	M.C	M.D	M.E	R.A	R.B
M.A	-						
M.B	1.04	-					
M.C	0.81	0.85	-				
M.D	1.03	1.05	0.82	-			
M.E	0.93	0.91	0.78	0.90	-		
R.A	0.76	0.82	0.69	0.81	0.68	-	
R.B	0.80	0.87	0.72	0.87	0.72	1.00	-

Table 19–2b. Disattenuated Strand Correlations for Mathematics, Reading, and Science: Grade 4

	M.A	M.B	M.C	M.D	M.E	R.A	R.B	S.A	S.B	S.C	S.D
M.A	-										
M.B	0.95	-									
M.C	0.87	0.82	-								
M.D	1.03	0.95	0.89	-							
M.E	0.90	0.88	0.78	0.94	-						
R.A	0.82	0.78	0.76	0.87	0.80	-					
R.B	0.83	0.78	0.80	0.89	0.81	1.00	-				
S.A	0.81	0.81	0.74	0.84	0.83	0.89	0.88	-			
S.B	0.76	0.76	0.71	0.79	0.78	0.87	0.86	1.00	-		
S.C	0.79	0.80	0.73	0.81	0.79	0.85	0.83	0.97	0.97	-	
S.D	0.79	0.80	0.74	0.80	0.79	0.85	0.84	0.98	1.00	0.99	-

Table 19–2c. Disattenuated Strand Correlations for Mathematics, Reading, and Writing: Grade 5

	M.A	M.B	M.C	M.D	M.E	R.A	R.B	W.A	W.B
M.A	-								
M.B	1.00	-							
M.C	0.89	0.93	-						
M.D	0.99	1.01	0.88	-					
M.E	0.96	0.94	0.87	0.93	-				
R.A	0.81	0.81	0.76	0.81	0.82	-			
R.B	0.82	0.82	0.77	0.82	0.86	0.99	-		
W.A	0.61	0.64	0.56	0.60	0.62	0.71	0.72	-	
W.B	0.80	0.81	0.74	0.79	0.81	0.90	0.91	0.97	-

Table 19–2d. Disattenuated Strand Correlations for Mathematics and Reading: Grade 6

	M.A	M.B	M.C	M.D	M.E	R.A	R.B
M.A	-						
M.B	0.93	-					
M.C	0.90	0.95	-				
M.D	0.95	0.90	0.90	-			
M.E	0.99	0.96	0.95	0.97	-		
R.A	0.82	0.79	0.81	0.84	0.88	-	
R.B	0.84	0.80	0.83	0.87	0.91	1.00	-

Table 19–2e. Disattenuated Strand Correlations for Mathematics and Reading: Grade 7

	M.A	M.B	M.C	M.D	M.E	R.A	R.B
M.A	-						
M.B	0.98	-					
M.C	0.96	0.95	-				
M.D	1.00	1.03	0.98	-			
M.E	0.96	0.96	0.94	0.98	-		
R.A	0.80	0.85	0.83	0.87	0.83	-	
R.B	0.80	0.84	0.82	0.87	0.83	1.02	-

**Table 19–2f. Disattenuated Strand Correlations
for Mathematics, Reading, Science, and Writing: Grade 8**

	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
M.A	-												
M.B	0.96	-											
M.C	0.93	0.92	-										
M.D	0.98	0.95	0.92	-									
M.E	1.01	0.97	0.95	1.00	-								
R.A	0.82	0.79	0.74	0.83	0.89	-							
R.B	0.85	0.81	0.75	0.84	0.89	1.00	-						
S.A	0.86	0.82	0.78	0.83	0.88	0.87	0.89	-					
S.B	0.85	0.81	0.76	0.81	0.87	0.86	0.90	0.99	-				
S.C	0.85	0.80	0.77	0.81	0.86	0.86	0.88	1.00	1.01	-			
S.D	0.84	0.79	0.77	0.79	0.86	0.86	0.88	0.99	1.01	1.00	-		
W.A	0.66	0.62	0.58	0.67	0.72	0.76	0.79	0.66	0.66	0.65	0.66	-	
W.B	0.81	0.77	0.73	0.82	0.87	0.91	0.92	0.84	0.84	0.84	0.83	1.00	-

**Table 19–2g. Disattenuated Strand Correlations
for Mathematics, Reading, Science, and Writing: Grade 11**

	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
M.A	-												
M.B	0.98	-											
M.C	1.05	0.98	-										
M.D	1.03	0.93	1.02	-									
M.E	0.97	0.94	0.95	0.92	-								
R.A	0.84	0.79	0.84	0.81	0.82	-							
R.B	0.84	0.77	0.84	0.83	0.80	0.98	-						
S.A	0.86	0.80	0.85	0.82	0.80	0.89	0.86	-					
S.B	0.85	0.75	0.81	0.78	0.75	0.86	0.81	0.96	-				
S.C	0.89	0.78	0.85	0.82	0.77	0.83	0.79	0.97	0.98	-			
S.D	0.75	0.71	0.73	0.69	0.70	0.80	0.71	0.92	0.97	0.92	-		
W.A	0.67	0.61	0.68	0.68	0.62	0.71	0.81	0.70	0.61	0.63	0.51	-	
W.B	0.82	0.74	0.82	0.81	0.76	0.88	0.91	0.85	0.77	0.77	0.67	0.98	-

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

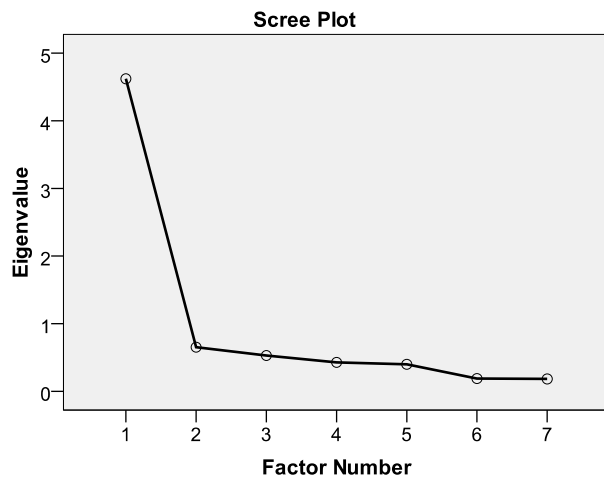
In order to further explore the internal structure of the PSSA tests, an exploratory factor analysis (EFA) of the strand scores across all the PSSA subject areas was conducted. The PSSA final data file (see Chapter Nine) was used to create the observed correlation matrices shown in Tables 19–1a through 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 66 percent of the total variance, while the second factor explained about 9 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 0.19). 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	4.62	66.02
2	0.65	9.31
3	0.53	7.56
4	0.43	6.11
5	0.40	5.69
6	0.19	2.69
7	0.18	2.61

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 strands clearly loaded on the first factor while the two reading strands 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 0.74, which is very close to the observed correlation between mathematics and reading (0.72 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
Mathematics		
M.A	0.95	0.00
M.B	0.66	0.11
M.C	0.55	0.15
M.D	0.68	0.12
M.E	0.79	0.00
Reading		
R.A	0.05	0.87
R.B	0.06	0.86
Correlation (F1, F2) = 0.74		

Other grades have similar results. The eigenvalue scree plots consistently indicate 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
Mathematics			
M.A	0.93	0.00	-0.01
M.B	0.72	0.14	-0.09
M.C	0.54	0.04	0.12
M.D	0.77	-0.04	0.13
M.E	0.61	0.16	0.04
Reading			
R.A	0.11	0.19	0.65
R.B	0.06	0.03	0.79
Science			
S.A	0.09	0.77	0.10
S.B	-0.04	0.80	0.07
S.C	0.10	0.72	-0.03
S.D	0.07	0.75	-0.03
Correlation (F1, F2) = 0.76		Correlation (F1, F3) = 0.77	
Correlation (F2, F3) = 0.79			

Table 19–4c. Pattern Matrix and Factor Correlations for Grade 5

Domain	Factor		
	1	2	3
Mathematics			
M.A	0.91	0.01	0.01
M.B	0.81	0.05	-0.05
M.C	0.67	-0.01	0.08
M.D	0.78	0.00	0.02
M.E	0.64	0.01	0.16
Reading			
R.A	0.10	0.06	0.75
R.B	0.06	0.03	0.83
Writing			
W.A	-0.03	0.87	-0.05
W.B	0.09	0.76	0.14
Correlation (F1, F2) = 0.67		Correlation (F1, F3) = 0.78	
Correlation (F2, F3) = 0.76			

Table 19–4d. Pattern Matrix and Factor Correlation for Grade 6

Domain	Factor	
	1	2
Mathematics		
M.A	0.83	0.08
M.B	0.82	-0.01
M.C	0.73	0.10
M.D	0.69	0.18
M.E	0.70	0.17
Reading		
R.A	0.08	0.84
R.B	0.06	0.86
Correlation (F1, F2) = 0.80		

Table 19–4e. Pattern Matrix and Factor Correlation for Grade 7

Domain	Factor	
	1	2
Mathematics		
M.A	0.90	-0.01
M.B	0.76	0.09
M.C	0.74	0.09
M.D	0.80	0.10
M.E	0.76	0.11
Reading		
R.A	0.11	0.83
R.B	0.03	0.85
Correlation (F1, F2) = 0.78		

Table 19–4f. Pattern Matrix and Factor Correlations for Grade 8

Domain	Factor			
	1	2	3	4
Mathematics				
M.A	0.76	0.09	0.00	0.00
M.B	0.81	0.06	-0.01	-0.01
M.C	0.84	0.07	-0.01	-0.09
M.D	0.82	-0.02	0.04	0.08
M.E	0.71	0.03	0.06	0.09
Reading				
R.A	0.06	0.11	0.08	0.69
R.B	0.04	0.15	0.10	0.68
Science				
S.A	0.12	0.80	0.01	0.03
S.B	0.05	0.77	0.01	0.02
S.C	0.05	0.79	0.01	0.00
S.D	0.04	0.78	0.01	0.00
Writing				
W.A	0.00	-0.05	0.86	0.00
W.B	0.05	0.12	0.80	0.00
Correlation (F1, F2) = 0.78		Correlation (F1, F3) = 0.69		
Correlation (F1, F4) = 0.76				
Correlation (F2, F3) = 0.70		Correlation (F2, F4) = 0.80		
Correlation (F3, F4) = 0.78				

Table19–4g. Pattern Matrix and Factor Correlations for Grade 11

Domain	Factor			
	1	2	3	4
Mathematics				
M.A	0.80	0.09	0.01	-0.07
M.B	0.80	0.03	-0.05	0.04
M.C	0.85	0.04	0.03	-0.03
M.D	0.88	-0.01	0.07	-0.01
M.E	0.70	0.00	-0.04	0.12
Reading				
R.A	0.04	0.11	-0.04	0.83
R.B	0.13	0.03	0.26	0.54
Science				
S.A	0.08	0.69	0.13	0.07
S.B	0.01	0.82	0.00	0.03
S.C	0.15	0.75	0.04	-0.09
S.D	-0.02	0.81	-0.10	0.04
Writing				
W.A	-0.03	-0.06	0.99	-0.09
W.B	0.06	0.07	0.74	0.09
Correlation (F1, F2) = 0.77		Correlation (F1, F3) = 0.71		
Correlation (F1, F4) = 0.75				
Correlation (F2, F3) = 0.68		Correlation (F2, F4) = 0.76		
Correlation (F3, F4) = 0.77				

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 those 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 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 on three types—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 administered 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 to 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 whether 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 2011 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

	Mathematics/ Reading	Mathematics/ Science	Mathematics/ Writing	Reading/ Science	Reading/ Writing	Science/ Writing
G3	.72 (.79)	-	-	-	-	-
G4	.76 (.84)	.76 (.82)	-	.79 (.88)	-	-
G5	.75 (.83)	-	.58 (.67)	-	.65 (.76)	-
G6	.79 (.86)	-	-	-	-	-
G7	.77 (.84)	-	-	-	-	-
G8	.77 (.84)	.79 (.84)	.61 (.70)	.80 (.88)	.69 (.81)	.61 (.70)
G11	.76 (.83)	.77 (.83)	.62 (.71)	.78 (.85)	.69 (.81)	.60 (.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 0.58 to 0.80. The correlations between the mathematics, reading, and science were relatively higher, while the correlations between writing and other subjects were relatively lower. In addition, the correlations are very stable across different grade levels. For example, the correlation between mathematics and reading tests was around 0.76 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**

Grade	2005	2006	2007	2008	2009	2010	2011
3	-	-	78.5	80.5	81.7	84.5	83.5
4	-	77.3	78.0	79.5	81.8	84.8	85.2
5	69.0	66.9	71.0	73.2	73.5	74.4	76.3
6	-	68.0	69.6	72.3	75.7	78.0	78.9
7	-	66.4	67.2	70.6	75.3	78.0	78.6
8	62.9	62.2	67.9	70.3	71.2	75.1	76.9
11	50.8	51.9	53.7	55.9	55.7	59.6	60.4

Table 19–6b. Percentage of Students Scoring in the Proficient or Advanced Category: Reading

Grade	2005	2006	2007	2008	2009	2010	2011
3	-	-	72.8	76.9	77.0	75.2	77.2
4	-	68.1	70.1	70.1	72.6	72.9	73.4
5	64.2	60.6	59.9	61.5	64.5	64.1	67.2
6	-	65.9	63.5	66.9	67.6	68.7	69.9
7	-	68.0	66.8	70.0	71.4	73.5	76.0
8	64.0	70.6	75.0	78.2	80.5	81.9	81.7
11	65.0	65.2	65.4	64.7	65.3	67.2	69.2

Table 19–6c. Percentage of Students Scoring in the Proficient or Advanced Category: Science

Grade	2005	2006	2007	2008	2009	2010	2011
4	-	-	-	81.5	83.4	81.5	83.0
8	-	-	-	52.7	54.8	57.2	58.3
11	-	-	-	35.6	39.7	39.8	40.8

Table 19–6d. Percentage of Students Scoring in the Proficient or Advanced Category: Writing

Grade	2005	2006	2007	2008	2009	2010	2011
5	-	54.1	57.3	57.3	58.1	61.7	67.1
8	-	66.0	71.7	69.1	71.2	75.1	73.1
11	-	85.7	87.8	85.8	82.8	80.7	84.7

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.

Lane and Stone (2002) also summarized possible unintended outcomes:

- Narrowing of curriculum and instruction to focus on only the specific standards assessed and ignore 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 principles.
- 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 provides accurate and clear test score and report information to 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 (see 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

Reporting Category	Standard
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)

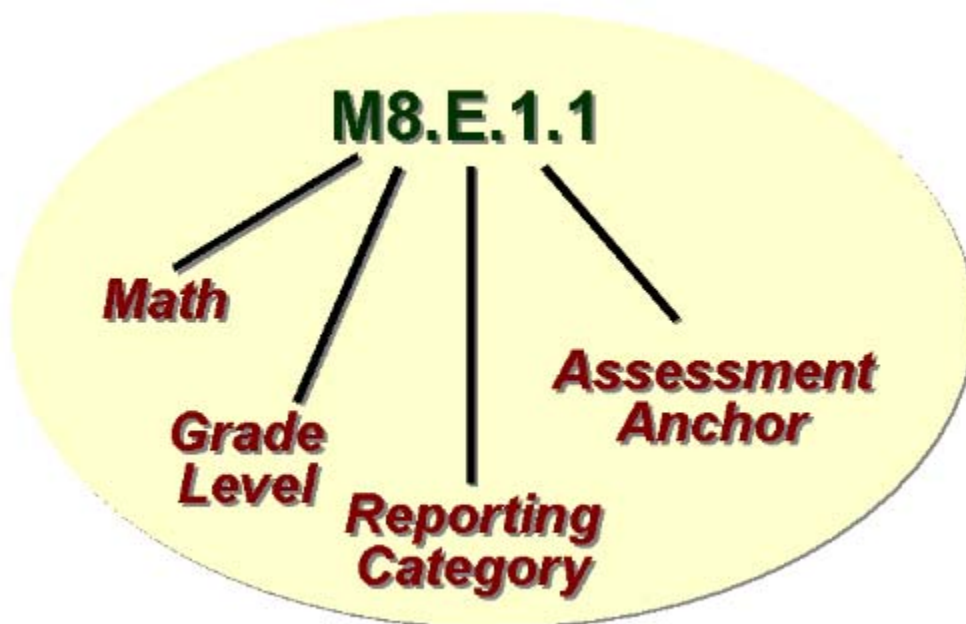
Important Patterns

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 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:

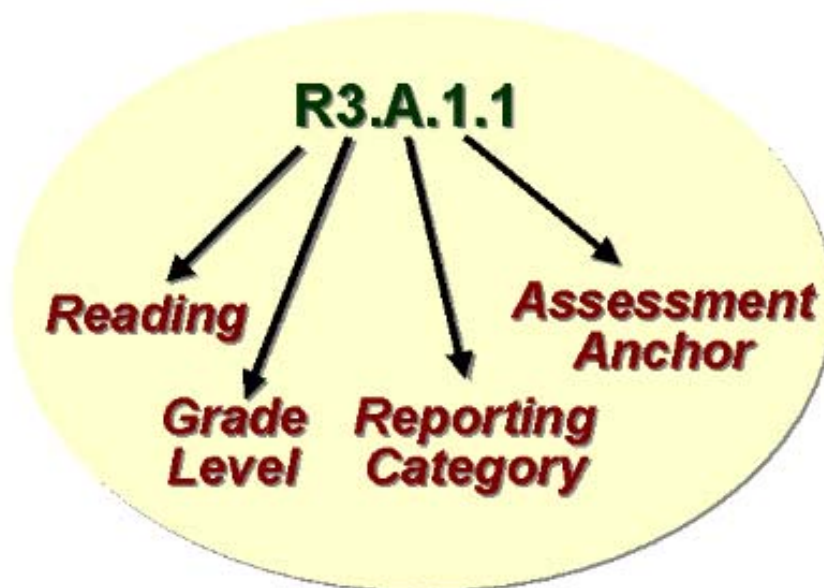
- B.1 Components within text **or** components within and across texts
- B.2 Literary Devices
- B.3 Concepts and Organization of Nonfiction Text

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 3rd 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 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:

- | | |
|--|---|
| 3.1 Unifying Themes | 4.1 Watersheds and Wetlands |
| 3.2 Inquiry and Design | 4.2 Renewable and Nonrenewable Resources |
| 3.3 Biological Sciences | 4.3 Environmental Health |
| 3.4 Physical Science, Chemistry,
and Physics | 4.4 Agriculture and Society |
| 3.5 Earth Sciences | 4.5 Integrated Pest Management |
| 3.6 Technology Education | 4.6 Ecosystems and their Interactions |
| 3.7 Technological Devices | 4.7 Threatened, Endangered and Extinct Species |
| 3.8 Science, Technology and
Human Endeavors | 4.8 Humans and the Environment |
| | 4.9 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

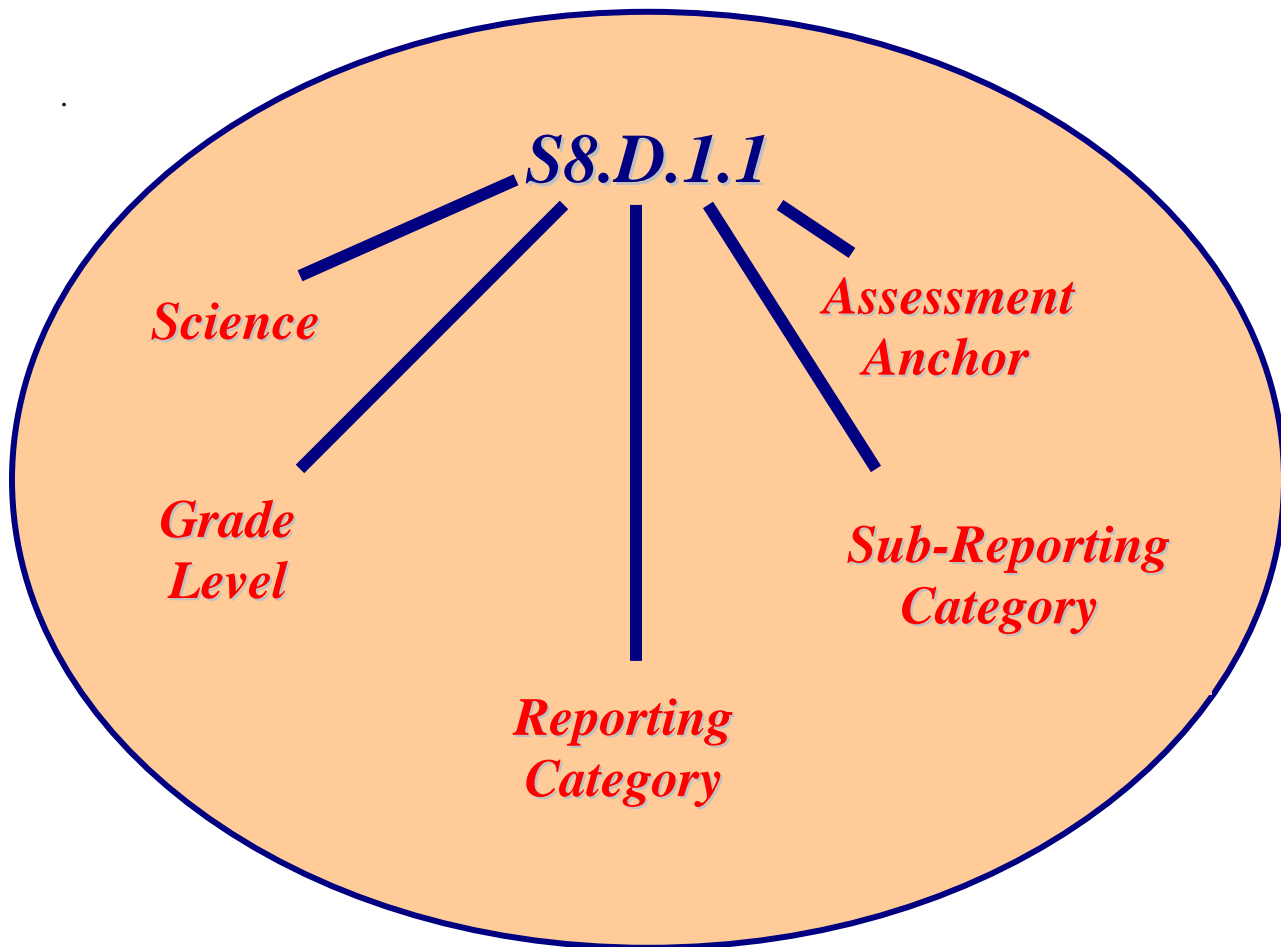
The four reporting categories are similar to those used by the National Assessment of Educational Progress (NEAP) and The Third International Mathematics and Science Study (TIMSS). The four categories for the assessment anchors are included in these major assessments, but are organized differently. Below 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

Reporting Categories	Connections to the Standards
A. The Nature of Science	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
B. Biological Sciences	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
C. Physical Sciences	3.2 Inquiry and Design 3.4 Physical Science, Chemistry, and Physics 3.6 Earth Sciences
D. Earth and Space Sciences	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

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 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.*

S.A The Nature of Science	
S.A.1. Reasoning and Analysis	
S4.A.1.1 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)
S4.A.1.2 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)
S.A.2. Processes, Procedures, and Tools of Scientific Investigations	
S4.A.2.1. Apply skills necessary to conduct an experiment or design a solution to solve a problem.	(3.2.4.C)
S4.A.2.2 Identify appropriate instruments for a specific task and describe the information the instrument can provide.	(3.7.4.A) (3.7.4.B)
S.A.3. Systems, Models, and Patterns	
S4.A.3.1 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)
S4.A.3.2 Use models to illustrate simple concepts and compare the models to what they represent.	(3.1.4.B) (4.3.4.C)
S4.A.3.3 Identify and make observations about patterns that regularly occur and reoccur in nature.	(3.1.4.C) (3.2.4.B)

S.B Biological Sciences	
S.B.1. Structure and Function of Organisms	
S4.B.1.1 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)
S.B.2. Continuity of Life	
S4.B.2.1 Identify and explain how adaptations help organisms to survive.	(4.7.4.B)
S4.B.2.2 Identify that characteristics are inherited and, thus, offspring closely resemble their parents.	(3.3.4.C) (4.7.4.A) (4.7.4.C)
S.B.3. Ecological Behavior and Systems	
S4.B.3.1 Identify and describe living and nonliving things in the environment or their interaction.	(4.6.4.A)
S4.B.3.2 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)
S4.B.3.3 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)

S.C Physical Sciences	
S.C.1. Structure, Properties and Interactions of Matter and Energy	
S4.C.1.1 Describe observable physical properties of matter.	(3.2.4.B) (3.4.4.A)
S.C.2 Forms, Sources, Conversions, and Transfer of Energy	
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)
S.C.3 Principles of Force and Motion	
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)

S.D Earth and Space Sciences	
S.D.1 Earth Features and Processes that Change Earth and Its Resources	
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)
S.D.2 Weather, Climate, and Atmospheric Processes	
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)
S.D.3 Composition and Structure of the Universe	
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

OTOff 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

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:
2011 PSSA Tally Sheets

Appendix C: 2011 PSSA Tally Sheets

Grade 03

Mathematics

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		1	1						1		1	
	1	1	2	Differentiate between even & odd	1				1		1	1						1		1	
	1	1	3	Compare two whole numbers	2		1		3		3	2		1				3		3	
	1	1	4	Order a set of whole numbers	1				1		1	1						1		1	
	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	3				3		3	3						3		3	
	1	3	2	Compare total values of combinations of coins	2				2		2	2						2		2	
	1	3	3	Make change up to \$5.00	1				1		1	1						1		1	
Total For Assessment Anchor A.1																					
Understand relationships among and representations of numbers and number systems					17	4	1		18	4	22	17	1	1				18	1	19	
A: Numbers and Operations	2			Understand meanings, uses and relations of operations																	
	2	1	1	Represent multiplication as repeated addition	2		1		3		3	2		1				3		3	
	2	1	2	Demonstrate inverse relationships	2				2		2	2						2		2	
	2	1	3	Identify correct operation(s)	1				1		1	1						1		1	
	Total For Assessment Anchor A.2																				
	Understand meanings, uses of operations and how they relate to each other					5		1		6		6	5		1				6		6
	3			Compute accurately/fluently and make reasonable estimates																	
	3	1	1	Solve single- & double-digit addition & subtraction problems	2		1		3		3	2		1				3		3	
	3	1	2	Solve multiplication problems	2		1		3		3	2		1				3		3	
	3	1	3	Solve triple digit addition & subtraction problems	2		1		3		3	2		1				3		3	
3	2	1	Estimate sums and differences	1				1		1	1						1		1		
Total For Assessment Anchor A.3																					
Compute accurately and fluently and make reasonable estimates					7		3		10		10	7		3				10		10	
Total For Reporting Category A					29	4	5		34	4	38	29	1	5				34	1	35	

Appendix C: 2011 PSSA Tally Sheets

Grade 03

Mathematics

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	1			Understand measurable attributes and units, systems, processes of measurement		4				4	4			1					1	1	
	1	1	1	Tell/show analog time to the minute	1				1		1	1							1	1	
	1	1	2	Find elapsed time																	
	1	1	3	Identify times as AM or PM	1				1		1	1							1	1	
	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		1			1					1	1	
	Total For Assessment Anchor B.1																				
	Understand measurable attributes and units, systems, processes of measurement					3	4	1		4	4	8	3	1	1				4	1	5
	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	1				1		1	1						1		1
Total For Assessment Anchor B.2																					
Apply appropriate techniques, tools and formulas to determine measurements					4		1		5		5	4		1				5		5	
Total For Reporting Category B					7	4	2		9	4	13	7	1	2				9	1	10	

Appendix C: 2011 PSSA Tally Sheets

Grade 03

Mathematics

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: Geometry	1			Analyze characteristics & properties of 2-D & 3-D shapes																
	1	1	1	Name/identify/describe 2-D shapes	3				3		3	3					3		3	
	1	1	2	Name/identify 3-D shapes	4				4		4	4					4		4	
	Total For Assessment Anchor C.1 Analyze characteristics and properties of two- and three-dimensional geometric shapes					7				7		7	7					7		7
	2			Identify and/or apply concepts of transformations or symmetry																
	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				3		3	3					3		3
	Total For Reporting Category C					10				10		10	10					10		10

Appendix C: 2011 PSSA Tally Sheets

Grade 03

Mathematics

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		1		1			1		1	
	1	1	2	Identify/describe rule for a pattern	1		1		2		2		1		1	2		2	
	Total For Assessment Anchor D.1 Understand patterns, relations and functions				2		1		3		3		2		1	3		3	
	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															
	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				3	4			3	4	7		3	1		3	1	4	
	Total For Reporting Category D				5	4	1		6	4	10		5	1	1		6	1	7

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Grade 03

Mathematics

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
E: Data Analysis and Probability	1			Formulate/answer questions; organize, display, interpret or analyze data															
	1	1	1	Analyze data shown on tables, charts, or bar graphs	2				2		2	2				2			2
	1	1	2	Describe, interpret and/or answer questions based on data	3				3		3	3				3			3
	1	2	1	Graph data	3		1		4		4	3		1		4			4
	1	2	2	Translate information from one type of display to another	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					9		2		11		11	9		2		11		
Total For Reporting Category E					9		2		11		11	9		2		11			11

Appendix C: 2011 PSSA Tally Sheets

Grade 04

Mathematics

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: Numbers and Operations	1			Understand relationships and representations of numbers and number systems																
	1	1	1	Match drawing to fraction, decimal, mixed number	1				1		1	1				1			1	
	1	1	2	Create a drawing or set to represent a fraction	1				1		1	1				1			1	
	1	1	3	Match standard form to word form (decimals)	1				1		1	1				1			1	
	1	1	4	Write in expanded, standard or word form (whole numbers)	2				2		2	2				2			2	
	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	2				2		2	2				2			2	
	1	3	2	Find/identify/list multiples	4		1		5		5	4		1		5			5	
	Total For Assessment Anchor A.1 Understand relationships among and representations of numbers and number systems					14		1		15		15	14		1		15			15
	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	2				2		2	2				2			2	
	Total For Assessment Anchor A.2 Understand meanings, uses of operations and how they relate to each other					4	4	1		5	4	9	4	1	1		5	1		6
	3			Compute accurately/fluently and make reasonable estimates																
	3	1	1	Round whole numbers	3		1		4		4	3		1		4			4	
	3	1	2	Round to nearest dollar	2		1		3		3	2		1		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	2		1		3		3	2		1		3			3	
Total For Assessment Anchor A.3 Compute accurately and fluently and make reasonable estimates					10		3		13		13	10		3		13			13	
Total For Reporting Category A					28	4	5		33	4	37	28	1	5		33	1		34	

Appendix C: 2011 PSSA Tally Sheets

Grade 04

Mathematics

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: 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	2	Identify time	1				1		1				1				1	
	1	1	3	Calculate elapsed time	2				2		2				2				2	
	1	1	4	Determine beginning or ending time	2				2		2				2				2	
	Total For Assessment Anchor B.1 Understand measurable attributes and units, systems, processes of measurement					6				6		6			6				6	
	2			Apply techniques, tools & formulas to determine measurements																
	2	1	1	Use/read ruler to nearest 1/4 inch	2				2		2				2				2	
	2	2	1	Make reasonable estimates of measurement	1		2		3		3		1		2		3		3	
	Total For Assessment Anchor B.2 Apply appropriate techniques, tools and formulas to determine measurements					3		2		5		5		3		2		5		5
	Total For Reporting Category B					9		2		11		11		9		2		11		11

Appendix C: 2011 PSSA Tally Sheets

Grade 04

Mathematics

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	1				1		1		1				1		1	
	1	1	2	Classify 3-D figures, identify characteristics																
	1	2	1	Identify points/lines/segments/rays	1				1		1		1				1		1	
	1	2	2	Identify parallel/perpendicular lines	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		1		5		5		4		1		5		5
	2			Identify and/or apply concepts of transformations and symmetry																
	2	1	1	Identify/draw figures having one, two, or no lines of symmetry	2		1		3		3		2		1		3		3	
	Total For Assessment Anchor C.2 Identify and/or apply concepts of transformations and symmetry					2		1		3		3		2		1		3		3
	3			Locate points/describe relationships using the coordinate plane		4				4	4			1				1		1
	3	1	1	Match or plot ordered pair	1				1		1		1				1		1	
	Total For Assessment Anchor C.3 Locate points or describe relationships using the coordinate plane					1	4			1	4	5	1	1			1	1		2
	Total For Reporting Category C					7	4	2		9	4	13	7	1	2		9	1		10

Appendix C: 2011 PSSA Tally Sheets

Grade 04

Mathematics

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				1		1			1					1	1	
	1	2	1	Determine missing elements in function table given the rule																	
	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	2				2		2			2					2	2	
	2	2	1	Solve for missing number in equation																	
	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					3				3		3		3					3	3	
	Total For Reporting Category D					7	4			7	4	11		7	1				7	1	8

Appendix C: 2011 PSSA Tally Sheets

Grade 04

Mathematics

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 questions; organize, display, interpret or analyze data															
	1	1	1	Describe/interpret/answer questions based on data shown	2				2		2				2		2		
	1	2	1	Graph data or complete a graph	3				3		3				3		3		
	1	2	2	Translate data from one type of display to another	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					6				6		6			6		6		
	3			Understand and apply basic concepts of probability															
	3	1	1	Make a prediction based on data or chance	3		1		4		4		3		1		4	4	
	Total For Assessment Anchor E.3 Understand and apply basic concepts of probability					3		1		4		4		3		1		4	4
	Total For Reporting Category E					9		1		10		10		9		1		10	10

Appendix C: 2011 PSSA Tally Sheets

Grade 05

Mathematics

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: Numbers and Operations	1			Understand relationships and representations of numbers and number systems																
	1	1	1	Use expanded notation	2				2		2	2				2		2		
	1	2	1	Read/write decimals	2				2		2	2				2		2		
	1	2	2	Identify number with place value	1				1		1	1				1		1		
	1	3	1	Compare whole numbers	1				1		1	1				1		1		
	1	3	2	Compare and/or order decimals	1				1		1	1				1		1		
	1	3	3	Compare proper fractions	2		1		3		3	2		1		3		3		
	1	4	1	Identify negative numbers on number line	1				1		1	1				1		1		
	1	4	2	Identify negative numbers on thermometer	2				2		2	2				2		2		
	1	5	1	Model fractions/mixed numbers	1		1		2		2	1		1		2		2		
	1	6	1	Name/identify prime and composite numbers	3				3		3	3				3		3		
	1	6	2	List/identify factors, multiples	1				1		1	1				1		1		
	Total For Assessment Anchor A.1					17		2		19		19	17		2		19		19	
	Understand relationships among and representations of numbers and number systems					17		2		19		19	17		2		19		19	
	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)	2				2	2	2				2		2		
	2	1	2		Solve problems involving addition/subtraction (fractions)	2		1		3	3	2		1		3		3		
	2	1	3		Choose correct operation	1				1	1	1				1		1		
	Total For Assessment Anchor A.2					5	4	1		6	4	10	5	1	1		6	1	7	
	Understand meanings, uses of operations and how they relate to each other					5	4	1		6	4	10	5	1	1		6	1	7	
3				Compute accurately/fluently and make reasonable estimates																
3	1	1		Round whole numbers & decimals	2		1		3	3	2		1		3		3			
3	1	2		Estimate to solve	2				2	2	2				2		2			
3	2	1		Compute without calculator	1				1	1	1				1		1			
Total For Assessment Anchor A.3					5		1		6	6	5		1		6		6			
Compute accurately and fluently and make reasonable estimates					5		1		6	6	5		1		6		6			
Total For Reporting Category A					27	4	4		31	4	35	27	1	4		31	1	32		

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Grade 05

Mathematics

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	1			Understand measurable attributes and units, systems, processes of measurement		4				4	4			1					1	1	
	1	1	1	Select appropriate unit																	
	1	2	1	Convert measurements			1		1		1			1				1		1	
	1	2	2	Add/subtract measurements	1				1		1		1						1		1
	1	3	1	Estimate polygon perimeter/area	1				1		1		1						1		1
	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	1		4	4	8	3	1	1				4	1	5
	2			Apply techniques, tools & formulas to determine measurements																	
	2	1	1	Use a ruler to nearest 1/8 in. or cm	1				1		1		1						1		1
	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																	
	Total For Assessment Anchor B.2 Apply appropriate techniques, tools and formulas to determine measurements					3				3		3	3						3		3
	Total For Reporting Category B					6	4	1		7	4	11	6	1	1				7	1	8

Appendix C: 2011 PSSA Tally Sheets

Grade 05

Mathematics

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 3-D figures	2				2		2				2			2		
	1	1	2	Identify/classify/compare quadrilaterals	1				1		1				1			1		
	1	2	1	Identify/draw/label points, lines, segments, rays, planes	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					5		1		6		6		5		1		6		6
	2			Identify and/or apply concepts of transformations or symmetry																
	2	1	1	Draw or identify translation, reflection, rotation	2				2		2			2				2		2
	2	1	2	Draw/identify lines of symmetry	3				3		3			3				3		3
	Total For Assessment Anchor C.2 Identify and/or apply concepts of transformations or symmetry					5				5		5		5				5		5
	Total For Reporting Category C					10		1		11		11		10		1		11		11

Appendix C: 2011 PSSA Tally Sheets

Grade 05

Mathematics

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: Algebraic Concepts	1			Understand patterns, relations and functions		4				4	4							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	Create numerical or geometric pattern	1		1		2		2	1		1				2	2	
	1	2	1	Form/illustrate pattern rule	1		1		2		2	1		1				2	2	
	Total For Assessment Anchor D.1 Understand patterns, relations and functions					3	4	2		5	4	9	3	1	2			5	1	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	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					4		1		5		5	4		1			5		5
	Total For Reporting Category D					7	4	3		10	4	14	7	1	3			10	1	11

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Grade 05

Mathematics

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																
	1	1	1	Interpret/display data	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					2				2		2		2			2		2	
	2			Select and/or use appropriate statistical methods to analyze data																
	2	1	1	Determine the mean, median, range	2				2		2		2				2		2	
	2	1	2	Identify the mode in set of data	1				1		1		1				1		1	
	Total For Assessment Anchor E.2 Select and/or use appropriate statistical methods to analyze data					3				3		3		3			3		3	
	3			Understand/apply basic concepts of probability or outcomes																
	3	1	1	Predict/determine likelihood of outcomes	2		1		3		3		2		1		3		3	
	3	1	2	Determine probability of outcome	3				3		3		3				3		3	
	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		1		11		11		10		1		11		11

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Grade 06

Mathematics

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	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	1				1		1				1				1	
	1	1	3	Represent number in exponential form	1				1		1				1				1	
	1	1	4	Represent mixed number as an improper fraction	1		1		2		2		1		2		1		2	
	1	2	1	Compare/order rational numbers except integers	2				2		2		2		2				2	
	1	3	1	Find GCF of two numbers	1		1		2		2		1		2		1		2	
	1	3	2	Find LCM of two numbers	1				1		1		1		1				1	
	1	3	3	Use divisibility rules for 2, 3, 5 & 10 to solve problems	1				1		1		1		1				1	
	1	4	1	Model percents	2				2		2		2		2				2	
	Total For Assessment Anchor A.1					11		2		13		13		11		2		13		13
	Understand relationships among and representations of numbers and number systems					11		2		13		13		11		2		13		13
	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	3				3		3		3					3	3
	Total For Assessment Anchor A.2					3	4			3	4	7		3	1				3	4
	Select /use operations to solve problems					3	4			3	4	7		3	1				3	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	2		1		3		3		2		1			3	3
	Total For Assessment Anchor A.3					4		1		5		5		4		1			5	5
Compute accurately and fluently and make reasonable estimates					4		1		5		5		4		1			5	5	
Total For Reporting Category A					18	4	3		21	4	25		18	1	3			21	1	22

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Grade 06

Mathematics

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: Measurement	1			Understand measurable attributes and units, systems, processes of measurement															
	1	1	1	Determine/compare elapsed time	3				3		3				3			3	
	Total For Assessment Anchor B.1 Understand measurable attributes and units, systems, processes of measurement				3				3		3				3			3	
	2			Apply techniques, tools & formulas to determine measurements		4				4	4			1				1	1
	2	1	1	Use ruler to nearest 1/16 in. or mm			1		1		1			1			1	1	
	2	1	2	Choose precise measurement															
	2	1	3	Measure angles using protractor	1				1		1			1			1	1	
	2	2	1	Find perimeter of any polygon	2				2		2			2			2	2	
	2	3	1	Define/label/identify angles	1		1		2		2			1		1	2	2	
	Total For Assessment Anchor B.2 Apply appropriate techniques, tools and formulas to determine measurements				4	4	2		6	4	10		4	1	2		6	1	7
Total For Reporting Category B					7	4	2		9	4	13		7	1	2		9	1	10

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Grade 06

Mathematics

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, and compare types of polygons	2				2		2		2			2		2		
	1	1	2	Identify properties of all types of triangles	1				1		1		1			1		1		
	1	1	3	Solve radius/diameter problems	2				2		2		2			2		2		
	1	1	4	Identify/use polygon/circle degrees	1		1		2		2		1		1	2		2		
	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	2				2		2		2			2		2		
	Total For Assessment Anchor C.1 Analyze characteristics and properties of two- and three-dimensional geometric shapes					10		1		11		11		10		1		11		11
	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					13		2		15		15		13		2		15		15	

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Grade 06

Mathematics

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	2		1		3		3		2		1		3		3	
	1	2	1	Determine or illustrate pattern rule	2				2		2		2				2		2	
	Total For Assessment Anchor D.1 Understand patterns, relations and functions				4		1		5		5		4		1		5		5	
	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				2		2		2				2		2	
	2	2	1	Match one variable, one-step equation/expression to situation	4		1		5		5		4		1		5		5	
	Total For Assessment Anchor D.2 Represent/analyze mathematical situations using numbers, symbols, words, tables and/or graphs				9		1		10		10		9		1		10		10	
	Total For Reporting Category D				13		2		15		15		13		2		15		15	

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Grade 06

Mathematics

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		1	1						1	1	
	Total For Assessment Anchor E.1 Formulate or answer questions about data and/or organize, display, interpret or analyze data					3	4			3	4	7	3	1				3	1	4
	2			Select/use appropriate statistical methods to analyze data																
	2	1	1	Determine/calculate mean, median, mode, range	2				2		2	2	2					2	2	
	Total For Assessment Anchor E.2 Select and/or use appropriate statistical methods to analyze data					2				2		2	2					2	2	
	3			Understand/apply basic concepts of probability or outcomes																
	3	1	1	Define/find probability	2				2		2	2	2					2	2	
	3	1	2	Determine/show combinations	2		1		3		3	2		1				3	3	
	Total For Assessment Anchor E.3 Understand and/or apply basic concepts of probability or outcomes					4		1		5		5	4		1			5	5	
	Total For Reporting Category E					9	4	1		10	4	14	9	1	1			10	1	11

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Grade 07

Mathematics

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	Convert between fractions, decimals, percents	3				3		3				3				3
	1	2	1	Compare/order rational numbers	3		1		4		4			3		1			4
	1	2	2	Locate and identify rational numbers on a number line															
	Total For Assessment Anchor A.1 Understand relationships among and representations of numbers and number systems					6		1		7		7		6		1			7
	2			Understand meanings, uses and relations of operations															
	2	1	1	Use order of operations	2				2		2			2					2
	2	2	1	Write ratios to compare quantities	2				2		2			2					2
	2	2	2	Solve for a variable in proportions	1				1		1			1					1
	2	2	3	Use proportions to test equivalency	1				1		1			1					1
	2	2	4	Calculate/apply unit rates or unit prices															
	2	2	5	Select and use ratios/proportions to solve problems															
	2	2	6	Use proportions to find missing lengths in similar figures	1		1		2		2			1		1			2
	Total For Assessment Anchor A.2 Understand meanings, uses of operations and how they relate to each other					7		1		8		8		7		1			8
	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
	3	2	1	Solve problems involving operations with whole numbers, decimals, fractions and mixed numbers	2				2		2			2					2
	3	2	2	Solve problems involving addition/subtraction of integers															
	Total For Assessment Anchor A.3 Compute accurately and fluently and make reasonable estimates					4				4		4		4					4
	Total For Reporting Category A					17		2		19		19		17		2			19

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Grade 07

Mathematics

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: Measurement	1			Understand measurable attributes and units, systems, processes of measurement		4				4	4			1				1	1		
	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	4	1		3	4	7			2	1	1		3	1	4	
	2			Apply techniques, tools & formulas to determine measurements																	
	2	1	1	Find perimeter and/or area of compound figures	1		1		2		2			1		1		2		2	
	2	1	2	Find circumference/area of circles	1				1		1			1				1		1	
	2	1	3	Find area of triangles, parallelograms, trapezoids																	
	2	2	1	Interpret and apply scale drawings	1				1		1			1				1		1	
	2	2	2	Determine appropriate scale for reduction and enlargement	1				1		1			1				1		1	
	Total For Assessment Anchor B.2																				
	Apply appropriate techniques, tools and formulas to determine measurements				4		1		5		5			4		1		5		5	
	Total For Reporting Category B					6	4	2		8	4	12		6	1	2		8	1	9	

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Grade 07

Mathematics

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	3				3		3			3					3	3	
	1	1	3	Identify parallel, perpendicular, and skew lines in a 3-dimensional figure																	
	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					6	4	1		7	4	11		6	1	1			7	1	8
	3			Locate points/describe relationships using the coordinate plane																	
	3	1	1	Plot/identify ordered pairs	2				2		2			2					2	2	
	3	1	2	Identify Quadrants I, II, III, IV, x- and y- axes, and the origin on the coordinate plane	1				1		1			1					1	1	
	Total For Assessment Anchor C.3 Locate points or describe relationships using the coordinate plane					3				3		3		3					3	3	
Total For Reporting Category C					9	4	1		10	4	14		9	1	1			10	1	11	

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Grade 07

Mathematics

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	3		1		4		4		3		1		4		4		
	Total For Assessment Anchor D.1 Understand patterns, relations and functions					3		1		4		4		3		1		4		4	
	2			Represent/analyze mathematical situations		4				4	4			1					1	1	
	2	1	1	Solve one-step equations	2				2		2		2				2		2	2	
	2	1	2	Use substitution of variables to simplify expression	2		1		3		3		2		1		3		3	3	
	2	2	1	Identify mathematical models	2		1		3		3		2		1		3		3	3	
	Total For Assessment Anchor D.2 Represent/analyze mathematical situations using numbers, symbols, words, tables and/or graphs					6	4	2		8	4	12		6	1	2		8	1	9	
	3			Analyze change in various contexts																	
	3	1	1	Solve problems w/ constant rate of change	5		1		6		6		5		1		6		6	6	
	3	1	2	Describe or use a rate of change shown on a graph	1				1		1		1				1		1	1	
	Total For Assessment Anchor D.3 Analyze change in various contexts					6		1		7		7		6		1		7		7	7
	Total For Reporting Category D					15	4	4		19	4	23		15	1	4		19	1	20	20

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Grade 07

Mathematics

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			
E: Data Analysis and Probability	1			Formulate/answer questions; organize, display, interpret or analyze data																		
	1	1	1	Analyze data	3		1		4		4		3		1		4		4			
	Total For Assessment Anchor E.1																					
	Formulate or answer questions about data and/or organize, display, interpret or analyze data				3		1		4		4		3		1		4		4		4	
	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				2		2		2				2		2		2	
	2	1	2	Choose appropriate measure of central tendency for a situation																		
	Total For Assessment Anchor E.2																					
	Select and/or use appropriate statistical methods to analyze data				2				2		2		2				2		2		2	
	3			Understand/apply basic concepts of probability or outcomes																		
	3	1	1	Find theoretical probability of event	2				2		2		2				2		2		2	
	3	1	2	Find theoretical probability of event not occurring	2				2		2		2				2		2		2	
	3	1	3	Find experimental probability	2				2		2		2				2		2		2	
	Total For Assessment Anchor E.3																					
	Understand and/or apply basic concepts of probability or outcomes				6				6		6		6				6		6		6	
	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		2	
	Total For Assessment Anchor E.4																					
	Develop/evaluate inferences and predictions based on data displays				2				2		2		2				2		2		2	
	Total For Reporting Category E					13		1		14		14		13		1		14		14		14

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Grade 08

Mathematics

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	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	1		1		2		2		1		1			2		2
	2	2	1	Use ratios, proportions, percents to solve problems	2				2		2		2					2		2
	2	2	2	Represent or solve rate problems	1				1		1		1					1		1
	Total For Assessment Anchor A.2 Understand meanings, uses of operations and how they relate to each other					4	4	1		5	4	9		4	1	1		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	1				1		1		1					1		1
	Total For Assessment Anchor A.3 Compute accurately and fluently and make reasonable estimates					5		1		6		6		5		1		6		6
	Total For Reporting Category A					11	4	2		13	4	17		11	1	2		13	1	14

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Grade 08

Mathematics

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	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	1				1		1			1				1		1
	1	1	3	Convert time	1				1		1			1				1		1
	1	1	4	Convert temperature	2				2		2			2				2		2
	Total For Assessment Anchor B.1 Understand measurable attributes and units, systems, processes of measurement					5				5		5			5			5		5
	2			Apply techniques, tools & formulas to determine measurements																
	2	1	1	Determine total degrees of interior angles	1				1		1			1				1		1
	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	1				1		1			1				1		1
	2	2	1	Calculate surface area of cubes and rectangular prisms	1				1		1			1				1		1
	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		1		7		7		6		1		7		7
Total For Reporting Category B					11		1		12		12		11		1		12		12	

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Grade 08

Mathematics

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	Match the 3-dimensional figure w/ its net	2				2		2		2				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	2				2		2		2				2		2	
	1	2	1	Use the Pythagorean Theorem	3		1		4		4		3		1		4		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		11
	3			Locate points/describe relationships using the coordinate plane																
	3	1	1	Plot/locate/identify ordered pairs	3				3		3		3				3		3	
	Total For Assessment Anchor C.3																			
	Locate points or describe relationships using the coordinate plane					3				3		3		3				3		3
Total For Reporting Category C					12		2		14		14		12		2		14		14	

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Grade 08

Mathematics

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		
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	2		1		3		3		2		1			3	3	
	Total For Assessment Anchor D.1 Understand patterns, relations and functions					4	4	2		6	4	10		4	1	2		6	1	7
	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	2				2		2		2					2	2	
	2	2	2	Write/solve equation for a situation	1				1		1		1					1	1	
	Total For Assessment Anchor D.2 Represent/analyze mathematical situations using numbers, symbols, words, tables and/or graphs					7				7		7		7				7		7
	4			Describe/use models to represent quantitative relationships																
	4	1	1	Graph linear function from x/y table	1		1		2		2		1		1			2	2	
	4	1	2	Match linear graph to x/y table	1				1		1		1					1	1	
	4	1	3	Match linear equation to x/y table	3				3		3		3					3	3	
	Total For Assessment Anchor D.4 Describe/use models to represent quantitative relationships					5		1		6		6		5		1		6		6
	Total For Reporting Category D					16	4	3		19	4	23		16	1	3		19	1	20

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Grade 08

Mathematics

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	
E: Data Analysis and Probability	1			Formulate/answer questions; organize, display, interpret or analyze data																
	1	1	1	Choose correct data representation	1				1		1						1		1	
	1	1	2	Display and/or interpret data																
	1	1	3	Interpret stem-and-leaf, box-and-whisker plots	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					2				2		2					2		2	
	3			Understand/apply basic concepts of probability or outcomes		4				4	4		1					1	1	
	3	1	1	Find probability	3		1		4		4		3		1		4		4	
	3	2	1	Calculate show number of permutations/combinations	1				1		1		1				1		1	
	Total For Assessment Anchor E.3 Understand and/or apply basic concepts of probability or outcomes					4	4	1		5	4	9		4	1	1		5	1	6
	4			Develop/evaluate inferences & predictions based on data																
	4	1	1	Fit line to scatter plot; describe correlation	3				3		3		3				3		3	
	4	1	2	Make predictions based on data	1		1		2		2		1		1		2		2	
	Total For Assessment Anchor E.4 Develop/evaluate inferences & predictions or draw conclusions based on data or data displays					4		1		5		5		4		1		5		5
	Total For Reporting Category E					10	4	2		12	4	16		10	1	2		12	1	13

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Grade 11

Mathematics

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: 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		1	1								1		1	
	1	1	2	Use scientific notation			1		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	3	2	Compare and/or order real numbers	1				1		1	1								1		1	
	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																		
	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					1				1		1	1								1		1
	3				Compute accurately/fluently and make reasonable estimates																		
	3	1	1		Use order of operations to simplify	3				3		3	3							3		3	
	3	2	1		Use estimation to solve problems	1				1		1	1							1		1	
Total For Assessment Anchor A.3																							
Compute accurately and fluently and make reasonable estimates					4				4		4	4								4		4	
Total For Reporting Category A					7	4	1		8	4	12	7	1	1						8	1	9	

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Grade 11

Mathematics

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: Measurement	2			Apply techniques, tools & formulas to determine measurements														
	2	1	1	Measure and/or compare angles	4				4		4	4				4		4
	2	2	1	Calculate surface area of prisms, cylinders, cones, pyramids, and/or spheres	2				2		2	2				2		2
	2	2	2	Calculate volume of prisms, cylinders, cones, pyramids, and/or spheres	1				1		1	1				1		1
	2	2	3	Estimate area, perimeter, or circumference of irregular figure	1				1		1	1				1		1
	2	2	4	Find missing length measurement	2		1		3		3	2		1		3		3
	2	3	1	Describe effect of linear dimension change	1				1		1	1				1		1
	Total For Assessment Anchor B.2 Apply appropriate techniques, tools and formulas to determine measurements					11		1		12		12	11		1		12	
Total For Reporting Category B					11		1		12		12	11		1		12		12

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Grade 11

Mathematics

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	Recognize/use properties of circles	1				1		1				1		1			
	1	1	2	Recognize or use properties of arcs, angles, semicircles	1				1		1				1		1			
	1	2	1	Identify/use triangle properties																
	1	2	2	Recognize/use quadrilateral properties			1		1		1			1		1		1		
	1	2	3	Identify and/or use properties of isosceles and equilateral triangles	2				2		2			2		2		2		
	1	3	1	Recognize/use properties of congruent & similar polygons/solids																
	1	4	1	Use the Pythagorean Theorem	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					6		2		8		8		6		2		8		8
	3			Locate points/describe relationships using the coordinate plane		4				4	4		1				1		1	
	3	1	1	Find distance and/or midpoint	2		1		3		3		2		1		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					3	4	1		4	4	8		3	1	1		4	1	5
	Total For Reporting Category C					9	4	3		12	4	16		9	1	3		12	1	13

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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																			
	1	1	1	Create and/or use appropriate graphical representations	1				1		1			1						1		1	
	1	1	2	Answer questions based on displayed data																			
	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		1	
	2			Select and/or use appropriate statistical methods to analyze data																			
	2	1	1	Find or select appropriate measure of central tendency	3				3		3			3						3		3	
	2	1	2	Calculate and/or interpret range, quartiles, interquartile range	1				1		1			1						1		1	
	2	1	3	Describe influence of outliers			1		1		1			1						1		1	
	Total For Assessment Anchor E.2 Select and/or use appropriate statistical methods to analyze data					4		1		5		5		4		1				5		5	
	3			Understand/apply basic concepts of probability or outcomes																			
	3	1	1	Determine probabilities	1				1		1			1						1		1	
	3	1	2	Determine, convert and/or compare probability and/or odds	1				1		1			1						1		1	
	3	2	1	Determine number of permutations and/or combinations																			
	Total For Assessment Anchor E.3 Understand and/or apply basic concepts of probability or outcomes					2				2		2		2						2		2	
	4			Develop/evaluate inferences, predictions or draw conclusions based on data																			
	4	1	1	Estimate or calculate predictions based on circle, line, bar graphs																			
	4	1	2	Use probability to predict outcomes	2				2		2			2						2		2	
	4	2	1	Draw/write equation for best-fit line																			
	4	2	2	Predict using equations of best-fit lines	1				1		1			1						1		1	
	Total For Assessment Anchor E.4 Develop and/or evaluate inferences and predictions or draw conclusions based on data or data displays					3				3		3		3						3		3	
	Total For Reporting Category E					10		1		11		11		10		1				11		11	

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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	2	Identify synonym/antonym																
	1	2	1	Identify meaning of word with an affix/how meaning changes																
	1	2	2	Define words from context clues	2		1		3		3		2		1		3		3	
	1	3	1	Make inferences/draw conclusions	4		2		6		6		4		2		6		6	
	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		2		2		1		1		2		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.					13		5		18		18		13		5		18		18
	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	3		1		4		4		3		1		4		4	
	2	3	1	Make inferences/draw conclusions	3		3		6		6		3		3		6		6	
	2	4	1	Identify main ideas/relevant details	9		1		10		10		9		1		10		10	
	2	5	1	Summarize major points/processes/events of a text as a whole																
	2	6	1	Identify author's purpose for writing text																
	Total For Assessment Anchor A.2 Understand nonfiction appropriate to grade level.					15		5		20		20		15		5		20		20
Total For Reporting Category A					28		10		38		38		28		10		38		38	

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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	MC	OE	MC	OE	MC	OE	Total	
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	2		8	3	11		6	1	2		8	1	9
	1	2	1	Connections between texts	1	3	2		3	3	6		1	1	2		3	1	4
	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			1		1		1				1		1		1
	Total For Assessment Anchor B.2 Understand literary devices in fictional and nonfictional text.						1		1		1				1		1		1
	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	2				2		2		2				2		2
	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.				5		1		6		6		5		1		6		6
	Total For Reporting Category B				12	6	6		18	6	24		12	2	6		18	2	20

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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)					
											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		1				1		1			
	1	1	2	Identify synonym/antonym	2				2		2				2		2			
	1	2	1	Identify meaning of word with an affix/how meaning changes	2		1		3		3		2		1		3			
	1	2	2	Define words from context clues																
	1	3	1	Make inferences/draw conclusions	7	3	1		8	3	11		7	1	1		8	1	9	
	1	4	1	Identify main ideas/relevant details	4		1		5		5		4		1		5		5	
	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	2		1		3		3		2		1		3		3	
	Total For Assessment Anchor A.1 Understand fiction appropriate to grade level.					18	3	6		24	3	27		18	1	6		24	1	25
	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	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	4		4		8		8		4		4		8		8	
	2	4	1	Identify main ideas/relevant details	3	3	1		4	3	7		3	1	1		4	1	5	
	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.					11	3	6		17	3	20		11	1	6		17	1	18
	Total For Reporting Category A					29	6	12		41	6	47		29	2	12		41	2	43

Appendix C: 2011 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		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	4	6	2		6	6	12	4	2	2		6	2	8
	1	2	1	Connections between texts														
	Total For Assessment Anchor B.1 Understand components within and between texts.				4	6	2		6	6	12	4	2	2		6	2	8
	2	1	1	Identify examples of personification	1				1		1	1				1		1
	2	1	2	Identify examples of similes														
	2	1	3	Identify examples of alliteration	1		1		2		2	1		1		2		2
	Total For Assessment Anchor B.2 Understand literary devices in fictional and nonfictional text.				2		1		3		3	2		1		3		3
	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)	1				1		1	1				1		1
	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		3	3				3		3
	3	3	4	Sequence of steps in a list of directions														
	Total For Assessment Anchor B.3 Understand concepts and organization of nonfictional text.				5		1		6		6	5		1		6		6
	Total For Reporting Category B				11	6	4		15	6	21	11	2	4		15	2	17

Appendix C: 2011 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	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	2	Identify synonym/antonym	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	6		1		7		7		6		1		7		7	
	1	3	2	Cite evidence from text to support generalizations																
	1	4	1	Identify and/or interpret main ideas/relevant details	6		2		8		8		6		2		8		8	
	1	5	1	Summarize key details and events of a text as a whole		3			3	3		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			1		1	1			1				1		1	
	Total For Assessment Anchor A.1 Understand fiction appropriate to grade level.					15	3	4		19	3	22	15	1	4		19	1	20	
	A: Comprehension and Reading Skills	2	1	1	Identify meaning of multiple-meaning words															
		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	3	1	Make inferences/draw conclusions	3	6	2		5	6	11		3	2	2		5	2	7
		2	3	2	Cite evidence from text to support generalizations	1		1		2		2		1		1		2		2
		2	4	1	Identify and/or interpret main ideas/relevant details	3		2		5		5		3		2		5		5
		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.					8	6	6		14	6	20	8	2	6		14	2	16		
Total For Reporting Category A					23	9	10		33	9	42	23	3	10		33	3	36		

Appendix C: 2011 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	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, theme	5	3	3		8	3	11	5	1	3		8	1	9
	1	2	1	Connections between texts														
	Total For Assessment Anchor B.1 Understand components within and between texts.				5	3	3		8	3	11	5	1	3		8	1	9
	2	1	1	Identify examples of personification			1		1		1			1		1		1
	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	1				1		1	1				1		1
	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														
	Total For Assessment Anchor B.2 Understand literary devices in fictional and nonfictional text.				6		1		7		7	6		1		7		7
	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)	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														
	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
	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				17	3	6		23	3	26	17	1	6		23	1	24

Appendix C: 2011 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	
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	2	2	Define words from context clues	1				1		1		1				1		1	
	1	3	1	Make inferences/draw conclusions	5				5		5		5				5		5	
	1	3	2	Cite evidence from text to support generalizations																
	1	4	1	Identify and/or interpret main ideas/relevant details	2		3		5		5		2		3		5		5	
	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.					12		4		16		16		12		4		16		16
		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		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	1	3	2		3	3	6		1	1	2		3	1	4
		2	3	2	Cite evidence from text to support generalizations	1	3			1	3	4		1	1			1	1	2
		2	4	1	Identify and/or interpret main ideas/relevant details	8		2		10		10		8		2		10		10
		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		1		1				1		1
2		6	2	Identify text that supports the author's intended purpose																
Total For Assessment Anchor A.2 Understand nonfiction appropriate to grade level.					14	6	4		18	6	24		14	2	4		18	2	20	
Total For Reporting Category A					26	6	8		34	6	40		26	2	8		34	2	36	

Appendix C: 2011 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	MC	OE	MC	OE	MC	OE	Total		
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, theme	3	3	3		6	3	9		3	1	3		6	1	7	
	1	2	1	Connections between texts	2	3			2	3	5		2	1			2	1	3	
	Total For Assessment Anchor B.1 Understand components within and between texts.				5	6	3		8	6	14		5	2	3		8	2	10	
	2	1	1	Identify examples of personification			1		1		1				1		1		1	
	2	1	2	Identify examples of similes	2				2		2		2				2		2	
	2	1	3	Identify/interpret examples of alliteration																
	2	1	4	Identify/interpret examples of metaphors	2				2		2		2				2		2	
	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	
	Total For Assessment Anchor B.2 Understand literary devices in fictional and nonfictional text.				4		2		6		6		4		2		6		6	
	3	1	1	Identify fact/opinion			1		1		1				1		1		1	
	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		2		2		1		1		2		2	
	3	3	3	Interpret and make connections between graphics/charts/texts	3		1		4		4		3		1		4		4	
	3	3	4	Sequence of steps in a list of directions																
	Total For Assessment Anchor B.3 Understand concepts and organization of nonfictional text.				5		3		8		8		5		3		8		8	
	Total For Reporting Category B					14	6	8		22	6	28		14	2	8		22	2	24

Appendix C: 2011 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	MC	OE	MC	OE	Total		
A: Comprehension and Reading Skills	1	1	1	Apply meaning of multiple-meaning words in text																
	1	1	2	Identify synonym/antonym	2		1		3		3		2		1			3		3
	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	3	1		4	3	7		3	1	1			4	1	5
	1	3	2	Cite evidence from text to support generalizations																
	1	4	1	Identify and/or interpret main ideas/relevant details	1		1		2		2		1		1			2		2
	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		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	4		13	3	16		9	1	4		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																
	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		2		2		1		1			2		2
	2	3	1	Make inferences/draw conclusions	4	3	2		6	3	9		4	1	2			6	1	7
	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	3		2		5		5		3		2			5		5
	2	5	1	Summarize major points/processes/events of a text as a whole	1	3	1		2	3	5		1	1	1			2	1	3
	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.					13	6	7		20	6	26		13	2	7		20	2	22	
Total For Reporting Category A					22	9	11		33	9	42		22	3	11		33	3	36	

Appendix C: 2011 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: 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, theme	6		3		9		9		6		3		9		9	
	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	3	3		10	3	13		7	1	3		10	1	11	
	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	2				2		2		2				2		2	
	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	
	Total For Assessment Anchor B.2 Understand literary devices in fictional and nonfictional text.				7		2		9		9		7		2		9		9	
	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	1				1		1		1				1		1	
	3	3	1	Analyze text organization (sequence, question/answer, comparison/contrast, cause/effect, problem/solution)	1				1		1		1				1		1	
	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																
	Total For Assessment Anchor B.3 Understand concepts and organization of nonfictional text.				4				4		4		4				4		4	
	Total For Reporting Category B					18	3	5		23	3	26		18	1	5		23	1	24

Appendix C: 2011 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	2	2	Define words from context clues	2				2		2					2		2			
	1	3	1	Make inferences/draw conclusions	3	3	2		5	3	8			3	1	2		5	1	6	
	1	3	2	Cite evidence from text to support generalizations																	
	1	4	1	Identify and/or interpret main ideas/relevant details	3				3		3			3				3		3	
	1	5	1	Summarize key details and events of a text as a whole	2				2		2			2				2		2	
	1	6	1	Identify author's purpose for writing text	1		1		2		2			1		1		2		2	
	1	6	2	Identify text that supports the author's intended purpose	1				1		1			1				1		1	
	Total For Assessment Anchor A.1 Understand fiction appropriate to grade level.					13	3	3		16	3	19		13	1	3		16	1	17	
	A: Comprehension and Reading Skills	2	1	1	Apply meaning of multiple-meaning words in text	1		1		2		2		1		1		2		2	
		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	3	2	Cite evidence from text to support generalizations																
		2	4	1	Identify and/or interpret main ideas/relevant details	2		2		4		4			2		2		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		2		2			1		1		2		2	
Total For Assessment Anchor A.2 Understand nonfiction appropriate to grade level.					9		5		14		14		9		5		14		14		
Total For Reporting Category A					22	3	8		30	3	33		22	1	8		30	1	31		

Appendix C: 2011 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
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, theme	4	3	4		8	3	11	4	1	4		8	1	9
	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.				7	9	4		11	9	20	7	3	4		11	3	14
	2	1	1	Interpret/analyze examples of personification, simile, metaphor, hyperbole, and imagery	2		2		4		4	2		2		4		4
	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
	Total For Assessment Anchor B.2 Understand literary devices in fictional and nonfictional text.				5		3		8		8	5		3		8		8
	3	1	1	Use of facts and opinions to make a point/construct an argument	1		1		2		2	1		1		2		2
	3	2	1	Identify bias/propaganda techniques														
	3	3	1	Analyze text organization (sequence, question/answer, comparison/contrast, cause/effect, problem/solution)	1				1		1	1				1		1
	3	3	2	Identify content that fits into a specific section														
	3	3	3	Interpret and make connections between graphics/charts/texts	2				2		2	2				2		2
	3	3	4	Sequence of steps in a list of directions	2				2		2	2				2		2
	Total For Assessment Anchor B.3 Understand concepts and organization of nonfictional text.				6		1		7		7	6		1		7		7
	Total For Reporting Category B				18	9	8		26	9	35	18	3	8		26	3	29

Appendix C: 2011 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	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	2		2		4		4		2		2		4		4	
	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.					6		3		9		9		6		3		9		9
	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	1				1		1		1				1		1	
	2	2	2	Define words from context clues	2				2		2		2				2		2	
	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	1		1		2		2		1		1		2		2	
	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																
2	6	2	Identify text that supports the author's intended purpose	2		1		3		3		2		1		3		3		
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					22		8		30		30		22		8		30		30	

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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	MC	OE	MC	OE	MC	OE	Total
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, theme, tone, style, mood, symbolism	2	3	3		5	3	8	2	1	3		5	1	6
	1	2	1	Connections between texts	4	6			4	6	10	4	2			4	2	6
	Total For Assessment Anchor B.1 Understand components within and between texts.				6	9	3		9	9	18	6	3	3		9	3	12
	2	1	1	Analyze examples of personification, simile, metaphor, hyperbole, satire, imagery, foreshadowing, flashbacks, and irony	2		1		3		3	2		1		3		3
	2	1	2	Identify author's purpose/effectiveness of figurative language	1	3	1		2	3	5	1	1	1		2	1	3
	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														
	Total For Assessment Anchor B.2 Understand literary devices in fictional and nonfictional text.				4	3	2		6	3	9	4	1	2		6	1	7
	3	1	1	Use of facts and opinions to make a point/construct an argument	2		1		3		3	2		1		3		3
	3	2	1	Identify bias/propaganda techniques	3				3		3	3				3		3
	3	2	2	Analyze the effectiveness of bias/propaganda techniques														
	3	3	1	Analyze the effect of text organization including use of headers			1		1		1			1		1		1
	3	3	2	Analyze author's purpose for text organization and content	3		1		4		4	3		1		4		4
	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.				8		3		11		11	8		3		11		11
	Total For Reporting Category B				18	12	8		26	12	38	18	4	8		26	4	30

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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
	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		4	2	6	2	1	2		4	1	5
	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.	2				2		2	2				2		2
	1	3	1	Observe and record change by using time and measurement.	1		1		2		2	1		1		2		2
	1	3	2	Describe relative size, distance, or motion.	2				2		2	2				2		2
	1	3	3	Observe and describe the change to objects caused by temperature change or light.	2		1		3		3	2		1		3		3
	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).	1	2			1	2	3	1	1			1	1	2
	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.	1		1		2		2	1		1		2		2
Total For Assessment Anchor A.1 Reasoning and Analysis					11	4	5		16	4	20	11	2	5		16	2	18
	2	1	1	Generate questions about objects, organisms, or events that can be answered through scientific investigations.	3		1		4		4	3		1		4		4
	2	1	2	Design and describe an investigation (a fair test) to test one variable.	1				1		1	1				1		1

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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.	1	1	2	2	1	1	2	2
	2	1	4	State a conclusion that is consistent with the information/data.								
	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).	1	2	3	3	1	2	3	3
	Total For Assessment Anchor A.2 Processes, Procedures, and Tools of Scientific Investigations				6	4	10	10	6	4	10	10
	3	1	1	Categorize systems as either natural or human-made (e.g., ballpoint pens, simple electrical circuits, plant anatomy, water cycle).	3		3	3	3		3	3
	3	1	2	Explain a relationship between the living and nonliving components in a system (e.g., food web, terrarium).	3	1	4	4	3	1	4	4
	3	1	3	Categorize the parts of an ecosystem as either living or nonliving and describe their roles in the system.								
	3	1	4	Identify the parts of the food and fiber systems as they relate to agricultural products from the source to the consumer.								
	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	2	2	1	1	2	2
	3	2	2	Use models to make observations to explain how systems work (e.g., water cycle, Sun-Earth-Moon system).								

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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				1		1					1		1
3	3	1	Identify and describe observable patterns (e.g., growth patterns in plants, weather, water cycle).	3				3		3					3		3
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
Total For Assessment Anchor A.3 Systems, Models, and Patterns				12		2		14		14			2		14		14
Total For Reporting Category A				29	4	11		40	4	44	29	2	11		40	2	42

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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	Total	MC	OE	MC	OE	MC	OE	Total	
	1	1	1	Identify life processes of living things (e.g., growth, digestion, respiration).	1				1		1		1				1		1
	1	1	2	Compare similar functions of external characteristics of organisms (e.g., anatomical characteristics: appendages, type of covering, body segments).			1		1		1				1		1		1
	1	1	3	Describe basic needs of plants and animals (e.g., air, water, food).			1		1		1			1		1		1	1
	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).	1				1		1		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
Total For Assessment Anchor B.1 Structures and Functions of Organisms					3		2		5		5		3		2		5		5
	2	1	1	Identify characteristics for plant and animal survival in different environments (e.g., wetland, tundra, desert, prairie, deep ocean, forest).															
	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	2	1		2	2	4		1	1	1		2	1	3
	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
Total For Assessment Anchor B.2 Continuity of Life					2	2	1		3	2	5		2	1	1		3	1	4

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B: Biological Sciences	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).															
	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		1		1				1		1	
	3	2	1	Describe what happens to a living thing when its habitat is changed.	2			2		2		2				2		2	
	3	2	2	Describe and predict how changes in the environment (e.g., fire, pollution, flood, building dams) can affect systems.			1		1		1			1		1		1	
	3	2	3	Explain and predict how changes in seasons affect plants, animals, or daily human life (e.g., food availability, shelter, mobility).	1				1		1		1			1		1	
	3	3	1	Identify everyday human activities (e.g., driving, washing, eating, manufacturing, farming) within a community that depend on the natural environment.															
	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		2		2		1		1		2		2
	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).	1				1		1		1			1		1	
	3	3	5	Describe the effects of pollution (e.g., litter) in the community.	1		1		2		2		1		1		2		2
Total For Assessment Anchor B.3 Ecological Behavior and Systems					7		3		10		10		7		3		10		10
Total For Reporting Category B					12	2	6		18	2	20		12	1	6		18	1	19

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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.															
	1	1	2	Categorize/group objects using physical characteristics.			1		1			1			1				1
	Total For Assessment Anchor C.1 Structures, Properties, and Interaction of Matter and Energy						1		1			1			1				1
	2	1	1	Identify energy forms, energy transfer, and energy examples (e.g., light, heat, electrical).	2	2			2	2	4	2	1			2	1		3
	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).			1		1		1			1		1			1
	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.	2				2		2	2			2				2
	2	1	4	Identify characteristics of sound (e.g., pitch, loudness, reflection).	1		2		3		3	1		2		3			3
	Total For Assessment Anchor C.2 Forms, Sources, Conversions, and Transfer of Energy				5	2	3		8	2	10	5	1	3		8	1		9
	3	1	1	Describe changes in motion caused by forces (e.g., magnetic, pushes or pulls, gravity, friction).															
	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				2		2	2			2				2
	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			1				1
	Total For Assessment Anchor C.3 Principles of Motion and Force				3				3		3	3			3				3
	Total For Reporting Category C				8	2	4		12	2	14	8	1	4		12	1		13

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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	MC	OE	MC	OE	MC	OE	Total	
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		1		1				1		1
	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).	1				1		1		1				1		1
	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		2		3		3		1		2		3		3
	1	3	1	Describe types of freshwater and saltwater bodies (e.g., lakes, rivers, wetlands, oceans).															
	1	3	2	Explain how water goes through phase changes (i.e., evaporation, condensation, freezing, and melting).	1	2			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					6	2	2		8	2	10		6	1	2		8	1	9

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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.	1		1		2		2		1		1		2				2
Total For Assessment Anchor D.2 Weather, Climate, and Atmospheric Processes				2		1		3		3		2		1		3				3
3	1	1	Describe motions of the Sun - Earth - Moon system.	1			1		1		1				1					1
3	1	2	Explain how the motion of the Sun - Earth - Moon system relates to time (e.g., days, months, years).																	
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				1			1		1		1				1					1
Total For Reporting Category D				9	2	3		12	2	14		9	1	3		12	1			13

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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	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	2	Explain how certain questions can be answered through scientific inquiry and/or technological design.	1				1			1				1			1	
	1	1	3	Use evidence, such as observations or experimental results, to support inferences about a relationship.			1		1			1			1				1	
	1	1	4	Develop descriptions, explanations, predictions, and models using evidence.	2		1		3			3	2		1			3		3
	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).	1		2		3			3	1		2			3		3
	1	2	2	Identify environmental issues and explain their potential long-term health effects (e.g., pollution, pest controls, vaccinations).			1		1			1			1			1		1
	1	2	3	Describe fundamental scientific or technological concepts that could solve practical problems (e.g., Newton's laws of motion, Mendelian genetics).	2				2			2	2					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).			2					2	2		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				2		2	2				2		2	
	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.		2				2	2		1					1	1
	Total For Assessment Anchor A.1 Reasoning and Analysis				10	4	6		16	4	20	10	2	6		16	2	18	
	2	1	1	Use evidence, observations, or a variety of scales (e.g., mass, distance, volume, temperature) to describe relationships.	1				1		1	1				1		1	
	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.	1				1		1	1				1		1	
	2	1	4	Interpret data/observations; develop relationships among variables based on data/observations to design models as solutions.	2				2		2	2				2		2	
	2	1	5	Use evidence from investigations to clearly communicate and support conclusions.	2				2		2	2				2		2	
	2	1	6	Identify a design flaw in a simple technological system and devise possible working solutions.	1				1		1	1				1		1	
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		1		3		3	2		1		3		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.	1				1			1				1		1
2	2	3	Describe ways technology (e.g., microscope, telescope, micrometer, hydraulics, barometer) extends and enhances human abilities for specific purposes.	1		1		2		2	1		1		2		2
Total For Assessment Anchor A.2 Processes, Procedures, and Tools of Scientific Investigations				11		2		13		13	11		2		13		13
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.	2				2		2	2				2		2
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).														
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).	1				1		1	1				1		1
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).	1				1		1	1				1		1
Total For Assessment Anchor A.3 Systems, Models, and Patterns				9				9		9	9				9		9
Total For Reporting Category A				30	4	8		38	4	42	30	2	8		38	2	40

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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	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	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	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.	1				1		1							1		1
Total For Assessment Anchor B.1 Structures and Functions of Organisms					3				3		3							3		3
	2	1	1	Explain how inherited structures or behaviors help organisms survive and reproduce in different environments.			1		1		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				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: Biological Sciences	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	
	Total For Assessment Anchor B.2 Continuity of Life				3		3		6		6	3		3		6	6	
	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)														
	3	1	3	Explain relationships among organisms (e.g., producers/consumers, predator/prey) in an ecosystem.	1		2		1		2		3	1		1		2
	3	2	1	Use evidence to explain factors that affect changes in populations (e.g., deforestation, disease, land use, natural disaster, invasive species).														
	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).	1				1		1		1			1		1
3	3	3	Describe how waste management affects the environment (e.g., recycling, composting, landfills, incineration, sewage treatment).	1				1		1		1			1		1	

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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				3	2			3	2	5	3	1			3	1	4
Total For Reporting Category B				9	2	3		12	2	14	9	1	3		12	1	13

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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	2	Use characteristic physical or chemical properties to distinguish one substance from another (e.g., density, thermal expansion/contraction, freezing/melting points, streak test).	1		1		2		2		1		1		2	2	
	1	1	3	Identify and describe reactants and products of simple chemical reactions.	2				2		2		2				2	2	
	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).	1				1		1		1				1	1	
	2	1	2	Explain how energy is transferred from one place to another through convection, conduction, or radiation.	1		1		2		2		1		1		2	2	
	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.															
	2	2	1	Describe the Sun as the major source of energy that impacts the environment.	1		1		2		2		1		1		2	2	
	2	2	2	Compare the time span of renewability for fossil fuels and the time span of renewability for alternative fuels.	1		1		2		2		1		1		2	2	
	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.	1		1		2		2		1		1		2	2	
	Total For Assessment Anchor C.2 Forms, Sources, Conversions, and Transer of Energy					5		4		9		9		5		4		9	9
	3	1	1	Describe forces acting on objects (e.g., friction, gravity, balanced versus unbalanced).	1				1		1		1				1	1	
	3	1	2	Distinguish between kinetic and potential energy.															

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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		1				1		1
Total For Assessment Anchor C.3 Principles of Motion and Force				2				2		2				2		2
Total For Reporting Category C				11		5		16		16		11		5		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)				
											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	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	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	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		2			2		1		1		2	2

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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		1	1				1		1
	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.	1	2			1	2	3	1	1			1	1	2
	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
	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)														
	Total For Assessment Anchor D.1 Earth Features and Processes that Change Earth and its Resources				6	2	1		7	2	9	6	1	1		7	1	8
	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.			1		1		1			1		1		1
	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						1		1		1			1		1		1
	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.														
3	1	2	Describe the role of gravity as the force that governs the movement of the solar system and universe.	1				1		1	1				1		1	

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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).	1	2	1		2	2	4	1	1	1		2	1	3
Total For Assessment Anchor D.3 Composition and Structure of the Universe				2	2	1		3	2	5	2	1	1		3	1	4
Total For Reporting Category D				8	4	2		10	4	14	8	2	2		10	2	12

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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	MC	OE	MC	OE	MC	OE	Total	
	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		1		1				1		1
	1	1	2	Analyze and explain the accuracy of scientific facts, principles, theories, and laws.	2		2		4		4		2		2		4		4
	1	1	3	Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).	2		1		1	2	3		1	1			1	1	2
	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).	2				2		2		1				1		1
	1	2	1	Explain and apply scientific concepts to societal issues using case studies (e.g., spread of HIV, deforestation, environmental health, energy).	1		1		2		2		1		1		2		2
	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	3	1	Use appropriate quantitative data to describe or interpret change in systems (e.g., biological indices, electrical circuit data, automobile diagnostic systems data).	2				2		2		2				2		2

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A: Nature of Science	1	3	2	Describe or interpret dynamic changes to stable systems (e.g., chemical reactions, human body, food webs, tectonics, homeostasis)	1				1	1	1				1	1		
	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		1	1			1		1	1		
	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	6		13	4	17	7	2	6		13	2	15
	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.		6				6	6		2			2	2	
	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.														
	2	1	3	Use data to make inferences and predictions, or to draw conclusions, demonstrating understanding of experimental limits.	1				1		1	1				1	1	
	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.	2				2		2	2				2	2	
	2	2	1	Evaluate appropriate methods, instruments, and scale for precise quantitative and qualitative observations (e.g., to compare properties of materials, water quality)	2		1		3		3	2		1		3	3	
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.	5				5		5	5				5	5		

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Total For Assessment Anchor A.2 Processes, Procedures, and Tools of Scientific Investigations				10	6	1		11	6	17	10	2	1		11	2	13
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.	1				1		1	1				1		1
3	1	2	Analyze and predict the effect of making a change in one part of a system on the system as a whole.	1				1		1	1				1		1
3	1	3	Use appropriate quantitative data to describe or interpret a system (e.g., biological indices, electrical circuit data, automobile diagnostic systems data).				1	1		1			1		1		1
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.		2				2	2		1				1	1
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).														
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
3	3	2	Compare stationary physical patterns (e.g., crystals, layers of rocks, skeletal systems, tree rings, atomic structure) to the object's properties.														
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).	2				2		2	2				2		2

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Total For Assessment Anchor A.3 Systems, Models, and Patterns	7	2	1		8	2	10	7	1	1		8	1	9
Total For Reporting Category A	24	12	8		32	12	44	24	5	8		32	5	37

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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.																
3	1	3	Describe how living organisms affect the survival of one another.																
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.																
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).																
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.																
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).																
Total For Assessment Anchor B.3 Ecological Behavior and Systems																			
Total For Reporting Category B				4				4	4		1					1	1		

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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).																
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.																
Total For Assessment Anchor C.2 Forms, Sources, Conversions, and Transfer of Energy				4				4	4		1						1	1	
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.																
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).																
3	1	4	Explain how electricity induces magnetism and how magnetism induces electricity as two aspects of a single electromagnetic force.																
3	1	5	Calculate the mechanical advantage for moving an object by using a simple machine.																
3	1	6	Identify elements of simple machines in compound machines.																
Total For Assessment Anchor C.3 Principles of Motion and Force																			
Total For Reporting Category C				4				4	4		1						1	1	

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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	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.	1				1		1		1				1		1
	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		1		3		3		2		1		3		3
	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	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				1		1		1				1		1
	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	
	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.														
	Total For Assessment Anchor D.1 Earth Features and Processes that Change Earth and its Resources				6		1		7		7		6		1		7	7
	2	1	1	Describe how changes in concentration of minor components (e.g., O ₂ , CO ₂ , dust, pollution) in Earth's atmosphere may be linked to climate change.	2	4			2	4	6	2	1			2	1	3
	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).														
	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.														
	Total For Assessment Anchor D.2 Weather, Climate, and Atmospheric Processes				2	4			2	4	6	2	1			2	1	3
	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.	2				2		2	2				2		2
	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				2				2		2	2				2		2
	Total For Reporting Category D				10	4	1		11	4	15	10	1	1		11	1	12

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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																
	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 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: Revising and Editing	5			Editing	8				8		8		8				8		8
	Total For Assessment Anchor B.5 A.S. 1.5 -- Quality of Writing				8				8		8		8				8		8
	6			Revising	4	8		8	4	16	20	4	2		2	4	4	8	
	Total For Assessment Anchor B.6 A.S. 1.5 -- Quality of Writing				4	8		8	4	16	20	4	2		2	4	4	8	
	Total For Reporting Category B				12	8		8	12	16	28	12	2		2	12	4	16	

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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	MC	OE	
A: Composition	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	

Appendix C: 2011 PSSA Tally Sheets

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	MC	OE	MC	OE	MC	OE	Total		
B: Revising and Edit	5			Editing	7				7		7		7				7		7	
	Total For Assessment Anchor B.5 A.S. 1.5 -- Quality of Writing				7				7		7		7					7		7
	6			Revising	5	8		8	5	16	21	5	2		2		5	4	9	
	Total For Assessment Anchor B.6 A.S. 1.5 -- Quality of Writing				5	8		8	5	16	21	5	2		2		5	4	9	
	Total For Reporting Category B				12	8		8	12	16	28	12	2		2		12	4	16	

Appendix C: 2011 PSSA Tally Sheets

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)					
					MC	OE	MC	OE	MC	OE	Total	Core		EB		Total				
												MC	OE	MC	OE	MC	OE	MC	OE	
A: Composition	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		

Appendix C: 2011 PSSA Tally Sheets

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: Revising and Editing	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	8		8	5	16	21	5	2		2	5	4	9
	Total For Assessment Anchor B.6 A.S. 1.5 -- Quality of Writing				5	8		8	5	16	21	5	2		2	5	4	9
	Total For Reporting Category B				12	8		8	12	16	28	12	2		2	12	4	16

Appendix D:
Item and Test Development Process

Item and Test Development Process for the PSSA

Step	Description
1. Review Guiding Documentation	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.
2. Meet with PDE to Confirm Understanding of Program	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).
3. Create Preliminary Test Item Development Plan	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.
4. Meet with PDE to Finalize Test Item Development Plan	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.
5. Analyze Item Bank	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.
6. Refine Test Item Development Plan to Include Writers and Subcontractors	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.
7. Train Item Writers	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
8. Write and Review Items	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.
9. Enter Test Items into Database	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.
10. Prepare Item Set for Sample Item Review by PDE	Item and test development specialists prepare a subset of the items for review by PDE.
11. PDE Conducts Sample Item Review	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.
12. Continue to Write and Review Items	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).
13. Review Items Prior to Test Item Review and Validation Sessions	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.
14. Prepare for Test Item Review Sessions (the New Item Content Review and the Bias, Fairness, and Sensitivity Review)	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
15. Conduct Test Item Review Sessions (the New Item Content Review and the Bias, Fairness, and Sensitivity Review)	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.
16. Conduct Item Review Resolution and Cleanup	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.
17. Submit Field Test Items for Final Sign-Off	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 step 22.</i></p> <p><i>OR</i></p> <p><i>To follow the chronological test development path, continue with step 18.</i></p>	

Item and Test Development Process for the PSSA

Step	Description
18. Review Results of the Field Test	<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>
19. Prepare for Field Test Item Data Review	<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>
20. Conduct Field Test Item Data Review	<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>
21. Conduct Field Test Item Data Review Reconciliation	<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>
22. Select Items to Fill Core, Field Test, and Equating Block Positions in Core and Field Test Forms	<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
23. Review Core and Equating Block Selections	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.
24. Construct Test Forms	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, IDEAS</i> . Forms are reviewed internally for style and formatting requirements.
25. Review Typeset Forms	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.
26. Print Test Forms	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.
27. Assemble Documentation of Test Materials	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 step 18.</i>	

Note: As discussed in Chapter Three, 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>PA - Item Card</p>
<p>1. Some students worked together on a group project. Matt has done $\frac{2}{8}$ of the project, Brady has done $\frac{3}{8}$ of the project, and Nathan has done $\frac{1}{2}$ 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>_____</p>
<p>B. Using decimals, indicate how much of the project is still not done. Show all your work.</p>	<p>Content Area</p>
<p>Data Recognition Corporation</p>	<p>Mathematics</p>
<p>09/25/09 Page 1</p>	<p>Passage ID</p>
<p></p>	<p>_____</p>
<p></p>	<p>Passage Title</p>
<p></p>	<p>_____</p>
<p></p>	<p>Grade</p>
<p></p>	<p>_____</p>
<p></p>	<p>AACS Standards</p>
<p></p>	<p>A.1</p>
<p></p>	<p>Item Type</p>
<p></p>	<p>Open Ended</p>
<p></p>	<p>Points</p>
<p></p>	<p>4</p>
<p></p>	<p>Depth of Knowledge</p>
<p></p>	<p>_____</p>
<p></p>	<p>Est Difficulty</p>
<p></p>	<p>_____</p>
<p></p>	<p>Calculator</p>
<p></p>	<p>C</p>
<p></p>	<p>Focus</p>
<p></p>	<p>_____</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	Bias 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 Item Review Criteria Guidelines

Reviewer Signature: _____

Item Rating Sheet

Content Area: _____ Grade: _____

Unique ID number	Content Alignment	Rigor Level Alignment				Technical Design			Universal Design		STATUS
	Standards	Grade	Difficulty	Depth of Knowledge	Source of Challenge	Correct Answer	Distractors	Graphics	Language Demand	Bias	Acceptance Status
	—Higher —Lower —None	—Above —At —Below	—Hard —Medium —Easy	—Recall —Application —Strategic Thinking	—Yes —No	—Yes —No	—Yes —No	—Yes —No	—Yes —No	—Yes —No	—Yes —No

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.

Content Alignment		Options
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 content is aligned (e.g., do the eligible content and the item both deal with fractions) and whether the required performance is aligned (e.g., if the eligible content calls for a comparison to be made, is this reflected in the item).	HIGHER —Aligns to the higher level of the EC LOWER —Aligns to the lower level of the EC NONE —No alignment with EC

Rigor Level Alignment		Options
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?	ABOVE Grade Level AT Grade Level BELOW 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?	HARD MEDIUM EASY
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"> 1. Recall – Recall of a fact, information, or procedure. 2. Basic Application of Skill or Concept – Use of information, conceptual knowledge, procedures, two or more steps, etc. 3. Strategic Thinking – Requires reasoning, developing a plan or sequence of steps; has some complexity; more than one possible answer. 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.) 	4 = Extended Thinking 3 = Strategic Thinking 2 = Basic Application 1 = Recall

Appendix F: Item Rating Sheet and Item Review Criteria Guidelines

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).	Y = Yes N = No
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Technical Design		Options
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

Universal Design		Options
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</i> (separate from this meeting) <i>will be completed for all items.</i>	Y = Yes N = No

Status		Options
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.	— Approved as is — Accepted with suggested revisions — Dissenting View

Appendix F: Item Rating Sheet and Item Review Criteria Guidelines

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:
2011 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)
Total	72 points

Reading Core

Core/common MC items	40 (16 core linking)
4 core 3 pt OE items	12 (6 core linking)
Total	52 points

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	23–common (core) items (includes 4 non–calc) 1–non–calc field test item	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	13–common (core) items 2–equating block items 9–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 5 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)
Total	72 points

Reading Core

Core/common MC items	40 (16 core linking)
2 core 3 pt OE items	6 (3 core linking)
Total	46 points

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
- There are 12 forms 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: 2011 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)
Total	68 points

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: 2011 Test Book Section Layout Plans

Science: Grade 11

Core/common MC items	50 (16 core linking)
6 core 2 pt Stand-alone 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

Writing Book Section Layout

General Information

- There are 6 forms per grade.
- All grades will have one consumable writing booklet.
- Writing assessments fall within two categories:
 - Composition – Academic Standard 1.4, Types of Writing
 - Revising and Editing – Academic Standard 1.5, Quality of Writing

Writing: All Grades

Core/common MC items	12 (weighted x1)
2 core 4 pt (Mode) WP items	80 (weighted x10)
2 core 4 pt (Conv.) WP items	8 (weighted x1)
Total	100 points

Section	Contents	Core Points Distribution by Academic Standards	Core/FT Item Breakdown	Testing Time
1	20 Multiple-choice	12 points within 1.5.E & 1.5.F	12-common (core) MC items 8-embedded field test MC items	45–55
2	1 Writing Prompt	8 points within 1.5.E & 1.5.F 80 points within 1.4.A, 1.4.B, & 1.4.C	2-common (core) WP items 1-embedded field test WP item	55–65
3	1 Writing Prompt			55–65
4	1 Writing Prompt			55–65

Appendix H:
Mean Raw Scores by Form

Column Heading	Definition
Form	Form
N	N students
L	Length
Pts	Points possible
Min	Minimum
Max	Maximum
Mean	Mean
Med	Median
<i>SD</i>	Standard deviation

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	124749	63	72	4	72	59.4	63.0	10.81	Mathematics 4	0	125604	63	72	3	72	48.9	51.0	13.25
	1	25117	63	72	8	72	59.3	63.0	11.00		1	25313	63	72	6	72	48.7	51.0	13.35
	2	24929	63	72	4	72	59.5	63.0	10.68		2	25052	63	72	3	72	49.0	51.0	13.20
	3	24999	63	72	6	72	59.6	63.0	10.80		3	25070	63	72	4	72	49.0	51.0	13.21
	4	24948	63	72	6	72	59.5	63.0	10.79		4	25077	63	72	7	72	49.0	51.0	13.27
5	24756	63	72	7	72	59.4	63.0	10.79	5	25092	63	72	7	72	49.0	51.0	13.22		
Mathematics 5	0	126578	63	72	6	72	47.5	49.0	13.17	Mathematics 6	0	126630	63	72	3	72	49.3	52.0	13.92
	1	25553	63	72	7	72	47.3	49.0	13.35		1	25560	63	72	7	72	49.1	52.0	14.09
	2	25298	63	72	7	72	47.5	49.0	13.17		2	25261	63	72	8	72	49.3	52.0	13.92
	3	25265	63	72	6	72	47.6	49.0	13.10		3	25275	63	72	3	72	49.4	52.0	13.84
	4	25252	63	72	8	72	47.5	49.0	13.16		4	25286	63	72	6	72	49.4	52.0	13.88
5	25210	63	72	9	72	47.8	49.0	13.08	5	25248	63	72	6	72	49.5	52.0	13.87		
Mathematics 7	0	126993	63	72	5	72	47.8	50.0	14.13	Mathematics 8	0	126786	63	72	4	72	49.2	52.0	14.17
	1	25657	63	72	7	72	47.6	50.0	14.31		1	25673	63	72	4	72	48.9	51.0	14.33
	2	25275	63	72	5	72	47.9	50.0	14.06		2	25312	63	72	7	72	49.3	52.0	14.12
	3	25391	63	72	5	72	47.9	50.0	14.16		3	25260	63	72	5	72	49.3	52.0	14.14
	4	25355	63	72	5	72	47.8	50.0	14.04		4	25250	63	72	6	72	49.2	52.0	14.23
5	25315	63	72	7	72	47.9	50.0	14.10	5	25291	63	72	7	72	49.4	52.0	14.01		
Mathematics 11	0	127797	63	72	1	72	48.0	50.0	14.56										
	1	25854	63	72	7	72	47.9	50.0	14.68										
	2	25516	63	72	6	72	48.0	50.0	14.57										
	3	25431	63	72	1	72	48.1	50.0	14.44										
	4	25530	63	72	9	72	48.0	50.0	14.58										
5	25466	63	72	6	72	48.1	50.0	14.52											

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	124678	42	46	3	46	31.1	33.0	8.87	Reading 4	0	124535	44	52	2	52	35.4	37.0	9.26
	1	25104	42	46	3	46	30.9	33.0	8.98		1	25050	44	52	2	52	35.2	37.0	9.45
	2	24918	42	46	4	46	31.1	33.0	8.81		2	24835	44	52	3	52	35.5	37.0	9.20
	3	24987	42	46	3	46	31.1	33.0	8.83		3	24870	44	52	4	52	35.5	37.0	9.22
	4	24928	42	46	3	46	31.2	33.0	8.86		4	24894	44	52	3	52	35.5	37.0	9.23
5	24741	42	46	3	46	31.2	33.0	8.86	5	24886	44	52	4	52	35.4	37.0	9.20		
Reading 5	0	125963	44	52	2	52	35.7	37.0	8.53	Reading 6	0	126170	44	52	0	52	36.2	38.0	9.27
	1	25418	44	52	3	52	35.5	37.0	8.68		1	25433	44	52	2	52	36.0	38.0	9.44
	2	25137	44	52	4	52	35.8	37.0	8.49		2	25167	44	52	4	52	36.2	38.0	9.27
	3	25164	44	52	3	52	35.7	37.0	8.52		3	25183	44	52	1	52	36.3	38.0	9.21
	4	25115	44	52	4	52	35.7	37.0	8.53		4	25222	44	52	2	52	36.3	38.0	9.25
5	25129	44	52	2	52	35.9	38.0	8.44	5	25165	44	52	0	52	36.3	38.0	9.19		
Reading 7	0	126902	44	52	2	52	34.4	36.0	9.02	Reading 8	0	127125	44	52	3	52	35.6	37.0	8.93
	1	25614	44	52	4	52	34.3	36.0	9.12		1	25738	44	52	3	52	35.4	37.0	9.03
	2	25257	44	52	3	52	34.5	36.0	8.97		2	25365	44	52	4	52	35.6	37.0	8.92
	3	25371	44	52	4	52	34.4	36.0	9.00		3	25331	44	52	3	52	35.7	37.0	8.84
	4	25355	44	52	4	52	34.5	36.0	8.98		4	25330	44	52	3	52	35.6	37.0	8.93
5	25305	44	52	2	52	34.4	36.0	9.01	5	25361	44	52	3	52	35.7	37.0	8.92		
Reading 11	0	127997	44	52	0	52	35.9	38.0	9.10										
	1	25880	44	52	4	52	35.8	38.0	9.18										
	2	25586	44	52	2	52	35.8	37.0	9.07										
	3	25486	44	52	0	52	35.9	37.0	9.05										
	4	25543	44	52	3	52	36.0	38.0	9.09										
5	25502	44	52	4	52	36.0	38.0	9.12											

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		
Science 4	0	128103	63	68	5	68	48.5	51.0	11.88	Science 8	0	127075	63	68	0	68	42.1	44.0	13.62		
	1	10955	63	68	9	68	47.9	51.0	12.24		1	10928	63	68	6	68	41.6	44.0	13.90		
	2	10653	63	68	7	68	48.6	51.0	11.89		2	10554	63	68	6	68	42.1	44.0	13.57		
	3	10661	63	68	7	68	48.5	51.0	11.90		3	10561	63	68	6	68	42.2	45.0	13.60		
	4	10648	63	68	9	68	48.4	51.0	11.90		4	10588	63	68	4	68	42.2	44.0	13.64		
	5	10655	63	68	9	68	48.6	51.0	11.90		5	10569	63	68	7	68	42.0	44.0	13.58		
	6	10668	63	68	5	68	48.6	51.0	11.66		6	10577	63	68	8	68	42.0	44.0	13.67		
	7	10658	63	68	11	68	48.7	51.0	11.77		7	10576	63	68	4	68	42.1	44.0	13.52		
	8	10623	63	68	10	68	48.4	51.0	11.77		8	10552	63	68	0	68	42.0	44.0	13.65		
	9	10657	63	68	6	68	48.6	51.0	11.79		9	10546	63	68	5	68	42.2	44.0	13.48		
	10	10665	63	68	6	68	48.6	51.0	11.94		10	10554	63	68	7	68	42.2	44.0	13.70		
	11	10615	63	68	11	68	48.4	51.0	11.87		11	10541	63	68	7	68	42.3	44.0	13.56		
12	10645	63	68	9	68	48.6	51.0	11.85	12	10529	63	68	6	68	42.4	45.0	13.50				
Science 11	0	125307	59	74	0	73	39.7	41.0	13.94												
	1	15924	59	74	5	73	39.5	40.0	14.07												
	2	15648	59	74	4	72	39.8	41.0	13.90												
	3	15751	59	74	5	73	39.7	41.0	13.87												
	4	15666	59	74	4	72	39.7	41.0	13.94												
	5	15674	59	74	5	71	39.9	41.0	13.89												
	6	15581	59	74	0	72	39.8	41.0	13.95												
	7	15653	59	74	6	72	39.8	41.0	13.88												
	8	15410	59	74	5	72	39.6	41.0	13.99												

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		
Writing 5	0	128833	16	100	22	100	65.8	66.0	14.57	Writing 8	0	129619	16	100	22	100	67.1	71.0	14.22		
	1	21589	16	100	22	100	65.8	66.0	14.54		1	21702	16	100	22	100	66.9	71.0	14.31		
	2	21444	16	100	22	100	65.9	66.0	14.50		2	21640	16	100	22	100	67.0	71.0	14.20		
	3	21510	16	100	22	100	65.7	66.0	14.70		3	21660	16	100	22	100	67.1	71.0	14.20		
	4	21526	16	100	22	100	65.7	66.0	14.64		4	21590	16	100	23	100	67.1	72.0	14.17		
	5	21567	16	100	22	100	65.8	66.0	14.58		5	21521	16	100	22	100	67.3	72.0	14.24		
	6	21197	16	100	22	100	66.0	66.0	14.47		6	21506	16	100	23	100	67.2	72.0	14.20		
Writing 11	0	128775	16	100	22	100	71.4	75.0	14.76												
	1	21540	16	100	22	100	71.1	75.0	14.81												
	2	21492	16	100	22	100	71.4	75.0	14.72												
	3	21616	16	100	22	100	71.4	75.0	14.76												
	4	21482	16	100	22	100	71.4	75.0	14.71												
	5	21405	16	100	22	100	71.6	75.0	14.87												
	6	21240	16	100	22	100	71.7	75.0	14.70												

Appendix I:

Item Statistics

Column Heading	Definition
PubID	Public ID
Form	Form
Std	Standard
DOK	Depth of knowledge
N	N
PVal	P-Value
P()	Proportion selecting given response (-=blank)
PtBis	Point biserial
PT()	Point biserial of repsonse
Meas	Rasch item measure
MeasSE	Rasch item measure standard error
t	t fit statistic
MS	Mean square fit statistic
M/F	Male/female DIF statistic
W/B	White/black DIF statistic

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	21	0	A.1.3.1	2	124752	0.92	0.01	0.02	0.92	0.05	0.00	0.47	-0.33	-0.33	0.47	-0.33	-0.1902	0.0114	-9.9	0.9	-9.9	0.7		
Math	3	105	0	A.1.1.3	1	124752	0.92	0.03	0.02	0.03	0.92	0.00	0.41	-0.26	-0.25	-0.30	0.41	-0.2309	0.0115	-4.4	1.0	-9.1	0.8		
Math	3	323	0	A.1.3.2	2	124752	0.84	0.05	0.07	0.84	0.04	0.00	0.51	-0.37	-0.43	0.51	-0.32	0.8205	0.0086	-9.9	0.9	-9.9	0.8		
Math	3	414	0	A.1.1.2	2	124752	0.75	0.08	0.75	0.14	0.03	0.00	0.48	-0.47	0.48	-0.35	-0.35	1.5425	0.0074	-9.9	1.0	-9.9	0.9		
Math	3	637	0	B.1.1.1	1	124752	0.89	0.06	0.03	0.89	0.03	0.00	0.46	-0.29	-0.35	0.46	-0.36	0.2841	0.0099	-9.3	0.9	-9.9	0.8		
Math	3	761	0	A.3.2.1	2	124752	0.70	0.13	0.70	0.12	0.04	0.00	0.48	-0.46	0.48	-0.33	-0.46	1.8262	0.0071	-9.9	1.0	-9.9	0.9		
Math	3	1020	0	B.2.2.1	2	124752	0.84	0.84	0.04	0.04	0.07	0.00	0.34	0.34	-0.28	-0.21	-0.22	0.7894	0.0086	9.9	1.1	9.9	1.1		
Math	3	1363	0	C.2.1.2	1	124752	0.88	0.03	0.02	0.06	0.88	0.00	0.44	-0.30	-0.22	-0.36	0.44	0.3428	0.0097	-3.7	1.0	-9.9	0.9		
Math	3	1604	0	C.1.1.2	1	124752	0.94	0.01	0.05	0.94	0.00	0.00	0.35	-0.21	-0.29	0.35	-0.17	-0.5442	0.0128	0.3	1.0	-3.7	0.9		
Math	3	1859	0	E.1.1.2	2	124752	0.96	0.00	0.01	0.96	0.02	0.00	0.36	-0.12	-0.21	0.36	-0.31	-1.1203	0.0158	-6.9	0.9	-5.6	0.8		
Math	3	1879	0	A.2.1.2	2	124752	0.83	0.05	0.07	0.83	0.04	0.00	0.43	-0.26	-0.33	0.43	-0.34	0.8666	0.0085	3.7	1.0	-9.4	0.9		
Math	3	1890	0	A.2.1.3	2	124752	0.68	0.03	0.01	0.28	0.68	0.00	0.40	-0.47	-0.39	-0.33	0.40	2.0046	0.0069	9.9	1.1	9.9	1.1		
Math	3	2184	0	A.3.1.1	1	124752	0.94	0.01	0.04	0.94	0.01	0.00	0.34	-0.19	-0.25	0.34	-0.24	-0.4975	0.0126	-0.9	1.0	7.8	1.2		
Math	3	2197	0	C.1.1.1	1	124752	0.85	0.11	0.85	0.04	0.00	0.00	0.30	-0.25	0.30	-0.21	-0.07	0.7127	0.0088	9.9	1.2	9.9	1.2		
Math	3	2227	0	A.1.1.5	1	124752	0.93	0.05	0.00	0.93	0.01	0.00	0.31	-0.20	-0.16	0.31	-0.32	-0.4350	0.0123	2.6	1.0	9.9	1.6		
Math	3	2494	0	A.3.1.2	2	124752	0.89	0.08	0.89	0.01	0.01	0.00	0.55	-0.51	0.55	-0.23	-0.30	0.2367	0.0100	-9.9	0.9	-9.9	0.6		
Math	3	2894	0	A.1.3.1	1	124752	0.92	0.03	0.02	0.92	0.02	0.00	0.50	-0.40	-0.28	0.50	-0.32	-0.2340	0.0115	-9.9	0.9	-9.9	0.6		
Math	3	3126	0	A.1.3.1	1	124752	0.89	0.04	0.04	0.89	0.03	0.00	0.44	-0.33	-0.30	0.44	-0.28	0.2469	0.0100	-5.4	1.0	-1.8	1.0		
Math	3	3181	0	B.2.1.1	1	124752	0.87	0.03	0.87	0.03	0.07	0.00	0.41	-0.23	0.41	-0.29	-0.33	0.5108	0.0093	3.4	1.0	0.6	1.0		
Math	3	3252	0	E.1.2.1	2	124752	0.88	0.88	0.03	0.04	0.06	0.00	0.44	0.44	-0.21	-0.33	-0.35	0.4113	0.0095	-3.1	1.0	-9.9	0.8		
Math	3	3294	0	D.2.2.1	1	124752	0.83	0.83	0.11	0.02	0.03	0.00	0.46	0.46	-0.35	-0.34	-0.35	0.8707	0.0085	-3.8	1.0	-9.9	0.9		
Math	3	3404	0	D.2.2.2	1	124752	0.73	0.05	0.19	0.03	0.73	0.00	0.49	-0.32	-0.47	-0.25	0.49	1.6714	0.0072	-9.9	1.0	-9.9	0.9		
Math	3	3564	0	A.2.1.1	1	124752	0.86	0.01	0.06	0.86	0.08	0.00	0.52	-0.28	-0.31	0.52	-0.49	0.6143	0.0090	-9.9	0.9	-9.9	0.7		
Math	3	3568	0	E.1.2.1	2	124752	0.95	0.01	0.01	0.02	0.95	0.00	0.42	-0.30	-0.29	-0.24	0.42	-0.8677	0.0144	-9.9	0.9	-9.9	0.7		
Math	3	3901	0	A.1.2.1	1	124752	0.86	0.86	0.03	0.08	0.02	0.00	0.40	0.40	-0.22	-0.32	-0.30	0.5350	0.0092	5.3	1.0	0.1	1.0		
Math	3	3945	0	E.1.1.1	2	124752	0.96	0.01	0.96	0.03	0.01	0.00	0.31	-0.20	0.31	-0.21	-0.20	-0.9260	0.0147	-1.8	1.0	9.3	1.3		
Math	3	4050	0	A.3.1.1	1	124752	0.86	0.86	0.08	0.04	0.02	0.00	0.41	0.41	-0.34	-0.22	-0.35	0.5890	0.0091	2.9	1.0	0.5	1.0		
Math	3	4379	0	E.1.2.1	2	124752	0.90	0.04	0.02	0.03	0.90	0.00	0.46	-0.40	-0.30	-0.23	0.46	0.0519	0.0106	-9.9	0.9	-8.9	0.9		
Math	3	4690	0	E.1.2.2	2	124752	0.89	0.03	0.04	0.04	0.89	0.00	0.47	-0.20	-0.35	-0.41	0.47	0.2599	0.0099	-9.9	0.9	-9.9	0.8		
Math	3	4752	0	D.1.1.1	2	124752	0.90	0.03	0.02	0.04	0.90	0.00	0.39	-0.27	-0.25	-0.26	0.39	0.0434	0.0106	2.1	1.0	-7.9	0.9		
Math	3	4982	0	A.1.3.3	2	124752	0.65	0.05	0.65	0.11	0.18	0.00	0.52	-0.33	0.52	-0.48	-0.50	2.1522	0.0068	-9.9	0.9	-9.9	0.8		
Math	3	5676	0	A.2.1.1	1	124752	0.89	0.04	0.03	0.04	0.89	0.00	0.49	-0.47	-0.25	-0.29	0.49	0.2455	0.0100	-9.9	0.9	-9.9	0.8		
Math	3	5691	0	A.1.1.5	1	124752	0.92	0.01	0.05	0.92	0.02	0.00	0.46	-0.19	-0.42	0.46	-0.24	-0.2566	0.0116	-9.9	0.9	-9.9	0.7		
Math	3	5983	0	B.1.1.3	2	124752	0.86	0.09	0.02	0.86	0.03	0.00	0.37	-0.29	-0.26	0.37	-0.23	0.5676	0.0091	9.9	1.1	4.1	1.1		
Math	3	6086	0	B.2.1.1	1	124752	0.69	0.02	0.69	0.04	0.25	0.00	0.23	-0.25	0.23	-0.27	-0.15	1.9072	0.0070	9.9	1.3	9.9	1.5		
Math	3	6087	0	E.1.1.2	2	124752	0.88	0.04	0.88	0.01	0.07	0.00	0.56	-0.27	0.56	-0.26	-0.57	0.3833	0.0096	-9.9	0.8	-9.9	0.7		
Math	3	6186	0	C.1.1.1	1	124752	0.88	0.88	0.08	0.04	0.00	0.00	0.22	0.22	-0.21	-0.10	-0.11	0.3544	0.0097	9.9	1.2	9.9	1.4		
Math	3	6207	0	D.2.1.1	2	124752	0.88	0.03	0.07	0.88	0.02	0.00	0.51	-0.39	-0.36	0.51	-0.35	0.3780	0.0096	-9.9	0.9	-9.9	0.7		
Math	3	6208	0	C.1.1.2	1	124752	0.91	0.04	0.03	0.02	0.91	0.00	0.31	-0.23	-0.15	-0.23	0.31	-0.0094	0.0108	9.9	1.1	9.9	1.2		
Math	3	6333	0	A.1.1.1	1	124752	0.87	0.03	0.87	0.03	0.07	0.00	0.39	-0.32	0.39	-0.12	-0.34	0.5115	0.0093	6.7	1.0	-0.1	1.0		
Math	3	6907	0	A.1.2.1	1	124752	0.95	0.95	0.02	0.01	0.01	0.00	0.30	0.30	-0.26	-0.11	-0.16	-0.8666	0.0144	1.1	1.0	4.6	1.1		
Math	3	6984	0	A.1.3.2	2	124752	0.68	0.15	0.04	0.68	0.14	0.00	0.39	-0.49	-0.19	0.39	-0.21	1.9982	0.0069	9.9	1.1	9.9	1.2		
Math	3	7006	0	A.1.1.3	1	124752	0.90	0.90	0.04	0.03	0.03	0.00	0.47	0.47	-0.31	-0.32	-0.34	0.0764	0.0105	-9.9	0.9	-9.9	0.7		
Math	3	7335	0	B.2.1.1	1	124752	0.94	0.00	0.01	0.94	0.05	0.00	0.29	-0.12	-0.12	0.29	-0.25	-0.5902	0.0130	6.9	1.1	1.2	1.0		
Math	3	7355	0	C.1.1.2	1	124752	0.92	0.00	0.01	0.07	0.92	0.00	0.33	-0.19	-0.15	-0.29	0.33	-0.2031	0.0114	6.6	1.1	7.8	1.2		
Math	3	7846	0	A.1.1.4	1	124752	0.92	0.01	0.92	0.04	0.02	0.00	0.46	-0.28	0.46	-0.35	-0.32	-0.2590	0.0116	-9.9	0.9	-9.9	0.8		
Math	3	7885	0	D.1.1.2	2	124752	0.84	0.04	0.84	0.08	0.04	0.00	0.36	-0.27	0.36	-0.20	-0.33	0.8278	0.0086	9.9	1.1	9.9	1.2		
Math	3	7985	0	C.2.1.2	1	124752	0.75	0.12	0.04	0.08	0.75	0.00	0.40	-0.31	-0.35	-0.30	0.40	1.5108	0.0074	9.9	1.1	9.2	1.1		
Math	3	8232	0	C.1.1.1	1	124752	0.87	0.07	0.05	0.87	0.01	0.00	0.29	-0.20	-0.22	0.29	-0.18	0.4933	0.0093	9.9	1.2	9.9	1.3		

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	8242	0	E.1.1.2	2	124752	0.86	0.02	0.86	0.05	0.07	0.01	0.58	-0.20	0.58	-0.45	-0.55	0.6302	0.0090	-9.9	0.8	-9.9	0.7		
Math	3	8268	0	B.1.2.1	1	124752	0.81	0.01	0.17	0.81	0.01	0.00	0.28	-0.25	-0.22	0.28	-0.21	1.0727	0.0081	9.9	1.2	9.9	1.4		
Math	3	8719	0	A.3.1.3	2	124752	0.86	0.05	0.86	0.02	0.06	0.00	0.49	-0.22	0.49	-0.38	-0.48	0.5939	0.0091	-9.9	0.9	-7.0	0.9		
Math	3	9051	0	C.2.1.1	1	124752	0.94	0.01	0.05	0.00	0.94	0.00	0.33	-0.15	-0.30	-0.12	0.33	-0.4832	0.0125	2.1	1.0	-0.1	1.0		
Math	3	9328	0	A.1.2.2	1	124752	0.96	0.00	0.01	0.96	0.03	0.00	0.36	-0.13	-0.13	0.36	-0.33	-1.1086	0.0157	-5.7	0.9	-9.9	0.7		
Math	3	9451	0	A.3.1.2	2	124752	0.84	0.11	0.84	0.02	0.03	0.00	0.55	-0.55	0.55	-0.24	-0.27	0.8067	0.0086	-9.9	0.9	-9.9	0.7		
Math	3	9602	0	A.3.1.3	1	124752	0.95	0.02	0.02	0.95	0.02	0.00	0.36	-0.23	-0.19	0.36	-0.28	-0.7810	0.0139	-4.8	1.0	-0.7	1.0		
Math	3	9615	0	E.1.1.1	2	124752	0.96	0.00	0.96	0.01	0.03	0.00	0.32	-0.17	0.32	-0.13	-0.27	-0.9844	0.0150	-3.0	1.0	4.4	1.1		
Math	3	9833	0	A.1.2.2	1	124752	0.95	0.01	0.95	0.03	0.01	0.00	0.41	-0.12	0.41	-0.34	-0.28	-0.8181	0.0141	-9.1	0.9	-9.9	0.7		
Math	3	9929	0	A.2.1.2	1	124752	0.90	0.90	0.02	0.05	0.03	0.00	0.33	0.33	-0.20	-0.23	-0.23	0.0809	0.0105	9.8	1.1	6.4	1.1		
Math	3	9949	0	C.1.1.2	1	124752	0.93	0.00	0.00	0.06	0.93	0.00	0.34	-0.18	-0.16	-0.29	0.34	-0.4296	0.0123	2.6	1.0	-0.6	1.0		
Math	3	43	1	A.1.1.3	1	25115	0.87	0.06	0.03	0.87	0.04	0.00	0.47	-0.36	-0.32	0.47	-0.34	0.4908	0.0207	-4.0	1.0	-7.3	0.8	A-	A-
Math	3	274	1	D.1.1.2	2	25115	0.89	0.89	0.03	0.03	0.03	0.01	0.51	0.51	-0.42	-0.34	-0.34	0.1913	0.0224	-8.3	0.9	-9.5	0.7	A+	A-
Math	3	1555	1	A.3.1.2	2	25115	0.82	0.03	0.12	0.03	0.82	0.00	0.53	-0.33	-0.50	-0.29	0.53	0.9088	0.0187	-9.9	0.9	-9.9	0.8	A-	B-
Math	3	1799	1	A.3.2.1	2	25115	0.58	0.08	0.29	0.58	0.04	0.00	0.40	-0.39	-0.35	0.40	-0.38	2.5154	0.0147	5.7	1.0	9.9	1.1	A-	A-
Math	3	2543	1	B.2.1.1	1	25115	0.90	0.03	0.90	0.03	0.03	0.00	0.37	-0.28	0.37	-0.19	-0.28	0.0322	0.0235	2.2	1.0	-0.6	1.0		
Math	3	3259	1	D.2.1.2	2	25115	0.89	0.03	0.89	0.02	0.05	0.00	0.46	-0.28	0.46	-0.30	-0.37	0.1949	0.0224	-3.9	0.9	-9.1	0.7	A+	A-
Math	3	3344	1	A.1.3.3	2	25115	0.58	0.05	0.32	0.05	0.58	0.00	0.50	-0.52	-0.47	-0.36	0.50	2.5316	0.0147	-9.9	0.9	-8.7	0.9	A-	A+
Math	3	4704	1	A.1.2.2	1	25115	0.94	0.01	0.94	0.04	0.01	0.00	0.36	-0.12	0.36	-0.27	-0.29	-0.6117	0.0289	-2.1	1.0	3.7	1.2	B+	A-
Math	3	4932	1	E.1.1.1	2	25115	0.99	0.00	0.99	0.00	0.00	0.00	0.21	-0.14	0.21	-0.14	-0.09	-2.5372	0.0631	-0.9	1.0	0.6	1.1	A+	B-
Math	3	5266	1	A.2.1.1	1	25115	0.84	0.03	0.84	0.04	0.08	0.00	0.47	-0.41	0.47	-0.41	-0.29	0.7650	0.0193	-3.2	1.0	-3.3	0.9		
Math	3	9138	1	B.1.1.3	1	25115	0.73	0.09	0.13	0.73	0.04	0.01	0.30	-0.37	-0.13	0.30	-0.22	1.5995	0.0163	9.9	1.2	9.9	1.4	A+	A-
Math	3	9904	1	A.1.1.2	1	25115	0.87	0.87	0.06	0.04	0.04	0.00	0.47	0.47	-0.34	-0.33	-0.33	0.5052	0.0206	-3.0	1.0	-9.0	0.8	A+	A-
Math	3	395	2	C.1.1.1	1	24932	0.61	0.00	0.61	0.08	0.31	0.00	0.41	-0.29	0.41	-0.32	-0.40	2.3775	0.0149	5.9	1.0	4.3	1.1	A-	A-
Math	3	975	2	B.1.2.2	2	24932	0.88	0.03	0.02	0.88	0.06	0.00	0.44	-0.33	-0.23	0.44	-0.34	0.4040	0.0213	-1.7	1.0	-3.7	0.9		
Math	3	979	2	C.2.1.1	1	24932	0.99	0.99	0.01	0.00	0.00	0.00	0.20	0.20	-0.13	-0.13	-0.12	-2.1628	0.0545	-0.4	1.0	0.4	1.0	A+	A-
Math	3	1422	2	A.1.1.4	1	24932	0.94	0.94	0.02	0.01	0.03	0.00	0.47	0.47	-0.26	-0.27	-0.38	-0.5721	0.0289	-6.7	0.9	-9.9	0.6	A+	B-
Math	3	3094	2	A.1.3.2	1	24932	0.63	0.24	0.63	0.04	0.09	0.00	0.43	-0.30	0.43	-0.43	-0.54	2.2440	0.0151	1.6	1.0	3.5	1.0	B-	A-
Math	3	4024	2	A.3.1.2	1	24932	0.91	0.03	0.02	0.91	0.04	0.01	0.43	-0.37	-0.25	0.43	-0.29	0.0307	0.0238	-3.0	1.0	-2.5	0.9		
Math	3	4462	2	D.2.1.1	2	24932	0.93	0.02	0.93	0.03	0.02	0.00	0.45	-0.32	0.45	-0.29	-0.30	-0.4232	0.0275	-5.8	0.9	-7.2	0.7	A+	B-
Math	3	5336	2	A.2.1.2	1	24932	0.82	0.09	0.82	0.05	0.03	0.00	0.42	-0.32	0.42	-0.33	-0.25	0.9547	0.0186	2.1	1.0	-5.1	0.9	A+	A-
Math	3	6224	2	A.3.1.3	2	24932	0.86	0.03	0.06	0.05	0.86	0.00	0.39	-0.32	-0.23	-0.28	0.39	0.6051	0.0202	3.2	1.0	1.6	1.0	A+	A-
Math	3	6570	2	E.1.2.1	2	24932	0.96	0.02	0.96	0.01	0.01	0.00	0.44	-0.36	0.44	-0.20	-0.24	-0.9802	0.0336	-6.1	0.9	-6.6	0.6	A+	C-
Math	3	9467	2	E.1.1.2	2	24932	0.96	0.01	0.01	0.96	0.02	0.00	0.34	-0.19	-0.23	0.34	-0.23	-1.1359	0.0356	-2.7	0.9	-4.1	0.7	A+	B-
Math	3	9473	2	A.1.1.1	1	24932	0.96	0.96	0.01	0.02	0.01	0.00	0.37	0.37	-0.23	-0.23	-0.24	-1.1373	0.0356	-3.4	0.9	-2.9	0.8	A+	B-
Math	3	302	3	A.1.1.1	1	24998	0.96	0.96	0.02	0.01	0.01	0.00	0.35	0.35	-0.24	-0.21	-0.22	-0.9655	0.0336	-2.0	1.0	-3.5	0.8	A+	A-
Math	3	942	3	C.1.1.1	1	24998	0.76	0.00	0.19	0.76	0.04	0.00	0.37	-0.21	-0.36	0.37	-0.20	1.4265	0.0169	9.8	1.1	5.7	1.1	A+	A-
Math	3	1081	3	D.2.2.2	1	24998	0.90	0.04	0.05	0.90	0.01	0.00	0.30	-0.15	-0.27	0.30	-0.21	0.1635	0.0230	6.1	1.1	9.0	1.4	A-	A-
Math	3	2850	3	B.1.1.1	1	24998	0.35	0.54	0.06	0.35	0.05	0.00	0.31	-0.31	-0.34	0.31	-0.32	3.7646	0.0150	8.9	1.1	9.9	1.4	A-	A-
Math	3	2962	3	B.2.2.1	1	24998	0.90	0.90	0.05	0.01	0.04	0.00	0.38	0.38	-0.35	-0.23	-0.19	0.1728	0.0229	9.9	1.0	-0.1	1.0	A-	C-
Math	3	3231	3	D.2.1.1	2	24998	0.47	0.33	0.47	0.12	0.09	0.00	0.32	-0.26	0.32	-0.35	-0.37	3.1607	0.0145	9.9	1.1	9.9	1.3	A-	A-
Math	3	3593	3	E.1.2.2	2	24998	0.90	0.03	0.90	0.04	0.03	0.00	0.41	-0.40	0.41	-0.25	-0.19	0.1573	0.0230	-1.0	1.0	4.4	1.2		
Math	3	3721	3	A.1.3.1	1	24998	0.96	0.01	0.02	0.96	0.01	0.00	0.43	-0.31	-0.29	0.43	-0.25	-0.9892	0.0339	-5.4	0.9	-8.6	0.5	A-	B-
Math	3	4265	3	A.3.1.1	2	24998	0.89	0.02	0.06	0.89	0.02	0.00	0.40	-0.35	-0.25	0.40	-0.27	0.2887	0.0222	0.8	1.0	2.8	1.1		
Math	3	4512	3	A.3.2.1	2	24998	0.46	0.46	0.13	0.14	0.27	0.01	0.36	0.36	-0.32	-0.33	-0.38	3.2013	0.0145	-2.5	1.0	9.9	1.2	A+	A-
Math	3	6920	3	E.1.1.1	2	24998	0.96	0.02	0.01	0.96	0.00	0.00	0.26	-0.16	-0.18	0.26	-0.19	-1.1295	0.0358	-0.3	1.0	6.1	1.5	A+	B-
Math	3	8345	3	C.2.1.2	2	24998	0.93	0.93	0.02	0.03	0.02	0.00	0.33	0.33	-0.20	-0.21	-0.22	-0.3427	0.0270	1.6	1.0	-0.8	1.0	A+	A-
Math	3	628	4	A.1.1.5	1	24949	0.96	0.01	0.01	0.96	0.02	0.00	0.42	-0.26	-0.23	0.42	-0.32	-1.0986	0.0351	-5.3	0.9	-8.0	0.6	A+	B-
Math	3	1840	4	D.1.1.2	2	24949	0.89	0.02	0.04	0.89	0.05	0.00	0.51	-0.31	-0.38	0.51	-0.39	0.2334	0.0224	-8.5	0.9	-9.9	0.7		

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	2183	4	A.2.1.3	2	24949	0.79	0.06	0.11	0.04	0.79	0.01	0.42	-0.39	-0.26	-0.38	0.42	1.2251	0.0175	2.8	1.0	3.4	1.1	A+	B-
Math	3	3196	4	A.1.3.2	1	24949	0.54	0.27	0.54	0.09	0.10	0.00	0.25	-0.13	0.25	-0.35	-0.30	2.7637	0.0146	9.9	1.2	9.9	1.4	A-	A-
Math	3	3451	4	E.1.2.2	2	24949	0.98	0.01	0.01	0.98	0.01	0.00	0.33	-0.23	-0.21	0.33	-0.18	-1.5828	0.0426	-3.0	0.9	-2.0	0.8	A+	B-
Math	3	4973	4	A.1.1.3	1	24949	0.89	0.89	0.02	0.07	0.01	0.00	0.41	0.41	-0.19	-0.35	-0.27	0.2183	0.0225	-0.2	1.0	0.8	1.0		
Math	3	5705	4	B.2.1.1	1	24949	0.92	0.00	0.02	0.92	0.05	0.00	0.27	-0.11	-0.08	0.27	-0.26	-0.2227	0.0258	5.7	1.1	5.5	1.3	A-	C-
Math	3	5786	4	B.1.2.1	1	24949	0.86	0.05	0.86	0.06	0.02	0.01	0.35	-0.27	0.35	-0.21	-0.28	0.6005	0.0203	6.7	1.1	0.2	1.0	A-	C-
Math	3	6057	4	A.3.1.1	2	24949	0.94	0.02	0.02	0.02	0.94	0.00	0.36	-0.20	-0.26	-0.24	0.36	-0.6098	0.0293	-1.3	1.0	-4.4	0.8	A+	A-
Math	3	7677	4	A.2.1.1	1	24949	0.89	0.06	0.89	0.04	0.02	0.00	0.51	-0.43	0.51	-0.31	-0.31	0.2524	0.0223	-8.2	0.9	-9.9	0.7	A+	A-
Math	3	8031	4	C.2.1.2	2	24949	0.93	0.03	0.00	0.03	0.93	0.00	0.34	-0.27	-0.15	-0.22	0.34	-0.3767	0.0271	1.1	1.0	-2.4	0.9	A+	A-
Math	3	8545	4	D.2.2.1	1	24949	0.88	0.04	0.05	0.88	0.02	0.00	0.39	-0.27	-0.30	0.39	-0.22	0.3168	0.0219	1.4	1.0	-0.7	1.0	A-	A-
Math	3	1253	5	D.1.1.1	2	24758	0.98	0.01	0.01	0.00	0.98	0.00	0.21	-0.19	-0.08	-0.10	0.21	-1.8437	0.0474	-0.2	1.0	3.3	1.4	A+	B-
Math	3	1338	5	A.3.1.2	2	24758	0.78	0.04	0.15	0.78	0.02	0.01	0.56	-0.34	-0.55	0.56	-0.35	1.3099	0.0173	-9.9	0.9	-9.9	0.7	A+	B-
Math	3	1403	5	B.1.1.2	2	24758	0.72	0.05	0.17	0.72	0.05	0.00	0.45	-0.43	-0.33	0.45	-0.41	1.6827	0.0162	1.7	1.0	1.0	1.0	A-	A-
Math	3	2177	5	A.1.1.4	1	24758	0.89	0.03	0.04	0.04	0.89	0.00	0.46	-0.32	-0.31	-0.34	0.46	0.2033	0.0226	-5.2	0.9	-5.1	0.8	A-	B-
Math	3	3291	5	E.1.1.2	1	24758	0.78	0.06	0.78	0.03	0.12	0.00	0.40	-0.34	0.40	-0.28	-0.30	1.2758	0.0174	5.6	1.1	-1.9	1.0	A-	A-
Math	3	4286	5	A.1.2.1	1	24758	0.88	0.01	0.88	0.03	0.09	0.00	0.43	-0.24	0.43	-0.17	-0.41	0.4075	0.0213	-1.0	1.0	-2.9	0.9	A+	B-
Math	3	4999	5	E.1.2.1	2	24758	0.96	0.02	0.01	0.01	0.96	0.00	0.44	-0.26	-0.27	-0.32	0.44	-1.0683	0.0347	-6.3	0.8	-6.2	0.6		
Math	3	6044	5	A.3.1.3	2	24758	0.87	0.06	0.87	0.04	0.02	0.01	0.42	-0.25	0.42	-0.36	-0.36	0.4761	0.0210	-0.4	1.0	0.8	1.0		
Math	3	6183	5	C.1.1.2	1	24758	0.93	0.04	0.02	0.01	0.93	0.01	0.29	-0.21	-0.19	-0.21	0.29	-0.3001	0.0264	3.5	1.1	3.6	1.2	A+	A-
Math	3	8282	5	B.1.2.2	1	24758	0.89	0.04	0.89	0.02	0.04	0.00	0.42	-0.32	0.42	-0.27	-0.27	0.1987	0.0226	-1.5	1.0	-3.6	0.9	A+	C-
Math	3	8621	5	D.2.1.2	2	24758	0.92	0.01	0.05	0.92	0.02	0.00	0.33	-0.23	-0.24	0.33	-0.20	-0.2126	0.0257	1.6	1.0	2.8	1.1	A+	A-
Math	3	9578	5	C.2.1.1	1	24758	0.98	0.01	0.01	0.01	0.98	0.00	0.25	-0.18	-0.18	-0.12	0.25	-1.6331	0.0434	-0.4	1.0	-0.6	1.0	A+	A-
Math	4	152	0	D.1.1.3	2	125600	0.64	0.05	0.17	0.13	0.64	0.00	0.52	-0.36	-0.54	-0.33	0.52	0.7279	0.0065	-9.9	0.9	-9.9	0.8		
Math	4	191	0	A.3.2.2	1	125600	0.80	0.02	0.17	0.80	0.02	0.00	0.26	-0.11	-0.24	0.26	-0.15	-0.2096	0.0075	9.9	1.1	9.9	1.2		
Math	4	363	0	A.2.1.1	2	125600	0.71	0.71	0.07	0.11	0.11	0.00	0.49	0.49	-0.34	-0.27	-0.51	0.3627	0.0068	-9.9	0.9	-9.9	0.8		
Math	4	490	0	A.2.1.2	1	125600	0.51	0.40	0.04	0.51	0.05	0.00	0.21	-0.14	-0.33	0.21	-0.25	1.4292	0.0063	9.9	1.2	9.9	1.3		
Math	4	715	0	B.1.1.1	1	125600	0.87	0.04	0.87	0.06	0.02	0.00	0.30	-0.14	0.30	-0.21	-0.27	-0.8580	0.0090	-2.1	1.0	9.9	1.2		
Math	4	927	0	E.1.2.2	2	125600	0.79	0.16	0.03	0.79	0.01	0.00	0.52	-0.52	-0.22	0.52	-0.14	-0.1922	0.0075	-9.9	0.8	-9.9	0.7		
Math	4	1008	0	A.1.1.4	1	125600	0.84	0.01	0.03	0.84	0.12	0.00	0.21	-0.21	-0.23	0.21	-0.10	-0.5717	0.0083	9.9	1.1	9.9	1.4		
Math	4	1059	0	A.3.1.2	1	125600	0.56	0.33	0.56	0.09	0.02	0.00	0.34	-0.29	0.34	-0.30	-0.35	1.1650	0.0063	9.9	1.1	9.9	1.1		
Math	4	1095	0	A.1.3.1	1	125600	0.74	0.08	0.74	0.09	0.09	0.00	0.49	-0.36	0.49	-0.34	-0.40	0.1850	0.0070	-9.9	0.9	-9.9	0.8		
Math	4	1174	0	A.1.1.4	2	125600	0.76	0.08	0.04	0.13	0.76	0.00	0.39	-0.32	-0.27	-0.27	0.39	0.0653	0.0071	-2.9	1.0	-2.6	1.0		
Math	4	1538	0	D.2.1.1	2	125600	0.72	0.18	0.03	0.72	0.07	0.00	0.41	-0.33	-0.32	0.41	-0.30	0.2815	0.0069	-8.1	1.0	-9.6	0.9		
Math	4	1942	0	A.1.3.2	2	125600	0.65	0.14	0.14	0.08	0.65	0.00	0.54	-0.52	-0.45	-0.34	0.54	0.7005	0.0065	-9.9	0.9	-9.9	0.8		
Math	4	2024	0	C.3.1.1	1	125600	0.85	0.01	0.13	0.85	0.01	0.00	0.31	-0.20	-0.25	0.31	-0.19	-0.5973	0.0083	2.1	1.0	4.1	1.0		
Math	4	2263	0	A.3.2.1	1	125600	0.92	0.92	0.06	0.01	0.01	0.00	0.37	0.37	-0.32	-0.20	-0.15	-1.4550	0.0109	-9.9	0.9	-9.9	0.6		
Math	4	2323	0	B.1.1.3	1	125600	0.47	0.47	0.13	0.09	0.31	0.00	0.29	0.29	-0.37	-0.31	-0.19	1.6118	0.0063	9.9	1.1	9.9	1.2		
Math	4	2395	0	E.3.1.1	2	125600	0.61	0.04	0.18	0.17	0.61	0.00	0.41	-0.37	-0.26	-0.42	0.41	0.9199	0.0064	-3.9	1.0	-8.1	1.0		
Math	4	2795	0	E.1.2.1	2	125600	0.88	0.07	0.02	0.03	0.88	0.00	0.21	-0.14	-0.15	-0.11	0.21	-0.9651	0.0093	8.8	1.1	9.9	1.4		
Math	4	2927	0	A.1.3.2	2	125600	0.70	0.13	0.06	0.11	0.70	0.00	0.50	-0.48	-0.30	-0.37	0.50	0.3983	0.0067	-9.9	0.9	-9.9	0.8		
Math	4	3255	0	C.2.1.1	1	125600	0.85	0.85	0.02	0.02	0.10	0.00	0.28	0.28	-0.22	-0.21	-0.18	-0.6449	0.0084	7.1	1.0	9.9	1.1		
Math	4	3546	0	E.1.1.1	1	125600	0.86	0.05	0.02	0.86	0.07	0.00	0.47	-0.42	-0.22	0.47	-0.30	-0.7191	0.0086	-9.9	0.9	-9.9	0.7		
Math	4	3762	0	A.1.3.2	1	125600	0.62	0.13	0.62	0.06	0.20	0.00	0.49	-0.37	0.49	-0.34	-0.48	0.8643	0.0064	-9.9	0.9	-9.9	0.9		
Math	4	3919	0	A.3.1.1	1	125600	0.68	0.07	0.68	0.14	0.10	0.00	0.48	-0.30	0.48	-0.42	-0.40	0.5134	0.0066	-9.9	0.9	-9.9	0.8		
Math	4	4229	0	B.1.1.4	1	125600	0.72	0.72	0.13	0.04	0.10	0.00	0.33	0.33	-0.25	-0.17	-0.29	0.2825	0.0069	9.9	1.1	9.9	1.1		
Math	4	4366	0	A.2.1.2	2	125600	0.52	0.04	0.52	0.36	0.08	0.00	0.28	-0.29	0.28	-0.21	-0.34	1.3330	0.0063	9.9	1.1	9.9	1.2		
Math	4	4402	0	C.1.2.1	1	125600	0.63	0.14	0.16	0.07	0.63	0.00	0.38	-0.28	-0.34	-0.30	0.38	0.7959	0.0064	8.5	1.0	2.3	1.0		
Math	4	4608	0	A.3.1.1		125600	0.50	0.04	0.10	0.50	0.36	0.00	0.35	-0.27	-0.25	0.35	-0.34	1.4315	0.0063	9.9	1.0	9.9	1.1		
Math	4	4644	0	A.3.1.1	1	125600	0.56	0.25	0.13	0.06	0.56	0.00	0.27	-0.15	-0.35	-0.26	0.27	1.1602	0.0063	9.9	1.2	9.9	1.2		

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	4881	0	D.1.1.1	1	125600	0.71	0.08	0.14	0.71	0.07	0.00	0.41	-0.33	-0.31	0.41	-0.31	0.3735	0.0068	-6.9	1.0	-9.9	0.9		
Math	4	4934	0	B.2.2.1	1	125600	0.73	0.04	0.16	0.73	0.07	0.00	0.27	-0.26	-0.19	0.27	-0.19	0.2196	0.0069	9.9	1.1	9.9	1.3		
Math	4	5256	0	E.3.1.1	1	125600	0.80	0.15	0.02	0.80	0.03	0.00	0.24	-0.18	-0.19	0.24	-0.16	-0.2541	0.0076	9.9	1.1	9.9	1.3		
Math	4	5281	0	E.1.2.1	2	125600	0.77	0.13	0.05	0.05	0.77	0.00	0.49	-0.42	-0.34	-0.31	0.49	-0.0347	0.0073	-9.9	0.9	-9.9	0.8		
Math	4	5365	0	A.1.1.1	1	125600	0.89	0.05	0.89	0.03	0.04	0.00	0.32	-0.18	0.32	-0.21	-0.25	-1.0081	0.0094	-5.0	1.0	-2.4	1.0		
Math	4	5516	0	E.1.2.1	2	125600	0.74	0.04	0.74	0.03	0.18	0.00	0.45	-0.32	0.45	-0.27	-0.38	0.1523	0.0070	-9.9	0.9	-9.9	0.9		
Math	4	5561	0	A.1.2.2	1	125600	0.67	0.67	0.13	0.07	0.12	0.00	0.38	0.38	-0.40	-0.34	-0.17	0.5540	0.0066	4.8	1.0	9.9	1.1		
Math	4	5776	0	A.1.2.1		125600	0.62	0.14	0.03	0.22	0.62	0.00	0.35	-0.33	-0.29	-0.27	0.35	0.8686	0.0064	9.9	1.1	9.9	1.1		
Math	4	5865	0	C.2.1.1	1	125600	0.73	0.09	0.09	0.10	0.73	0.00	0.23	-0.21	-0.12	-0.16	0.23	0.2399	0.0069	9.9	1.2	9.9	1.3		
Math	4	6146	0	A.3.1.2	1	125600	0.54	0.17	0.54	0.11	0.17	0.00	0.39	-0.35	0.39	-0.36	-0.30	1.2473	0.0063	3.1	1.0	4.2	1.0		
Math	4	6169	0	E.3.1.1	2	125600	0.86	0.04	0.05	0.04	0.86	0.00	0.37	-0.27	-0.23	-0.24	0.37	-0.7515	0.0087	-9.4	1.0	-9.2	0.9		
Math	4	6221	0	A.3.2.2	1	125600	0.75	0.05	0.16	0.75	0.03	0.00	0.14	-0.17	-0.05	0.14	-0.16	0.0875	0.0071	9.9	1.2	9.9	1.5		
Math	4	6516	0	C.1.1.1	1	125600	0.64	0.04	0.10	0.22	0.64	0.00	0.33	-0.27	-0.33	-0.22	0.33	0.7194	0.0065	9.9	1.1	9.9	1.1		
Math	4	6709	0	A.3.1.3	2	125600	0.75	0.05	0.13	0.75	0.07	0.00	0.42	-0.32	-0.37	0.42	-0.23	0.1181	0.0071	-9.9	1.0	-7.0	1.0		
Math	4	6794	0	D.2.1.1	2	125600	0.64	0.28	0.64	0.04	0.04	0.00	0.51	-0.50	0.51	-0.36	-0.24	0.7546	0.0065	-9.9	0.9	-9.9	0.8		
Math	4	6851	0	B.1.1.2	1	125600	0.69	0.05	0.69	0.13	0.13	0.00	0.37	-0.21	0.37	-0.29	-0.30	0.4702	0.0067	9.9	1.0	-4.0	1.0		
Math	4	6944	0	B.2.1.1	1	125600	0.70	0.16	0.07	0.06	0.70	0.00	0.45	-0.34	-0.36	-0.38	0.45	0.3794	0.0068	-9.9	0.9	-9.9	0.9		
Math	4	7229	0	A.1.1.3	1	125600	0.76	0.08	0.76	0.11	0.04	0.00	0.38	-0.20	0.38	-0.32	-0.32	0.0285	0.0072	-1.9	1.0	-5.8	1.0		
Math	4	7282	0	B.1.1.4	2	125600	0.77	0.77	0.14	0.04	0.05	0.00	0.46	0.46	-0.41	-0.39	-0.15	0.0061	0.0072	-9.9	0.9	-9.9	0.9		
Math	4	7541	0	A.3.1.3	2	125600	0.74	0.09	0.09	0.74	0.08	0.00	0.46	-0.40	-0.31	0.46	-0.30	0.1768	0.0070	-9.9	0.9	-9.9	0.9		
Math	4	7716	0	A.1.2.1	1	125600	0.75	0.06	0.13	0.75	0.06	0.00	0.31	-0.19	-0.21	0.31	-0.30	0.1341	0.0070	9.9	1.1	9.9	1.1		
Math	4	7770	0	B.2.1.1	1	125600	0.60	0.15	0.11	0.60	0.15	0.00	0.54	-0.42	-0.51	0.54	-0.48	0.9534	0.0064	-9.9	0.9	-9.9	0.8		
Math	4	8129	0	E.1.1.1	2	125600	0.78	0.08	0.06	0.08	0.78	0.00	0.49	-0.36	-0.28	-0.42	0.49	-0.0942	0.0074	-9.9	0.9	-9.9	0.8		
Math	4	8485	0	C.1.2.2	1	125600	0.52	0.52	0.03	0.29	0.16	0.00	0.38	0.38	-0.32	-0.39	-0.26	1.3421	0.0063	9.9	1.0	9.9	1.0		
Math	4	8487	0	D.1.1.2	2	125600	0.69	0.14	0.04	0.69	0.13	0.00	0.49	-0.43	-0.34	0.49	-0.37	0.4437	0.0067	-9.9	0.9	-9.9	0.8		
Math	4	8626	0	D.2.2.2	1	125600	0.81	0.04	0.07	0.81	0.08	0.00	0.38	-0.22	-0.25	0.38	-0.31	-0.2790	0.0077	-6.2	1.0	-4.1	1.0		
Math	4	8650	0	A.1.1.2	1	125600	0.51	0.04	0.51	0.06	0.38	0.00	0.39	-0.26	0.39	-0.28	-0.39	1.4110	0.0063	3.7	1.0	2.2	1.0		
Math	4	8773	0	A.2.1.1	2	125600	0.61	0.14	0.61	0.22	0.03	0.00	0.49	-0.32	0.49	-0.49	-0.37	0.8803	0.0064	-9.9	0.9	-9.9	0.9		
Math	4	9395	0	A.1.3.2	2	125600	0.68	0.16	0.10	0.68	0.06	0.00	0.52	-0.48	-0.39	0.52	-0.34	0.5290	0.0066	-9.9	0.9	-9.9	0.8		
Math	4	9576	0	C.1.2.2	1	125600	0.59	0.22	0.09	0.10	0.59	0.00	0.32	-0.35	-0.17	-0.19	0.32	0.9778	0.0063	9.9	1.1	9.9	1.1		
Math	4	9603	0	A.1.3.1		125600	0.47	0.24	0.47	0.14	0.15	0.00	0.43	-0.48	0.43	-0.35	-0.33	1.5940	0.0063	-9.9	1.0	-8.1	1.0		
Math	4	9897	0	D.1.2.2	2	125600	0.73	0.10	0.07	0.09	0.73	0.00	0.44	-0.24	-0.38	-0.39	0.44	0.2511	0.0069	-9.9	1.0	-9.9	0.9		
Math	4	9940	0	B.1.1.3	1	125600	0.46	0.14	0.46	0.07	0.33	0.00	0.35	-0.47	0.35	-0.39	-0.23	1.6638	0.0063	9.9	1.0	9.9	1.1		
Math	4	529	1	A.1.1.3	1	25312	0.72	0.18	0.72	0.07	0.03	0.00	0.33	-0.26	0.33	-0.22	-0.27	0.2517	0.0153	7.5	1.1	2.6	1.0	A-	A-
Math	4	575	1	A.2.1.1	2	25312	0.76	0.05	0.08	0.76	0.11	0.00	0.41	-0.29	-0.34	0.41	-0.28	0.0001	0.0160	-4.9	1.0	-4.8	0.9	A-	A-
Math	4	629	1	B.2.2.1	1	25312	0.75	0.05	0.75	0.10	0.10	0.00	0.35	-0.27	0.35	-0.25	-0.25	0.0633	0.0158	2.4	1.0	4.4	1.1		
Math	4	1634	1	C.1.2.1	1	25312	0.74	0.13	0.09	0.74	0.03	0.00	0.30	-0.26	-0.22	0.30	-0.14	0.1301	0.0156	9.2	1.1	4.2	1.1	A-	A-
Math	4	3797	1	E.1.2.1	2	25312	0.88	0.88	0.02	0.04	0.06	0.00	0.48	0.48	-0.21	-0.28	-0.43	-0.9736	0.0206	-9.9	0.8	-9.9	0.6	A-	C-
Math	4	5005	1	A.3.2.2	1	25312	0.90	0.02	0.06	0.03	0.90	0.00	0.27	-0.16	-0.17	-0.19	0.27	-1.1184	0.0215	0.4	1.0	-0.3	1.0		
Math	4	5071	1	B.1.1.2	1	25312	0.80	0.06	0.11	0.80	0.03	0.00	0.37	-0.26	-0.27	0.37	-0.28	-0.2143	0.0168	-2.1	1.0	-0.1	1.0	A-	B-
Math	4	6283	1	E.1.1.1	2	25312	0.86	0.86	0.04	0.02	0.08	0.00	0.49	0.49	-0.26	-0.21	-0.47	-0.7296	0.0191	-9.9	0.8	-9.9	0.7	A-	B-
Math	4	7568	1	A.3.2.1	2	25312	0.92	0.05	0.92	0.02	0.01	0.00	0.32	-0.27	0.32	-0.16	-0.14	-1.5076	0.0247	-3.4	0.9	-3.1	0.9	A+	B-
Math	4	7769	1	A.1.2.2	1	25312	0.86	0.08	0.02	0.86	0.04	0.00	0.34	-0.20	-0.23	0.34	-0.29	-0.7089	0.0190	-3.0	1.0	2.2	1.1	A+	B-
Math	4	7954	1	A.1.3.2	1	25312	0.79	0.09	0.79	0.07	0.05	0.00	0.42	-0.36	0.42	-0.25	-0.26	-0.1823	0.0166	-5.9	1.0	-9.9	0.8	A+	A-
Math	4	9500	1	D.2.2.1	2	25312	0.70	0.24	0.03	0.03	0.70	0.00	0.28	-0.22	-0.24	-0.21	0.28	0.4081	0.0149	9.9	1.1	7.8	1.1	A+	A+
Math	4	609	2	E.1.2.1	2	25054	0.92	0.02	0.92	0.02	0.04	0.00	0.34	-0.27	0.34	-0.19	-0.21	-1.3849	0.0239	-5.0	0.9	-3.9	0.9	A+	B-
Math	4	974	2	D.1.1.2	2	25054	0.83	0.06	0.05	0.06	0.83	0.00	0.47	-0.33	-0.36	-0.28	0.47	-0.4747	0.0180	-9.9	0.9	-9.9	0.7	A-	A-
Math	4	2075	2	C.1.2.2	1	25054	0.51	0.51	0.21	0.21	0.08	0.00	0.37	0.37	-0.26	-0.41	-0.31	1.4242	0.0140	4.4	1.0	4.8	1.0	A+	A+
Math	4	2929	2	A.1.2.1	1	25054	0.87	0.03	0.05	0.87	0.05	0.00	0.35	-0.23	-0.18	0.35	-0.29	-0.8110	0.0198	-3.2	1.0	-5.2	0.9	A-	A-

Appendix I: Item Statistics Multiple Choice

Item Information						Classical													Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	3785	2	C.2.1.1	2	25054	0.80	0.02	0.11	0.80	0.08	0.00	0.34	-0.21	-0.22	0.34	-0.30	-0.2037	0.0169	1.4	1.0	3.3	1.1	A+	B-	
Math	4	4022	2	A.1.1.2	1	25054	0.92	0.03	0.92	0.04	0.02	0.00	0.31	-0.15	0.31	-0.26	-0.17	-1.3530	0.0237	-3.0	1.0	-4.0	0.9	B+	A-	
Math	4	4958	2	E.3.1.1	2	25054	0.81	0.02	0.13	0.81	0.03	0.00	0.23	-0.19	-0.16	0.23	-0.15	-0.3278	0.0174	9.5	1.1	9.9	1.4			
Math	4	6264	2	A.1.3.2	1	25054	0.90	0.05	0.90	0.04	0.02	0.00	0.35	-0.29	0.35	-0.19	-0.19	-1.1480	0.0220	-4.8	0.9	-4.1	0.9	A+	A-	
Math	4	7540	2	A.2.1.1	2	25054	0.71	0.05	0.12	0.71	0.11	0.00	0.45	-0.31	-0.32	0.45	-0.39	0.3324	0.0153	-8.1	0.9	-7.3	0.9			
Math	4	8589	2	A.3.1.1	1	25054	0.70	0.08	0.70	0.08	0.13	0.00	0.57	-0.43	0.57	-0.41	-0.52	0.4303	0.0150	-9.9	0.8	-9.9	0.7	A-	B-	
Math	4	8722	2	A.3.1.3	2	25054	0.65	0.16	0.65	0.06	0.13	0.00	0.40	-0.25	0.40	-0.30	-0.43	0.6773	0.0146	0.1	1.0	4.3	1.1	A-	A-	
Math	4	8885	2	B.1.1.1	1	25054	0.89	0.06	0.02	0.02	0.89	0.00	0.31	-0.16	-0.27	-0.23	0.31	-0.9769	0.0208	-2.3	1.0	1.6	1.1	A-	B-	
Math	4	51	3	E.3.1.1	2	25067	0.91	0.02	0.01	0.91	0.05	0.00	0.22	-0.16	-0.12	0.22	-0.15	-1.3168	0.0234	1.2	1.0	2.3	1.1	A+	B-	
Math	4	1270	3	A.1.1.2	1	25067	0.63	0.07	0.08	0.22	0.63	0.00	0.48	-0.36	-0.39	-0.42	0.48	0.7895	0.0144	-9.9	0.9	-9.9	0.9	A+	A-	
Math	4	1320	3	A.1.1.4	1	25067	0.89	0.01	0.07	0.03	0.89	0.00	0.40	-0.24	-0.31	-0.23	0.40	-0.9796	0.0209	-7.2	0.9	-9.9	0.7	A-	B-	
Math	4	1788	3	C.3.1.1	1	25067	0.84	0.12	0.03	0.84	0.01	0.00	0.31	-0.26	-0.19	0.31	-0.14	-0.5175	0.0182	1.5	1.0	1.5	1.0	A+	A-	
Math	4	3755	3	D.1.2.2	2	25067	0.67	0.12	0.11	0.10	0.67	0.00	0.45	-0.32	-0.37	-0.38	0.45	0.6095	0.0147	-7.6	1.0	-7.0	0.9	A+	A+	
Math	4	3769	3	B.2.2.1	1	25067	0.86	0.06	0.03	0.86	0.05	0.00	0.35	-0.31	-0.17	0.35	-0.19	-0.7244	0.0193	-2.8	1.0	-4.7	0.9			
Math	4	4064	3	C.2.1.1	2	25067	0.74	0.06	0.74	0.12	0.09	0.00	0.35	-0.20	0.35	-0.23	-0.32	0.1878	0.0156	3.8	1.0	3.5	1.1	A-	B-	
Math	4	5359	3	A.3.1.1	1	25067	0.60	0.05	0.60	0.27	0.08	0.00	0.41	-0.29	0.41	-0.35	-0.40	0.9750	0.0142	-1.5	1.0	-0.2	1.0			
Math	4	5431	3	B.1.1.2	1	25067	0.87	0.04	0.03	0.87	0.05	0.00	0.38	-0.23	-0.24	0.38	-0.29	-0.8592	0.0201	-5.4	0.9	-9.6	0.8	A-	B-	
Math	4	6135	3	A.1.3.1	1	25067	0.86	0.03	0.05	0.86	0.06	0.00	0.43	-0.22	-0.23	0.43	-0.40	-0.6985	0.0192	-9.3	0.9	-9.9	0.7	A-	A-	
Math	4	8191	3	B.1.1.3	2	25067	0.61	0.08	0.08	0.61	0.24	0.00	0.45	-0.36	-0.35	0.45	-0.40	0.9136	0.0143	-9.7	0.9	-9.9	0.9	B-	A-	
Math	4	8465	3	A.3.1.3	2	25067	0.40	0.18	0.13	0.40	0.29	0.00	0.19	-0.10	-0.29	0.19	-0.18	1.9521	0.0143	9.9	1.2	9.9	1.4	A-	A-	
Math	4	705	4	A.3.1.3	2	25075	0.73	0.15	0.73	0.05	0.06	0.00	0.49	-0.44	0.49	-0.34	-0.29	0.2293	0.0155	-9.9	0.9	-9.6	0.9	A+	A-	
Math	4	3302	4	A.3.1.2	1	25075	0.74	0.16	0.08	0.74	0.02	0.00	0.42	-0.35	-0.30	0.42	-0.28	0.2011	0.0156	-4.6	1.0	-6.3	0.9	A-	A-	
Math	4	3326	4	C.1.1.1	1	25075	0.77	0.05	0.08	0.10	0.77	0.00	0.32	-0.26	-0.25	-0.19	0.32	-0.0190	0.0163	5.1	1.0	3.8	1.1	A-	A-	
Math	4	3484	4	E.1.1.1	1	25075	0.93	0.04	0.02	0.93	0.01	0.00	0.21	-0.14	-0.12	0.21	-0.15	-1.6483	0.0263	-0.2	1.0	5.2	1.2	A+	B-	
Math	4	3772	4	C.2.1.1	2	25075	0.86	0.86	0.08	0.02	0.04	0.00	0.32	0.32	-0.26	-0.15	-0.18	-0.6871	0.0191	0.4	1.0	-2.0	1.0			
Math	4	4115	4	A.1.1.4	1	25075	0.86	0.02	0.08	0.86	0.04	0.00	0.42	-0.20	-0.34	0.42	-0.28	-0.7166	0.0193	-8.4	0.9	-9.7	0.8	A-	A-	
Math	4	5311	4	E.1.2.2	2	25075	0.89	0.06	0.03	0.02	0.89	0.00	0.38	-0.29	-0.25	-0.20	0.38	-1.0562	0.0214	-6.7	0.9	-5.1	0.9	A-	C-	
Math	4	5970	4	A.1.1.1	1	25075	0.81	0.81	0.13	0.01	0.05	0.00	0.40	0.40	-0.36	-0.17	-0.24	-0.2882	0.0172	-4.3	1.0	-2.0	1.0	A+	A-	
Math	4	6412	4	B.1.1.3	2	25075	0.67	0.03	0.06	0.67	0.24	0.00	0.45	-0.33	-0.37	0.45	-0.38	0.6011	0.0147	-7.9	1.0	-9.9	0.9	A-	A-	
Math	4	7764	4	A.1.3.2	1	25075	0.71	0.22	0.71	0.05	0.03	0.00	0.51	-0.48	0.51	-0.28	-0.32	0.3790	0.0152	-9.9	0.9	-9.9	0.8			
Math	4	8972	4	A.2.1.2	2	25075	0.87	0.87	0.06	0.05	0.02	0.00	0.38	0.38	-0.24	-0.34	-0.15	-0.8270	0.0199	-5.9	0.9	-6.6	0.8	A+	B-	
Math	4	9740	4	D.1.2.1	2	25075	0.70	0.14	0.70	0.09	0.07	0.00	0.42	-0.32	0.42	-0.34	-0.32	0.4321	0.0151	-3.3	1.0	-2.4	1.0	A-	A+	
Math	4	47	5	D.1.1.3	2	25092	0.83	0.03	0.06	0.83	0.09	0.00	0.46	-0.22	-0.31	0.46	-0.39	-0.4163	0.0178	-9.9	0.9	-9.9	0.7	A+	A-	
Math	4	413	5	B.2.1.1	1	25092	0.88	0.04	0.03	0.88	0.06	0.00	0.27	-0.13	-0.15	0.27	-0.23	-0.9304	0.0206	0.6	1.0	3.5	1.1	A-	B-	
Math	4	805	5	A.3.2.2	1	25092	0.84	0.01	0.02	0.13	0.84	0.00	0.37	-0.20	-0.19	-0.32	0.37	-0.5303	0.0183	-3.0	1.0	-3.4	0.9	A+	A-	
Math	4	1115	5	A.1.2.1	1	25092	0.80	0.11	0.80	0.05	0.05	0.00	0.43	-0.33	0.43	-0.33	-0.24	-0.2320	0.0170	-7.6	0.9	-9.0	0.8	A-	A-	
Math	4	3322	5	A.3.1.2	1	25092	0.65	0.17	0.65	0.08	0.11	0.00	0.45	-0.35	0.45	-0.30	-0.43	0.7225	0.0145	-9.9	0.9	-9.9	0.9			
Math	4	3545	5	B.1.1.4	2	25092	0.88	0.04	0.88	0.04	0.04	0.00	0.30	-0.20	0.30	-0.23	-0.16	-0.9104	0.0204	-0.9	1.0	0.7	1.0	A-	A-	
Math	4	6465	5	C.1.2.2	1	25092	0.67	0.67	0.08	0.16	0.09	0.00	0.42	0.42	-0.36	-0.33	-0.30	0.5674	0.0148	-3.7	1.0	-4.3	1.0			
Math	4	6605	5	D.1.1.1	2	25092	0.85	0.04	0.07	0.85	0.04	0.00	0.37	-0.28	-0.28	0.37	-0.19	-0.6276	0.0188	-4.0	1.0	-7.0	0.8	A-	B-	
Math	4	7239	5	A.1.1.1	1	25092	0.73	0.20	0.03	0.73	0.04	0.00	0.28	-0.20	-0.25	0.28	-0.20	0.2661	0.0154	9.9	1.1	9.9	1.2	A+	A-	
Math	4	7849	5	A.1.2.2	1	25092	0.90	0.03	0.90	0.03	0.04	0.00	0.34	-0.27	0.34	-0.19	-0.20	-1.1655	0.0222	-4.1	0.9	-5.3	0.8	A-	B-	
Math	4	8365	5	D.2.2.2	1	25092	0.95	0.02	0.95	0.02	0.01	0.00	0.20	-0.14	0.20	-0.13	-0.11	-1.9517	0.0297	-0.3	1.0	-0.5	1.0	A-	A-	
Math	4	8890	5	C.1.1.2	1	25092	0.74	0.17	0.07	0.74	0.02	0.00	0.36	-0.31	-0.23	0.36	-0.25	0.2064	0.0156	2.2	1.0	2.0	1.0	A+	A-	
Math	5	155	0	A.1.3.2	1	126578	0.54	0.14	0.03	0.29	0.54	0.00	0.51	-0.43	-0.32	-0.49	0.51	1.5445	0.0063	-9.9	0.9	-9.9	0.9			
Math	5	459	0	A.1.6.1	1	126578	0.70	0.09	0.11	0.10	0.70	0.00	0.48	-0.33	-0.39	-0.36	0.48	0.7191	0.0068	-9.9	0.9	-9.9	0.9			
Math	5	515	0	A.2.1.3	2	126578	0.66	0.66	0.14	0.09	0.10	0.00	0.47	0.47	-0.40	-0.36	-0.34	0.9231	0.0066	-9.9	0.9	-9.9	0.9			
Math	5	524	0	A.3.1.1	1	126578	0.66	0.13	0.10	0.11	0.66	0.00	0.47	-0.32	-0.32	-0.49	0.47	0.9597	0.0066	-9.9	0.9	-9.9	0.9			
Math	5	843	0	A.1.1.1	2	126578	0.67	0.25	0.67	0.04	0.04	0.00	0.41	-0.36	0.41	-0.31	-0.23	0.8926	0.0066	3.8	1.0	2.4	1.0			

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	1143	0	E.1.1.1	1	126578	0.64	0.12	0.15	0.64	0.08	0.00	0.44	-0.41	-0.34	0.44	-0.31	1.0179	0.0065	-9.9	1.0	-6.0	1.0		
Math	5	1380	0	B.2.2.2	1	126578	0.65	0.65	0.07	0.04	0.24	0.00	0.42	0.42	-0.40	-0.24	-0.35	0.9787	0.0065	-1.2	1.0	-8.6	1.0		
Math	5	1442	0	E.3.1.2	2	126578	0.68	0.26	0.03	0.68	0.03	0.00	0.44	-0.39	-0.32	0.44	-0.28	0.8396	0.0066	-9.3	1.0	-9.9	0.9		
Math	5	1636	0	A.3.1.1	1	126578	0.74	0.74	0.06	0.05	0.15	0.00	0.39	0.39	-0.20	-0.34	-0.32	0.4747	0.0070	1.8	1.0	4.1	1.0		
Math	5	1652	0	A.3.1.2	2	126578	0.81	0.11	0.81	0.06	0.01	0.00	0.37	-0.36	0.37	-0.19	-0.14	-0.0140	0.0077	-3.2	1.0	-3.8	1.0		
Math	5	1814	0	A.1.4.2	1	126578	0.69	0.03	0.24	0.69	0.04	0.00	0.40	-0.27	-0.39	0.40	-0.14	0.7769	0.0067	5.3	1.0	6.5	1.0		
Math	5	2354	0	E.2.1.1	1	126578	0.65	0.10	0.13	0.12	0.65	0.00	0.39	-0.36	-0.21	-0.37	0.39	0.9923	0.0065	9.8	1.0	2.6	1.0		
Math	5	2529	0	B.1.3.1	1	126578	0.72	0.19	0.72	0.07	0.02	0.00	0.32	-0.27	0.32	-0.23	-0.18	0.6181	0.0068	9.9	1.1	9.9	1.1		
Math	5	2749	0	D.2.1.2	1	126578	0.67	0.04	0.09	0.19	0.67	0.00	0.46	-0.44	-0.32	-0.37	0.46	0.8553	0.0066	-9.9	1.0	-9.9	0.9		
Math	5	2779	0	C.1.1.1	2	126578	0.64	0.14	0.10	0.64	0.12	0.00	0.40	-0.41	-0.32	0.40	-0.21	1.0356	0.0065	8.0	1.0	5.1	1.0		
Math	5	2920	0	C.1.1.1	1	126578	0.41	0.27	0.18	0.15	0.41	0.00	0.36	-0.40	-0.38	-0.22	0.36	2.2575	0.0064	9.9	1.1	9.9	1.1		
Math	5	3194	0	A.1.3.3	2	126578	0.54	0.54	0.14	0.22	0.10	0.00	0.46	0.46	-0.37	-0.49	-0.28	1.5533	0.0063	-9.9	1.0	-9.9	0.9		
Math	5	3210	0	A.1.2.1	1	126578	0.83	0.12	0.02	0.03	0.83	0.00	0.43	-0.37	-0.20	-0.27	0.43	-0.2107	0.0081	-9.9	0.9	-9.9	0.8		
Math	5	3658	0	A.1.6.1	1	126578	0.48	0.18	0.48	0.18	0.17	0.00	0.40	-0.44	0.40	-0.35	-0.29	1.8701	0.0063	8.3	1.0	9.9	1.1		
Math	5	3766	0	B.2.1.1	1	126578	0.43	0.12	0.43	0.18	0.27	0.00	0.38	-0.40	0.38	-0.38	-0.32	2.1284	0.0064	9.9	1.0	9.9	1.1		
Math	5	3768	0	D.2.1.2	2	126578	0.55	0.07	0.55	0.31	0.06	0.00	0.37	-0.43	0.37	-0.27	-0.36	1.5010	0.0063	9.9	1.1	9.9	1.1		
Math	5	3883	0	C.2.1.2	1	126578	0.47	0.03	0.40	0.47	0.09	0.00	0.34	-0.19	-0.29	0.34	-0.42	1.9118	0.0063	9.9	1.1	9.9	1.2		
Math	5	3959	0	C.2.1.2	1	126578	0.73	0.73	0.13	0.07	0.07	0.00	0.35	0.35	-0.25	-0.27	-0.25	0.5070	0.0070	9.9	1.1	4.2	1.0		
Math	5	4028	0	B.1.2.2	2	126578	0.66	0.16	0.66	0.08	0.10	0.00	0.54	-0.47	0.54	-0.35	-0.44	0.9555	0.0066	-9.9	0.9	-9.9	0.8		
Math	5	4099	0	A.2.1.1	2	126578	0.58	0.35	0.03	0.03	0.58	0.00	0.43	-0.42	-0.23	-0.27	0.43	1.3353	0.0064	-0.8	1.0	4.2	1.0		
Math	5	4231	0	A.1.4.1	1	126578	0.87	0.87	0.11	0.02	0.01	0.00	0.38	0.38	-0.32	-0.24	-0.18	-0.5130	0.0088	-9.9	0.9	-9.9	0.8		
Math	5	4463	0	C.2.1.1	1	126578	0.82	0.03	0.07	0.82	0.08	0.00	0.33	-0.20	-0.26	0.33	-0.20	-0.1266	0.0079	3.7	1.0	9.8	1.1		
Math	5	4858	0	A.1.6.2	1	126578	0.79	0.06	0.10	0.79	0.05	0.00	0.46	-0.30	-0.35	0.46	-0.33	0.1269	0.0075	-9.9	0.9	-9.9	0.8		
Math	5	4864	0	E.3.1.1	1	126578	0.91	0.03	0.03	0.91	0.04	0.00	0.30	-0.19	-0.21	0.30	-0.17	-0.9605	0.0101	-3.9	1.0	-4.6	0.9		
Math	5	5013	0	A.2.1.2	2	126578	0.68	0.68	0.06	0.07	0.19	0.00	0.49	0.49	-0.34	-0.31	-0.44	0.8124	0.0067	-9.9	0.9	-9.9	0.8		
Math	5	5118	0	A.1.3.1	1	126578	0.88	0.01	0.10	0.88	0.01	0.00	0.30	-0.16	-0.27	0.30	-0.11	-0.6493	0.0092	-2.5	1.0	8.4	1.1		
Math	5	5163	0	C.2.1.1	1	126578	0.59	0.59	0.12	0.08	0.21	0.00	0.32	0.32	-0.35	-0.23	-0.22	1.2910	0.0064	9.9	1.1	9.9	1.2		
Math	5	5191	0	A.1.6.1	1	126578	0.41	0.30	0.14	0.15	0.41	0.00	0.36	-0.31	-0.44	-0.33	0.36	2.2624	0.0064	9.9	1.1	9.9	1.1		
Math	5	5375	0	E.3.1.2	2	126578	0.74	0.13	0.03	0.74	0.10	0.00	0.23	-0.25	-0.29	0.23	0.00	0.4599	0.0070	9.9	1.2	9.9	1.5		
Math	5	5934	0	E.3.1.1	1	126578	0.81	0.05	0.07	0.07	0.81	0.00	0.48	-0.32	-0.34	-0.35	0.48	-0.0197	0.0077	-9.9	0.9	-9.9	0.7		
Math	5	6105	0	C.1.2.1	1	126578	0.73	0.10	0.06	0.11	0.73	0.00	0.47	-0.38	-0.29	-0.37	0.47	0.5344	0.0069	-9.9	0.9	-9.9	0.9		
Math	5	6258	0	E.1.1.1	2	126578	0.82	0.02	0.04	0.12	0.82	0.00	0.42	-0.27	-0.26	-0.33	0.42	-0.1203	0.0079	-9.9	0.9	-9.9	0.8		
Math	5	6369	0	D.2.1.1	1	126578	0.66	0.31	0.02	0.01	0.66	0.00	0.37	-0.34	-0.25	-0.24	0.37	0.9617	0.0066	9.9	1.1	3.1	1.0		
Math	5	6449	0	A.3.2.1	1	126578	0.64	0.06	0.12	0.18	0.64	0.00	0.36	-0.29	-0.26	-0.31	0.36	1.0334	0.0065	9.9	1.1	9.9	1.1		
Math	5	6645	0	B.1.3.2	2	126578	0.38	0.28	0.23	0.38	0.11	0.00	0.29	-0.35	-0.22	0.29	-0.25	2.3987	0.0065	9.9	1.2	9.9	1.3		
Math	5	6811	0	A.1.5.1	2	126578	0.67	0.03	0.08	0.22	0.67	0.00	0.40	-0.16	-0.31	-0.36	0.40	0.8635	0.0066	7.5	1.0	-5.4	1.0		
Math	5	6877	0	C.1.1.2	1	126578	0.55	0.06	0.23	0.55	0.16	0.00	0.31	-0.34	-0.28	0.31	-0.19	1.5018	0.0063	9.9	1.1	9.9	1.2		
Math	5	6933	0	A.3.1.2	2	126578	0.66	0.23	0.66	0.06	0.05	0.00	0.31	-0.19	0.31	-0.31	-0.33	0.9318	0.0066	9.9	1.1	9.9	1.2		
Math	5	6991	0	A.1.4.2	1	126578	0.81	0.03	0.05	0.81	0.11	0.00	0.33	-0.13	-0.11	0.33	-0.36	-0.0262	0.0077	3.7	1.0	9.9	1.1		
Math	5	7218	0	E.2.1.1	1	126578	0.71	0.14	0.71	0.06	0.09	0.00	0.42	-0.37	0.42	-0.20	-0.35	0.6759	0.0068	-6.0	1.0	0.3	1.0		
Math	5	7254	0	A.1.2.1	1	126578	0.82	0.03	0.13	0.82	0.03	0.00	0.43	-0.30	-0.35	0.43	-0.26	-0.0799	0.0078	-9.9	0.9	-9.9	0.8		
Math	5	7287	0	D.1.1.2	2	126578	0.50	0.46	0.03	0.50	0.01	0.00	0.34	-0.31	-0.37	0.34	-0.30	1.7705	0.0063	9.9	1.1	9.9	1.1		
Math	5	7389	0	D.1.2.1	2	126578	0.68	0.04	0.68	0.15	0.12	0.00	0.37	-0.31	0.37	-0.20	-0.39	0.8033	0.0067	9.9	1.0	8.6	1.1		
Math	5	7650	0	A.2.1.1	2	126578	0.84	0.03	0.84	0.04	0.09	0.00	0.49	-0.22	0.49	-0.27	-0.46	-0.2304	0.0081	-9.9	0.8	-9.9	0.7		
Math	5	7865	0	A.1.2.2	1	126578	0.81	0.81	0.05	0.02	0.13	0.00	0.29	0.29	-0.27	-0.22	-0.17	-0.0138	0.0077	9.9	1.1	9.9	1.1		
Math	5	7884	0	D.1.1.1	2	126578	0.61	0.21	0.61	0.11	0.06	0.00	0.43	-0.33	0.43	-0.37	-0.41	1.1780	0.0064	-3.5	1.0	-9.9	1.0		
Math	5	8093	0	A.1.3.3	1	126578	0.69	0.08	0.08	0.69	0.15	0.00	0.54	-0.39	-0.36	0.54	-0.50	0.7867	0.0067	-9.9	0.9	-9.9	0.8		
Math	5	8286	0	C.1.2.1	1	126578	0.80	0.08	0.80	0.05	0.07	0.00	0.35	-0.24	0.35	-0.26	-0.22	0.0719	0.0076	6.0	1.0	-0.2	1.0		
Math	5	8335	0	D.2.1.2	2	126578	0.81	0.04	0.03	0.12	0.81	0.00	0.49	-0.37	-0.31	-0.37	0.49	-0.0130	0.0077	-9.9	0.9	-9.9	0.7		

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	8371	0	B.2.2.1	2	126578	0.61	0.29	0.61	0.06	0.04	0.00	0.43	-0.41	0.43	-0.29	-0.27	1.2164	0.0064	-3.3	1.0	-5.0	1.0		
Math	5	8751	0	E.2.1.2	1	126578	0.88	0.88	0.06	0.03	0.03	0.00	0.28	0.28	-0.24	-0.10	-0.18	-0.6092	0.0091	3.3	1.0	7.7	1.1		
Math	5	9018	0	E.3.1.2	2	126578	0.91	0.03	0.02	0.91	0.04	0.00	0.34	-0.25	-0.19	0.34	-0.21	-0.9854	0.0102	-9.0	0.9	-9.9	0.8		
Math	5	9204	0	A.2.1.2	2	126578	0.87	0.05	0.05	0.87	0.03	0.00	0.39	-0.29	-0.24	0.39	-0.24	-0.5763	0.0090	-9.9	0.9	-9.9	0.7		
Math	5	9347	0	C.2.1.2	1	126578	0.83	0.13	0.83	0.01	0.02	0.00	0.26	-0.22	0.26	-0.10	-0.17	-0.2060	0.0081	9.9	1.1	9.9	1.4		
Math	5	9838	0	A.1.1.1	1	126578	0.83	0.83	0.03	0.11	0.03	0.00	0.38	0.38	-0.23	-0.29	-0.26	-0.2071	0.0081	-8.3	1.0	-6.9	0.9		
Math	5	573	1	D.1.2.1	2	25554	0.80	0.15	0.03	0.03	0.80	0.00	0.27	-0.15	-0.26	-0.28	0.27	0.0501	0.0169	8.9	1.1	9.9	1.3	A-	A-
Math	5	1819	1	E.2.1.1	1	25554	0.74	0.03	0.74	0.09	0.13	0.00	0.46	-0.27	0.46	-0.35	-0.40	0.4356	0.0157	-9.9	0.9	-7.6	0.9	A+	A-
Math	5	3192	1	A.1.2.2	1	25554	0.83	0.83	0.02	0.06	0.09	0.00	0.31	0.31	-0.19	-0.23	-0.21	-0.2112	0.0179	3.5	1.0	3.2	1.1	A-	A-
Math	5	3582	1	B.1.2.1	2	25554	0.65	0.65	0.08	0.18	0.09	0.00	0.52	0.52	-0.36	-0.55	-0.28	0.9574	0.0146	-9.9	0.9	-9.9	0.9		
Math	5	5733	1	A.2.1.2	1	25554	0.74	0.07	0.07	0.74	0.12	0.00	0.35	-0.24	-0.20	0.35	-0.30	0.4400	0.0156	6.9	1.1	2.3	1.0	A-	A-
Math	5	6489	1	C.1.1.1	1	25554	0.76	0.76	0.20	0.03	0.02	0.00	0.36	0.36	-0.30	-0.25	-0.21	0.3343	0.0159	4.5	1.0	0.7	1.0	A+	A-
Math	5	7037	1	E.3.1.2	2	25554	0.92	0.92	0.04	0.03	0.02	0.00	0.37	0.37	-0.24	-0.27	-0.19	-1.0919	0.0234	-6.1	0.9	-7.4	0.8	A+	B-
Math	5	7594	1	A.1.3.3	1	25554	0.71	0.71	0.22	0.04	0.03	0.00	0.51	0.51	-0.48	-0.26	-0.31	0.6467	0.0152	-9.9	0.9	-9.9	0.8		
Math	5	8283	1	B.2.1.1	1	25554	0.79	0.01	0.79	0.17	0.02	0.00	0.45	-0.18	0.45	-0.42	-0.23	0.1140	0.0166	-9.5	0.9	-7.4	0.9	A-	B-
Math	5	8794	1	A.2.1.3	2	25554	0.66	0.10	0.03	0.21	0.66	0.00	0.45	-0.33	-0.31	-0.40	0.45	0.9101	0.0147	-5.7	1.0	-8.2	0.9	A-	A-
Math	5	8946	1	A.1.6.1	1	25554	0.79	0.07	0.06	0.79	0.08	0.00	0.46	-0.34	-0.35	0.46	-0.30	0.1416	0.0166	-9.9	0.9	-8.5	0.9	A+	A-
Math	5	9342	1	D.1.1.1	2	25554	0.53	0.17	0.27	0.04	0.53	0.00	0.11	-0.03	-0.12	-0.20	0.11	1.6090	0.0140	9.9	1.4	9.9	1.6	A-	A-
Math	5	896	2	E.3.1.1	2	25296	0.72	0.19	0.05	0.04	0.72	0.00	0.37	-0.29	-0.28	-0.27	0.37	0.5635	0.0154	4.1	1.0	0.2	1.0	A-	B-
Math	5	943	2	A.1.2.1	1	25296	0.83	0.02	0.03	0.83	0.12	0.00	0.40	-0.23	-0.25	0.40	-0.33	-0.1548	0.0179	-5.3	1.0	-7.3	0.8	A+	A-
Math	5	1132	2	D.1.2.1	2	25296	0.87	0.04	0.87	0.05	0.04	0.00	0.37	-0.20	0.37	-0.26	-0.27	-0.5447	0.0199	-5.9	0.9	-4.8	0.9		
Math	5	2537	2	A.3.2.1	1	25296	0.82	0.82	0.06	0.07	0.06	0.00	0.39	0.39	-0.21	-0.25	-0.36	-0.0536	0.0174	-4.7	1.0	-2.9	0.9	A+	A-
Math	5	2656	2	B.1.1.1	2	25296	0.73	0.08	0.14	0.73	0.05	0.00	0.39	-0.23	-0.32	0.39	-0.32	0.5133	0.0156	0.2	1.0	2.1	1.0	A-	C-
Math	5	3820	2	C.2.1.2	2	25296	0.81	0.81	0.05	0.08	0.05	0.00	0.26	0.26	-0.19	-0.15	-0.20	-0.0423	0.0174	8.7	1.1	9.9	1.3	A-	A-
Math	5	5771	2	B.1.2.2	2	25296	0.58	0.58	0.13	0.23	0.06	0.00	0.42	0.42	-0.33	-0.35	-0.43	1.3832	0.0142	0.7	1.0	-0.1	1.0	A+	A-
Math	5	7313	2	A.1.3.2	1	25296	0.86	0.86	0.08	0.04	0.02	0.00	0.24	0.24	-0.17	-0.14	-0.15	-0.4026	0.0191	6.1	1.1	8.2	1.2	A-	A-
Math	5	7609	2	A.1.5.1	2	25296	0.90	0.01	0.02	0.07	0.90	0.00	0.29	-0.14	-0.21	-0.21	0.29	-0.9120	0.0223	-1.3	1.0	-0.4	1.0	A+	A-
Math	5	9101	2	A.2.1.1	2	25296	0.66	0.66	0.05	0.12	0.17	0.00	0.45	0.45	-0.36	-0.35	-0.37	0.9186	0.0147	-6.6	1.0	-1.2	1.0	A+	A-
Math	5	9278	2	C.1.2.1	1	25296	0.67	0.08	0.67	0.24	0.02	0.00	0.43	-0.30	0.43	-0.40	-0.22	0.9004	0.0148	-2.9	1.0	-4.6	0.9		
Math	5	9428	2	D.2.1.2	2	25296	0.87	0.07	0.87	0.03	0.03	0.00	0.41	-0.31	0.41	-0.26	-0.24	-0.5129	0.0197	-7.7	0.9	-8.7	0.8	A+	B-
Math	5	674	3	A.3.1.1	2	25265	0.81	0.05	0.05	0.81	0.09	0.00	0.45	-0.32	-0.27	0.45	-0.36	0.0214	0.0172	-9.9	0.9	-9.9	0.8		
Math	5	1553	3	C.1.1.2	1	25265	0.69	0.69	0.11	0.11	0.08	0.00	0.39	0.39	-0.27	-0.31	-0.29	0.7519	0.0150	3.2	1.0	-1.6	1.0	A-	A-
Math	5	2528	3	C.2.1.1	2	25265	0.89	0.02	0.05	0.89	0.04	0.00	0.30	-0.17	-0.23	0.30	-0.17	-0.7837	0.0215	-1.5	1.0	-1.0	1.0	A-	B-
Math	5	3097	3	A.1.3.1	1	25265	0.88	0.88	0.01	0.08	0.03	0.00	0.36	0.36	-0.18	-0.28	-0.22	-0.6616	0.0207	-4.7	0.9	-4.3	0.9	A+	B-
Math	5	3807	3	A.1.1.1	1	25265	0.79	0.09	0.05	0.07	0.79	0.00	0.45	-0.42	-0.23	-0.28	0.45	0.1681	0.0166	-9.4	0.9	-8.9	0.8	A-	A-
Math	5	6011	3	A.1.4.2	1	25265	0.78	0.04	0.02	0.78	0.16	0.00	0.30	-0.15	-0.15	0.30	-0.27	0.2430	0.0164	7.9	1.1	9.9	1.2	A-	A+
Math	5	6071	3	B.1.3.2	2	25265	0.29	0.14	0.34	0.23	0.29	0.00	0.24	-0.41	-0.18	-0.27	0.24	2.8622	0.0153	9.9	1.2	9.9	1.4	A+	A-
Math	5	6396	3	D.1.1.2	2	25265	0.83	0.83	0.03	0.04	0.10	0.00	0.28	0.28	-0.21	-0.32	-0.11	-0.1459	0.0179	3.3	1.0	9.9	1.4	B+	A-
Math	5	6423	3	A.3.2.1	2	25265	0.47	0.08	0.32	0.47	0.14	0.00	0.42	-0.33	-0.39	0.42	-0.43	1.9336	0.0141	-1.3	1.0	1.4	1.0	A-	A-
Math	5	6721	3	A.2.1.1	2	25265	0.71	0.06	0.71	0.20	0.03	0.00	0.48	-0.32	0.48	-0.42	-0.33	0.6806	0.0152	-9.9	0.9	-8.9	0.9	A+	A-
Math	5	9135	3	E.3.1.1	2	25265	0.75	0.09	0.75	0.07	0.09	0.00	0.37	-0.26	0.37	-0.28	-0.27	0.4076	0.0159	1.6	1.0	0.0	1.0		
Math	5	9577	3	D.2.1.1	1	25265	0.88	0.02	0.88	0.01	0.08	0.00	0.17	-0.13	0.17	-0.16	-0.09	-0.6364	0.0205	7.2	1.1	9.9	1.4	A-	A-
Math	5	1128	4	A.1.6.2	1	25256	0.85	0.05	0.03	0.07	0.85	0.00	0.41	-0.27	-0.23	-0.32	0.41	-0.3212	0.0186	-6.9	0.9	-9.5	0.8	A+	A-
Math	5	2654	4	E.3.1.1	2	25256	0.72	0.13	0.04	0.11	0.72	0.00	0.35	-0.26	-0.28	-0.25	0.35	0.5695	0.0154	6.2	1.1	4.6	1.1	A-	A-
Math	5	2858	4	A.3.1.2	2	25256	0.66	0.20	0.66	0.09	0.05	0.00	0.38	-0.28	0.38	-0.29	-0.35	0.9293	0.0147	6.4	1.0	5.1	1.1	A-	A-
Math	5	3038	4	E.2.1.2	1	25256	0.84	0.04	0.84	0.07	0.05	0.00	0.35	-0.27	0.35	-0.21	-0.24	-0.2289	0.0182	-1.7	1.0	-1.9	1.0	A+	A-
Math	5	3566	4	C.1.1.1	1	25256	0.36	0.33	0.13	0.36	0.18	0.00	0.32	-0.29	-0.40	0.32	-0.30	2.4656	0.0146	9.9	1.1	9.9	1.2	A-	A-
Math	5	4744	4	A.1.4.1	1	25256	0.93	0.02	0.93	0.04	0.01	0.00	0.31	-0.19	0.31	-0.22	-0.16	-1.3574	0.0261	-3.6	0.9	-5.6	0.8	A-	B-
Math	5	4819	4	C.1.2.1	1	25256	0.88	0.88	0.03	0.01	0.08	0.00	0.16	0.16	-0.13	-0.13	-0.09	-0.6219	0.0203	8.0	1.1	9.9	1.5	A-	A-

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	5310	4	D.2.1.1	1	25256	0.95	0.95	0.01	0.01	0.02	0.00	0.27	0.27	-0.16	-0.15	-0.18	-1.7185	0.0301	-2.5	0.9	-5.0	0.8	A+	A-
Math	5	6173	4	D.1.1.2	2	25256	0.54	0.31	0.11	0.54	0.04	0.00	0.58	-0.59	-0.47	0.58	-0.33	1.5627	0.0141	-9.9	0.8	-9.9	0.8		
Math	5	8292	4	D.2.1.2	2	25256	0.85	0.85	0.05	0.07	0.02	0.00	0.43	0.43	-0.27	-0.35	-0.25	-0.3413	0.0187	-9.6	0.9	-8.1	0.8		
Math	5	8339	4	B.1.3.1	2	25256	0.35	0.45	0.35	0.10	0.10	0.00	0.31	-0.34	0.31	-0.21	-0.26	2.5508	0.0147	9.9	1.1	9.9	1.2	A+	A-
Math	5	9029	4	A.3.1.1	1	25256	0.68	0.05	0.68	0.17	0.11	0.00	0.30	-0.25	0.30	-0.25	-0.17	0.8409	0.0148	9.9	1.1	9.9	1.1	A-	A+
Math	5	65	5	A.1.1.1	1	25207	0.85	0.03	0.07	0.85	0.04	0.00	0.37	-0.29	-0.24	0.37	-0.24	-0.3491	0.0190	-4.0	1.0	-3.4	0.9	A-	A-
Math	5	1145	5	E.1.1.1	2	25207	0.77	0.06	0.05	0.77	0.13	0.00	0.45	-0.31	-0.35	0.45	-0.34	0.3127	0.0163	-8.8	0.9	-9.7	0.8	A-	C-
Math	5	2225	5	E.3.1.2	2	25207	0.87	0.05	0.87	0.04	0.04	0.00	0.37	-0.27	0.37	-0.19	-0.27	-0.5294	0.0199	-5.2	0.9	-1.1	1.0	A+	B-
Math	5	2639	5	A.1.3.3	1	25207	0.73	0.73	0.18	0.07	0.02	0.00	0.50	0.50	-0.48	-0.31	-0.21	0.5791	0.0155	-9.9	0.9	-9.9	0.8	A-	A-
Math	5	2945	5	C.1.2.1	1	25207	0.80	0.80	0.11	0.02	0.08	0.00	0.38	0.38	-0.34	-0.19	-0.23	0.1106	0.0169	-0.7	1.0	-2.1	1.0	A-	B-
Math	5	2973	5	B.1.2.1	2	25207	0.67	0.16	0.11	0.07	0.67	0.00	0.40	-0.15	-0.48	-0.36	0.40	0.9130	0.0148	2.4	1.0	4.8	1.1	A-	A-
Math	5	3914	5	A.3.1.2	2	25207	0.64	0.25	0.08	0.64	0.02	0.00	0.34	-0.31	-0.25	0.34	-0.21	1.0409	0.0146	9.9	1.1	9.9	1.2	A+	A-
Math	5	4508	5	A.2.1.2	2	25207	0.66	0.66	0.14	0.07	0.14	0.00	0.40	0.40	-0.36	-0.30	-0.26	0.9664	0.0148	3.9	1.0	0.1	1.0		
Math	5	6525	5	A.1.5.1	2	25207	0.73	0.09	0.73	0.09	0.09	0.00	0.55	-0.45	0.55	-0.35	-0.47	0.5412	0.0156	-9.9	0.8	-9.9	0.7		
Math	5	7616	5	C.1.1.2	1	25207	0.60	0.60	0.11	0.10	0.19	0.00	0.46	0.46	-0.37	-0.39	-0.39	1.2980	0.0143	-5.7	1.0	-5.9	0.9	A+	A-
Math	5	8459	5	D.1.1.1	2	25207	0.74	0.08	0.14	0.04	0.74	0.00	0.51	-0.37	-0.44	-0.31	0.51	0.5118	0.0157	-9.9	0.9	-9.9	0.8	A-	A-
Math	5	8576	5	D.1.2.1	2	25207	0.56	0.20	0.20	0.05	0.56	0.00	0.44	-0.58	-0.21	-0.34	0.44	1.4952	0.0142	-2.1	1.0	1.0	1.0	A-	A+
Math	6	8	0	A.3.1.1	2	126606	0.58	0.20	0.10	0.12	0.58	0.00	0.49	-0.49	-0.44	-0.35	0.49	1.0593	0.0064	-9.9	0.9	-9.9	0.9		
Math	6	35	0	A.1.3.3	2	126606	0.47	0.11	0.47	0.20	0.21	0.00	0.40	-0.35	0.40	-0.39	-0.37	1.6371	0.0064	9.9	1.1	9.9	1.1		
Math	6	119	0	B.1.1.1	2	126606	0.60	0.09	0.60	0.16	0.14	0.00	0.50	-0.32	0.50	-0.45	-0.47	0.9392	0.0065	-9.9	0.9	-9.9	0.9		
Math	6	133	0	D.1.2.1	1	126606	0.79	0.05	0.07	0.09	0.79	0.00	0.51	-0.36	-0.36	-0.40	0.51	-0.2007	0.0076	-9.9	0.9	-9.9	0.8		
Math	6	249	0	B.1.1.1	2	126606	0.61	0.04	0.61	0.15	0.20	0.00	0.49	-0.30	0.49	-0.54	-0.37	0.9217	0.0065	-9.9	0.9	-9.9	0.9		
Math	6	451	0	D.2.2.1	2	126606	0.71	0.10	0.08	0.10	0.71	0.00	0.53	-0.47	-0.37	-0.40	0.53	0.3248	0.0069	-9.9	0.9	-9.9	0.8		
Math	6	1001	0	A.1.3.1	2	126606	0.58	0.58	0.13	0.20	0.10	0.00	0.43	0.43	-0.35	-0.37	-0.41	1.0847	0.0064	9.9	1.0	9.9	1.1		
Math	6	1119	0	B.2.2.1	2	126606	0.73	0.09	0.73	0.12	0.06	0.00	0.49	-0.43	0.49	-0.36	-0.31	0.1728	0.0071	-9.9	0.9	-9.9	0.9		
Math	6	1140	0	D.2.2.1	1	126606	0.64	0.14	0.04	0.64	0.18	0.00	0.40	-0.43	-0.28	0.40	-0.25	0.7244	0.0066	9.9	1.0	2.0	1.0		
Math	6	1168	0	B.2.3.1	1	126606	0.82	0.03	0.10	0.05	0.82	0.00	0.44	-0.28	-0.31	-0.33	0.44	-0.4650	0.0080	-9.9	0.9	-9.9	0.9		
Math	6	1293	0	A.1.1.1	1	126606	0.75	0.02	0.75	0.12	0.11	0.00	0.41	-0.19	0.41	-0.29	-0.39	0.0840	0.0072	2.7	1.0	-4.0	1.0		
Math	6	1449	0	D.2.2.1	1	126606	0.65	0.11	0.05	0.19	0.65	0.00	0.44	-0.48	-0.35	-0.28	0.44	0.6890	0.0066	0.3	1.0	-3.2	1.0		
Math	6	1893	0	D.2.1.1	1	126606	0.68	0.05	0.06	0.20	0.68	0.00	0.36	-0.29	-0.26	-0.29	0.36	0.5008	0.0067	9.9	1.1	9.9	1.2		
Math	6	2014	0	C.1.1.1	2	126606	0.77	0.05	0.13	0.04	0.77	0.00	0.47	-0.38	-0.35	-0.33	0.47	-0.0525	0.0073	-9.9	0.9	-9.9	0.9		
Math	6	2097	0	E.3.1.2	2	126606	0.62	0.10	0.06	0.23	0.62	0.00	0.51	-0.53	-0.33	-0.42	0.51	0.8638	0.0065	-9.9	0.9	-9.9	0.9		
Math	6	2337	0	B.1.1.1	2	126606	0.59	0.06	0.59	0.20	0.16	0.00	0.48	-0.29	0.48	-0.47	-0.41	1.0275	0.0064	-9.9	1.0	-9.9	0.9		
Math	6	2360	0	E.3.1.1	2	126606	0.70	0.17	0.70	0.07	0.06	0.00	0.59	-0.54	0.59	-0.39	-0.46	0.4054	0.0068	-9.9	0.8	-9.9	0.8		
Math	6	2513	0	A.1.1.3	1	126606	0.80	0.08	0.06	0.80	0.06	0.00	0.38	-0.25	-0.27	0.38	-0.28	-0.3012	0.0077	4.2	1.0	1.7	1.0		
Math	6	2594	0	A.1.4.1	2	126606	0.59	0.05	0.30	0.06	0.59	0.00	0.51	-0.33	-0.50	-0.31	0.51	0.9881	0.0065	-9.9	0.9	-9.9	0.9		
Math	6	2603	0	D.1.1.1	2	126606	0.79	0.12	0.07	0.79	0.02	0.00	0.36	-0.22	-0.33	0.36	-0.20	-0.1780	0.0075	9.9	1.1	-3.5	1.0		
Math	6	2723	0	C.1.1.3	1	126606	0.69	0.22	0.06	0.69	0.03	0.00	0.45	-0.36	-0.40	0.45	-0.31	0.4288	0.0068	-4.7	1.0	-7.2	1.0		
Math	6	2912	0	C.1.2.1	1	126606	0.78	0.78	0.02	0.01	0.19	0.00	0.27	0.27	-0.17	-0.16	-0.23	-0.1515	0.0075	9.9	1.2	9.9	1.3		
Math	6	3133	0	C.1.1.3	1	126606	0.76	0.76	0.03	0.11	0.10	0.00	0.47	0.47	-0.32	-0.48	-0.23	-0.0144	0.0073	-9.9	0.9	-9.9	0.9		
Math	6	3664	0	E.1.1.3	2	126606	0.76	0.09	0.76	0.09	0.06	0.00	0.39	-0.28	0.39	-0.29	-0.27	-0.0327	0.0073	8.9	1.0	2.3	1.0		
Math	6	4165	0	A.1.2.1	1	126606	0.67	0.08	0.67	0.12	0.14	0.00	0.45	-0.32	0.45	-0.41	-0.33	0.5772	0.0067	-6.8	1.0	-9.9	0.9		
Math	6	4168	0	A.1.2.1	1	126606	0.70	0.70	0.16	0.04	0.09	0.00	0.51	0.51	-0.53	-0.31	-0.26	0.3663	0.0069	-9.9	0.9	-9.9	0.9		
Math	6	4428	0	D.1.1.1	2	126606	0.88	0.03	0.88	0.07	0.02	0.00	0.40	-0.22	0.40	-0.34	-0.20	-1.0572	0.0094	-9.9	0.9	-9.9	0.8		
Math	6	4926	0	D.2.1.2	2	126606	0.81	0.14	0.03	0.02	0.81	0.00	0.33	-0.23	-0.30	-0.23	0.33	-0.3606	0.0078	9.9	1.1	9.9	1.2		
Math	6	4976	0	A.1.3.2	1	126606	0.70	0.09	0.08	0.70	0.13	0.00	0.46	-0.40	-0.37	0.46	-0.31	0.3611	0.0069	-9.1	1.0	-9.9	0.9		
Math	6	5031	0	E.2.1.1	2	126606	0.54	0.08	0.54	0.09	0.29	0.00	0.40	-0.46	0.40	-0.22	-0.37	1.2958	0.0064	9.9	1.1	9.9	1.1		
Math	6	5546	0	C.1.1.4	1	126606	0.66	0.12	0.10	0.12	0.66	0.00	0.48	-0.44	-0.31	-0.40	0.48	0.6250	0.0067	-9.9	1.0	-9.9	0.9		
Math	6	5920	0	B.2.1.3	1	126606	0.76	0.76	0.08	0.12	0.04	0.00	0.41	0.41	-0.27	-0.33	-0.30	0.0087	0.0073	2.3	1.0	-1.0	1.0		

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	5952	0	C.1.2.1	1	126606	0.81	0.03	0.12	0.04	0.81	0.00	0.32	-0.28	-0.24	-0.18	0.32	-0.3739	0.0078	9.9	1.1	9.9	1.2		
Math	6	6062	0	C.1.2.2	1	126606	0.79	0.11	0.79	0.02	0.08	0.00	0.35	-0.29	0.35	-0.17	-0.25	-0.2186	0.0076	9.9	1.1	8.4	1.1		
Math	6	6083	0	C.3.1.1	1	126606	0.89	0.00	0.01	0.10	0.89	0.00	0.33	-0.13	-0.12	-0.30	0.33	-1.1616	0.0097	-1.5	1.0	-0.9	1.0		
Math	6	6128	0	A.1.1.4	1	126606	0.87	0.04	0.87	0.05	0.04	0.00	0.44	-0.27	0.44	-0.28	-0.34	-0.8679	0.0089	-9.9	0.9	-9.9	0.8		
Math	6	6172	0	D.1.2.1	2	126606	0.72	0.12	0.05	0.72	0.11	0.00	0.42	-0.36	-0.32	0.42	-0.29	0.2643	0.0070	1.7	1.0	-5.7	1.0		
Math	6	6477	0	C.1.1.1	2	126606	0.70	0.70	0.07	0.13	0.10	0.00	0.40	0.40	-0.32	-0.27	-0.34	0.3837	0.0068	9.9	1.0	4.0	1.0		
Math	6	6536	0	D.2.1.1	1	126606	0.78	0.04	0.06	0.11	0.78	0.00	0.46	-0.33	-0.27	-0.39	0.46	-0.1678	0.0075	-9.9	0.9	-9.9	0.9		
Math	6	6712	0	A.1.4.1	2	126606	0.62	0.25	0.07	0.62	0.06	0.00	0.59	-0.62	-0.35	0.59	-0.32	0.8427	0.0065	-9.9	0.8	-9.9	0.7		
Math	6	7031	0	D.2.2.1	2	126606	0.79	0.79	0.13	0.05	0.02	0.00	0.46	0.46	-0.34	-0.39	-0.28	-0.2458	0.0076	-9.9	0.9	-9.9	0.9		
Math	6	7089	0	A.3.2.1	1	126606	0.69	0.13	0.14	0.69	0.03	0.00	0.53	-0.40	-0.50	0.53	-0.31	0.4394	0.0068	-9.9	0.9	-9.9	0.8		
Math	6	7279	0	E.1.1.2	2	126606	0.71	0.05	0.71	0.08	0.15	0.00	0.39	-0.35	0.39	-0.29	-0.28	0.2970	0.0069	9.9	1.1	9.9	1.1		
Math	6	8007	0	C.3.1.1	1	126606	0.92	0.01	0.92	0.07	0.01	0.00	0.32	-0.12	0.32	-0.28	-0.15	-1.4861	0.0108	-3.2	1.0	-4.3	0.9		
Math	6	8032	0	A.3.2.1	1	126606	0.39	0.11	0.48	0.39	0.02	0.00	0.31	-0.32	-0.31	0.31	-0.25	2.1018	0.0065	9.9	1.1	9.9	1.3		
Math	6	8428	0	E.3.1.1	1	126606	0.66	0.13	0.07	0.66	0.14	0.00	0.53	-0.49	-0.40	0.53	-0.42	0.6151	0.0067	-9.9	0.9	-9.9	0.9		
Math	6	8509	0	A.2.1.1	1	126606	0.75	0.05	0.04	0.16	0.75	0.00	0.40	-0.30	-0.33	-0.30	0.40	0.0862	0.0072	5.9	1.0	5.5	1.0		
Math	6	8522	0	E.2.1.1	2	126606	0.69	0.10	0.69	0.15	0.06	0.00	0.39	-0.21	0.39	-0.30	-0.44	0.4552	0.0068	9.9	1.1	9.9	1.1		
Math	6	8539	0	A.2.1.1	1	126606	0.73	0.08	0.06	0.13	0.73	0.00	0.39	-0.30	-0.29	-0.29	0.39	0.2099	0.0070	9.9	1.0	8.7	1.1		
Math	6	8615	0	E.1.1.1	2	126606	0.71	0.16	0.08	0.71	0.04	0.00	0.43	-0.36	-0.29	0.43	-0.33	0.2925	0.0069	0.3	1.0	-0.9	1.0		
Math	6	8634	0	A.2.1.1	1	126606	0.63	0.63	0.27	0.06	0.04	0.00	0.43	0.43	-0.38	-0.33	-0.34	0.7838	0.0066	2.9	1.0	-5.0	1.0		
Math	6	8784	0	A.1.1.2	1	126606	0.67	0.26	0.05	0.67	0.03	0.00	0.54	-0.51	-0.40	0.54	-0.20	0.5889	0.0067	-9.9	0.9	-9.9	0.8		
Math	6	8962	0	B.2.2.1	2	126606	0.83	0.07	0.07	0.83	0.03	0.00	0.46	-0.36	-0.33	0.46	-0.24	-0.5015	0.0081	-9.9	0.9	-9.9	0.8		
Math	6	8977	0	C.1.2.2	1	126606	0.83	0.10	0.02	0.83	0.06	0.00	0.29	-0.23	-0.18	0.29	-0.17	-0.5051	0.0081	9.9	1.1	9.9	1.2		
Math	6	9094	0	E.3.1.2	2	126606	0.84	0.04	0.06	0.06	0.84	0.00	0.46	-0.33	-0.33	-0.30	0.46	-0.5870	0.0083	-9.9	0.9	-9.9	0.8		
Math	6	9475	0	D.2.1.1	1	126606	0.67	0.04	0.67	0.26	0.03	0.00	0.41	-0.34	0.41	-0.36	-0.26	0.5637	0.0067	9.9	1.0	2.3	1.0		
Math	6	9753	0	A.3.1.1	2	126606	0.67	0.03	0.67	0.20	0.10	0.00	0.42	-0.15	0.42	-0.34	-0.43	0.5544	0.0067	6.7	1.0	8.6	1.1		
Math	6	9839	0	C.3.1.1	1	126606	0.87	0.11	0.01	0.01	0.87	0.00	0.35	-0.31	-0.17	-0.16	0.35	-0.8574	0.0089	-3.0	1.0	0.5	1.0		
Math	6	9880	0	C.1.1.2	1	126606	0.79	0.08	0.79	0.09	0.04	0.00	0.41	-0.36	0.41	-0.27	-0.24	-0.1994	0.0076	-1.9	1.0	0.0	1.0		
Math	6	9913	0	D.2.1.2	1	126606	0.84	0.84	0.07	0.04	0.06	0.00	0.44	0.44	-0.36	-0.33	-0.24	-0.6186	0.0083	-9.9	0.9	-9.9	0.8		
Math	6	1133	1	A.2.1.1	1	25551	0.80	0.08	0.80	0.05	0.07	0.00	0.32	-0.32	0.32	-0.23	-0.10	-0.2929	0.0171	7.3	1.1	9.9	1.4	A+	A+
Math	6	1536	1	A.1.3.3	1	25551	0.71	0.10	0.09	0.10	0.71	0.00	0.57	-0.44	-0.47	-0.43	0.57	0.2870	0.0154	-9.9	0.9	-9.9	0.7	A-	A-
Math	6	2484	1	B.2.3.1	1	25551	0.73	0.73	0.07	0.13	0.07	0.00	0.39	0.39	-0.36	-0.28	-0.25	0.1582	0.0157	5.1	1.0	3.8	1.1		
Math	6	2681	1	E.3.1.1	2	25551	0.77	0.12	0.05	0.77	0.06	0.00	0.44	-0.31	-0.32	0.44	-0.35	-0.1136	0.0165	-4.1	1.0	-1.1	1.0	A+	B-
Math	6	4939	1	D.2.2.1	2	25551	0.72	0.72	0.11	0.06	0.11	0.00	0.42	0.42	-0.33	-0.35	-0.28	0.2313	0.0155	2.1	1.0	-2.3	1.0	A-	A-
Math	6	5854	1	B.2.1.1	1	25551	0.70	0.03	0.70	0.24	0.03	0.00	0.35	-0.26	0.35	-0.30	-0.24	0.3435	0.0153	9.9	1.1	5.5	1.1	A+	A-
Math	6	5937	1	C.1.2.2	1	25551	0.63	0.13	0.63	0.10	0.15	0.00	0.43	-0.39	0.43	-0.31	-0.34	0.7847	0.0146	3.8	1.0	1.2	1.0	A+	A-
Math	6	6887	1	C.3.1.1	1	25551	0.82	0.02	0.08	0.82	0.09	0.00	0.19	-0.11	0.02	0.19	-0.28	-0.4436	0.0177	9.9	1.2	9.9	1.7	A+	A-
Math	6	8390	1	A.1.1.3	1	25551	0.87	0.03	0.08	0.02	0.87	0.00	0.37	-0.28	-0.26	-0.21	0.37	-0.8692	0.0197	-2.5	1.0	-1.5	1.0	A+	A+
Math	6	8432	1	C.1.1.1	1	25551	0.65	0.14	0.13	0.65	0.08	0.00	0.39	-0.35	-0.28	0.39	-0.31	0.6560	0.0147	9.5	1.1	7.4	1.1	A-	A-
Math	6	9807	1	D.1.1.1	2	25551	0.90	0.05	0.02	0.04	0.90	0.00	0.36	-0.24	-0.23	-0.24	0.36	-1.1917	0.0216	-3.6	1.0	-3.0	0.9	A+	A-
Math	6	9888	1	A.3.2.1	2	25551	0.67	0.14	0.67	0.12	0.07	0.00	0.48	-0.44	0.48	-0.35	-0.34	0.5407	0.0149	-7.1	1.0	-8.0	0.9		
Math	6	556	2	A.1.3.1	2	25256	0.64	0.20	0.64	0.10	0.06	0.00	0.27	-0.15	0.27	-0.19	-0.35	0.7238	0.0147	9.9	1.2	9.9	1.3	A+	A+
Math	6	1700	2	D.1.2.1	2	25256	0.73	0.04	0.17	0.06	0.73	0.00	0.41	-0.35	-0.30	-0.33	0.41	0.2240	0.0156	0.7	1.0	2.8	1.0	A+	A-
Math	6	2497	2	B.1.1.1	2	25256	0.45	0.11	0.12	0.45	0.33	0.00	0.38	-0.48	-0.32	0.38	-0.33	1.7272	0.0143	7.4	1.0	9.9	1.1	A-	A-
Math	6	4790	2	B.2.1.1	1	25256	0.78	0.09	0.78	0.09	0.03	0.00	0.37	-0.30	0.37	-0.26	-0.20	-0.1366	0.0167	4.8	1.0	-1.0	1.0		
Math	6	6117	2	A.3.1.1	2	25256	0.54	0.54	0.28	0.10	0.08	0.00	0.17	0.17	-0.08	-0.24	-0.18	1.2618	0.0142	9.9	1.3	9.9	1.4	A-	A-
Math	6	6143	2	A.1.1.2	1	25256	0.68	0.13	0.68	0.13	0.05	0.00	0.47	-0.31	0.47	-0.47	-0.30	0.4820	0.0151	-6.1	1.0	-7.8	0.9	A+	A-
Math	6	7420	2	C.1.1.4	2	25256	0.81	0.81	0.12	0.04	0.03	0.00	0.44	0.44	-0.40	-0.31	-0.16	-0.3406	0.0174	-6.6	0.9	-8.8	0.8	A-	A-
Math	6	8797	2	A.1.2.1	1	25256	0.55	0.55	0.18	0.06	0.21	0.00	0.53	0.53	-0.61	-0.37	-0.40	1.2074	0.0142	-9.9	0.9	-9.9	0.9	A-	A-
Math	6	8857	2	E.3.1.1	2	25256	0.91	0.03	0.03	0.91	0.03	0.00	0.36	-0.24	-0.26	0.36	-0.20	-1.3627	0.0232	-5.0	0.9	-3.8	0.9	A+	B-

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	9532	2	D.2.1.1	1	25256	0.59	0.05	0.03	0.59	0.33	0.00	0.23	-0.29	-0.25	0.23	-0.15	1.0191	0.0144	9.9	1.2	9.9	1.3	A+	A-
Math	6	9680	2	E.1.1.2	2	25256	0.90	0.02	0.06	0.01	0.90	0.00	0.30	-0.19	-0.20	-0.22	0.30	-1.2708	0.0225	-1.7	1.0	2.7	1.1	A+	A-
Math	6	9780	2	C.3.1.1	1	25256	0.81	0.81	0.02	0.09	0.09	0.00	0.31	0.31	-0.19	-0.30	-0.16	-0.3544	0.0175	6.7	1.1	9.9	1.3		
Math	6	2553	3	E.2.1.1	2	25274	0.57	0.13	0.13	0.57	0.17	0.00	0.48	-0.40	-0.51	0.48	-0.37	1.1157	0.0143	-8.9	1.0	-8.8	0.9	A-	B-
Math	6	3062	3	B.2.1.2	1	25274	0.20	0.33	0.25	0.22	0.20	0.00	0.15	-0.25	-0.20	-0.06	0.15	3.2084	0.0172	9.9	1.2	9.9	1.9	A-	A-
Math	6	3908	3	C.1.1.4	2	25274	0.80	0.80	0.10	0.05	0.05	0.00	0.36	0.36	-0.21	-0.27	-0.28	-0.2986	0.0173	3.9	1.0	3.1	1.1		
Math	6	3985	3	D.2.2.1	2	25274	0.77	0.09	0.77	0.07	0.07	0.00	0.43	-0.30	0.43	-0.35	-0.29	-0.0637	0.0165	-2.6	1.0	-4.6	0.9		
Math	6	4521	3	B.2.2.1	1	25274	0.95	0.02	0.95	0.02	0.01	0.00	0.23	-0.14	0.23	-0.14	-0.13	-2.0186	0.0295	-0.7	1.0	1.6	1.1	A+	A-
Math	6	5995	3	D.1.2.1	2	25274	0.77	0.05	0.77	0.09	0.09	0.00	0.46	-0.31	0.46	-0.39	-0.31	-0.0795	0.0165	-7.1	0.9	-6.2	0.9	A+	A-
Math	6	6353	3	A.1.1.4	1	25274	0.84	0.05	0.07	0.04	0.84	0.00	0.51	-0.37	-0.39	-0.30	0.51	-0.5830	0.0185	-9.9	0.9	-9.9	0.7	A+	A-
Math	6	6699	3	C.1.2.1	2	25274	0.87	0.06	0.04	0.04	0.87	0.00	0.37	-0.25	-0.26	-0.24	0.37	-0.8399	0.0198	-2.9	1.0	-4.4	0.9	A+	B-
Math	6	7079	3	A.1.3.2	1	25274	0.60	0.22	0.07	0.60	0.11	0.00	0.37	-0.27	-0.39	0.37	-0.29	0.9397	0.0145	9.9	1.1	9.6	1.1	A+	A+
Math	6	7312	3	D.2.1.2	1	25274	0.88	0.03	0.08	0.88	0.01	0.00	0.35	-0.21	-0.28	0.35	-0.18	-0.9880	0.0206	-1.4	1.0	-3.5	0.9	A-	A-
Math	6	8344	3	E.1.1.1	2	25274	0.82	0.06	0.10	0.82	0.02	0.00	0.33	-0.13	-0.33	0.33	-0.19	-0.4192	0.0178	4.0	1.0	8.1	1.2	A+	A-
Math	6	9498	3	A.3.1.1	2	25274	0.28	0.28	0.15	0.30	0.26	0.00	0.36	0.36	-0.38	-0.39	-0.43	2.6557	0.0156	-1.5	1.0	9.9	1.2	A-	A-
Math	6	694	4	B.2.3.1	1	25282	0.92	0.92	0.05	0.03	0.01	0.00	0.39	0.39	-0.30	-0.25	-0.19	-1.4521	0.0239	-5.9	0.9	-9.9	0.6	A+	B-
Math	6	1755	4	D.1.1.1	2	25282	0.40	0.40	0.11	0.38	0.10	0.00	0.24	0.24	-0.31	-0.17	-0.36	1.9750	0.0145	9.9	1.2	9.9	1.4	A-	A-
Math	6	3217	4	A.1.1.4	1	25282	0.79	0.04	0.07	0.10	0.79	0.00	0.38	-0.34	-0.40	-0.14	0.38	-0.2104	0.0170	2.2	1.0	9.9	1.2		
Math	6	3357	4	E.3.1.2	2	25282	0.79	0.07	0.09	0.05	0.79	0.00	0.50	-0.41	-0.43	-0.24	0.50	-0.1942	0.0169	-9.9	0.9	-9.9	0.8		
Math	6	3674	4	C.1.1.3	1	25282	0.78	0.78	0.05	0.14	0.02	0.00	0.48	0.48	-0.37	-0.38	-0.30	-0.1421	0.0168	-8.4	0.9	-9.9	0.8	A-	A-
Math	6	4636	4	E.1.1.1	2	25282	0.67	0.08	0.07	0.67	0.18	0.00	0.43	-0.34	-0.36	0.43	-0.33	0.5586	0.0150	1.3	1.0	-2.3	1.0	A+	B-
Math	6	4787	4	A.1.1.1	1	25282	0.57	0.22	0.03	0.57	0.19	0.00	0.35	-0.48	-0.21	0.35	-0.10	1.1267	0.0144	9.9	1.1	9.9	1.2	C-	A-
Math	6	5942	4	D.2.1.1	1	25282	0.68	0.05	0.05	0.22	0.68	0.00	0.45	-0.38	-0.34	-0.37	0.45	0.4843	0.0152	-1.5	1.0	-2.6	1.0	A+	A-
Math	6	8437	4	B.2.2.1	2	25282	0.77	0.77	0.05	0.06	0.12	0.00	0.54	0.54	-0.31	-0.34	-0.50	-0.0594	0.0165	-9.9	0.9	-9.9	0.7	A-	B-
Math	6	8544	4	A.1.3.2	2	25282	0.37	0.11	0.33	0.20	0.37	0.00	0.48	-0.42	-0.52	-0.53	0.48	2.1813	0.0147	-9.9	0.9	-9.3	0.9	B-	C-
Math	6	9038	4	A.1.2.1	1	25282	0.94	0.01	0.03	0.94	0.01	0.00	0.30	-0.17	-0.21	0.30	-0.17	-1.8668	0.0278	-2.5	1.0	-1.4	0.9	A+	B-
Math	6	9375	4	C.1.1.1	1	25282	0.68	0.68	0.03	0.18	0.11	0.00	0.46	0.46	-0.37	-0.36	-0.40	0.5331	0.0151	-3.4	1.0	-2.3	1.0	A-	A-
Math	6	142	5	C.1.1.2	2	25243	0.70	0.13	0.04	0.70	0.13	0.00	0.41	-0.33	-0.35	0.41	-0.28	0.4069	0.0153	4.8	1.0	1.3	1.0	A-	A-
Math	6	743	5	E.3.1.2	2	25243	0.68	0.05	0.14	0.12	0.68	0.00	0.49	-0.30	-0.42	-0.42	0.49	0.4956	0.0152	-9.1	0.9	-8.3	0.9	A+	B-
Math	6	949	5	D.2.2.1	2	25243	0.67	0.67	0.11	0.07	0.15	0.00	0.33	0.33	-0.33	-0.23	-0.22	0.5894	0.0150	9.9	1.1	9.9	1.2	A-	A-
Math	6	2468	5	D.1.1.1	2	25243	0.75	0.08	0.75	0.11	0.06	0.00	0.36	-0.32	0.36	-0.18	-0.33	0.0681	0.0161	7.2	1.1	9.0	1.2		
Math	6	2900	5	A.1.3.1	1	25243	0.76	0.05	0.16	0.76	0.03	0.00	0.36	-0.30	-0.26	0.36	-0.28	-0.0088	0.0164	6.2	1.1	8.8	1.2		
Math	6	3055	5	E.1.1.3	2	25243	0.94	0.94	0.03	0.01	0.02	0.00	0.33	0.33	-0.20	-0.21	-0.22	-1.8181	0.0273	-3.8	0.9	-5.4	0.8	A+	A-
Math	6	3869	5	D.2.1.2	1	25243	0.89	0.89	0.03	0.03	0.05	0.00	0.45	0.45	-0.31	-0.30	-0.30	-1.0670	0.0212	-9.4	0.9	-9.9	0.7	A+	A-
Math	6	5259	5	A.3.1.1	2	25243	0.38	0.08	0.38	0.24	0.30	0.00	0.40	-0.34	0.40	-0.43	-0.42	2.1231	0.0147	-1.0	1.0	8.0	1.1	A+	A-
Math	6	7098	5	C.1.1.3	2	25243	0.43	0.09	0.39	0.09	0.43	0.00	0.48	-0.54	-0.49	-0.30	0.48	1.8307	0.0144	-9.9	0.9	-2.4	1.0	A-	A-
Math	6	8050	5	B.2.1.3	1	25243	0.64	0.64	0.07	0.22	0.08	0.00	0.39	0.39	-0.25	-0.31	-0.40	0.7623	0.0147	9.9	1.1	8.1	1.1	A-	A-
Math	6	8934	5	A.1.4.1	2	25243	0.70	0.05	0.04	0.70	0.22	0.00	0.51	-0.24	-0.32	0.51	-0.50	0.3928	0.0154	-9.9	0.9	-9.9	0.9	A-	A-
Math	6	9237	5	E.2.1.1	1	25243	0.63	0.14	0.63	0.14	0.09	0.00	0.49	-0.49	0.49	-0.35	-0.38	0.7875	0.0147	-9.0	0.9	-9.3	0.9	A+	A-
Math	7	123	0	D.3.1.1	2	126959	0.74	0.04	0.07	0.74	0.15	0.00	0.39	-0.26	-0.31	0.39	-0.29	0.0610	0.0071	9.9	1.0	4.6	1.0		
Math	7	164	0	C.3.1.1	1	126959	0.85	0.11	0.85	0.02	0.02	0.00	0.41	-0.35	0.41	-0.21	-0.20	-0.8022	0.0085	9.9	0.9	-9.9	0.9		
Math	7	301	0	A.2.2.2	1	126959	0.88	0.07	0.03	0.88	0.01	0.00	0.37	-0.28	-0.29	0.37	-0.14	-1.1169	0.0093	-8.8	1.0	-7.9	0.9		
Math	7	937	0	D.2.2.1	2	126959	0.42	0.42	0.39	0.08	0.11	0.00	0.36	0.36	-0.31	-0.36	-0.41	1.7982	0.0064	9.9	1.1	9.9	1.2		
Math	7	1094	0	A.1.2.1	2	126959	0.69	0.08	0.12	0.69	0.10	0.00	0.57	-0.48	-0.48	0.57	-0.40	0.3242	0.0068	-9.9	0.8	-9.9	0.7		
Math	7	1134	0	B.1.1.1	2	126959	0.48	0.22	0.12	0.48	0.18	0.00	0.27	-0.09	-0.44	0.27	-0.28	1.4773	0.0064	9.9	1.2	9.9	1.3		
Math	7	1136	0	D.3.1.1	2	126959	0.72	0.72	0.07	0.02	0.18	0.00	0.24	-0.24	-0.30	-0.26	-0.10	0.1642	0.0069	9.9	1.2	9.9	1.5		
Math	7	1304	0	B.2.2.2	1	126959	0.80	0.08	0.80	0.10	0.03	0.00	0.47	-0.34	0.47	-0.41	-0.17	-0.3729	0.0077	-9.9	0.9	-9.9	0.9		
Math	7	1439	0	E.3.1.2	2	126959	0.61	0.12	0.20	0.07	0.61	0.00	0.54	-0.61	-0.40	-0.39	0.54	0.7881	0.0065	-9.9	0.9	-9.9	0.9		
Math	7	1774	0	E.3.1.3	2	126959	0.76	0.08	0.11	0.76	0.04	0.00	0.47	-0.37	-0.36	0.47	-0.31	-0.1080	0.0073	-9.9	0.9	-9.9	0.9		

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	1921	0	E.4.1.1	2	126959	0.59	0.27	0.11	0.59	0.03	0.00	0.52	-0.52	-0.37	0.52	-0.34	0.9089	0.0064	-9.9	0.9	-9.9	0.9		
Math	7	2564	0	D.3.1.1	2	126959	0.84	0.08	0.84	0.05	0.04	0.00	0.35	-0.17	0.35	-0.32	-0.27	-0.7023	0.0083	-1.5	1.0	9.9	1.2		
Math	7	2576	0	D.3.1.2	2	126959	0.54	0.23	0.08	0.15	0.54	0.00	0.42	-0.33	-0.45	-0.37	0.42	1.1532	0.0064	9.9	1.0	9.0	1.0		
Math	7	2734	0	E.3.1.1	2	126959	0.76	0.12	0.76	0.10	0.02	0.00	0.23	-0.06	0.23	-0.28	-0.24	-0.0690	0.0072	9.9	1.2	9.9	2.1		
Math	7	2820	0	D.2.1.1	1	126959	0.86	0.04	0.09	0.86	0.01	0.00	0.36	-0.25	-0.28	0.36	-0.18	-0.8723	0.0086	-1.4	1.0	-8.8	0.9		
Math	7	2915	0	A.3.2.1	2	126959	0.60	0.60	0.07	0.26	0.07	0.00	0.46	0.46	-0.37	-0.41	-0.35	0.8459	0.0065	-6.3	1.0	-8.6	1.0		
Math	7	3043	0	A.1.2.1	2	126959	0.62	0.06	0.62	0.10	0.21	0.00	0.49	-0.35	0.49	-0.42	-0.43	0.7218	0.0065	-9.9	1.0	-9.9	0.9		
Math	7	3232	0	A.2.2.1	2	126959	0.67	0.19	0.67	0.06	0.07	0.00	0.39	-0.20	0.39	-0.40	-0.44	0.4416	0.0067	9.9	1.1	9.9	1.2		
Math	7	3446	0	D.1.1.1	2	126959	0.45	0.05	0.45	0.09	0.40	0.00	0.30	-0.43	0.30	-0.43	-0.20	1.6427	0.0064	9.9	1.2	9.9	1.3		
Math	7	3449	0	C.1.1.2	1	126959	0.78	0.12	0.06	0.04	0.78	0.00	0.52	-0.40	-0.41	-0.36	0.52	-0.2220	0.0074	-9.9	0.9	-9.9	0.7		
Math	7	3486	0	A.1.1.1	1	126959	0.82	0.12	0.04	0.82	0.02	0.00	0.50	-0.45	-0.29	0.50	-0.20	-0.5155	0.0079	-9.9	0.9	-9.9	0.7		
Math	7	3603	0	B.1.1.1	2	126959	0.58	0.58	0.14	0.15	0.13	0.00	0.52	0.52	-0.38	-0.42	-0.55	0.9623	0.0064	-9.9	0.9	-9.9	0.9		
Math	7	3639	0	E.2.1.1	1	126959	0.67	0.08	0.13	0.67	0.13	0.00	0.35	-0.21	-0.20	0.35	-0.37	0.4883	0.0067	9.9	1.1	9.9	1.2		
Math	7	3708	0	C.1.1.1	1	126959	0.83	0.06	0.04	0.06	0.83	0.00	0.43	-0.28	-0.29	-0.31	0.43	-0.6391	0.0081	-9.9	0.9	-9.9	0.8		
Math	7	3717	0	A.2.1.1	1	126959	0.74	0.07	0.74	0.13	0.06	0.00	0.43	-0.35	0.43	-0.29	-0.34	0.0241	0.0071	-4.4	1.0	-6.1	1.0		
Math	7	4017	0	E.3.1.2	2	126959	0.70	0.11	0.12	0.07	0.70	0.00	0.57	-0.53	-0.38	-0.44	0.57	0.2561	0.0069	-9.9	0.8	-9.9	0.7		
Math	7	4122	0	D.2.1.2	1	126959	0.88	0.06	0.88	0.04	0.01	0.00	0.42	-0.39	0.42	-0.20	-0.17	-1.1413	0.0093	-9.9	0.9	-9.9	0.8		
Math	7	4446	0	E.1.1.1	1	126959	0.58	0.58	0.07	0.08	0.27	0.00	0.32	0.32	-0.30	-0.34	-0.23	0.9329	0.0064	9.9	1.2	9.9	1.3		
Math	7	4802	0	B.2.2.1	2	126959	0.53	0.13	0.10	0.25	0.53	0.00	0.53	-0.46	-0.49	-0.48	0.53	1.2402	0.0064	-9.9	0.9	-9.9	0.9		
Math	7	4989	0	C.1.2.1	2	126959	0.77	0.77	0.07	0.09	0.07	0.00	0.48	0.48	-0.36	-0.36	-0.32	-0.1822	0.0074	-9.9	0.9	-9.9	0.8		
Math	7	5162	0	C.3.1.1	1	126959	0.82	0.03	0.13	0.02	0.82	0.00	0.39	-0.20	-0.35	-0.18	0.39	-0.5324	0.0079	-2.8	1.0	-2.3	1.0		
Math	7	5323	0	A.2.2.1	2	126959	0.76	0.76	0.17	0.04	0.03	0.00	0.45	0.45	-0.36	-0.33	-0.33	-0.0917	0.0072	-9.9	1.0	-5.8	1.0		
Math	7	5374	0	A.2.2.3	2	126959	0.66	0.16	0.14	0.66	0.05	0.00	0.50	-0.38	-0.47	0.50	-0.32	0.5354	0.0066	-9.9	0.9	-9.9	0.9		
Math	7	5536	0	A.1.2.1	1	126959	0.87	0.87	0.06	0.04	0.03	0.00	0.34	0.34	-0.14	-0.33	-0.25	-0.9966	0.0089	-4.0	1.0	8.3	1.1		
Math	7	5704	0	A.3.1.1	2	126959	0.56	0.32	0.56	0.07	0.05	0.00	0.44	-0.40	0.44	-0.35	-0.35	1.0586	0.0064	1.3	1.0	2.4	1.0		
Math	7	5769	0	D.2.1.2	1	126959	0.91	0.91	0.04	0.04	0.01	0.00	0.40	0.40	-0.27	-0.31	-0.16	-1.4348	0.0103	-9.9	0.9	-9.9	0.7		
Math	7	5864	0	A.1.1.1	2	126959	0.80	0.03	0.11	0.80	0.07	0.00	0.37	-0.17	-0.26	0.37	-0.33	-0.3728	0.0077	5.6	1.0	-2.5	1.0		
Math	7	5935	0	E.2.1.1	1	126959	0.76	0.06	0.04	0.13	0.76	0.00	0.43	-0.37	-0.27	-0.32	0.43	-0.1256	0.0073	-6.9	1.0	-9.9	0.9		
Math	7	6005	0	A.2.2.6	2	126959	0.85	0.03	0.04	0.85	0.08	0.00	0.41	-0.28	-0.34	0.41	-0.24	-0.7972	0.0085	-9.9	1.0	-9.9	0.8		
Math	7	6158	0	B.2.1.2	1	126959	0.48	0.33	0.16	0.48	0.02	0.00	0.50	-0.59	-0.31	0.50	-0.29	1.4685	0.0064	-9.9	0.9	-9.9	0.9		
Math	7	6433	0	D.3.1.1	2	126959	0.62	0.14	0.15	0.62	0.09	0.00	0.38	-0.33	-0.27	0.38	-0.34	0.7660	0.0065	9.9	1.1	9.9	1.1		
Math	7	6795	0	D.2.2.1	2	126959	0.59	0.14	0.14	0.59	0.13	0.00	0.49	-0.45	-0.36	0.49	-0.42	0.8828	0.0064	-9.9	0.9	-9.9	0.9		
Math	7	6978	0	A.3.2.1	2	126959	0.55	0.19	0.23	0.55	0.02	0.00	0.42	-0.36	-0.41	0.42	-0.25	1.1120	0.0064	9.9	1.0	6.7	1.0		
Math	7	7061	0	C.3.1.2	1	126959	0.67	0.14	0.67	0.13	0.06	0.00	0.27	-0.32	0.27	-0.13	-0.17	0.4681	0.0067	9.9	1.2	9.9	1.5		
Math	7	7104	0	D.1.1.1	2	126959	0.60	0.12	0.22	0.60	0.06	0.00	0.41	-0.35	-0.36	0.41	-0.28	0.8544	0.0065	9.9	1.1	6.9	1.0		
Math	7	7303	0	E.1.1.1	1	126959	0.72	0.06	0.10	0.11	0.72	0.00	0.46	-0.33	-0.44	-0.29	0.46	0.1756	0.0069	-9.9	1.0	-5.2	1.0		
Math	7	7343	0	A.2.1.1	2	126959	0.85	0.04	0.85	0.08	0.03	0.00	0.31	-0.26	0.31	-0.22	-0.14	-0.7913	0.0085	7.2	1.0	9.8	1.1		
Math	7	7430	0	A.1.1.1	1	126959	0.81	0.11	0.03	0.81	0.05	0.00	0.52	-0.48	-0.28	0.52	-0.27	-0.4782	0.0078	-9.9	0.9	-9.9	0.7		
Math	7	7657	0	E.1.1.1	2	126959	0.67	0.05	0.09	0.18	0.67	0.00	0.47	-0.38	-0.41	-0.36	0.47	0.4412	0.0067	-9.9	1.0	-9.9	0.9		
Math	7	8034	0	D.3.1.1	2	126959	0.70	0.06	0.08	0.16	0.70	0.00	0.51	-0.37	-0.37	-0.43	0.51	0.2742	0.0068	-9.9	0.9	-9.9	0.8		
Math	7	8038	0	E.3.1.1	1	126959	0.86	0.07	0.04	0.03	0.86	0.00	0.40	-0.32	-0.20	-0.29	0.40	-0.8470	0.0086	-9.9	0.9	-7.6	0.9		
Math	7	8328	0	B.2.1.1	2	126959	0.57	0.19	0.10	0.57	0.14	0.00	0.42	-0.45	-0.38	0.42	-0.18	1.0300	0.0064	8.8	1.0	4.5	1.0		
Math	7	8401	0	C.1.1.2	1	126959	0.87	0.04	0.06	0.87	0.03	0.00	0.41	-0.27	-0.34	0.41	-0.18	-1.0370	0.0091	-9.9	0.9	-9.9	0.8		
Math	7	8511	0	A.3.1.1	2	126959	0.40	0.40	0.30	0.23	0.07	0.00	0.42	0.42	-0.41	-0.42	-0.41	1.8859	0.0065	-2.6	1.0	9.9	1.1		
Math	7	8643	0	E.4.1.1	2	126959	0.63	0.06	0.21	0.63	0.09	0.00	0.37	-0.32	-0.25	0.37	-0.36	0.6703	0.0065	9.9	1.1	9.9	1.1		
Math	7	8811	0	C.1.2.2	1	126959	0.78	0.04	0.10	0.78	0.08	0.00	0.38	-0.27	-0.27	0.38	-0.28	-0.2449	0.0075	4.0	1.0	6.3	1.1		
Math	7	8843	0	E.3.1.3	2	126959	0.81	0.08	0.08	0.81	0.03	0.00	0.28	-0.27	-0.14	0.28	-0.17	-0.4522	0.0078	9.9	1.1	9.9	1.4		
Math	7	8982	0	C.1.1.2	1	126959	0.77	0.17	0.04	0.77	0.02	0.00	0.50	-0.43	-0.38	0.50	-0.21	-0.1827	0.0074	-9.9	0.9	-9.9	0.8		
Math	7	9801	0	D.2.1.1	2	126959	0.63	0.33	0.02	0.02	0.63	0.00	0.37	-0.33	-0.29	-0.23	0.37	0.6770	0.0065	9.9	1.1	9.9	1.1		

Appendix I: Item Statistics Multiple Choice

Item Information					Classical													Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	9803	0	D.1.1.1	1	126959	0.50	0.22	0.13	0.14	0.50	0.00	0.46	-0.48	-0.41	-0.32	0.46	1.3791	0.0064	-8.5	1.0	-4.1	1.0		
Math	7	1015	1	A.2.2.4	1	25653	0.63	0.25	0.63	0.06	0.05	0.00	0.41	-0.34	0.41	-0.44	-0.23	0.6463	0.0146	6.8	1.0	2.8	1.0	A-	A-
Math	7	1606	1	C.1.2.2	2	25653	0.76	0.76	0.07	0.10	0.08	0.00	0.41	0.41	-0.24	-0.33	-0.32	-0.0914	0.0161	-0.2	1.0	-1.3	1.0		
Math	7	2976	1	A.1.1.1	1	25653	0.46	0.08	0.46	0.40	0.06	0.00	0.41	-0.32	0.41	-0.38	-0.44	1.5741	0.0142	3.3	1.0	8.3	1.1	A-	A-
Math	7	3570	1	C.3.1.1	1	25653	0.84	0.84	0.13	0.02	0.02	0.00	0.38	0.38	-0.31	-0.21	-0.23	-0.6876	0.0182	-1.2	1.0	1.4	1.0	A+	A-
Math	7	4145	1	A.3.2.1	1	25653	0.63	0.07	0.25	0.63	0.04	0.00	0.31	-0.23	-0.27	0.31	-0.21	0.6482	0.0146	9.9	1.2	9.9	1.3	A-	A-
Math	7	4975	1	E.4.1.1	2	25653	0.49	0.19	0.49	0.18	0.14	0.00	0.32	-0.28	0.32	-0.26	-0.33	1.4144	0.0142	9.9	1.2	9.9	1.2	A-	A-
Math	7	6050	1	D.1.1.1	2	25653	0.68	0.16	0.09	0.68	0.07	0.00	0.40	-0.26	-0.37	0.40	-0.33	0.3829	0.0150	6.2	1.0	6.5	1.1		
Math	7	6586	1	D.2.1.2	1	25653	0.83	0.03	0.09	0.05	0.83	0.00	0.52	-0.29	-0.42	-0.35	0.52	-0.6413	0.0180	-9.9	0.8	-9.9	0.7	A+	B-
Math	7	6971	1	C.1.2.2	2	25653	0.77	0.11	0.77	0.06	0.06	0.00	0.40	-0.28	0.40	-0.31	-0.29	-0.2006	0.0164	-0.2	1.0	1.0	1.0	A-	A-
Math	7	7953	1	D.1.1.1	2	25653	0.71	0.20	0.04	0.71	0.05	0.00	0.55	-0.48	-0.35	0.55	-0.40	0.1952	0.0154	-9.9	0.9	-9.9	0.7	A-	A-
Math	7	9181	1	B.2.1.1	2	25653	0.33	0.42	0.33	0.13	0.12	0.00	0.32	-0.43	0.32	-0.20	-0.19	2.2729	0.0150	9.9	1.1	9.9	1.3	A-	A-
Math	7	9185	1	E.3.1.2	2	25653	0.61	0.08	0.22	0.08	0.61	0.00	0.44	-0.53	-0.25	-0.44	0.44	0.7517	0.0145	1.9	1.0	2.2	1.0	A+	A-
Math	7	1162	2	B.2.1.3	1	25267	0.60	0.07	0.15	0.60	0.18	0.00	0.54	-0.47	-0.57	0.54	-0.37	0.8646	0.0145	-9.9	0.9	-9.9	0.9	A+	A-
Math	7	1967	2	D.3.1.1	2	25267	0.68	0.05	0.68	0.21	0.05	0.00	0.50	-0.34	0.50	-0.44	-0.38	0.3891	0.0152	-9.9	0.9	-9.9	0.8	A-	A-
Math	7	2283	2	A.1.2.1	1	25267	0.63	0.14	0.08	0.63	0.14	0.00	0.52	-0.54	-0.40	0.52	-0.34	0.6901	0.0147	-9.9	0.9	-9.9	0.8		
Math	7	3594	2	E.3.1.1	2	25267	0.66	0.18	0.07	0.66	0.09	0.00	0.55	-0.53	-0.46	0.55	-0.30	0.5244	0.0149	-9.9	0.9	-9.9	0.9	A+	B-
Math	7	4387	2	D.2.2.1	2	25267	0.47	0.25	0.47	0.16	0.11	0.00	0.37	-0.40	0.37	-0.35	-0.23	1.5465	0.0143	9.9	1.1	9.9	1.1	A-	A-
Math	7	4878	2	C.3.1.2	1	25267	0.91	0.04	0.03	0.02	0.91	0.00	0.38	-0.24	-0.25	-0.23	0.38	-1.4280	0.0230	-5.9	0.9	-6.9	0.8	A+	B-
Math	7	5308	2	D.2.1.2	2	25267	0.81	0.06	0.07	0.81	0.06	0.00	0.47	-0.31	-0.36	0.47	-0.32	-0.4837	0.0176	-9.4	0.9	-9.9	0.8		
Math	7	6568	2	C.1.1.2	1	25267	0.84	0.09	0.84	0.05	0.02	0.00	0.48	-0.40	0.48	-0.32	-0.25	-0.6905	0.0185	-9.9	0.9	-9.9	0.7	A+	A-
Math	7	7069	2	D.2.1.1	1	25267	0.69	0.24	0.04	0.03	0.69	0.00	0.43	-0.35	-0.36	-0.33	0.43	0.3392	0.0152	1.5	1.0	-1.8	1.0	A+	A-
Math	7	8249	2	A.3.1.1	2	25267	0.53	0.18	0.15	0.53	0.14	0.00	0.41	-0.43	-0.36	0.41	-0.28	1.2084	0.0143	7.7	1.1	8.7	1.1	A-	A-
Math	7	8379	2	E.2.1.1	1	25267	0.87	0.04	0.06	0.87	0.03	0.00	0.31	-0.24	-0.20	0.31	-0.18	-0.9961	0.0201	0.7	1.0	5.0	1.2	A+	A-
Math	7	8741	2	E.1.1.1	2	25267	0.35	0.34	0.10	0.35	0.21	0.00	0.12	0.01	-0.29	0.12	-0.23	2.1870	0.0149	9.9	1.4	9.9	1.7	A-	A+
Math	7	40	3	E.3.1.2	2	25381	0.62	0.25	0.08	0.06	0.62	0.00	0.51	-0.41	-0.46	-0.45	0.51	0.7530	0.0146	-9.9	0.9	-7.2	0.9	A+	A-
Math	7	383	3	C.1.2.1	2	25381	0.80	0.10	0.80	0.08	0.02	0.00	0.49	-0.44	0.49	-0.32	-0.26	-0.3892	0.0172	-9.9	0.9	-9.9	0.7	A-	A-
Math	7	1355	3	B.1.1.1	2	25381	0.70	0.05	0.15	0.70	0.10	0.00	0.47	-0.38	-0.47	0.47	-0.22	0.2896	0.0153	-6.1	1.0	-5.2	0.9		
Math	7	1388	3	A.2.2.5	2	25381	0.77	0.77	0.08	0.07	0.07	0.00	0.31	0.31	-0.26	-0.19	-0.20	-0.1586	0.0164	9.9	1.1	9.9	1.3	A+	A+
Math	7	3216	3	D.3.1.2	2	25381	0.36	0.23	0.36	0.12	0.29	0.00	0.40	-0.37	0.40	-0.38	-0.45	2.1459	0.0148	-3.8	1.0	9.9	1.1	A-	A-
Math	7	3552	3	E.2.1.2	2	25381	0.71	0.13	0.12	0.71	0.04	0.00	0.18	-0.05	-0.18	0.18	-0.23	0.2062	0.0155	9.9	1.3	9.9	1.8	A+	A-
Math	7	3962	3	D.3.1.1	2	25381	0.55	0.09	0.09	0.55	0.28	0.00	0.40	-0.46	-0.33	0.40	-0.30	1.1300	0.0143	8.8	1.1	6.0	1.1		
Math	7	6336	3	B.2.2.1	2	25381	0.51	0.13	0.10	0.26	0.51	0.00	0.49	-0.45	-0.56	-0.39	0.49	1.3221	0.0143	-8.9	1.0	-5.3	1.0	A-	A-
Math	7	6346	3	A.3.1.1	2	25381	0.62	0.11	0.62	0.14	0.13	0.00	0.46	-0.45	0.46	-0.35	-0.34	0.7515	0.0146	-2.1	1.0	-3.6	1.0	A-	A-
Math	7	9458	3	C.1.1.2	1	25381	0.86	0.03	0.86	0.09	0.02	0.00	0.48	-0.25	0.48	-0.42	-0.26	-0.8556	0.0193	-9.9	0.9	-9.9	0.6	A+	A-
Math	7	9587	3	A.2.1.1	1	25381	0.74	0.74	0.16	0.07	0.04	0.00	0.27	0.27	-0.18	-0.21	-0.21	0.0620	0.0158	9.9	1.2	9.9	1.4	A+	A+
Math	7	9626	3	B.2.2.2	2	25381	0.74	0.13	0.74	0.04	0.08	0.00	0.50	-0.35	0.50	-0.37	-0.43	0.0401	0.0159	-9.9	0.9	-9.9	0.8	A-	A-
Math	7	168	4	D.2.2.1	2	25353	0.63	0.08	0.16	0.12	0.63	0.00	0.36	-0.31	-0.16	-0.41	0.36	0.6631	0.0146	9.9	1.1	9.1	1.1	A+	A-
Math	7	244	4	D.1.1.1	2	25353	0.30	0.09	0.42	0.30	0.19	0.00	0.26	-0.39	-0.27	0.26	-0.23	2.4368	0.0153	9.9	1.1	9.9	1.4	A+	A+
Math	7	372	4	B.2.1.1	2	25353	0.48	0.02	0.31	0.48	0.18	0.00	0.57	-0.40	-0.64	0.57	-0.39	1.4845	0.0142	-9.9	0.8	-9.9	0.8		
Math	7	393	4	A.2.2.1	1	25353	0.59	0.59	0.13	0.13	0.14	0.00	0.51	0.51	-0.27	-0.50	-0.53	0.8987	0.0143	-9.9	0.9	-8.0	0.9	A+	A-
Math	7	766	4	E.3.1.3	2	25353	0.67	0.13	0.10	0.67	0.10	0.00	0.45	-0.49	-0.31	0.45	-0.24	0.4500	0.0149	-3.5	1.0	0.8	1.0	A+	A-
Math	7	1803	4	E.1.1.1	2	25353	0.64	0.07	0.13	0.16	0.64	0.00	0.38	-0.21	-0.33	-0.34	0.38	0.6231	0.0147	9.1	1.1	5.6	1.1		
Math	7	2216	4	A.3.2.2	1	25353	0.28	0.04	0.66	0.28	0.02	0.00	0.18	-0.36	-0.15	0.18	-0.32	2.5657	0.0156	9.9	1.2	9.9	1.8	B-	A-
Math	7	3640	4	D.3.1.2	2	25353	0.73	0.73	0.06	0.12	0.09	0.00	0.43	0.43	-0.38	-0.35	-0.27	0.1253	0.0156	-3.0	1.0	-2.3	1.0	A-	A-
Math	7	3862	4	D.2.1.2	1	25353	0.72	0.72	0.08	0.03	0.17	0.00	0.28	0.28	-0.32	-0.24	-0.14	0.1709	0.0155	9.9	1.2	9.9	1.2	A+	A+
Math	7	4855	4	B.2.1.2	2	25353	0.62	0.16	0.62	0.13	0.09	0.00	0.36	-0.44	0.36	-0.27	-0.10	0.7456	0.0145	9.9	1.1	9.9	1.1	A+	A-
Math	7	5496	4	B.2.2.2	2	25353	0.75	0.75	0.07	0.08	0.10	0.00	0.49	0.49	-0.32	-0.45	-0.33	0.0021	0.0159	-9.9	0.9	-9.9	0.8	A+	A-
Math	7	6946	4	C.1.1.1	1	25353	0.36	0.16	0.30	0.36	0.19	0.00	0.14	-0.19	0.01	0.14	-0.29	2.1092	0.0147	9.9	1.3	9.9	1.6	A+	A-

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	2199	5	C.1.1.3	2	25305	0.20	0.33	0.08	0.20	0.39	0.00	0.12	-0.01	-0.32	0.12	-0.21	3.1285	0.0173	9.9	1.2	9.9	2.1	A-	A-
Math	7	3619	5	B.1.1.1	2	25305	0.47	0.15	0.17	0.21	0.47	0.00	0.44	-0.46	-0.44	-0.34	0.44	1.5067	0.0142	-3.8	1.0	-0.8	1.0	A-	A-
Math	7	3767	5	D.2.2.1	2	25305	0.74	0.74	0.09	0.13	0.04	0.00	0.49	0.49	-0.30	-0.44	-0.32	0.0437	0.0158	-9.9	0.9	-9.9	0.8		
Math	7	4669	5	B.2.1.3	2	25305	0.49	0.49	0.08	0.34	0.09	0.00	0.42	0.42	-0.39	-0.36	-0.39	1.4259	0.0142	-0.4	1.0	4.7	1.0	A+	B-
Math	7	5582	5	D.2.1.1	1	25305	0.61	0.61	0.14	0.18	0.07	0.00	0.39	0.39	-0.30	-0.31	-0.38	0.7789	0.0145	8.9	1.1	4.5	1.1	A+	A-
Math	7	5590	5	A.1.2.1	1	25305	0.43	0.43	0.11	0.29	0.17	0.00	0.33	0.33	-0.42	-0.26	-0.30	1.7412	0.0144	9.9	1.1	9.9	1.2	A-	A-
Math	7	5765	5	D.3.1.1	2	25305	0.53	0.21	0.17	0.53	0.09	0.00	0.35	-0.26	-0.34	0.35	-0.30	1.2322	0.0142	9.9	1.1	9.9	1.1	A-	A-
Math	7	7001	5	A.1.1.1	1	25305	0.50	0.13	0.26	0.50	0.12	0.00	0.45	-0.38	-0.46	0.45	-0.33	1.3628	0.0142	-0.5	1.0	-1.1	1.0	A-	A+
Math	7	7913	5	E.1.1.1	2	25305	0.54	0.08	0.09	0.29	0.54	0.00	0.35	-0.25	-0.27	-0.34	0.35	1.1652	0.0142	9.9	1.1	9.9	1.2	A-	A-
Math	7	8053	5	E.3.1.1	2	25305	0.19	0.19	0.11	0.55	0.15	0.00	0.08	0.08	-0.38	0.03	-0.25	3.2045	0.0176	9.9	1.2	9.9	2.4	A-	A+
Math	7	8098	5	A.2.2.6	2	25305	0.69	0.11	0.14	0.69	0.06	0.00	0.50	-0.42	-0.39	0.50	-0.34	0.3623	0.0151	-9.9	0.9	-9.9	0.8		
Math	7	8356	5	C.1.1.1	1	25305	0.84	0.04	0.84	0.09	0.03	0.00	0.42	-0.27	0.42	-0.29	-0.30	-0.6595	0.0183	-6.0	0.9	-7.2	0.8	A+	A-
Math	8	100	0	B.2.1.1	1	126750	0.74	0.10	0.74	0.11	0.05	0.00	0.44	-0.39	0.44	-0.32	-0.24	0.1530	0.0071	-3.1	1.0	-9.9	0.9		
Math	8	479	0	A.3.1.2	2	126750	0.70	0.05	0.09	0.16	0.70	0.00	0.25	-0.27	-0.25	-0.12	0.25	0.3897	0.0068	9.9	1.2	9.9	1.5		
Math	8	621	0	E.4.1.1	2	126750	0.85	0.09	0.02	0.04	0.85	0.00	0.42	-0.37	-0.22	-0.23	0.42	-0.7298	0.0086	-9.9	0.9	-9.9	0.9		
Math	8	1017	0	B.2.2.3	1	126750	0.76	0.15	0.07	0.76	0.03	0.00	0.41	-0.34	-0.31	0.41	-0.24	0.0117	0.0073	1.8	1.0	-7.8	0.9		
Math	8	1433	0	D.1.1.3	1	126750	0.89	0.03	0.89	0.05	0.03	0.00	0.47	-0.28	0.47	-0.32	-0.34	-1.0782	0.0095	-9.9	0.9	-9.9	0.7		
Math	8	1489	0	D.2.1.1	1	126750	0.68	0.68	0.11	0.14	0.07	0.00	0.39	0.39	-0.28	-0.33	-0.29	0.5026	0.0068	9.9	1.1	9.9	1.1		
Math	8	1584	0	B.1.1.3	1	126750	0.67	0.67	0.04	0.14	0.15	0.00	0.51	0.51	-0.39	-0.40	-0.45	0.5465	0.0067	-9.9	0.9	-9.9	0.9		
Math	8	1675	0	C.1.2.1	2	126750	0.64	0.03	0.07	0.64	0.25	0.00	0.50	-0.28	-0.33	0.50	-0.48	0.7131	0.0066	-9.9	0.9	-9.9	0.9		
Math	8	1769	0	B.2.1.3	2	126750	0.64	0.64	0.06	0.21	0.09	0.00	0.42	0.42	-0.32	-0.35	-0.35	0.7522	0.0066	8.3	1.0	0.7	1.0		
Math	8	1816	0	D.2.1.2	1	126750	0.74	0.14	0.07	0.06	0.74	0.00	0.48	-0.34	-0.41	-0.38	0.48	0.1499	0.0071	-9.9	0.9	-9.9	0.9		
Math	8	2114	0	B.1.1.2	2	126750	0.69	0.04	0.13	0.69	0.14	0.00	0.38	-0.28	-0.33	0.38	-0.28	0.4524	0.0068	9.9	1.1	9.9	1.1		
Math	8	2195	0	A.2.2.1	2	126750	0.77	0.15	0.77	0.05	0.02	0.00	0.55	-0.50	0.55	-0.35	-0.30	-0.0967	0.0074	-9.9	0.9	-9.9	0.7		
Math	8	2341	0	D.4.1.3	2	126750	0.82	0.04	0.07	0.07	0.82	0.00	0.54	-0.34	-0.44	-0.39	0.54	-0.4181	0.0079	-9.9	0.8	-9.9	0.7		
Math	8	2368	0	C.1.1.1	2	126750	0.72	0.72	0.18	0.06	0.04	0.00	0.35	0.35	-0.25	-0.28	-0.29	0.2851	0.0069	9.9	1.1	9.9	1.1		
Math	8	2578	0	B.2.1.2	1	126750	0.69	0.06	0.12	0.13	0.69	0.00	0.46	-0.40	-0.31	-0.38	0.46	0.4652	0.0068	-6.7	1.0	-9.9	0.9		
Math	8	2647	0	B.1.1.1	2	126750	0.63	0.07	0.15	0.14	0.63	0.00	0.51	-0.43	-0.50	-0.35	0.51	0.7765	0.0066	-9.9	0.9	-9.9	0.9		
Math	8	2873	0	A.2.1.1	1	126750	0.68	0.12	0.68	0.09	0.11	0.00	0.42	-0.31	0.42	-0.29	-0.36	0.5181	0.0067	8.7	1.0	-0.9	1.0		
Math	8	2888	0	A.1.1.1	1	126750	0.84	0.01	0.84	0.07	0.08	0.00	0.38	-0.13	0.38	-0.25	-0.33	-0.6248	0.0083	-4.4	1.0	4.6	1.1		
Math	8	3222	0	E.3.1.1	2	126750	0.70	0.15	0.07	0.70	0.08	0.00	0.48	-0.41	-0.38	0.48	-0.30	0.3796	0.0069	-9.9	1.0	-9.9	0.9		
Math	8	3287	0	A.2.2.1	2	126750	0.60	0.12	0.10	0.18	0.60	0.00	0.38	-0.25	-0.33	-0.34	0.38	0.9467	0.0065	9.9	1.1	9.9	1.1		
Math	8	3692	0	B.1.1.4	1	126750	0.74	0.16	0.74	0.06	0.04	0.00	0.42	-0.33	0.42	-0.35	-0.24	0.1302	0.0071	1.2	1.0	-7.1	1.0		
Math	8	4035	0	E.1.1.1	2	126750	0.85	0.05	0.85	0.05	0.05	0.00	0.38	-0.31	0.38	-0.26	-0.21	-0.6909	0.0085	-5.4	1.0	0.5	1.0		
Math	8	4332	0	D.1.1.3	2	126750	0.78	0.08	0.08	0.06	0.78	0.00	0.52	-0.40	-0.40	-0.35	0.52	-0.1128	0.0074	-9.9	0.9	-9.9	0.8		
Math	8	4352	0	B.2.2.1	2	126750	0.53	0.33	0.07	0.07	0.53	0.00	0.51	-0.54	-0.40	-0.30	0.51	1.3511	0.0064	-9.9	0.9	-9.9	0.9		
Math	8	4587	0	A.2.2.2	2	126750	0.49	0.49	0.24	0.12	0.15	0.00	0.30	0.30	-0.27	-0.32	-0.24	1.5345	0.0064	9.9	1.2	9.9	1.3		
Math	8	4786	0	E.4.1.1	2	126750	0.64	0.08	0.22	0.06	0.64	0.00	0.38	-0.35	-0.28	-0.35	0.38	0.7342	0.0066	9.9	1.1	9.9	1.1		
Math	8	4789	0	C.1.1.3	1	126750	0.74	0.02	0.20	0.74	0.04	0.00	0.31	-0.26	-0.20	0.31	-0.32	0.1416	0.0071	9.9	1.1	9.9	1.3		
Math	8	4961	0	E.4.1.2	2	126750	0.81	0.03	0.13	0.81	0.02	0.00	0.48	-0.29	-0.43	0.48	-0.23	-0.3400	0.0078	-9.9	0.9	-9.9	0.8		
Math	8	4968	0	E.1.1.3	2	126750	0.63	0.63	0.06	0.05	0.26	0.00	0.35	0.35	-0.34	-0.29	-0.27	0.7940	0.0066	9.9	1.1	9.9	1.2		
Math	8	5335	0	A.3.1.1	2	126750	0.53	0.09	0.35	0.53	0.04	0.00	0.42	-0.47	-0.36	0.42	-0.33	1.3395	0.0064	9.9	1.0	9.9	1.1		
Math	8	5392	0	E.3.1.1	2	126750	0.84	0.05	0.84	0.10	0.01	0.00	0.42	-0.33	0.42	-0.30	-0.23	-0.5988	0.0083	-9.9	0.9	-4.8	1.0		
Math	8	5601	0	D.2.2.1	1	126750	0.64	0.05	0.22	0.10	0.64	0.00	0.46	-0.39	-0.36	-0.42	0.46	0.7616	0.0066	-6.8	1.0	-7.0	1.0		
Math	8	5693	0	C.3.1.1	1	126750	0.80	0.80	0.14	0.01	0.05	0.00	0.42	0.42	-0.39	-0.23	-0.24	-0.2457	0.0076	-8.4	1.0	-1.2	1.0		
Math	8	5721	0	A.3.2.1	2	126750	0.70	0.09	0.06	0.15	0.70	0.00	0.47	-0.30	-0.35	-0.42	0.47	0.4012	0.0068	-9.9	1.0	-9.9	0.9		
Math	8	5904	0	C.3.1.1	1	126750	0.76	0.03	0.17	0.04	0.76	0.00	0.35	-0.29	-0.27	-0.23	0.35	0.0027	0.0073	9.9	1.1	9.9	1.2		
Math	8	6014	0	E.3.2.1	2	126750	0.54	0.20	0.05	0.54	0.21	0.00	0.36	-0.37	-0.44	0.36	-0.21	1.2977	0.0064	9.9	1.1	9.9	1.1		
Math	8	6382	0	D.2.1.3	1	126750	0.88	0.88	0.04	0.08	0.01	0.00	0.41	0.41	-0.35	-0.28	-0.17	-1.0147	0.0093	-9.9	0.9	-9.9	0.8		

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	6805	0	D.2.2.1	1	126750	0.66	0.19	0.66	0.07	0.09	0.00	0.45	-0.29	0.45	-0.44	-0.42	0.6334	0.0067	-2.1	1.0	-5.5	1.0		
Math	8	6901	0	D.1.1.1	2	126750	0.68	0.68	0.16	0.07	0.09	0.00	0.54	0.54	-0.51	-0.32	-0.42	0.5286	0.0067	-9.9	0.9	-9.9	0.8		
Math	8	6929	0	D.4.1.2	2	126750	0.69	0.69	0.10	0.07	0.14	0.00	0.41	0.41	-0.31	-0.36	-0.29	0.4724	0.0068	9.9	1.0	7.7	1.1		
Math	8	6960	0	D.4.1.1	1	126750	0.72	0.08	0.13	0.72	0.07	0.00	0.43	-0.31	-0.34	0.43	-0.34	0.2710	0.0070	-0.1	1.0	-1.9	1.0		
Math	8	7243	0	A.1.1.1	1	126750	0.77	0.12	0.77	0.07	0.04	0.00	0.42	-0.35	0.42	-0.33	-0.19	-0.0614	0.0074	-3.9	1.0	-2.4	1.0		
Math	8	7371	0	D.4.1.3	1	126750	0.86	0.06	0.03	0.86	0.05	0.00	0.46	-0.32	-0.31	0.46	-0.33	-0.8362	0.0088	-9.9	0.9	-9.9	0.7		
Math	8	7496	0	E.4.1.1	1	126750	0.87	0.08	0.02	0.03	0.87	0.00	0.35	-0.24	-0.23	-0.26	0.35	-0.9329	0.0091	-2.4	1.0	-5.2	0.9		
Math	8	7547	0	C.1.1.1	2	126750	0.78	0.09	0.78	0.08	0.06	0.00	0.35	-0.24	0.35	-0.29	-0.22	-0.1165	0.0074	9.9	1.1	9.9	1.1		
Math	8	7582	0	C.1.2.1	2	126750	0.68	0.17	0.68	0.08	0.07	0.00	0.41	-0.37	0.41	-0.16	-0.42	0.5275	0.0067	9.9	1.0	2.5	1.0		
Math	8	7715	0	E.3.1.1	2	126750	0.65	0.65	0.05	0.13	0.18	0.00	0.44	0.44	-0.42	-0.41	-0.30	0.6872	0.0066	1.2	1.0	8.9	1.1		
Math	8	7946	0	D.1.1.2	1	126750	0.86	0.06	0.05	0.86	0.03	0.00	0.49	-0.37	-0.37	0.49	-0.25	-0.7901	0.0087	-9.9	0.9	-9.9	0.7		
Math	8	8106	0	D.4.1.3	2	126750	0.80	0.05	0.80	0.10	0.05	0.00	0.48	-0.37	0.48	-0.34	-0.34	-0.2907	0.0077	-9.9	0.9	-9.9	0.8		
Math	8	8623	0	A.3.2.1	1	126750	0.81	0.05	0.05	0.81	0.08	0.00	0.36	-0.16	-0.27	0.36	-0.30	-0.3822	0.0079	8.5	1.0	1.3	1.0		
Math	8	8697	0	C.1.1.2	1	126750	0.82	0.82	0.08	0.08	0.01	0.00	0.40	0.40	-0.31	-0.28	-0.22	-0.4689	0.0080	-1.5	1.0	-9.9	0.9		
Math	8	8715	0	B.2.2.2	1	126750	0.74	0.10	0.08	0.09	0.74	0.00	0.35	-0.29	-0.28	-0.18	0.35	0.1615	0.0071	9.9	1.1	9.7	1.1		
Math	8	8716	0	B.1.1.4	1	126750	0.75	0.06	0.75	0.08	0.10	0.00	0.46	-0.27	0.46	-0.37	-0.36	0.0494	0.0072	-9.9	1.0	-9.9	0.9		
Math	8	9134	0	D.2.2.2	2	126750	0.74	0.11	0.74	0.08	0.07	0.00	0.43	-0.26	0.43	-0.37	-0.32	0.1261	0.0071	0.3	1.0	-9.1	0.9		
Math	8	9180	0	C.1.1.2	2	126750	0.70	0.07	0.07	0.17	0.70	0.00	0.42	-0.31	-0.35	-0.32	0.42	0.3990	0.0068	6.4	1.0	6.6	1.0		
Math	8	9182	0	C.1.2.1	1	126750	0.59	0.09	0.59	0.28	0.04	0.00	0.52	-0.35	0.52	-0.53	-0.33	1.0189	0.0064	-9.9	0.9	-9.9	0.8		
Math	8	9356	0	C.1.1.3	2	126750	0.74	0.04	0.74	0.07	0.15	0.00	0.46	-0.32	0.46	-0.34	-0.38	0.1573	0.0071	-9.9	1.0	-9.9	0.9		
Math	8	9382	0	C.3.1.1	1	126750	0.82	0.82	0.01	0.14	0.04	0.00	0.35	0.35	-0.16	-0.27	-0.30	-0.4049	0.0079	7.7	1.0	9.9	1.2		
Math	8	9507	0	D.2.1.1	1	126750	0.86	0.04	0.05	0.86	0.05	0.00	0.41	-0.30	-0.24	0.41	-0.29	-0.8281	0.0088	-9.9	0.9	-6.0	0.9		
Math	8	9607	0	A.3.3.1	2	126750	0.80	0.05	0.09	0.06	0.80	0.00	0.35	-0.25	-0.26	-0.23	0.35	-0.2993	0.0077	9.9	1.1	9.9	1.2		
Math	8	1481	1	E.1.1.2	2	25664	0.73	0.06	0.14	0.73	0.06	0.00	0.48	-0.38	-0.42	0.48	-0.28	0.1452	0.0157	-8.6	0.9	-5.5	0.9	A-	B-
Math	8	1667	1	D.4.1.2	1	25664	0.92	0.92	0.02	0.03	0.03	0.00	0.37	0.37	-0.25	-0.21	-0.25	-1.5108	0.0239	-5.5	0.9	-6.5	0.8	A+	A-
Math	8	2021	1	C.1.1.2	2	25664	0.74	0.74	0.20	0.03	0.02	0.00	0.32	0.32	-0.24	-0.24	-0.25	0.1008	0.0159	9.9	1.1	9.9	1.2		
Math	8	2773	1	A.2.1.1	1	25664	0.82	0.13	0.82	0.03	0.01	0.00	0.27	-0.16	0.27	-0.27	-0.20	-0.5066	0.0179	9.9	1.1	9.9	1.4		
Math	8	3328	1	B.2.1.1	1	25664	0.71	0.13	0.71	0.07	0.09	0.00	0.46	-0.44	0.46	-0.30	-0.29	0.3204	0.0153	-3.5	1.0	-7.1	0.9	A-	A-
Math	8	3519	1	D.2.1.1	1	25664	0.86	0.04	0.05	0.04	0.86	0.00	0.41	-0.35	-0.29	-0.20	0.41	-0.8738	0.0197	-6.6	0.9	-2.2	0.9	B+	A-
Math	8	4182	1	D.2.1.3	1	25664	0.87	0.05	0.06	0.87	0.03	0.00	0.48	-0.36	-0.34	0.48	-0.26	-0.9120	0.0199	-9.9	0.9	-9.9	0.7	B+	A-
Math	8	4969	1	A.1.1.2	1	25664	0.89	0.89	0.04	0.03	0.04	0.00	0.34	0.34	-0.25	-0.22	-0.19	-1.1039	0.0210	-0.4	1.0	-3.1	0.9	A-	B+
Math	8	6859	1	D.1.1.1	2	25664	0.68	0.05	0.68	0.10	0.17	0.00	0.48	-0.21	0.48	-0.36	-0.48	0.4955	0.0150	-7.0	1.0	-8.1	0.9	A-	A-
Math	8	9219	1	A.3.1.2	2	25664	0.83	0.04	0.08	0.83	0.05	0.00	0.38	-0.24	-0.28	0.38	-0.25	-0.5718	0.0182	0.0	1.0	0.6	1.0	A+	C-
Math	8	9360	1	C.1.1.1	2	25664	0.41	0.41	0.08	0.38	0.13	0.00	0.30	0.30	-0.30	-0.24	-0.40	1.9462	0.0144	9.9	1.2	9.9	1.3	A+	A-
Math	8	9562	1	E.3.2.1	2	25664	0.40	0.12	0.06	0.42	0.40	0.00	0.35	-0.55	-0.39	-0.27	0.35	1.9913	0.0145	9.9	1.1	9.9	1.2	A+	A-
Math	8	2758	2	A.2.1.1	1	25308	0.63	0.19	0.07	0.11	0.63	0.00	0.48	-0.36	-0.47	-0.41	0.48	0.7982	0.0147	-6.4	1.0	-8.2	0.9	A-	A-
Math	8	3774	2	A.3.1.1	2	25308	0.75	0.06	0.08	0.10	0.75	0.00	0.47	-0.39	-0.37	-0.30	0.47	0.0567	0.0162	-6.9	0.9	-8.1	0.9	A+	A-
Math	8	4213	2	E.1.1.1	2	25308	0.96	0.96	0.01	0.02	0.01	0.00	0.28	0.28	-0.16	-0.19	-0.15	-2.3241	0.0333	-2.3	0.9	-5.4	0.7	A+	B-
Math	8	4903	2	A.1.1.1	1	25308	0.78	0.12	0.06	0.78	0.04	0.00	0.46	-0.37	-0.31	0.46	-0.32	-0.1474	0.0168	-7.0	0.9	-7.0	0.9	A+	A+
Math	8	5004	2	C.1.1.3	2	25308	0.73	0.08	0.15	0.73	0.04	0.00	0.37	-0.25	-0.31	0.37	-0.25	0.2197	0.0157	8.1	1.1	5.0	1.1	A-	A-
Math	8	5313	2	C.3.1.1	1	25308	0.85	0.08	0.06	0.85	0.02	0.00	0.39	-0.30	-0.29	0.39	-0.19	-0.6759	0.0190	-3.0	1.0	-2.7	0.9	A-	B-
Math	8	6226	2	D.2.1.2	1	25308	0.79	0.09	0.07	0.04	0.79	0.00	0.50	-0.35	-0.41	-0.33	0.50	-0.2063	0.0170	-9.9	0.9	-9.9	0.8	A+	A-
Math	8	7181	2	E.3.1.1	2	25308	0.66	0.22	0.66	0.09	0.03	0.00	0.23	-0.10	0.23	-0.29	-0.26	0.6377	0.0149	9.9	1.3	9.9	1.5	A-	A-
Math	8	7422	2	E.4.1.2	2	25308	0.50	0.06	0.35	0.50	0.09	0.00	0.26	-0.43	-0.19	0.26	-0.23	1.4747	0.0143	9.9	1.2	9.9	1.3	A-	A-
Math	8	8764	2	B.1.1.4	1	25308	0.74	0.17	0.74	0.07	0.02	0.00	0.41	-0.30	0.41	-0.33	-0.29	0.1487	0.0159	3.3	1.0	-0.6	1.0	A+	A+
Math	8	9548	2	D.1.1.3	2	25308	0.85	0.04	0.05	0.06	0.85	0.00	0.54	-0.39	-0.35	-0.41	0.54	-0.6606	0.0189	-9.9	0.8	-9.9	0.6		
Math	8	9828	2	B.2.2.3	1	25308	0.73	0.17	0.73	0.08	0.02	0.00	0.40	-0.30	0.40	-0.35	-0.22	0.2289	0.0157	5.1	1.0	-0.8	1.0		
Math	8	1044	3	D.2.1.2	1	25255	0.68	0.05	0.06	0.21	0.68	0.00	0.48	-0.42	-0.49	-0.35	0.48	0.5145	0.0151	-7.1	1.0	-6.1	0.9	A+	A-
Math	8	2167	3	B.1.1.2	2	25255	0.88	0.02	0.04	0.88	0.05	0.00	0.43	-0.32	-0.32	0.43	-0.24	-1.0309	0.0210	-8.0	0.9	-5.7	0.8	A-	A-

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	3521	3	C.1.1.2	2	25255	0.57	0.57	0.14	0.23	0.06	0.00	0.42	0.42	-0.39	-0.34	-0.37	1.1001	0.0144	4.7	1.0	3.1	1.0	A+	A-
Math	8	3882	3	E.4.1.2	2	25255	0.69	0.10	0.69	0.11	0.10	0.00	0.55	-0.40	0.55	-0.40	-0.51	0.4862	0.0152	-9.9	0.9	-9.9	0.8		
Math	8	4533	3	B.2.2.1	1	25255	0.61	0.08	0.25	0.06	0.61	0.00	0.53	-0.55	-0.48	-0.33	0.53	0.9019	0.0146	-9.9	0.9	-9.9	0.9	A+	A-
Math	8	5003	3	C.1.2.1	2	25255	0.69	0.10	0.69	0.12	0.08	0.00	0.40	-0.39	0.40	-0.32	-0.19	0.4360	0.0153	6.3	1.1	0.5	1.0	A+	A+
Math	8	5787	3	D.2.2.1	2	25255	0.37	0.30	0.37	0.18	0.14	0.00	0.19	-0.09	0.19	-0.28	-0.24	2.1450	0.0147	9.9	1.3	9.9	1.6	A+	A-
Math	8	6916	3	A.3.2.1	2	25255	0.52	0.07	0.32	0.52	0.10	0.00	0.22	-0.27	-0.11	0.22	-0.33	1.3858	0.0143	9.9	1.3	9.9	1.4	A-	A-
Math	8	8024	3	A.2.2.2	2	25255	0.68	0.07	0.68	0.07	0.19	0.00	0.49	-0.36	0.49	-0.40	-0.41	0.5422	0.0151	-9.3	0.9	-9.9	0.9	A-	A-
Math	8	9059	3	D.4.1.1	1	25255	0.65	0.65	0.07	0.20	0.08	0.00	0.35	0.35	-0.39	-0.22	-0.29	0.7225	0.0148	9.9	1.1	9.9	1.2		
Math	8	9793	3	D.1.1.2	2	25255	0.55	0.08	0.16	0.21	0.55	0.00	0.43	-0.40	-0.37	-0.37	0.43	1.2413	0.0143	1.8	1.0	1.3	1.0	A-	A+
Math	8	9820	3	E.1.1.3	2	25255	0.47	0.47	0.33	0.07	0.13	0.00	0.37	0.37	-0.28	-0.42	-0.44	1.6237	0.0143	9.9	1.1	9.9	1.2	A-	A-
Math	8	683	4	D.2.2.1	2	25240	0.51	0.30	0.05	0.51	0.14	0.00	0.37	-0.30	-0.44	0.37	-0.34	1.4434	0.0143	9.9	1.1	9.9	1.1	A+	A-
Math	8	1639	4	D.4.1.3	2	25240	0.87	0.06	0.05	0.87	0.03	0.00	0.53	-0.39	-0.40	0.53	-0.30	-0.8448	0.0198	-9.9	0.8	-9.9	0.6	A+	A-
Math	8	2028	4	A.2.2.1	2	25240	0.55	0.24	0.55	0.05	0.15	0.00	0.28	-0.31	0.28	-0.37	-0.08	1.2060	0.0143	9.9	1.2	9.9	1.3	A-	A-
Math	8	3911	4	B.1.1.1	2	25240	0.55	0.55	0.09	0.31	0.05	0.00	0.33	0.33	-0.32	-0.25	-0.31	1.1987	0.0143	9.9	1.2	9.9	1.2	A-	A-
Math	8	4659	4	D.1.1.2	2	25240	0.73	0.05	0.73	0.17	0.04	0.00	0.45	-0.32	0.45	-0.37	-0.31	0.1727	0.0158	-3.5	1.0	-7.4	0.9		
Math	8	5732	4	D.2.1.1	1	25240	0.74	0.74	0.11	0.09	0.06	0.00	0.47	0.47	-0.36	-0.38	-0.31	0.1313	0.0159	-7.0	1.0	-9.5	0.9	A+	A-
Math	8	6778	4	B.2.1.2	2	25240	0.58	0.27	0.10	0.58	0.04	0.00	0.46	-0.44	-0.36	0.46	-0.30	1.0576	0.0144	-3.2	1.0	-3.5	1.0	A-	A+
Math	8	7000	4	E.3.1.1	2	25240	0.70	0.13	0.10	0.06	0.70	0.00	0.59	-0.55	-0.45	-0.39	0.59	0.3740	0.0154	-9.9	0.8	-9.9	0.7		
Math	8	7587	4	A.3.2.1	2	25240	0.60	0.16	0.60	0.17	0.07	0.00	0.26	-0.21	0.26	-0.20	-0.20	0.9336	0.0145	9.9	1.2	9.9	1.3	A-	A-
Math	8	7974	4	E.4.1.1	1	25240	0.75	0.75	0.05	0.11	0.08	0.00	0.42	0.42	-0.30	-0.34	-0.29	0.0632	0.0161	0.1	1.0	-3.0	1.0	A-	A-
Math	8	8604	4	C.1.1.3	1	25240	0.51	0.10	0.51	0.18	0.21	0.00	0.34	-0.32	0.34	-0.27	-0.32	1.4327	0.0143	9.9	1.1	9.9	1.2	A-	A-
Math	8	8735	4	C.1.1.1	2	25240	0.86	0.02	0.86	0.09	0.03	0.00	0.28	-0.14	0.28	-0.21	-0.21	-0.7428	0.0193	5.7	1.1	8.2	1.2	A+	A-
Math	8	436	5	B.2.2.2	2	25283	0.43	0.24	0.43	0.28	0.06	0.00	0.36	-0.40	0.36	-0.31	-0.28	1.8497	0.0143	6.5	1.0	9.9	1.2	A-	A-
Math	8	1546	5	D.4.1.1	1	25283	0.65	0.07	0.09	0.18	0.65	0.00	0.48	-0.34	-0.30	-0.48	0.48	0.6692	0.0148	-8.1	1.0	-7.7	0.9	A+	A+
Math	8	2964	5	E.1.1.3	2	25283	0.70	0.05	0.70	0.13	0.12	0.00	0.48	-0.35	0.48	-0.36	-0.41	0.4296	0.0152	-8.0	0.9	-7.1	0.9	A+	A-
Math	8	3134	5	A.3.1.1	2	25283	0.72	0.23	0.72	0.03	0.02	0.00	0.43	-0.39	0.43	-0.28	-0.29	0.2986	0.0155	-1.1	1.0	-4.6	0.9		
Math	8	4297	5	D.1.1.3	2	25283	0.81	0.06	0.08	0.05	0.81	0.00	0.52	-0.33	-0.43	-0.37	0.52	-0.2998	0.0173	-9.9	0.9	-9.9	0.7	A+	A+
Math	8	5857	5	C.1.2.1	1	25283	0.69	0.08	0.69	0.05	0.18	0.00	0.47	-0.35	0.47	-0.30	-0.42	0.4880	0.0151	-6.5	1.0	-9.8	0.9		
Math	8	7095	5	C.1.1.2	1	25283	0.52	0.18	0.20	0.52	0.11	0.00	0.32	-0.31	-0.24	0.32	-0.32	1.3776	0.0142	9.9	1.1	9.9	1.2	A-	A-
Math	8	7173	5	D.2.1.3	1	25283	0.75	0.75	0.12	0.08	0.05	0.00	0.40	0.40	-0.35	-0.21	-0.33	0.1192	0.0160	1.9	1.0	2.9	1.1	A+	A+
Math	8	7226	5	A.3.2.1	2	25283	0.37	0.37	0.18	0.34	0.11	0.00	0.26	0.26	-0.37	-0.12	-0.45	2.1663	0.0147	9.9	1.2	9.9	1.4	A-	A-
Math	8	7731	5	D.2.2.2	2	25283	0.28	0.28	0.23	0.34	0.14	0.00	0.10	0.10	-0.12	-0.02	-0.26	2.6540	0.0155	9.9	1.3	9.9	1.9	A+	A+
Math	8	8325	5	E.1.1.1	2	25283	0.79	0.79	0.02	0.09	0.10	0.00	0.31	0.31	-0.26	-0.26	-0.17	-0.1575	0.0168	9.9	1.1	9.7	1.2	A-	A-
Math	8	9642	5	B.1.1.3	2	25283	0.67	0.09	0.19	0.67	0.05	0.00	0.48	-0.40	-0.46	0.48	-0.21	0.5725	0.0150	-8.7	0.9	-7.8	0.9	A-	A-
Math	11	11	0	B.2.2.3	2	127794	0.55	0.08	0.55	0.24	0.13	0.00	0.24	-0.31	0.24	-0.12	-0.22	0.5351	0.0064	9.9	1.3	9.9	1.3		
Math	11	121	0	A.1.3.2	1	127794	0.62	0.05	0.26	0.07	0.62	0.00	0.43	-0.42	-0.34	-0.38	0.43	0.1707	0.0065	5.3	1.0	7.6	1.0		
Math	11	624	0	C.3.1.2	2	127794	0.66	0.07	0.11	0.16	0.66	0.00	0.51	-0.38	-0.38	-0.45	0.51	-0.0209	0.0066	-9.9	0.9	-9.9	0.8		
Math	11	738	0	B.2.1.1	1	127794	0.72	0.09	0.15	0.72	0.03	0.00	0.35	-0.28	-0.25	0.35	-0.26	-0.4220	0.0069	9.9	1.1	9.9	1.2		
Math	11	763	0	D.1.1.2	1	127794	0.66	0.08	0.18	0.08	0.66	0.00	0.40	-0.36	-0.32	-0.27	0.40	-0.0286	0.0066	9.9	1.0	8.8	1.1		
Math	11	849	0	B.2.2.1	1	127794	0.72	0.11	0.72	0.11	0.05	0.00	0.40	-0.37	0.40	-0.28	-0.23	-0.4082	0.0069	4.9	1.0	3.7	1.0		
Math	11	1176	0	C.1.2.3	2	127794	0.77	0.14	0.06	0.77	0.03	0.00	0.54	-0.48	-0.36	0.54	-0.29	-0.7163	0.0073	-9.9	0.8	-9.9	0.8		
Math	11	1213	0	D.3.2.3	1	127794	0.67	0.14	0.67	0.05	0.14	0.00	0.34	-0.21	0.34	-0.30	-0.28	-0.1055	0.0066	9.9	1.1	9.9	1.1		
Math	11	1602	0	D.4.1.1	1	127794	0.74	0.09	0.10	0.07	0.74	0.00	0.51	-0.41	-0.40	-0.33	0.51	-0.5096	0.0070	-9.9	0.9	-9.9	0.8		
Math	11	1685	0	C.3.1.1	1	127794	0.70	0.10	0.04	0.17	0.70	0.00	0.47	-0.36	-0.38	-0.38	0.47	-0.2687	0.0068	-9.9	1.0	-9.9	0.9		
Math	11	1963	0	E.2.1.1	1	127794	0.87	0.04	0.87	0.04	0.05	0.00	0.44	-0.29	0.44	-0.24	-0.35	-1.4873	0.0087	-9.9	0.9	-9.9	0.8		
Math	11	2057	0	D.2.2.2	1	127794	0.72	0.72	0.09	0.11	0.08	0.00	0.55	0.55	-0.43	-0.42	-0.43	-0.4071	0.0069	-9.9	0.9	-9.9	0.7		
Math	11	2080	0	D.2.2.1	1	127794	0.77	0.08	0.06	0.77	0.08	0.00	0.48	-0.33	-0.40	0.48	-0.33	-0.7492	0.0073	-9.9	0.9	-9.9	0.8		
Math	11	2298	0	D.3.2.3	1	127794	0.77	0.77	0.06	0.09	0.08	0.00	0.49	0.49	-0.39	-0.37	-0.33	-0.6861	0.0072	-9.9	0.9	-9.9	0.8		
Math	11	2401	0	D.2.1.4	2	127794	0.66	0.09	0.14	0.11	0.66	0.00	0.43	-0.23	-0.40	-0.35	0.43	-0.0270	0.0066	4.1	1.0	-2.1	1.0		

Appendix I: Item Statistics Multiple Choice

Item Information					Classical												Rasch		Infit		Outfit		DIF		
Cont	Grade	PubID	Form	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	2511	0	E.2.1.1	1	127794	0.77	0.03	0.09	0.77	0.11	0.00	0.35	-0.20	-0.29	0.35	-0.25	-0.6938	0.0073	9.9	1.1	9.9	1.2		
Math	11	2573	0	B.2.3.1	2	127794	0.77	0.09	0.05	0.77	0.08	0.00	0.27	-0.32	-0.24	0.27	-0.02	-0.7412	0.0073	9.9	1.1	9.9	1.4		
Math	11	2739	0	E.1.1.1	2	127794	0.62	0.26	0.62	0.08	0.05	0.00	0.30	-0.25	0.30	-0.27	-0.22	0.1710	0.0065	9.9	1.2	9.9	1.3		
Math	11	3284	0	E.4.2.2	2	127794	0.86	0.03	0.05	0.86	0.05	0.00	0.28	-0.27	-0.15	0.28	-0.15	-1.4832	0.0087	6.3	1.0	9.9	1.3		
Math	11	3314	0	D.4.1.1	1	127794	0.84	0.05	0.02	0.08	0.84	0.00	0.42	-0.29	-0.27	-0.31	0.42	-1.2931	0.0083	-9.9	0.9	-9.9	0.8		
Math	11	3445	0	E.2.1.2	1	127794	0.73	0.73	0.13	0.07	0.07	0.00	0.23	0.23	-0.15	-0.18	-0.19	-0.4286	0.0069	9.9	1.2	9.9	1.5		
Math	11	3475	0	C.1.2.3	2	127794	0.73	0.73	0.11	0.08	0.09	0.00	0.47	0.47	-0.45	-0.30	-0.28	-0.4532	0.0070	-9.9	0.9	-9.9	0.9		
Math	11	3677	0	D.2.1.5	2	127794	0.69	0.05	0.15	0.69	0.12	0.00	0.41	-0.34	-0.30	0.41	-0.32	-0.1848	0.0067	9.3	1.0	7.1	1.1		
Math	11	3760	0	A.3.2.1	1	127794	0.50	0.10	0.50	0.28	0.12	0.00	0.41	-0.31	0.41	-0.41	-0.34	0.8174	0.0063	9.9	1.0	9.9	1.0		
Math	11	3982	0	D.2.1.2	1	127794	0.73	0.10	0.73	0.10	0.07	0.00	0.48	-0.30	0.48	-0.40	-0.39	-0.4611	0.0070	-9.9	0.9	-9.9	0.9		
Math	11	4261	0	D.2.1.5		127794	0.60	0.11	0.19	0.60	0.10	0.00	0.44	-0.37	-0.36	0.44	-0.37	0.3125	0.0064	-1.5	1.0	-9.9	1.0		
Math	11	4266	0	D.2.2.1	1	127794	0.74	0.05	0.11	0.10	0.74	0.00	0.49	-0.33	-0.41	-0.35	0.49	-0.5146	0.0070	-9.9	0.9	-9.9	0.8		
Math	11	4584	0	E.3.1.2	2	127794	0.55	0.14	0.24	0.55	0.07	0.00	0.24	-0.22	-0.21	0.24	-0.15	0.5713	0.0064	9.9	1.3	9.9	1.4		
Math	11	4652	0	E.4.1.2	2	127794	0.86	0.08	0.86	0.04	0.03	0.00	0.47	-0.38	0.47	-0.28	-0.28	-1.3961	0.0085	-9.9	0.9	-9.9	0.7		
Math	11	4974	0	D.1.1.3	1	127794	0.73	0.03	0.21	0.73	0.03	0.00	0.46	-0.29	-0.42	0.46	-0.21	-0.4484	0.0070	-9.9	1.0	-9.9	0.9		
Math	11	5134	0	B.2.1.1	1	127794	0.73	0.10	0.73	0.09	0.08	0.00	0.45	-0.20	0.45	-0.42	-0.40	-0.4629	0.0070	-9.9	1.0	-6.7	1.0		
Math	11	5188	0	D.2.2.2	2	127794	0.82	0.82	0.04	0.13	0.01	0.00	0.47	0.47	-0.28	-0.42	-0.22	-1.0772	0.0079	-9.9	0.9	-9.9	0.7		
Math	11	5330	0	D.2.2.2	1	127794	0.70	0.09	0.14	0.70	0.06	0.00	0.45	-0.33	-0.35	0.45	-0.35	-0.2823	0.0068	-9.9	1.0	-9.9	0.9		
Math	11	5542	0	E.2.1.1	1	127794	0.81	0.05	0.81	0.07	0.07	0.00	0.43	-0.36	0.43	-0.26	-0.30	-1.0047	0.0077	-9.9	0.9	-8.1	0.9		
Math	11	5600	0	D.2.1.3	2	127794	0.70	0.11	0.16	0.70	0.03	0.00	0.41	-0.31	-0.37	0.41	-0.17	-0.2737	0.0068	6.7	1.0	9.9	1.1		
Math	11	5735	0	D.1.1.3	1	127794	0.72	0.72	0.13	0.06	0.09	0.00	0.44	0.44	-0.28	-0.34	-0.38	-0.4128	0.0069	-6.4	1.0	-4.7	1.0		
Math	11	5750	0	A.1.1.1	1	127794	0.81	0.06	0.81	0.09	0.04	0.00	0.42	-0.23	0.42	-0.35	-0.30	-1.0192	0.0078	-9.9	1.0	-9.9	0.8		
Math	11	5945	0	A.3.1.1	1	127794	0.82	0.02	0.03	0.82	0.14	0.00	0.38	-0.19	-0.23	0.38	-0.32	-1.0568	0.0078	-0.9	1.0	-1.7	1.0		
Math	11	6170	0	E.3.1.1	2	127794	0.71	0.71	0.08	0.04	0.17	0.00	0.50	0.50	-0.33	-0.38	-0.44	-0.3100	0.0068	-9.9	0.9	-9.9	0.9		
Math	11	6267	0	B.2.2.4	1	127794	0.66	0.18	0.66	0.06	0.10	0.00	0.51	-0.40	0.51	-0.33	-0.50	-0.0600	0.0066	-9.9	0.9	-9.9	0.9		
Math	11	6295	0	B.2.2.2	2	127794	0.70	0.12	0.08	0.70	0.11	0.00	0.55	-0.42	-0.43	0.55	-0.46	-0.2506	0.0068	-9.9	0.9	-9.9	0.8		
Math	11	6306	0	A.3.1.1	1	127794	0.55	0.05	0.55	0.06	0.33	0.00	0.36	-0.35	0.36	-0.37	-0.28	0.5376	0.0064	9.9	1.1	9.9	1.1		
Math	11	6435	0	C.3.1.1	1	127794	0.71	0.12	0.71	0.09	0.08	0.00	0.44	-0.23	0.44	-0.45	-0.35	-0.3215	0.0068	-5.8	1.0	0.2	1.0		
Math	11	6685	0	C.1.1.1	2	127794	0.80	0.10	0.80	0.08	0.02	0.00	0.36	-0.23	0.36	-0.35	-0.16	-0.9606	0.0077	1.5	1.0	9.9	1.2		
Math	11	6764	0	D.3.2.1	2	127794	0.72	0.04	0.19	0.72	0.06	0.00	0.42	-0.31	-0.34	0.42	-0.30	-0.3761	0.0069	0.2	1.0	-3.3	1.0		
Math	11	7143	0	E.4.1.2	2	127794	0.61	0.26	0.61	0.09	0.04	0.00	0.40	-0.34	0.40	-0.33	-0.25	0.2111	0.0065	9.9	1.1	5.4	1.0		
Math	11	7368	0	D.1.1.1	2	127794	0.68	0.22	0.04	0.68	0.07	0.00	0.51	-0.46	-0.39	0.51	-0.31	-0.1397	0.0067	-9.9	0.9	-9.9	0.9		
Math	11	7532	0	B.2.2.4	2	127794	0.77	0.77	0.03	0.03	0.16	0.00	0.31	0.31	-0.28	-0.30	-0.18	-0.7486	0.0073	9.9	1.1	9.5	1.1		
Math	11	7592	0	C.1.4.1	2	127794	0.70	0.70	0.12	0.11	0.06	0.00	0.45	0.45	-0.32	-0.44	-0.23	-0.2861	0.0068	-8.3	1.0	-9.9	0.9		
Math	11	7829	0	A.2.2.1	1	127794	0.64	0.11	0.17	0.64	0.08	0.00	0.41	-0.37	-0.32	0.41	-0.26	0.0874	0.0065	9.9	1.0	-6.2	1.0		
Math	11	7845	0	D.3.2.1	1	127794	0.72	0.72	0.05	0.09	0.14	0.00	0.41	0.41	-0.34	-0.39	-0.23	-0.3775	0.0069	4.1	1.0	6.9	1.1		
Math	11	8039	0	B.2.2.1	2	127794	0.86	0.04	0.05	0.05	0.86	0.00	0.44	-0.27	-0.32	-0.31	0.44	-1.4293	0.0086	-9.9	0.9	-3.6	1.0		
Math	11	8261	0	A.3.1.1	1	127794	0.64	0.08	0.64	0.24	0.05	0.00	0.37	-0.30	0.37	-0.32	-0.22	0.0773	0.0065	9.9	1.1	9.9	1.1		
Math	11	8370	0	B.2.1.1	1	127794	0.76	0.04	0.10	0.76	0.10	0.00	0.41	-0.16	-0.39	0.41	-0.29	-0.6290	0.0072	-2.4	1.0	-7.1	0.9		
Math	11	8408	0	D.2.1.4	2	127794	0.63	0.20	0.63	0.11	0.05	0.00	0.40	-0.36	0.40	-0.31	-0.26	0.1237	0.0065	9.9	1.1	3.3	1.0		
Math	11	9064	0	D.2.1.3	2	127794	0.74	0.74	0.10	0.08	0.07	0.00	0.51	0.51	-0.37	-0.40	-0.39	-0.5348	0.0071	-9.9	0.9	-9.9	0.8		
Math	11	9072	0	C.1.1.2	2	127794	0.51	0.08	0.30	0.12	0.51	0.00	0.38	-0.38	-0.30	-0.40	0.38	0.7905	0.0063	9.9	1.1	9.9	1.1		
Math	11	9258	0	D.2.1.2	1	127794	0.71	0.71	0.09	0.15	0.04	0.00	0.45	0.45	-0.35	-0.36	-0.34	-0.3476	0.0069	-9.9	1.0	-6.0	1.0		
Math	11	9519	0	C.1.4.1	1	127794	0.74	0.04	0.74	0.10	0.12	0.00	0.48	-0.27	0.48	-0.34	-0.42	-0.5366	0.0071	-9.9	0.9	-9.9	0.9		
Math	11	9982	0	B.2.1.1	1	127794	0.76	0.76	0.13	0.06	0.05	0.00	0.48	0.48	-0.34	-0.38	-0.37	-0.6624	0.0072	-9.9	0.9	-9.9	0.9		
Math	11	1292	1	D.2.2.2	1	25858	0.61	0.16	0.61	0.14	0.09	0.00	0.42	-0.25	0.42	-0.43	-0.35	0.2353	0.0143	4.9	1.0	0.0	1.0	A+	A+
Math	11	1642	1	D.3.2.2	1	25858	0.55	0.16	0.19	0.55	0.10	0.00	0.35	-0.34	-0.31	0.35	-0.19	0.5199	0.0141	9.9	1.1	9.9	1.2	A+	A+
Math	11	3032	1	D.3.2.2	1	25858	0.51	0.51	0.25	0.19	0.05	0.00	0.58	0.58	-0.53	-0.59	-0.46	0.7321	0.0141	-9.9	0.8	-9.9	0.8	A-	A+
Math	11	3921	1	B.2.2.2	2	25858	0.51	0.15	0.51	0.22	0.13	0.00	0.42	-0.43	0.42	-0.37	-0.27	0.7674	0.0141	1.6	1.0	4.2	1.0	A-	A-

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	4220	1	C.1.2.2	2	25858	0.55	0.28	0.55	0.10	0.06	0.00	0.45	-0.41	0.45	-0.35	-0.41	0.5528	0.0141	-0.1	1.0	1.9	1.0		
Math	11	4792	1	D.2.1.3	1	25858	0.84	0.03	0.84	0.08	0.05	0.00	0.52	-0.31	0.52	-0.42	-0.33	-1.2636	0.0182	-9.9	0.8	-9.9	0.6		
Math	11	5858	1	B.2.1.1	1	25858	0.76	0.05	0.76	0.06	0.13	0.00	0.49	-0.28	0.49	-0.35	-0.42	-0.6896	0.0161	-9.9	0.9	-9.9	0.8	B-	B-
Math	11	6452	1	D.1.1.3	1	25858	0.35	0.35	0.26	0.21	0.18	0.00	0.17	0.17	-0.30	-0.01	-0.19	1.5925	0.0147	9.9	1.3	9.9	1.6	A+	A+
Math	11	7379	1	D.3.1.1	2	25858	0.61	0.20	0.13	0.61	0.07	0.00	0.47	-0.43	-0.35	0.47	-0.37	0.2384	0.0143	-4.6	1.0	-2.6	1.0	A-	A-
Math	11	7925	1	A.2.2.1	1	25858	0.34	0.34	0.21	0.16	0.29	0.00	0.28	0.28	-0.27	-0.42	-0.21	1.6683	0.0148	9.9	1.1	9.9	1.4	A-	A+
Math	11	8398	1	E.3.2.1	2	25858	0.40	0.35	0.40	0.08	0.17	0.00	0.28	-0.42	0.28	-0.22	0.00	1.3458	0.0144	9.9	1.2	9.9	1.3	A+	A-
Math	11	9272	1	E.1.1.1	2	25858	0.37	0.37	0.15	0.18	0.30	0.00	0.23	0.23	-0.36	-0.21	-0.17	1.4865	0.0146	9.9	1.2	9.9	1.5	A-	A-
Math	11	1234	2	D.4.1.1	1	25507	0.51	0.51	0.23	0.11	0.16	0.00	0.26	0.26	-0.12	-0.38	-0.24	0.7663	0.0142	9.9	1.2	9.9	1.3	A-	A+
Math	11	1257	2	D.1.1.1	2	25507	0.82	0.82	0.06	0.07	0.06	0.00	0.38	0.38	-0.31	-0.26	-0.21	-1.0491	0.0175	-1.9	1.0	1.9	1.0	A+	A-
Math	11	2286	2	E.3.1.1	2	25507	0.13	0.50	0.13	0.13	0.24	0.00	-0.18	0.27	0.26	-0.18	0.15	3.1985	0.0203	9.9	1.5	9.9	4.2	A-	A+
Math	11	2787	2	D.2.2.3	1	25507	0.30	0.14	0.30	0.19	0.37	0.00	0.22	-0.28	0.22	-0.36	-0.14	1.9115	0.0154	9.9	1.2	9.9	1.5	A+	A-
Math	11	4228	2	D.2.1.5	1	25507	0.56	0.06	0.32	0.06	0.56	0.00	0.46	-0.45	-0.38	-0.41	0.46	0.4726	0.0142	-4.8	1.0	-6.6	0.9	A+	A-
Math	11	5979	2	A.3.1.1	1	25507	0.59	0.08	0.59	0.17	0.16	0.00	0.28	-0.20	0.28	-0.25	-0.21	0.3217	0.0143	9.9	1.2	9.9	1.2	A+	A+
Math	11	6866	2	C.1.4.1	2	25507	0.57	0.14	0.57	0.17	0.11	0.00	0.51	-0.44	0.51	-0.37	-0.53	0.4415	0.0143	-9.9	0.9	-9.9	0.9		
Math	11	6912	2	D.3.2.1	2	25507	0.57	0.11	0.24	0.57	0.08	0.00	0.42	-0.38	-0.35	0.42	-0.35	0.4302	0.0143	3.6	1.0	1.4	1.0	A-	A-
Math	11	7305	2	C.1.2.1	2	25507	0.54	0.15	0.11	0.54	0.20	0.00	0.48	-0.55	-0.42	0.48	-0.32	0.5797	0.0142	-8.8	1.0	-8.2	0.9	A-	A-
Math	11	9093	2	B.2.2.3	2	25507	0.48	0.20	0.16	0.48	0.16	0.00	0.44	-0.38	-0.42	0.44	-0.39	0.9119	0.0142	-2.7	1.0	2.3	1.0	A-	A-
Math	11	9674	2	A.1.1.2	1	25507	0.68	0.26	0.03	0.68	0.03	0.00	0.50	-0.47	-0.34	0.50	-0.27	-0.1513	0.0149	-9.9	0.9	-9.9	0.8		
Math	11	9864	2	D.2.1.2	1	25507	0.70	0.70	0.14	0.11	0.04	0.00	0.45	0.45	-0.27	-0.42	-0.36	-0.2794	0.0152	-3.7	1.0	-3.1	1.0	A+	A+
Math	11	114	3	C.1.2.2	2	25433	0.47	0.13	0.47	0.13	0.26	0.00	0.45	-0.42	0.45	-0.41	-0.42	0.9819	0.0142	-7.2	1.0	-3.3	1.0	A-	A-
Math	11	1317	3	C.1.4.1	2	25433	0.56	0.17	0.11	0.56	0.15	0.00	0.50	-0.51	-0.43	0.50	-0.33	0.4843	0.0143	-9.9	0.9	-7.9	0.9	A+	A-
Math	11	3367	3	D.2.2.1	1	25433	0.56	0.09	0.56	0.21	0.13	0.00	0.41	-0.37	0.41	-0.37	-0.27	0.4807	0.0143	5.0	1.0	1.8	1.0	A+	A+
Math	11	3667	3	E.2.1.2	1	25433	0.25	0.05	0.25	0.34	0.36	0.00	0.18	-0.30	0.18	-0.21	-0.16	2.2602	0.0163	9.9	1.2	9.9	1.8	A-	A+
Math	11	4041	3	D.3.1.2	2	25433	0.60	0.10	0.09	0.60	0.21	0.00	0.27	-0.20	-0.38	0.27	-0.14	0.3136	0.0144	9.9	1.2	9.9	1.4	A-	A-
Math	11	5394	3	D.3.2.3	1	25433	0.61	0.21	0.61	0.12	0.06	0.00	0.35	-0.27	0.35	-0.30	-0.31	0.2456	0.0144	9.9	1.1	9.9	1.1		
Math	11	5455	3	A.1.1.1	1	25433	0.57	0.21	0.57	0.17	0.04	0.00	0.33	-0.14	0.33	-0.42	-0.30	0.4435	0.0143	9.9	1.1	9.9	1.2	A-	A+
Math	11	5547	3	D.1.1.1	2	25433	0.63	0.10	0.18	0.63	0.09	0.00	0.39	-0.35	-0.29	0.39	-0.32	0.1532	0.0145	8.5	1.1	3.5	1.0	A+	A+
Math	11	6462	3	E.4.1.1	2	25433	0.60	0.07	0.27	0.60	0.06	0.00	0.41	-0.36	-0.37	0.41	-0.28	0.3066	0.0144	5.9	1.0	3.0	1.0	B-	A-
Math	11	6722	3	B.2.2.4	2	25433	0.62	0.62	0.12	0.13	0.13	0.00	0.54	0.54	-0.45	-0.44	-0.47	0.1862	0.0145	-9.9	0.9	-9.9	0.8		
Math	11	9193	3	A.1.3.1	1	25433	0.63	0.27	0.63	0.06	0.04	0.00	0.47	-0.38	0.47	-0.40	-0.44	0.1552	0.0145	-6.6	1.0	-9.7	0.9	A+	A-
Math	11	9368	3	D.2.1.4	1	25433	0.66	0.16	0.10	0.66	0.08	0.00	0.36	-0.30	-0.28	0.36	-0.26	-0.0170	0.0147	9.9	1.1	3.7	1.1	A+	A-
Math	11	312	4	A.1.1.1	1	25532	0.65	0.65	0.22	0.09	0.04	0.00	0.43	0.43	-0.32	-0.39	-0.32	0.0168	0.0147	3.3	1.0	0.5	1.0	A-	A+
Math	11	1088	4	E.3.1.2	2	25532	0.20	0.20	0.65	0.10	0.05	0.00	0.19	0.19	-0.16	-0.42	-0.32	2.6019	0.0175	9.9	1.2	9.9	1.9	A-	A+
Math	11	1730	4	E.1.1.2	2	25532	0.37	0.15	0.37	0.17	0.30	0.00	0.30	-0.22	0.30	-0.32	-0.32	1.4986	0.0147	9.9	1.1	9.9	1.4	A-	A-
Math	11	1972	4	B.2.3.1	2	25532	0.63	0.63	0.16	0.15	0.05	0.00	0.38	0.38	-0.30	-0.29	-0.32	0.0951	0.0146	9.9	1.1	7.3	1.1	A-	A-
Math	11	2591	4	B.2.2.4	2	25532	0.67	0.03	0.67	0.23	0.07	0.00	0.41	-0.26	0.41	-0.35	-0.31	-0.1101	0.0149	4.0	1.0	-2.3	1.0	A-	A-
Math	11	4370	4	C.1.2.3	2	25532	0.69	0.07	0.69	0.11	0.12	0.00	0.54	-0.41	0.54	-0.39	-0.46	-0.2315	0.0151	-9.9	0.9	-9.9	0.8	A-	B-
Math	11	6285	4	D.2.1.3	2	25532	0.84	0.84	0.05	0.08	0.02	0.00	0.44	0.44	-0.20	-0.41	-0.26	-1.2759	0.0184	-9.6	0.9	-3.8	0.9	A+	A-
Math	11	6603	4	D.2.2.2	1	25532	0.52	0.24	0.52	0.14	0.10	0.00	0.47	-0.49	0.47	-0.34	-0.36	0.7020	0.0142	-7.4	1.0	-6.2	0.9	A+	A-
Math	11	7025	4	E.2.1.3	2	25532	0.49	0.16	0.15	0.21	0.49	0.00	0.41	-0.37	-0.38	-0.37	0.41	0.8676	0.0142	4.7	1.0	5.0	1.1		
Math	11	7981	4	D.2.1.1	2	25532	0.29	0.22	0.23	0.25	0.29	0.00	0.35	-0.50	-0.36	-0.33	0.35	1.9634	0.0156	6.1	1.1	9.9	1.2	A+	A-
Math	11	8001	4	D.3.2.3	1	25532	0.56	0.16	0.56	0.12	0.15	0.00	0.53	-0.50	0.53	-0.44	-0.41	0.4760	0.0143	-9.9	0.9	-9.9	0.9	A+	A-
Math	11	8368	4	C.3.1.1	1	25532	0.69	0.13	0.69	0.13	0.06	0.00	0.34	-0.27	0.34	-0.26	-0.23	-0.1996	0.0150	9.9	1.1	6.6	1.1		
Math	11	228	5	C.3.1.2	1	25464	0.57	0.17	0.57	0.15	0.11	0.00	0.45	-0.37	0.45	-0.38	-0.40	0.4643	0.0143	-1.5	1.0	-4.0	1.0	A+	A-
Math	11	553	5	E.4.2.2	2	25464	0.63	0.04	0.06	0.27	0.63	0.00	0.41	-0.35	-0.42	-0.32	0.41	0.1448	0.0146	6.5	1.0	9.6	1.1	A+	A-
Math	11	745	5	D.2.1.3	1	25464	0.88	0.88	0.07	0.03	0.02	0.00	0.48	0.48	-0.39	-0.30	-0.24	-1.6230	0.0204	-9.9	0.8	-9.9	0.6	B+	B-
Math	11	1125	5	B.2.2.1	2	25464	0.49	0.49	0.38	0.06	0.07	0.00	0.35	0.35	-0.32	-0.41	-0.19	0.8768	0.0142	9.9	1.1	9.9	1.2	A-	A-
Math	11	1831	5	C.1.1.2	2	25464	0.26	0.26	0.20	0.45	0.09	0.00	0.19	0.19	-0.25	-0.16	-0.39	2.1886	0.0161	9.9	1.2	9.9	1.7	A-	A-

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	1938	5	D.2.2.2	1	25464	0.74	0.74	0.08	0.12	0.05	0.00	0.50	0.50	-0.40	-0.37	-0.38	-0.5031	0.0158	-9.9	0.9	-9.9	0.8		
Math	11	2405	5	E.2.1.1	2	25464	0.83	0.09	0.06	0.83	0.02	0.00	0.43	-0.38	-0.25	0.43	-0.23	-1.1517	0.0180	-7.9	0.9	-2.7	0.9	A+	A-
Math	11	2985	5	A.3.2.1	2	25464	0.54	0.15	0.54	0.19	0.12	0.00	0.33	-0.26	0.33	-0.34	-0.24	0.6107	0.0143	9.9	1.1	9.9	1.2	A-	A-
Math	11	3837	5	C.1.3.1	2	25464	0.76	0.76	0.10	0.07	0.07	0.00	0.46	0.46	-0.36	-0.32	-0.34	-0.6409	0.0161	-7.6	0.9	-9.9	0.8	A-	A-
Math	11	4169	5	D.1.1.2	1	25464	0.62	0.62	0.12	0.07	0.18	0.00	0.42	0.42	-0.25	-0.32	-0.41	0.1757	0.0146	-5.7	1.0	2.2	1.0	A+	A-
Math	11	5837	5	C.3.1.1	1	25464	0.64	0.09	0.16	0.64	0.10	0.00	0.47	-0.42	-0.40	0.47	-0.30	0.0618	0.0147	-5.4	1.0	-8.6	0.9	A-	A-
Math	11	6248	5	D.4.1.1	2	25464	0.57	0.20	0.57	0.15	0.08	0.00	0.46	-0.38	0.46	-0.44	-0.31	0.4290	0.0143	-2.9	1.0	-5.2	1.0		
Reading	3	229	0	A.2.3.1	2	124681	0.72	0.12	0.08	0.72	0.08	0.00	0.41	-0.25	-0.35	0.41	-0.36	-0.1140	0.0071	5.3	1.0	2.2	1.0		
Reading	3	263	0	A.2.3.1	2	124681	0.48	0.04	0.48	0.08	0.40	0.00	0.34	-0.43	0.34	-0.36	-0.28	1.2459	0.0064	9.9	1.1	9.9	1.2		
Reading	3	492	0	B.1.1.1	2	124681	0.88	0.07	0.03	0.88	0.02	0.00	0.43	-0.32	-0.26	0.43	-0.28	-1.3588	0.0093	-9.9	0.9	-9.9	0.8		
Reading	3	846	0	B.1.1.1		124681	0.81	0.09	0.03	0.81	0.07	0.00	0.52	-0.37	-0.34	0.52	-0.41	-0.7382	0.0079	-9.9	0.9	-9.9	0.7		
Reading	3	1055	0	A.2.4.1		124681	0.75	0.75	0.15	0.07	0.03	0.00	0.31	0.31	-0.18	-0.31	-0.22	-0.3081	0.0073	9.9	1.1	9.9	1.2		
Reading	3	1601	0	B.1.1.1		124681	0.78	0.11	0.05	0.78	0.04	0.01	0.53	-0.46	-0.35	0.53	-0.37	-0.5455	0.0076	-9.9	0.9	-9.9	0.7		
Reading	3	1914	0	A.2.4.1	2	124681	0.81	0.81	0.09	0.04	0.05	0.00	0.48	0.48	-0.39	-0.33	-0.31	-0.7482	0.0080	-9.9	0.9	-9.9	0.8		
Reading	3	2120	0	A.1.2.2		124681	0.77	0.77	0.04	0.03	0.15	0.00	0.31	0.31	-0.34	-0.29	-0.16	-0.4538	0.0075	9.9	1.1	9.9	1.2		
Reading	3	2142	0	B.3.1.1		124681	0.78	0.09	0.78	0.06	0.06	0.01	0.51	-0.36	0.51	-0.40	-0.36	-0.5047	0.0076	-9.9	0.9	-9.9	0.8		
Reading	3	2692	0	A.1.5.1		124681	0.56	0.56	0.12	0.24	0.09	0.00	0.34	0.34	-0.40	-0.20	-0.35	0.8057	0.0064	9.9	1.1	9.9	1.2		
Reading	3	2866	0	B.1.1.1		124681	0.91	0.02	0.02	0.91	0.05	0.01	0.31	-0.29	-0.23	0.31	-0.14	-1.7217	0.0104	-1.5	1.0	5.1	1.1		
Reading	3	3355	0	A.1.3.1		124681	0.77	0.03	0.07	0.77	0.12	0.00	0.49	-0.34	-0.34	0.49	-0.41	-0.4335	0.0074	-9.9	0.9	-9.9	0.8		
Reading	3	3401	0	A.1.4.1	1	124681	0.78	0.10	0.78	0.07	0.04	0.00	0.50	-0.40	0.50	-0.40	-0.26	-0.5204	0.0076	-9.9	0.9	-9.9	0.8		
Reading	3	3418	0	B.1.1.1	2	124681	0.84	0.84	0.08	0.02	0.06	0.00	0.37	0.37	-0.30	-0.26	-0.22	-1.0137	0.0085	-0.8	1.0	9.9	1.1		
Reading	3	3816	0	A.1.6.1		124681	0.52	0.25	0.52	0.07	0.16	0.00	0.37	-0.35	0.37	-0.31	-0.31	1.0140	0.0064	9.9	1.1	9.9	1.1		
Reading	3	3917	0	A.2.4.1	2	124681	0.59	0.13	0.13	0.59	0.14	0.00	0.44	-0.37	-0.35	0.44	-0.40	0.6177	0.0065	-2.8	1.0	-6.9	1.0		
Reading	3	3923	0	A.2.4.1		124681	0.69	0.10	0.13	0.08	0.69	0.00	0.46	-0.40	-0.36	-0.32	0.46	0.0952	0.0068	-9.5	1.0	-9.9	0.9		
Reading	3	4057	0	B.1.2.1		124681	0.43	0.20	0.43	0.20	0.17	0.00	0.32	-0.35	0.32	-0.29	-0.27	1.5092	0.0065	9.9	1.1	9.9	1.2		
Reading	3	4131	0	B.3.3.2	2	124681	0.71	0.15	0.06	0.71	0.07	0.01	0.52	-0.39	-0.44	0.52	-0.44	-0.0515	0.0070	-9.9	0.9	-9.9	0.8		
Reading	3	4311	0	A.2.4.1		124681	0.69	0.08	0.16	0.06	0.69	0.01	0.47	-0.44	-0.35	-0.36	0.47	0.0655	0.0069	-9.9	1.0	-9.9	0.9		
Reading	3	4579	0	A.1.3.1		124681	0.67	0.08	0.14	0.12	0.67	0.00	0.52	-0.45	-0.45	-0.38	0.52	0.2053	0.0068	-9.9	0.9	-9.9	0.8		
Reading	3	4737	0	A.2.4.1		124681	0.60	0.11	0.10	0.60	0.18	0.00	0.35	-0.39	-0.30	0.35	-0.20	0.5710	0.0065	9.9	1.1	9.9	1.1		
Reading	3	4771	0	A.1.1.1		124681	0.50	0.28	0.14	0.07	0.50	0.00	0.45	-0.39	-0.44	-0.44	0.45	1.0947	0.0064	-9.9	1.0	-5.6	1.0		
Reading	3	4940	0	B.1.1.1	2	124681	0.78	0.78	0.12	0.06	0.03	0.00	0.42	0.42	-0.37	-0.27	-0.22	-0.5459	0.0076	-2.7	1.0	-6.7	0.9		
Reading	3	5024	0	B.3.3.4		124681	0.58	0.09	0.16	0.58	0.16	0.00	0.45	-0.46	-0.37	0.45	-0.36	0.6872	0.0065	-6.5	1.0	-2.6	1.0		
Reading	3	5386	0	A.2.2.2	2	124681	0.89	0.03	0.05	0.89	0.03	0.00	0.51	-0.34	-0.37	0.51	-0.32	-1.5545	0.0099	-9.9	0.8	-9.9	0.5		
Reading	3	5388	0	A.1.3.1	2	124681	0.70	0.04	0.21	0.05	0.70	0.00	0.40	-0.33	-0.31	-0.33	0.40	0.0251	0.0069	9.9	1.0	0.6	1.0		
Reading	3	5588	0	B.3.1.1	2	124681	0.69	0.69	0.09	0.08	0.14	0.00	0.35	0.35	-0.34	-0.32	-0.18	0.0954	0.0068	9.9	1.1	9.9	1.1		
Reading	3	5659	0	A.2.2.2		124681	0.83	0.06	0.07	0.83	0.03	0.01	0.51	-0.41	-0.33	0.51	-0.36	-0.9063	0.0082	-9.9	0.9	-9.9	0.7		
Reading	3	6072	0	A.2.3.1		124681	0.73	0.11	0.08	0.08	0.73	0.01	0.45	-0.38	-0.31	-0.32	0.45	-0.1425	0.0071	-8.1	1.0	-9.9	0.9		
Reading	3	6797	0	A.1.3.1		124681	0.77	0.07	0.77	0.08	0.07	0.00	0.44	-0.31	0.44	-0.30	-0.35	-0.4664	0.0075	-7.4	1.0	-9.9	0.9		
Reading	3	6827	0	A.2.4.1		124681	0.68	0.09	0.68	0.14	0.09	0.00	0.41	-0.31	0.41	-0.27	-0.41	0.1278	0.0068	8.0	1.0	6.0	1.0		
Reading	3	6993	0	A.1.4.1	2	124681	0.78	0.06	0.05	0.78	0.11	0.00	0.47	-0.36	-0.36	0.47	-0.33	-0.4899	0.0075	-9.9	0.9	-9.9	0.8		
Reading	3	7326	0	A.1.2.2	2	124681	0.87	0.05	0.04	0.04	0.87	0.00	0.51	-0.39	-0.36	-0.30	0.51	-1.3130	0.0092	-9.9	0.8	-9.9	0.6		
Reading	3	7382	0	A.2.4.1	2	124681	0.41	0.28	0.13	0.18	0.41	0.00	0.28	-0.20	-0.38	-0.30	0.28	1.5880	0.0065	9.9	1.2	9.9	1.3		
Reading	3	7392	0	A.1.4.1		124681	0.53	0.19	0.13	0.53	0.15	0.00	0.37	-0.29	-0.25	0.37	-0.47	0.9791	0.0064	9.9	1.1	9.9	1.2		
Reading	3	7509	0	A.2.2.2		124681	0.94	0.94	0.03	0.01	0.01	0.00	0.41	0.41	-0.31	-0.24	-0.22	-2.2746	0.0126	-9.9	0.9	-9.9	0.4		
Reading	3	8622	0	A.2.4.1		124681	0.60	0.20	0.12	0.60	0.09	0.00	0.48	-0.39	-0.46	0.48	-0.38	0.5718	0.0065	-9.9	0.9	-9.9	0.9		
Reading	3	9100	0	B.3.3.2		124681	0.63	0.08	0.08	0.63	0.21	0.00	0.48	-0.39	-0.46	0.48	-0.37	0.4180	0.0066	-9.9	0.9	-9.9	0.9		
Reading	3	9858	0	A.1.6.1	2	124681	0.63	0.63	0.03	0.06	0.28	0.00	0.28	0.28	-0.34	-0.28	-0.19	0.4301	0.0066	9.9	1.2	9.9	1.3		
Reading	3	882	1	A.1.3.1	2	75009	0.69	0.06	0.07	0.17	0.69	0.00	0.37	-0.38	-0.34	-0.21	0.37	0.0486	0.0089	9.9	1.1	9.9	1.1		
Reading	3	1127	1	B.1.1.1	2	75009	0.76	0.06	0.76	0.05	0.12	0.00	0.50	-0.27	0.50	-0.40	-0.45	-0.3810	0.0095	-9.9	0.9	-9.9	0.8		

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	1797	1	A.2.3.1	2	25102	0.63	0.63	0.12	0.08	0.16	0.00	0.45	0.45	-0.41	-0.39	-0.32	0.3770	0.0147	-5.3	1.0	-8.7	0.9	A-	A-
Reading	3	2714	1	B.3.1.1	2	25102	0.44	0.25	0.12	0.18	0.44	0.00	0.25	-0.15	-0.42	-0.20	0.25	1.3719	0.0143	9.9	1.2	9.9	1.3	A+	A-
Reading	3	3743	1	A.1.3.1	2	75009	0.58	0.07	0.58	0.12	0.22	0.00	0.44	-0.40	0.44	-0.34	-0.42	0.6872	0.0083	-5.0	1.0	-4.0	1.0		
Reading	3	3970	1	B.3.3.4	2	25102	0.67	0.67	0.12	0.09	0.12	0.00	0.39	0.39	-0.32	-0.34	-0.27	0.1609	0.0150	5.2	1.0	-0.1	1.0	A-	A-
Reading	3	4093	1	B.3.3.4	2	25102	0.51	0.20	0.16	0.51	0.14	0.00	0.40	-0.42	-0.32	0.40	-0.34	1.0253	0.0142	-1.1	1.0	3.0	1.0	A-	A-
Reading	3	4796	1	A.2.3.1	3	25102	0.60	0.04	0.22	0.14	0.60	0.00	0.23	-0.31	-0.15	-0.18	0.23	0.5706	0.0144	9.9	1.3	9.9	1.3	A-	A-
Reading	3	4874	1	B.1.1.1	2	75009	0.89	0.89	0.04	0.03	0.04	0.00	0.42	0.42	-0.26	-0.29	-0.30	-1.4662	0.0123	-9.9	0.9	-9.9	0.7		
Reading	3	5166	1	A.1.4.1	2	75009	0.91	0.02	0.03	0.04	0.91	0.00	0.43	-0.30	-0.27	-0.28	0.43	-1.8208	0.0138	-9.9	0.9	-9.9	0.6		
Reading	3	5491	1	A.2.4.1	2	25102	0.83	0.06	0.05	0.83	0.06	0.00	0.41	-0.33	-0.33	0.41	-0.22	-0.8759	0.0181	-5.5	0.9	-1.5	1.0	A-	A-
Reading	3	5565	1	A.2.2.2	2	25102	0.42	0.08	0.42	0.06	0.44	0.00	0.23	-0.43	0.23	-0.39	-0.13	1.4819	0.0143	9.9	1.2	9.9	1.4	A+	A-
Reading	3	5816	1	A.2.4.1	1	25102	0.49	0.13	0.18	0.20	0.49	0.00	0.40	-0.38	-0.37	-0.35	0.40	1.1238	0.0142	-0.6	1.0	3.4	1.0	A-	A-
Reading	3	6997	1	B.2.1.1	2	75009	0.58	0.58	0.15	0.17	0.10	0.00	0.32	0.32	-0.27	-0.30	-0.24	0.6972	0.0083	9.9	1.1	9.9	1.2		
Reading	3	8014	1	A.1.5.1	2	75009	0.67	0.67	0.11	0.13	0.09	0.00	0.31	0.31	-0.24	-0.25	-0.23	0.2137	0.0087	9.9	1.1	9.9	1.2		
Reading	3	8791	1	A.2.6.1	2	25102	0.76	0.12	0.76	0.04	0.07	0.00	0.44	-0.29	0.44	-0.39	-0.34	-0.3879	0.0163	-5.5	1.0	-7.5	0.9	A+	A-
Reading	3	8855	1	A.1.2.2	2	75009	0.70	0.10	0.08	0.11	0.70	0.01	0.45	-0.44	-0.32	-0.29	0.45	0.0005	0.0089	-7.0	1.0	-6.7	1.0		
Reading	3	9344	1	A.2.4.1	1	25102	0.64	0.30	0.64	0.03	0.04	0.00	0.16	-0.10	0.16	-0.20	-0.16	0.3572	0.0147	9.9	1.3	9.9	1.4	A+	A+
Reading	3	713	2	B.1.1.1	2	24921	0.74	0.11	0.74	0.09	0.06	0.00	0.47	-0.40	0.47	-0.31	-0.36	-0.2185	0.0160	-9.2	0.9	-9.9	0.8	A+	A-
Reading	3	807	2	A.1.2.2	2	24921	0.63	0.14	0.10	0.63	0.13	0.00	0.35	-0.36	-0.30	0.35	-0.21	0.4219	0.0147	9.9	1.1	9.9	1.2	A+	A+
Reading	3	882	2	A.1.3.1	2	75009	0.69	0.06	0.07	0.17	0.69	0.00	0.37	-0.38	-0.34	-0.21	0.37	0.0486	0.0089	9.9	1.1	9.9	1.1		
Reading	3	1127	2	B.1.1.1	2	75009	0.76	0.06	0.76	0.05	0.12	0.00	0.50	-0.27	0.50	-0.40	-0.45	-0.3810	0.0095	-9.9	0.9	-9.9	0.8		
Reading	3	1438	2	B.1.1.1	2	24921	0.42	0.25	0.11	0.22	0.42	0.00	0.30	-0.31	-0.50	-0.16	0.30	1.5297	0.0144	9.9	1.1	9.9	1.2	A+	A-
Reading	3	1794	2	A.1.6.1	2	24921	0.57	0.26	0.08	0.09	0.57	0.00	0.41	-0.34	-0.32	-0.40	0.41	0.7297	0.0144	3.6	1.0	2.8	1.0	A+	A-
Reading	3	3028	2	A.1.3.1	2	24921	0.64	0.07	0.64	0.07	0.22	0.00	0.38	-0.35	0.38	-0.28	-0.31	0.3795	0.0148	7.7	1.1	5.3	1.1	A+	A-
Reading	3	3743	2	A.1.3.1	2	75009	0.58	0.07	0.58	0.12	0.22	0.00	0.44	-0.40	0.44	-0.34	-0.42	0.6872	0.0083	-5.0	1.0	-4.0	1.0		
Reading	3	4515	2	A.1.4.1	1	24921	0.73	0.06	0.04	0.18	0.73	0.00	0.39	-0.33	-0.33	-0.28	0.39	-0.1459	0.0158	3.3	1.0	1.0	1.0	A+	A-
Reading	3	4528	2	A.1.4.1	2	24921	0.58	0.58	0.27	0.12	0.03	0.00	0.34	0.34	-0.29	-0.27	-0.38	0.7024	0.0144	9.9	1.1	9.9	1.2	A+	A+
Reading	3	4874	2	B.1.1.1	2	75009	0.89	0.89	0.04	0.03	0.04	0.00	0.42	0.42	-0.26	-0.29	-0.30	-1.4662	0.0123	-9.9	0.9	-9.9	0.7		
Reading	3	5166	2	A.1.4.1	2	75009	0.91	0.02	0.03	0.04	0.91	0.00	0.43	-0.30	-0.27	-0.28	0.43	-1.8208	0.0138	-9.9	0.9	-9.9	0.6		
Reading	3	5395	2	A.1.2.1	2	24921	0.74	0.74	0.17	0.03	0.05	0.00	0.37	0.37	-0.22	-0.37	-0.36	-0.2686	0.0161	4.9	1.0	4.4	1.1	A+	A-
Reading	3	6997	2	B.2.1.1	2	75009	0.58	0.58	0.15	0.17	0.10	0.00	0.32	0.32	-0.27	-0.30	-0.24	0.6972	0.0083	9.9	1.1	9.9	1.2		
Reading	3	8014	2	A.1.5.1	2	75009	0.67	0.67	0.11	0.13	0.09	0.00	0.31	0.31	-0.24	-0.25	-0.23	0.2137	0.0087	9.9	1.1	9.9	1.2		
Reading	3	8855	2	A.1.2.2	2	75009	0.70	0.10	0.08	0.11	0.70	0.01	0.45	-0.44	-0.32	-0.29	0.45	0.0005	0.0089	-7.0	1.0	-6.7	1.0		
Reading	3	9079	2	A.1.4.1	1	24921	0.50	0.22	0.50	0.14	0.13	0.00	0.49	-0.37	0.49	-0.51	-0.51	1.0883	0.0143	-9.9	0.9	-9.9	0.9	A-	B-
Reading	3	9883	2	A.1.4.1	1	24921	0.63	0.10	0.18	0.09	0.63	0.00	0.49	-0.46	-0.42	-0.35	0.49	0.4182	0.0147	-9.9	0.9	-9.9	0.9	A-	A-
Reading	3	146	3	A.2.2.2	2	24986	0.79	0.06	0.79	0.07	0.08	0.00	0.53	-0.37	0.53	-0.42	-0.40	-0.5480	0.0170	-9.9	0.9	-9.9	0.7	A-	A-
Reading	3	718	3	B.3.3.2	2	24986	0.75	0.75	0.09	0.08	0.08	0.00	0.43	0.43	-0.39	-0.29	-0.29	-0.2990	0.0163	-3.3	1.0	-1.4	1.0	A+	A-
Reading	3	882	3	A.1.3.1	2	75009	0.69	0.06	0.07	0.17	0.69	0.00	0.37	-0.38	-0.34	-0.21	0.37	0.0486	0.0089	9.9	1.1	9.9	1.1		
Reading	3	1127	3	B.1.1.1	2	75009	0.76	0.06	0.76	0.05	0.12	0.00	0.50	-0.27	0.50	-0.40	-0.45	-0.3810	0.0095	-9.9	0.9	-9.9	0.8		
Reading	3	3264	3	B.3.3.2	2	24986	0.75	0.07	0.08	0.09	0.75	0.00	0.45	-0.35	-0.32	-0.33	0.45	-0.3190	0.0163	-5.4	1.0	-6.6	0.9	A-	A-
Reading	3	3743	3	A.1.3.1	2	75009	0.58	0.07	0.58	0.12	0.22	0.00	0.44	-0.40	0.44	-0.34	-0.42	0.6872	0.0083	-5.0	1.0	-4.0	1.0		
Reading	3	4874	3	B.1.1.1	2	75009	0.89	0.89	0.04	0.03	0.04	0.00	0.42	0.42	-0.26	-0.29	-0.30	-1.4662	0.0123	-9.9	0.9	-9.9	0.7		
Reading	3	5166	3	A.1.4.1	2	75009	0.91	0.02	0.03	0.04	0.91	0.00	0.43	-0.30	-0.27	-0.28	0.43	-1.8208	0.0138	-9.9	0.9	-9.9	0.6		
Reading	3	5235	3	A.2.4.1	2	24986	0.60	0.14	0.60	0.13	0.13	0.00	0.47	-0.40	0.47	-0.42	-0.36	0.6082	0.0146	-8.6	1.0	-8.4	0.9	A-	A-
Reading	3	5669	3	A.2.2.1	2	24986	0.63	0.63	0.03	0.02	0.32	0.00	0.17	0.17	-0.35	-0.33	-0.06	0.4453	0.0148	9.9	1.3	9.9	1.6	A+	A-
Reading	3	6757	3	A.2.4.1	2	24986	0.64	0.16	0.64	0.07	0.13	0.00	0.48	-0.42	0.48	-0.38	-0.41	0.3758	0.0149	-9.9	0.9	-9.9	0.9	A-	A-
Reading	3	6997	3	B.2.1.1	2	75009	0.58	0.58	0.15	0.17	0.10	0.00	0.32	0.32	-0.27	-0.30	-0.24	0.6972	0.0083	9.9	1.1	9.9	1.2		
Reading	3	7103	3	B.3.3.1	2	24986	0.63	0.21	0.63	0.06	0.10	0.00	0.46	-0.41	0.46	-0.36	-0.36	0.4102	0.0148	-6.7	1.0	-8.5	0.9	A+	A-
Reading	3	7817	3	A.2.4.1	2	24986	0.69	0.09	0.14	0.69	0.08	0.01	0.33	-0.21	-0.30	0.33	-0.23	0.1015	0.0153	9.9	1.1	7.9	1.1	A+	A-
Reading	3	8014	3	A.1.5.1	2	75009	0.67	0.67	0.11	0.13	0.09	0.00	0.31	0.31	-0.24	-0.25	-0.23	0.2137	0.0087	9.9	1.1	9.9	1.2		

Appendix I: Item Statistics Multiple Choice

Item Information						Classical													Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	8070	3	A.2.6.1	2	24986	0.89	0.89	0.04	0.03	0.03	0.00	0.46	0.46	-0.34	-0.28	-0.29	-1.5403	0.0219	-9.9	0.9	-9.9	0.6	A-	A-	
Reading	3	8189	3	A.2.4.1	1	24986	0.75	0.18	0.04	0.75	0.02	0.00	0.40	-0.31	-0.34	0.40	-0.31	-0.3092	0.0163	1.4	1.0	2.0	1.0	A-	A+	
Reading	3	8855	3	A.1.2.2	2	75009	0.70	0.10	0.08	0.11	0.70	0.01	0.45	-0.44	-0.32	-0.29	0.45	0.0005	0.0089	-7.0	1.0	-6.7	1.0			
Reading	3	1597	4	B.3.1.1	2	49672	0.79	0.08	0.07	0.06	0.79	0.00	0.52	-0.39	-0.37	-0.40	0.52	-0.5691	0.0122	-9.9	0.9	-9.9	0.7			
Reading	3	1689	4	A.2.4.1	2	49672	0.81	0.04	0.81	0.04	0.11	0.00	0.48	-0.34	0.48	-0.35	-0.36	-0.7010	0.0125	-9.9	0.9	-9.9	0.7			
Reading	3	1943	4	A.2.2.2	2	49672	0.93	0.03	0.03	0.02	0.93	0.00	0.46	-0.31	-0.30	-0.28	0.46	-1.9770	0.0180	-9.9	0.8	-9.9	0.5			
Reading	3	1979	4	A.2.3.1	2	49672	0.77	0.05	0.13	0.04	0.77	0.00	0.51	-0.43	-0.37	-0.39	0.51	-0.4588	0.0119	-9.9	0.9	-9.9	0.8			
Reading	3	3001	4	A.1.3.1	2	24929	0.71	0.71	0.06	0.08	0.15	0.00	0.28	0.28	-0.28	-0.21	-0.19	-0.0033	0.0157	9.9	1.2	9.9	1.4	A-	A+	
Reading	3	3565	4	A.1.1.1	2	24929	0.75	0.75	0.11	0.09	0.04	0.00	0.42	0.42	-0.33	-0.29	-0.36	-0.2909	0.0164	0.0	1.0	3.7	1.1	A+	A-	
Reading	3	3609	4	B.1.1.1	2	24929	0.62	0.08	0.24	0.62	0.06	0.00	0.47	-0.42	-0.38	0.47	-0.45	0.5060	0.0148	-6.8	1.0	-8.1	0.9	A+	A-	
Reading	3	4161	4	A.1.3.1	2	24929	0.58	0.08	0.58	0.06	0.28	0.00	0.49	-0.45	0.49	-0.53	-0.40	0.7045	0.0146	-9.9	0.9	-9.5	0.9	A-	A-	
Reading	3	4359	4	A.1.4.1	1	24929	0.66	0.25	0.03	0.66	0.05	0.00	0.40	-0.33	-0.29	0.40	-0.35	0.2544	0.0152	7.8	1.1	7.2	1.1	A+	A-	
Reading	3	5030	4	A.2.3.1	2	49672	0.54	0.09	0.15	0.54	0.21	0.00	0.43	-0.40	-0.40	0.43	-0.36	0.9308	0.0102	-4.3	1.0	-1.1	1.0			
Reading	3	5486	4	B.1.1.1	2	24929	0.57	0.29	0.06	0.57	0.07	0.00	0.50	-0.42	-0.48	0.50	-0.47	0.7472	0.0146	-9.9	0.9	-9.9	0.9	A-	A+	
Reading	3	6650	4	B.1.2.1	3	49672	0.71	0.11	0.71	0.13	0.06	0.00	0.40	-0.30	0.40	-0.34	-0.27	-0.0180	0.0111	5.0	1.0	-3.3	1.0			
Reading	3	7429	4	A.1.6.1	2	24929	0.72	0.11	0.11	0.72	0.06	0.00	0.45	-0.37	-0.30	0.45	-0.38	-0.0825	0.0159	-1.9	1.0	-1.2	1.0	A+	A-	
Reading	3	8099	4	A.1.4.1	1	24929	0.87	0.87	0.05	0.03	0.05	0.00	0.50	0.50	-0.35	-0.30	-0.38	-1.2616	0.0203	-9.9	0.8	-9.9	0.6	A+	A-	
Reading	3	8921	4	A.2.3.1	2	49672	0.64	0.14	0.13	0.64	0.09	0.00	0.39	-0.32	-0.40	0.39	-0.22	0.3582	0.0106	9.4	1.1	3.8	1.0			
Reading	3	8935	4	A.1.4.1	1	24929	0.77	0.06	0.77	0.04	0.14	0.00	0.46	-0.42	0.46	-0.34	-0.31	-0.4256	0.0168	-6.3	0.9	-5.6	0.9	A-	A-	
Reading	3	9227	4	A.1.3.1	2	24929	0.84	0.84	0.07	0.05	0.05	0.00	0.50	0.50	-0.36	-0.42	-0.28	-0.9576	0.0188	-9.9	0.9	-9.9	0.7	A+	A-	
Reading	3	9457	4	B.1.2.1	2	49672	0.55	0.17	0.19	0.55	0.09	0.00	0.45	-0.47	-0.36	0.45	-0.33	0.8478	0.0102	-9.9	1.0	-7.2	1.0			
Reading	3	1597	5	B.3.1.1	2	49672	0.79	0.08	0.07	0.06	0.79	0.00	0.52	-0.39	-0.37	-0.40	0.52	-0.5691	0.0122	-9.9	0.9	-9.9	0.7			
Reading	3	1689	5	A.2.4.1	2	49672	0.81	0.04	0.81	0.04	0.11	0.00	0.48	-0.34	0.48	-0.35	-0.36	-0.7010	0.0125	-9.9	0.9	-9.9	0.7			
Reading	3	1943	5	A.2.2.2	2	49672	0.93	0.03	0.03	0.02	0.93	0.00	0.46	-0.31	-0.30	-0.28	0.46	-1.9770	0.0180	-9.9	0.8	-9.9	0.5			
Reading	3	1979	5	A.2.3.1	2	49672	0.77	0.05	0.13	0.04	0.77	0.00	0.51	-0.43	-0.37	-0.39	0.51	-0.4588	0.0119	-9.9	0.9	-9.9	0.8			
Reading	3	2568	5	A.1.4.1	2	24743	0.90	0.02	0.02	0.06	0.90	0.00	0.45	-0.26	-0.29	-0.35	0.45	-1.5480	0.0222	-9.9	0.9	-9.9	0.7	A+	B-	
Reading	3	3121	5	A.1.3.1	2	24743	0.34	0.15	0.26	0.24	0.34	0.00	0.26	-0.39	-0.23	-0.23	0.26	1.9492	0.0149	9.9	1.1	9.9	1.4	A+	A-	
Reading	3	3621	5	A.1.4.1	2	24743	0.54	0.54	0.06	0.13	0.27	0.00	0.27	0.27	-0.38	-0.26	-0.17	0.8905	0.0143	9.9	1.2	9.9	1.2	A-	A-	
Reading	3	5030	5	A.2.3.1	2	49672	0.54	0.09	0.15	0.54	0.21	0.00	0.43	-0.40	-0.40	0.43	-0.36	0.9308	0.0102	-4.3	1.0	-1.1	1.0			
Reading	3	5781	5	A.1.3.1	2	24743	0.71	0.17	0.71	0.04	0.07	0.00	0.35	-0.26	0.35	-0.29	-0.26	-0.0527	0.0156	9.4	1.1	5.3	1.1	A-	C-	
Reading	3	6445	5	B.1.2.1	3	24743	0.76	0.12	0.06	0.06	0.76	0.00	0.41	-0.34	-0.32	-0.22	0.41	-0.3308	0.0164	-1.3	1.0	0.7	1.0	A-	B-	
Reading	3	6650	5	B.1.2.1	3	49672	0.71	0.11	0.71	0.13	0.06	0.00	0.40	-0.30	0.40	-0.34	-0.27	-0.0180	0.0111	5.0	1.0	-3.3	1.0			
Reading	3	6990	5	B.2.1.1	2	24743	0.47	0.11	0.24	0.47	0.18	0.00	0.32	-0.37	-0.29	0.32	-0.28	1.2785	0.0143	9.9	1.1	9.9	1.2	A-	A-	
Reading	3	8532	5	A.1.3.1	2	24743	0.60	0.60	0.04	0.11	0.26	0.00	0.26	0.26	-0.29	-0.26	-0.17	0.6053	0.0145	9.9	1.2	9.9	1.2	A-	A-	
Reading	3	8734	5	B.2.1.1	2	24743	0.49	0.49	0.21	0.16	0.14	0.00	0.22	0.22	-0.12	-0.19	-0.30	1.1713	0.0143	9.9	1.2	9.9	1.3	A-	A-	
Reading	3	8921	5	A.2.3.1	2	49672	0.64	0.14	0.13	0.64	0.09	0.00	0.39	-0.32	-0.40	0.39	-0.22	0.3582	0.0106	9.4	1.1	3.8	1.0			
Reading	3	9457	5	B.1.2.1	2	49672	0.55	0.17	0.19	0.55	0.09	0.00	0.45	-0.47	-0.36	0.45	-0.33	0.8478	0.0102	-9.9	1.0	-7.2	1.0			
Reading	3	9594	5	A.1.4.1	2	24743	0.64	0.10	0.17	0.10	0.64	0.01	0.31	-0.28	-0.20	-0.29	0.31	0.3993	0.0148	9.9	1.1	9.9	1.2	A-	A-	
Reading	3	9643	5	A.1.2.2	2	24743	0.51	0.51	0.26	0.10	0.13	0.00	0.21	0.21	-0.12	-0.32	-0.18	1.0595	0.0143	9.9	1.3	9.9	1.4	A-	A+	
Reading	4	158	0	A.2.3.1		124530	0.58	0.05	0.26	0.11	0.58	0.00	0.40	-0.44	-0.35	-0.29	0.40	0.7218	0.0063	-9.9	1.0	-9.9	1.0			
Reading	4	1032	0	B.2.1.3		124530	0.70	0.10	0.15	0.70	0.05	0.00	0.35	-0.28	-0.23	0.35	-0.35	0.0810	0.0067	-4.0	1.0	1.5	1.0			
Reading	4	1049	0	A.2.4.1		124530	0.88	0.88	0.05	0.03	0.04	0.00	0.34	0.34	-0.28	-0.16	-0.20	-1.2333	0.0092	-4.0	1.0	-7.6	0.9			
Reading	4	1780	0	B.2.1.1		124530	0.62	0.10	0.62	0.15	0.13	0.00	0.41	-0.41	0.41	-0.30	-0.32	0.5364	0.0064	-9.9	1.0	-9.9	0.9			
Reading	4	1951	0	A.2.3.1		124530	0.58	0.09	0.15	0.18	0.58	0.00	0.43	-0.46	-0.42	-0.27	0.43	0.7290	0.0063	-9.9	0.9	-9.9	0.9			
Reading	4	2165	0	A.2.2.1		124530	0.76	0.05	0.76	0.11	0.08	0.00	0.39	-0.35	0.39	-0.28	-0.26	-0.2578	0.0071	-7.6	1.0	-9.9	0.9			
Reading	4	2741	0	B.3.3.3		124530	0.88	0.03	0.03	0.05	0.88	0.00	0.43	-0.27	-0.26	-0.32	0.43	-1.2895	0.0094	-9.9	0.9	-9.9	0.7			
Reading	4	2781	0	A.1.1.2		124530	0.64	0.15	0.64	0.15	0.06	0.00	0.25	-0.23	0.25	-0.18	-0.19	0.4135	0.0064	9.9	1.1	9.9	1.1			
Reading	4	3655	0	A.1.3.1		124530	0.78	0.07	0.07	0.78	0.07	0.00	0.45	-0.33	-0.32	0.45	-0.34	-0.4171	0.0074	-9.9	0.9	-9.9	0.8			
Reading	4	3706	0	B.3.1.1		124530	0.66	0.13	0.15	0.66	0.05	0.00	0.30	-0.30	-0.11	0.30	-0.36	0.2996	0.0065	9.9	1.1	9.9	1.1			

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	3829	0	A.1.6.1		124530	0.65	0.09	0.65	0.09	0.17	0.00	0.35	-0.40	0.35	-0.31	-0.16	0.3507	0.0065	8.5	1.0	5.9	1.0		
Reading	4	4015	0	A.1.3.1	2	124530	0.78	0.07	0.05	0.78	0.09	0.00	0.48	-0.31	-0.39	0.48	-0.38	-0.4261	0.0074	-9.9	0.9	-9.9	0.8		
Reading	4	4240	0	A.2.6.1		124530	0.68	0.68	0.16	0.08	0.08	0.00	0.43	0.43	-0.28	-0.38	-0.41	0.1970	0.0066	-9.9	0.9	-9.9	0.9		
Reading	4	4292	0	A.1.4.1		124530	0.66	0.23	0.66	0.04	0.07	0.00	0.44	-0.35	0.44	-0.37	-0.38	0.3319	0.0065	-9.9	0.9	-9.9	0.9		
Reading	4	4890	0	B.3.3.3		124530	0.63	0.09	0.63	0.09	0.18	0.00	0.41	-0.41	0.41	-0.39	-0.27	0.4810	0.0064	-9.9	1.0	-9.9	0.9		
Reading	4	4988	0	B.1.1.1	2	124530	0.87	0.04	0.07	0.87	0.02	0.00	0.42	-0.31	-0.28	0.42	-0.27	-1.1182	0.0089	-9.9	0.9	-9.9	0.8		
Reading	4	5045	0	A.1.3.1		124530	0.70	0.16	0.70	0.07	0.07	0.00	0.50	-0.41	0.50	-0.35	-0.44	0.0975	0.0067	-9.9	0.9	-9.9	0.8		
Reading	4	5069	0	A.1.3.1		124530	0.51	0.10	0.27	0.12	0.51	0.00	0.24	-0.37	-0.13	-0.25	0.24	1.0925	0.0062	9.9	1.1	9.9	1.2		
Reading	4	5231	0	A.1.4.1		124530	0.65	0.08	0.12	0.15	0.65	0.00	0.42	-0.38	-0.34	-0.34	0.42	0.3828	0.0065	-9.9	1.0	-9.9	0.9		
Reading	4	5264	0	B.3.3.3		124530	0.79	0.09	0.03	0.79	0.09	0.00	0.30	-0.23	-0.16	0.30	-0.22	-0.4431	0.0074	9.9	1.1	9.9	1.1		
Reading	4	5907	0	A.1.3.1	2	124530	0.50	0.22	0.50	0.16	0.12	0.00	0.27	-0.27	0.27	-0.19	-0.24	1.1236	0.0062	9.9	1.1	9.9	1.1		
Reading	4	6497	0	A.1.3.1	2	124530	0.81	0.04	0.81	0.10	0.04	0.00	0.44	-0.35	0.44	-0.27	-0.36	-0.6280	0.0078	-9.9	0.9	-9.9	0.9		
Reading	4	7036	0	A.2.2.2		124530	0.80	0.80	0.12	0.05	0.03	0.00	0.40	0.40	-0.27	-0.31	-0.32	-0.5212	0.0076	-9.9	1.0	-9.9	0.9		
Reading	4	7050	0	A.1.5.1		124530	0.79	0.79	0.10	0.08	0.03	0.00	0.49	0.49	-0.38	-0.38	-0.33	-0.4368	0.0074	-9.9	0.9	-9.9	0.8		
Reading	4	7167	0	A.2.3.1		124530	0.70	0.70	0.13	0.09	0.08	0.00	0.36	0.36	-0.18	-0.33	-0.35	0.0836	0.0067	3.1	1.0	6.1	1.0		
Reading	4	7393	0	B.3.3.1		124530	0.58	0.58	0.29	0.07	0.05	0.00	0.17	0.17	-0.01	-0.34	-0.35	0.7286	0.0063	9.9	1.2	9.9	1.3		
Reading	4	7570	0	A.1.2.1		124530	0.64	0.64	0.09	0.18	0.09	0.00	0.16	0.16	-0.21	-0.03	-0.20	0.4366	0.0064	9.9	1.2	9.9	1.3		
Reading	4	7805	0	A.1.2.1	2	124530	0.88	0.04	0.03	0.06	0.88	0.00	0.44	-0.36	-0.30	-0.26	0.44	-1.2047	0.0091	-9.9	0.9	-9.9	0.7		
Reading	4	7821	0	A.1.3.1		124530	0.44	0.12	0.44	0.17	0.26	0.00	0.18	-0.26	0.18	-0.21	-0.08	1.3993	0.0062	9.9	1.2	9.9	1.3		
Reading	4	7875	0	A.1.4.1		124530	0.72	0.06	0.09	0.14	0.72	0.00	0.41	-0.30	-0.29	-0.34	0.41	0.0001	0.0068	-9.9	1.0	-9.9	0.9		
Reading	4	7916	0	A.1.4.1	2	124530	0.40	0.40	0.24	0.18	0.17	0.00	0.28	0.28	-0.21	-0.32	-0.32	1.6002	0.0063	9.9	1.0	9.9	1.1		
Reading	4	7939	0	A.2.4.1		124530	0.76	0.76	0.18	0.03	0.02	0.00	0.35	0.35	-0.25	-0.36	-0.28	-0.2987	0.0072	0.6	1.0	-2.5	1.0		
Reading	4	8021	0	B.1.1.1	2	124530	0.72	0.72	0.08	0.16	0.04	0.00	0.45	0.45	-0.33	-0.38	-0.32	-0.0384	0.0069	-9.9	0.9	-9.9	0.9		
Reading	4	8700	0	B.1.1.1		124530	0.71	0.04	0.13	0.12	0.71	0.00	0.41	-0.36	-0.32	-0.31	0.41	0.0121	0.0068	-9.9	1.0	-5.6	1.0		
Reading	4	8777	0	A.1.6.1		124530	0.57	0.23	0.14	0.05	0.57	0.00	0.35	-0.31	-0.26	-0.35	0.35	0.7571	0.0062	7.1	1.0	4.7	1.0		
Reading	4	8787	0	B.1.1.1		124530	0.58	0.17	0.07	0.58	0.17	0.00	0.34	-0.34	-0.32	0.34	-0.22	0.7142	0.0063	9.6	1.0	7.8	1.0		
Reading	4	9114	0	A.2.4.1		124530	0.77	0.05	0.06	0.77	0.12	0.00	0.50	-0.39	-0.42	0.50	-0.34	-0.3452	0.0073	-9.9	0.9	-9.9	0.8		
Reading	4	9115	0	A.2.3.1		124530	0.75	0.09	0.75	0.13	0.03	0.00	0.46	-0.35	0.46	-0.38	-0.31	-0.1998	0.0071	-9.9	0.9	-9.9	0.8		
Reading	4	9277	0	A.1.1.2	2	124530	0.86	0.04	0.07	0.02	0.86	0.00	0.46	-0.36	-0.31	-0.30	0.46	-1.0545	0.0087	-9.9	0.9	-9.9	0.7		
Reading	4	9997	0	A.2.5.1		124530	0.73	0.10	0.11	0.05	0.73	0.00	0.54	-0.42	-0.44	-0.40	0.54	-0.1052	0.0069	-9.9	0.8	-9.9	0.7		
Reading	4	86	1	B.2.1.1	2	25049	0.75	0.75	0.10	0.05	0.10	0.00	0.43	0.43	-0.35	-0.32	-0.31	-0.2187	0.0158	-8.2	0.9	-9.9	0.9	A+	A-
Reading	4	266	1	A.1.4.1	1	25049	0.83	0.05	0.04	0.08	0.83	0.00	0.44	-0.27	-0.26	-0.38	0.44	-0.8101	0.0180	-9.4	0.9	-9.9	0.8	A+	A-
Reading	4	557	1	B.2.1.3	1	74752	0.72	0.08	0.72	0.09	0.10	0.00	0.43	-0.35	0.43	-0.26	-0.38	-0.0382	0.0089	-9.9	0.9	-9.9	0.9		
Reading	4	880	1	A.2.3.1	2	74752	0.65	0.12	0.10	0.65	0.13	0.00	0.49	-0.40	-0.36	0.49	-0.43	0.3601	0.0084	-9.9	0.9	-9.9	0.8		
Reading	4	1376	1	A.2.6.1	2	74752	0.47	0.04	0.34	0.47	0.15	0.00	0.30	-0.38	-0.25	0.30	-0.30	1.2559	0.0080	9.9	1.0	9.9	1.1		
Reading	4	2664	1	B.1.1.1	2	25049	0.77	0.14	0.03	0.77	0.05	0.00	0.37	-0.26	-0.31	0.37	-0.30	-0.3752	0.0163	-2.7	1.0	-2.8	1.0	A-	A-
Reading	4	3378	1	A.1.3.1	2	25049	0.71	0.05	0.19	0.71	0.05	0.00	0.45	-0.41	-0.35	0.45	-0.33	0.0248	0.0151	-9.9	0.9	-9.9	0.8	A+	A-
Reading	4	4362	1	A.2.3.1	2	74752	0.58	0.07	0.21	0.15	0.58	0.00	0.26	-0.08	-0.30	-0.18	0.26	0.7496	0.0081	9.9	1.1	9.9	1.2		
Reading	4	5042	1	A.1.5.1	3	25049	0.67	0.67	0.23	0.03	0.07	0.00	0.24	0.24	-0.12	-0.34	-0.26	0.2527	0.0146	9.9	1.1	9.9	1.2	A+	A-
Reading	4	5094	1	A.1.6.1	2	25049	0.43	0.04	0.08	0.45	0.43	0.00	0.20	-0.44	-0.39	-0.11	0.20	1.4232	0.0139	9.9	1.2	9.9	1.3	A+	A-
Reading	4	5550	1	A.2.4.1	2	74752	0.91	0.91	0.03	0.06	0.00	0.00	0.38	0.38	-0.24	-0.32	-0.12	-1.5655	0.0132	-9.0	0.9	-9.9	0.7		
Reading	4	5747	1	A.2.3.1	2	74752	0.54	0.54	0.05	0.06	0.35	0.00	0.24	0.24	-0.34	-0.35	-0.14	0.9073	0.0080	9.9	1.1	9.9	1.2		
Reading	4	6060	1	A.1.1.2	1	25049	0.75	0.04	0.75	0.12	0.09	0.00	0.37	-0.32	0.37	-0.22	-0.34	-0.2113	0.0158	-1.4	1.0	-1.9	1.0	A-	B-
Reading	4	6405	1	B.2.1.2	2	25049	0.39	0.09	0.39	0.35	0.17	0.00	0.21	-0.36	0.21	-0.15	-0.20	1.6340	0.0141	9.9	1.1	9.9	1.3	A-	A-
Reading	4	7347	1	A.1.3.1	2	25049	0.84	0.84	0.03	0.09	0.04	0.00	0.45	0.45	-0.28	-0.37	-0.28	-0.8471	0.0182	-9.9	0.9	-9.9	0.8	A+	A-
Reading	4	7766	1	A.2.3.1	2	74752	0.44	0.07	0.28	0.44	0.21	0.00	0.24	-0.41	-0.19	0.24	-0.19	1.4074	0.0080	9.9	1.1	9.9	1.2		
Reading	4	7799	1	A.1.4.1	1	25049	0.76	0.07	0.14	0.76	0.02	0.00	0.42	-0.37	-0.30	0.42	-0.29	-0.3131	0.0161	-7.6	0.9	-9.2	0.9	A+	A-
Reading	4	9966	1	B.3.3.2	2	74752	0.59	0.07	0.59	0.18	0.15	0.00	0.40	-0.37	0.40	-0.29	-0.38	0.6656	0.0081	-9.9	1.0	-9.9	0.9		
Reading	4	214	2	B.1.1.1	2	24836	0.79	0.79	0.04	0.14	0.03	0.00	0.21	0.21	-0.28	-0.05	-0.23	-0.4491	0.0167	9.9	1.1	9.9	1.3	A-	A-

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	520	2	A.1.3.1	2	24836	0.69	0.17	0.69	0.04	0.10	0.00	0.42	-0.35	0.42	-0.35	-0.29	0.1766	0.0148	-8.3	0.9	-9.9	0.9	A-	A-
Reading	4	557	2	B.2.1.3	1	74752	0.72	0.08	0.72	0.09	0.10	0.00	0.43	-0.35	0.43	-0.26	-0.38	-0.0382	0.0089	-9.9	0.9	-9.9	0.9		
Reading	4	880	2	A.2.3.1	2	74752	0.65	0.12	0.10	0.65	0.13	0.00	0.49	-0.40	-0.36	0.49	-0.43	0.3601	0.0084	-9.9	0.9	-9.9	0.8		
Reading	4	1376	2	A.2.6.1	2	74752	0.47	0.04	0.34	0.47	0.15	0.00	0.30	-0.38	-0.25	0.30	-0.30	1.2559	0.0080	9.9	1.0	9.9	1.1		
Reading	4	2241	2	A.1.4.1	2	24836	0.73	0.09	0.04	0.13	0.73	0.00	0.37	-0.29	-0.27	-0.28	0.37	-0.0888	0.0155	-2.0	1.0	-3.7	1.0	B-	A-
Reading	4	3956	2	A.1.3.1	2	24836	0.75	0.02	0.03	0.75	0.21	0.00	0.22	-0.28	-0.29	0.22	-0.12	-0.1516	0.0157	9.9	1.1	9.9	1.3	A-	A-
Reading	4	4362	2	A.2.3.1	2	74752	0.58	0.07	0.21	0.15	0.58	0.00	0.26	-0.08	-0.30	-0.18	0.26	0.7496	0.0081	9.9	1.1	9.9	1.2		
Reading	4	5550	2	A.2.4.1	2	74752	0.91	0.91	0.03	0.06	0.00	0.00	0.38	0.38	-0.24	-0.32	-0.12	-1.5655	0.0132	-9.0	0.9	-9.9	0.7		
Reading	4	5639	2	A.1.3.1	2	24836	0.83	0.04	0.06	0.07	0.83	0.00	0.48	-0.34	-0.32	-0.37	0.48	-0.7347	0.0179	-9.9	0.9	-9.9	0.7	A-	A-
Reading	4	5747	2	A.2.3.1	2	74752	0.54	0.54	0.05	0.06	0.35	0.00	0.24	0.24	-0.34	-0.35	-0.14	0.9073	0.0080	9.9	1.1	9.9	1.2		
Reading	4	5873	2	B.1.1.1	2	24836	0.78	0.14	0.04	0.04	0.78	0.00	0.34	-0.23	-0.34	-0.23	0.34	-0.3594	0.0164	-1.1	1.0	2.9	1.0	A+	A-
Reading	4	7766	2	A.2.3.1	2	74752	0.44	0.07	0.28	0.44	0.21	0.00	0.24	-0.41	-0.19	0.24	-0.19	1.4074	0.0080	9.9	1.1	9.9	1.2		
Reading	4	8023	2	B.1.1.1	2	24836	0.79	0.07	0.79	0.10	0.04	0.00	0.32	-0.31	0.32	-0.17	-0.24	-0.4424	0.0167	0.4	1.0	3.2	1.1	A-	A-
Reading	4	8609	2	A.1.3.1	2	24836	0.68	0.09	0.05	0.68	0.18	0.00	0.47	-0.46	-0.38	0.47	-0.34	0.2188	0.0148	-9.9	0.9	-9.9	0.8	A-	B-
Reading	4	8832	2	B.1.1.1	2	24836	0.83	0.83	0.03	0.09	0.04	0.00	0.33	0.33	-0.27	-0.18	-0.27	-0.7444	0.0180	-1.6	1.0	-0.2	1.0	A+	A-
Reading	4	9044	2	A.1.1.1	2	24836	0.64	0.04	0.21	0.64	0.11	0.00	0.07	-0.25	-0.02	0.07	0.00	0.4584	0.0143	9.9	1.3	9.9	1.5	A+	A+
Reading	4	9966	2	B.3.3.2	2	74752	0.59	0.07	0.59	0.18	0.15	0.00	0.40	-0.37	0.40	-0.29	-0.38	0.6656	0.0081	-9.9	1.0	-9.9	0.9		
Reading	4	475	3	B.3.3.1	3	24867	0.59	0.10	0.20	0.11	0.59	0.00	0.35	-0.35	-0.25	-0.33	0.35	0.6921	0.0141	3.3	1.0	3.3	1.0	A-	A-
Reading	4	557	3	B.2.1.3	1	74752	0.72	0.08	0.72	0.09	0.10	0.00	0.43	-0.35	0.43	-0.26	-0.38	-0.0382	0.0089	-9.9	0.9	-9.9	0.9		
Reading	4	785	3	A.2.3.1	2	24867	0.49	0.31	0.06	0.14	0.49	0.00	0.39	-0.33	-0.44	-0.36	0.39	1.1878	0.0138	-9.9	1.0	-5.4	1.0	A-	A-
Reading	4	880	3	A.2.3.1	2	74752	0.65	0.12	0.10	0.65	0.13	0.00	0.49	-0.40	-0.36	0.49	-0.43	0.3601	0.0084	-9.9	0.9	-9.9	0.8		
Reading	4	1021	3	A.2.3.1	2	24867	0.61	0.20	0.12	0.61	0.07	0.00	0.41	-0.33	-0.37	0.41	-0.33	0.5729	0.0142	-8.9	1.0	-9.5	0.9	A-	A-
Reading	4	1376	3	A.2.6.1	2	74752	0.47	0.04	0.34	0.47	0.15	0.00	0.30	-0.38	-0.25	0.30	-0.30	1.2559	0.0080	9.9	1.0	9.9	1.1		
Reading	4	1405	3	A.2.4.1	1	24867	0.71	0.08	0.08	0.13	0.71	0.00	0.42	-0.29	-0.31	-0.35	0.42	0.0257	0.0152	-8.5	0.9	-9.9	0.9	A-	A-
Reading	4	2257	3	A.2.2.2	2	24867	0.42	0.09	0.17	0.42	0.32	0.00	0.31	-0.37	-0.26	0.31	-0.31	1.5235	0.0140	3.4	1.0	8.5	1.1	B-	A-
Reading	4	2953	3	B.3.1.1	2	24867	0.52	0.05	0.52	0.39	0.05	0.00	0.27	-0.42	0.27	-0.17	-0.41	1.0290	0.0138	9.9	1.1	9.9	1.1	A-	A-
Reading	4	4362	3	A.2.3.1	2	74752	0.58	0.07	0.21	0.15	0.58	0.00	0.26	-0.08	-0.30	-0.18	0.26	0.7496	0.0081	9.9	1.1	9.9	1.2		
Reading	4	5550	3	A.2.4.1	2	74752	0.91	0.91	0.03	0.06	0.00	0.00	0.38	0.38	-0.24	-0.32	-0.12	-1.5655	0.0132	-9.0	0.9	-9.9	0.7		
Reading	4	5747	3	A.2.3.1	2	74752	0.54	0.54	0.05	0.06	0.35	0.00	0.24	0.24	-0.34	-0.35	-0.14	0.9073	0.0080	9.9	1.1	9.9	1.2		
Reading	4	7003	3	A.2.3.1	2	24867	0.91	0.91	0.02	0.03	0.04	0.00	0.39	0.39	-0.24	-0.28	-0.25	-1.5425	0.0229	-7.4	0.9	-9.9	0.7	A+	A-
Reading	4	7766	3	A.2.3.1	2	74752	0.44	0.07	0.28	0.44	0.21	0.00	0.24	-0.41	-0.19	0.24	-0.19	1.4074	0.0080	9.9	1.1	9.9	1.2		
Reading	4	7896	3	B.3.2.1	2	24867	0.63	0.63	0.14	0.16	0.08	0.00	0.30	0.30	-0.17	-0.23	-0.36	0.5061	0.0143	9.9	1.1	9.9	1.1	A-	A-
Reading	4	9653	3	A.2.3.1	2	24867	0.69	0.08	0.69	0.11	0.12	0.00	0.37	-0.31	0.37	-0.29	-0.27	0.1865	0.0148	-0.2	1.0	-0.9	1.0	A-	A-
Reading	4	9966	3	B.3.3.2	2	74752	0.59	0.07	0.59	0.18	0.15	0.00	0.40	-0.37	0.40	-0.29	-0.38	0.6656	0.0081	-9.9	1.0	-9.9	0.9		
Reading	4	9977	3	A.2.3.1	2	24867	0.76	0.06	0.76	0.03	0.15	0.00	0.37	-0.38	0.37	-0.32	-0.21	-0.2495	0.0160	-2.4	1.0	-1.0	1.0	A-	A-
Reading	4	343	4	A.2.3.1	2	24892	0.81	0.04	0.10	0.05	0.81	0.00	0.52	-0.35	-0.39	-0.40	0.52	-0.5946	0.0173	-9.9	0.8	-9.9	0.7	A+	B-
Reading	4	910	4	A.2.4.1	2	24892	0.70	0.05	0.70	0.14	0.11	0.00	0.43	-0.32	0.43	-0.37	-0.32	0.1327	0.0150	-8.9	0.9	-8.2	0.9	A-	A-
Reading	4	980	4	A.2.2.1	2	24892	0.91	0.04	0.03	0.03	0.91	0.00	0.41	-0.26	-0.31	-0.25	0.41	-1.5298	0.0227	-8.2	0.9	-9.9	0.7	A-	A-
Reading	4	1356	4	A.2.4.1	1	24892	0.53	0.53	0.15	0.05	0.27	0.00	0.38	0.38	-0.47	-0.41	-0.23	0.9682	0.0139	-3.6	1.0	-1.7	1.0	A+	A+
Reading	4	1867	4	A.2.4.1	2	24892	0.73	0.08	0.06	0.73	0.13	0.00	0.32	-0.28	-0.28	0.32	-0.17	-0.0562	0.0154	5.6	1.0	2.1	1.0	A+	A-
Reading	4	2126	4	B.3.3.2	2	24892	0.28	0.19	0.11	0.41	0.28	0.00	0.10	-0.12	-0.32	-0.04	0.10	2.2113	0.0150	9.9	1.2	9.9	1.5	A+	A+
Reading	4	2544	4	B.3.3.4	2	24892	0.59	0.14	0.14	0.59	0.13	0.00	0.30	-0.21	-0.27	0.30	-0.27	0.6784	0.0141	9.9	1.1	8.2	1.1	A+	A+
Reading	4	3592	4	B.1.1.1	2	49778	0.73	0.73	0.12	0.08	0.07	0.00	0.31	0.31	-0.18	-0.15	-0.37	-0.0947	0.0110	7.6	1.0	9.8	1.1		
Reading	4	3789	4	B.1.1.1	2	49778	0.83	0.09	0.02	0.05	0.83	0.00	0.42	-0.28	-0.31	-0.33	0.42	-0.8017	0.0129	-9.9	0.9	-9.9	0.8		
Reading	4	3980	4	A.1.1.1	2	49778	0.78	0.16	0.03	0.78	0.03	0.00	0.37	-0.28	-0.31	0.37	-0.27	-0.4065	0.0117	-3.5	1.0	-7.8	0.9		
Reading	4	4020	4	A.1.6.1	2	49778	0.65	0.07	0.15	0.65	0.13	0.00	0.31	-0.37	-0.25	0.31	-0.16	0.3814	0.0102	9.9	1.1	9.9	1.1		
Reading	4	4371	4	A.1.5.1	2	49778	0.84	0.03	0.08	0.84	0.05	0.00	0.42	-0.27	-0.33	0.42	-0.27	-0.8766	0.0131	-9.9	0.9	-9.9	0.8		
Reading	4	4817	4	A.1.2.1	2	49778	0.77	0.04	0.16	0.02	0.77	0.00	0.29	-0.20	-0.22	-0.22	0.29	-0.3021	0.0114	9.9	1.1	5.5	1.1		
Reading	4	4959	4	A.1.3.1	1	49778	0.84	0.84	0.05	0.04	0.07	0.00	0.43	0.43	-0.31	-0.28	-0.31	-0.8683	0.0131	-9.9	0.9	-9.9	0.8		

Appendix I: Item Statistics Multiple Choice

Item Information						Classical													Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	5914	4	A.2.4.1	1	24892	0.68	0.25	0.68	0.02	0.06	0.00	0.47	-0.42	0.47	-0.27	-0.39	0.2420	0.0147	-9.9	0.9	-9.9	0.8	A+	A-	
Reading	4	6909	4	A.1.4.1	2	49778	0.53	0.53	0.11	0.02	0.33	0.00	0.18	0.18	-0.17	-0.29	-0.14	0.9577	0.0098	9.9	1.2	9.9	1.3			
Reading	4	7723	4	A.2.3.1	2	24892	0.61	0.24	0.05	0.61	0.10	0.00	0.36	-0.29	-0.36	0.36	-0.28	0.5680	0.0142	0.8	1.0	-0.6	1.0	A+	A-	
Reading	4	8639	4	A.2.6.1	2	24892	0.74	0.74	0.06	0.11	0.08	0.00	0.37	0.37	-0.23	-0.27	-0.32	-0.1554	0.0157	-1.4	1.0	-2.5	1.0	A+	A-	
Reading	4	344	5	B.3.3.3	2	24886	0.43	0.43	0.35	0.10	0.12	0.00	0.11	0.11	-0.04	-0.19	-0.19	1.4370	0.0138	9.9	1.2	9.9	1.3	A+	A+	
Reading	4	2686	5	A.2.4.1	1	24886	0.65	0.15	0.13	0.65	0.06	0.00	0.43	-0.33	-0.35	0.43	-0.39	0.3527	0.0144	-9.9	0.9	-9.9	0.9	A+	A-	
Reading	4	2784	5	A.2.6.1	2	24886	0.84	0.03	0.84	0.03	0.10	0.00	0.43	-0.35	0.43	-0.30	-0.29	-0.8019	0.0181	-9.2	0.9	-9.9	0.8	A+	A-	
Reading	4	3592	5	B.1.1.1	2	49778	0.73	0.73	0.12	0.08	0.07	0.00	0.31	0.31	-0.18	-0.15	-0.37	-0.0947	0.0110	7.6	1.0	9.8	1.1			
Reading	4	3689	5	A.2.2.2	2	24886	0.63	0.07	0.19	0.10	0.63	0.00	0.40	-0.35	-0.32	-0.32	0.40	0.4651	0.0142	-7.2	1.0	-9.3	0.9	A+	B-	
Reading	4	3724	5	B.3.3.4	2	24886	0.41	0.22	0.41	0.16	0.21	0.00	0.18	-0.17	0.18	-0.18	-0.16	1.5486	0.0139	9.9	1.1	9.9	1.3	A+	A-	
Reading	4	3789	5	B.1.1.1	2	49778	0.83	0.09	0.02	0.05	0.83	0.00	0.42	-0.28	-0.31	-0.33	0.42	-0.8017	0.0129	-9.9	0.9	-9.9	0.8			
Reading	4	3843	5	B.3.3.2	2	24886	0.52	0.37	0.05	0.06	0.52	0.00	0.30	-0.26	-0.26	-0.30	0.30	0.9968	0.0138	9.3	1.1	9.1	1.1	A+	A-	
Reading	4	3980	5	A.1.1.1	2	49778	0.78	0.16	0.03	0.78	0.03	0.00	0.37	-0.28	-0.31	0.37	-0.27	-0.4065	0.0117	-3.5	1.0	-7.8	0.9			
Reading	4	4020	5	A.1.6.1	2	49778	0.65	0.07	0.15	0.65	0.13	0.00	0.31	-0.37	-0.25	0.31	-0.16	0.3814	0.0102	9.9	1.1	9.9	1.1			
Reading	4	4371	5	A.1.5.1	2	49778	0.84	0.03	0.08	0.84	0.05	0.00	0.42	-0.27	-0.33	0.42	-0.27	-0.8766	0.0131	-9.9	0.9	-9.9	0.8			
Reading	4	4817	5	A.1.2.1	2	49778	0.77	0.04	0.16	0.02	0.77	0.00	0.29	-0.20	-0.22	-0.22	0.29	-0.3021	0.0114	9.9	1.1	5.5	1.1			
Reading	4	4959	5	A.1.3.1	1	49778	0.84	0.84	0.05	0.04	0.07	0.00	0.43	0.43	-0.31	-0.28	-0.31	-0.8683	0.0131	-9.9	0.9	-9.9	0.8			
Reading	4	5620	5	B.3.3.4	2	24886	0.43	0.23	0.11	0.43	0.22	0.00	0.16	-0.16	-0.24	0.16	-0.09	1.4171	0.0138	9.9	1.2	9.9	1.3	A+	A-	
Reading	4	5948	5	A.2.1.1	2	24886	0.40	0.40	0.08	0.47	0.06	0.00	0.21	0.21	-0.23	-0.18	-0.24	1.6002	0.0140	9.9	1.1	9.9	1.2	A+	A-	
Reading	4	6023	5	B.3.3.3	2	24886	0.81	0.07	0.81	0.06	0.06	0.00	0.41	-0.30	0.41	-0.28	-0.30	-0.5750	0.0171	-7.5	0.9	-9.9	0.8	A+	A-	
Reading	4	6909	5	A.1.4.1	2	49778	0.53	0.53	0.11	0.02	0.33	0.00	0.18	0.18	-0.17	-0.29	-0.14	0.9577	0.0098	9.9	1.2	9.9	1.3			
Reading	4	8009	5	A.2.3.1	2	24886	0.71	0.09	0.05	0.15	0.71	0.00	0.39	-0.40	-0.34	-0.23	0.39	0.0627	0.0150	-5.8	1.0	-4.1	1.0	A+	A-	
Reading	5	64	0	A.1.4.1		125963	0.87	0.04	0.07	0.87	0.03	0.00	0.49	-0.31	-0.42	0.49	-0.26	-0.9282	0.0088	-9.9	0.9	-9.9	0.6			
Reading	5	132	0	A.1.4.1	1	125963	0.92	0.03	0.03	0.02	0.92	0.00	0.44	-0.29	-0.31	-0.27	0.44	-1.6007	0.0110	-9.9	0.9	-9.9	0.6			
Reading	5	137	0	B.1.1.1	3	125963	0.76	0.76	0.10	0.05	0.09	0.00	0.43	0.43	-0.27	-0.41	-0.32	-0.1036	0.0072	-9.9	0.9	-9.9	0.9			
Reading	5	331	0	A.1.3.1		125963	0.60	0.60	0.34	0.02	0.04	0.00	0.35	0.35	-0.29	-0.37	-0.36	0.8036	0.0063	9.9	1.0	8.3	1.0			
Reading	5	770	0	B.2.1.4		125963	0.81	0.06	0.05	0.81	0.08	0.00	0.41	-0.38	-0.34	0.41	-0.20	-0.4562	0.0078	-9.9	0.9	-7.0	1.0			
Reading	5	803	0	A.1.3.1	2	125963	0.73	0.73	0.08	0.07	0.12	0.00	0.30	0.30	-0.32	-0.26	-0.14	0.1174	0.0069	9.9	1.1	9.9	1.2			
Reading	5	822	0	A.1.4.1	2	125963	0.72	0.13	0.05	0.72	0.10	0.00	0.30	-0.20	-0.25	0.30	-0.24	0.1329	0.0069	9.9	1.1	9.9	1.1			
Reading	5	1276	0	A.2.3.1		125963	0.75	0.17	0.75	0.05	0.03	0.00	0.37	-0.25	0.37	-0.34	-0.31	-0.0441	0.0071	2.0	1.0	1.5	1.0			
Reading	5	1853	0	A.2.3.1		125963	0.83	0.83	0.04	0.08	0.05	0.00	0.33	0.33	-0.28	-0.26	-0.15	-0.6145	0.0081	3.8	1.0	5.7	1.1			
Reading	5	2862	0	A.1.3.1	2	125963	0.62	0.17	0.62	0.07	0.14	0.00	0.31	-0.32	0.31	-0.34	-0.14	0.7363	0.0064	9.9	1.1	9.9	1.1			
Reading	5	3293	0	B.1.1.1		125963	0.70	0.10	0.70	0.03	0.17	0.00	0.40	-0.39	0.40	-0.33	-0.28	0.2678	0.0067	-6.2	1.0	-2.2	1.0			
Reading	5	3650	0	A.1.3.1	2	125963	0.73	0.73	0.15	0.09	0.03	0.00	0.24	0.24	-0.16	-0.14	-0.27	0.1098	0.0069	9.9	1.1	9.9	1.3			
Reading	5	4430	0	B.2.1.3	2	125963	0.78	0.78	0.03	0.03	0.16	0.00	0.28	0.28	-0.28	-0.27	-0.17	-0.2013	0.0073	9.9	1.1	9.9	1.1			
Reading	5	5136	0	A.2.1.2		125963	0.84	0.03	0.06	0.06	0.84	0.00	0.51	-0.35	-0.38	-0.36	0.51	-0.7148	0.0083	-9.9	0.8	-9.9	0.7			
Reading	5	5208	0	B.3.1.1		125963	0.78	0.12	0.03	0.07	0.78	0.00	0.46	-0.32	-0.42	-0.36	0.46	-0.2259	0.0074	-9.9	0.9	-9.9	0.9			
Reading	5	5229	0	A.1.3.1	2	125963	0.67	0.11	0.19	0.67	0.02	0.00	0.30	-0.25	-0.23	0.30	-0.25	0.4328	0.0066	9.9	1.1	9.9	1.1			
Reading	5	5500	0	B.2.2.1		125963	0.56	0.08	0.24	0.13	0.56	0.00	0.47	-0.55	-0.40	-0.38	0.47	1.0249	0.0062	-9.9	0.9	-9.9	0.9			
Reading	5	5754	0	B.3.3.4		125963	0.80	0.09	0.05	0.80	0.06	0.00	0.49	-0.37	-0.41	0.49	-0.30	-0.3671	0.0076	-9.9	0.9	-9.9	0.8			
Reading	5	6424	0	A.1.3.1	2	125963	0.88	0.04	0.05	0.88	0.04	0.00	0.40	-0.26	-0.27	0.40	-0.29	-1.0201	0.0091	-9.9	0.9	-9.9	0.8			
Reading	5	6732	0	A.2.4.1		125963	0.72	0.11	0.72	0.09	0.07	0.00	0.49	-0.40	0.49	-0.34	-0.41	0.1491	0.0069	-9.9	0.9	-9.9	0.8			
Reading	5	6796	0	A.2.4.1		125963	0.90	0.06	0.90	0.03	0.02	0.00	0.47	-0.34	0.47	-0.32	-0.31	-1.2440	0.0097	-9.9	0.9	-9.9	0.6			
Reading	5	7046	0	B.3.1.1		125963	0.93	0.93	0.03	0.02	0.02	0.00	0.44	0.44	-0.27	-0.27	-0.30	-1.8043	0.0118	-9.9	0.8	-9.9	0.5			
Reading	5	7706	0	A.1.2.1		125963	0.46	0.12	0.30	0.12	0.46	0.00	0.32	-0.39	-0.22	-0.36	0.32	1.4887	0.0062	9.9	1.0	9.9	1.1			
Reading	5	7724	0	A.2.3.1		125963	0.63	0.15	0.07	0.63	0.14	0.00	0.29	-0.26	-0.18	0.29	-0.24	0.6545	0.0064	9.9	1.1	9.9	1.1			
Reading	5	7869	0	B.1.1.1	3	125963	0.75	0.75	0.06	0.05	0.14	0.00	0.37	0.37	-0.27	-0.34	-0.26	-0.0141	0.0071	-0.3	1.0	9.0	1.1			
Reading	5	7960	0	B.2.1.2	2	125963	0.60	0.28	0.60	0.06	0.06	0.00	0.30	-0.20	0.30	-0.34	-0.34	0.8144	0.0063	9.9	1.1	9.9	1.1			
Reading	5	7972	0	A.1.4.1		125963	0.92	0.92	0.03	0.01	0.04	0.00	0.38	0.38	-0.24	-0.23	-0.27	-1.5749	0.0109	-9.5	0.9	-9.9	0.6			

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	8196	0	B.2.1.3		125963	0.85	0.05	0.05	0.85	0.05	0.00	0.45	-0.32	-0.31	0.45	-0.31	-0.7706	0.0085	-9.9	0.9	-9.9	0.8		
Reading	5	8224	0	A.2.3.2		125963	0.57	0.24	0.57	0.05	0.14	0.00	0.39	-0.40	0.39	-0.35	-0.24	0.9807	0.0062	-8.5	1.0	-3.0	1.0		
Reading	5	8333	0	A.2.4.1		125963	0.79	0.79	0.11	0.04	0.05	0.00	0.48	0.48	-0.38	-0.36	-0.33	-0.3029	0.0075	-9.9	0.9	-9.9	0.8		
Reading	5	8620	0	B.3.3.3		125963	0.88	0.02	0.04	0.05	0.88	0.00	0.38	-0.27	-0.28	-0.24	0.38	-1.1082	0.0093	-9.9	0.9	-9.9	0.9		
Reading	5	8742	0	B.3.3.4		125963	0.60	0.08	0.09	0.60	0.23	0.00	0.27	-0.36	-0.31	0.27	-0.11	0.8001	0.0063	9.9	1.1	9.9	1.2		
Reading	5	8895	0	A.1.4.1	1	125963	0.66	0.14	0.13	0.66	0.07	0.00	0.33	-0.30	-0.24	0.33	-0.23	0.4754	0.0065	9.9	1.1	6.8	1.0		
Reading	5	9010	0	A.1.6.1	3	125963	0.36	0.07	0.28	0.29	0.36	0.00	0.32	-0.48	-0.29	-0.31	0.32	1.9908	0.0064	-4.1	1.0	9.9	1.1		
Reading	5	9256	0	B.1.1.1	2	125963	0.65	0.06	0.65	0.25	0.04	0.00	0.43	-0.35	0.43	-0.36	-0.36	0.5460	0.0065	-9.9	1.0	-9.9	0.9		
Reading	5	9470	0	A.1.1.2	1	125963	0.67	0.12	0.67	0.07	0.14	0.00	0.36	-0.35	0.36	-0.33	-0.19	0.4507	0.0066	9.7	1.0	3.8	1.0		
Reading	5	9530	0	A.1.4.1	1	125963	0.45	0.52	0.02	0.01	0.45	0.00	0.28	-0.26	-0.34	-0.29	0.28	1.5614	0.0062	9.9	1.1	9.9	1.1		
Reading	5	9682	0	B.2.1.2		125963	0.73	0.04	0.20	0.73	0.03	0.00	0.34	-0.38	-0.21	0.34	-0.33	0.1162	0.0069	9.9	1.0	9.9	1.1		
Reading	5	9865	0	B.3.3.1		125963	0.58	0.16	0.58	0.12	0.14	0.00	0.36	-0.31	0.36	-0.31	-0.30	0.9251	0.0063	9.9	1.0	9.6	1.0		
Reading	5	9891	0	B.1.1.1		125963	0.85	0.85	0.07	0.05	0.03	0.00	0.26	0.26	-0.12	-0.22	-0.24	-0.7311	0.0084	9.9	1.1	9.9	1.4		
Reading	5	793	1	A.1.4.1	1	75718	0.86	0.06	0.86	0.02	0.07	0.00	0.41	-0.30	0.41	-0.24	-0.30	-0.8262	0.0111	-9.9	0.9	-9.9	0.8		
Reading	5	1521	1	A.2.3.1	2	25419	0.76	0.03	0.10	0.76	0.11	0.00	0.40	-0.30	-0.32	0.40	-0.28	-0.0854	0.0159	-3.6	1.0	-3.7	1.0	A-	A-
Reading	5	1892	1	A.1.4.1	1	75718	0.73	0.73	0.03	0.03	0.21	0.00	0.25	0.25	-0.23	-0.29	-0.16	0.1079	0.0089	9.9	1.1	9.9	1.2		
Reading	5	2651	1	B.2.1.1	2	75718	0.79	0.07	0.79	0.07	0.07	0.00	0.43	-0.38	0.43	-0.27	-0.30	-0.2875	0.0096	-9.9	0.9	-9.9	0.9		
Reading	5	3079	1	B.3.3.1	2	25419	0.60	0.60	0.13	0.20	0.07	0.00	0.33	0.33	-0.34	-0.17	-0.40	0.7750	0.0141	8.1	1.1	7.5	1.1	A+	A-
Reading	5	4158	1	B.1.1.1	2	25419	0.40	0.28	0.40	0.13	0.18	0.00	0.18	-0.14	0.18	-0.29	-0.15	1.7603	0.0139	9.9	1.2	9.9	1.3	A+	A-
Reading	5	4417	1	B.3.3.2	3	25419	0.30	0.12	0.30	0.21	0.36	0.00	0.18	-0.32	0.18	-0.25	-0.11	2.2661	0.0147	9.9	1.1	9.9	1.4	A+	A-
Reading	5	4639	1	A.1.6.2	3	75718	0.47	0.05	0.32	0.47	0.15	0.00	0.26	-0.29	-0.21	0.26	-0.29	1.4476	0.0080	9.9	1.1	9.9	1.2		
Reading	5	4828	1	B.1.1.1	2	75718	0.66	0.66	0.12	0.04	0.18	0.00	0.26	0.26	-0.22	-0.19	-0.20	0.5051	0.0084	9.9	1.1	9.9	1.2		
Reading	5	4901	1	A.2.1.1	2	25419	0.47	0.10	0.07	0.36	0.47	0.00	0.33	-0.31	-0.39	-0.28	0.33	1.4229	0.0137	1.2	1.0	9.3	1.1	A+	A-
Reading	5	5125	1	B.1.1.1	2	75718	0.87	0.01	0.05	0.87	0.07	0.00	0.35	-0.26	-0.32	0.35	-0.17	-0.9293	0.0114	-4.9	1.0	-1.3	1.0		
Reading	5	6184	1	A.2.4.1	1	25419	0.79	0.08	0.06	0.79	0.07	0.00	0.44	-0.29	-0.34	0.44	-0.34	-0.2913	0.0166	-8.3	0.9	-8.4	0.9	A+	A-
Reading	5	6348	1	A.2.3.2	2	25419	0.72	0.13	0.09	0.72	0.05	0.00	0.49	-0.45	-0.36	0.49	-0.30	0.1181	0.0153	-9.9	0.9	-9.9	0.8	A+	A-
Reading	5	6359	1	B.3.1.1	2	25419	0.87	0.87	0.03	0.04	0.06	0.00	0.47	0.47	-0.32	-0.34	-0.32	-0.9754	0.0198	-9.9	0.9	-9.9	0.7	A+	A-
Reading	5	6458	1	A.2.3.1	2	25419	0.61	0.25	0.61	0.07	0.07	0.00	0.43	-0.35	0.43	-0.39	-0.37	0.7257	0.0141	-9.9	0.9	-9.9	0.9	A-	A-
Reading	5	8332	1	A.2.4.1	1	25419	0.64	0.15	0.64	0.07	0.14	0.00	0.33	-0.26	0.33	-0.36	-0.21	0.5718	0.0143	8.3	1.1	3.9	1.0	A-	A-
Reading	5	8726	1	A.1.3.1	3	75718	0.71	0.71	0.05	0.06	0.17	0.00	0.35	0.35	-0.32	-0.34	-0.23	0.1900	0.0088	4.7	1.0	6.0	1.0		
Reading	5	9333	1	B.1.1.1	2	75718	0.81	0.08	0.09	0.81	0.02	0.00	0.30	-0.20	-0.22	0.30	-0.23	-0.4198	0.0099	8.7	1.1	8.8	1.1		
Reading	5	793	2	A.1.4.1	1	75718	0.86	0.06	0.86	0.02	0.07	0.00	0.41	-0.30	0.41	-0.24	-0.30	-0.8262	0.0111	-9.9	0.9	-9.9	0.8		
Reading	5	913	2	A.2.2.2	2	25135	0.86	0.05	0.05	0.04	0.86	0.00	0.41	-0.34	-0.25	-0.27	0.41	-0.8591	0.0195	-7.2	0.9	-9.9	0.8	A+	C-
Reading	5	1286	2	A.2.6.1	3	25135	0.92	0.02	0.92	0.03	0.02	0.00	0.43	-0.30	0.43	-0.28	-0.29	-1.5288	0.0241	-9.1	0.9	-9.9	0.7	A+	B-
Reading	5	1892	2	A.1.4.1	1	75718	0.73	0.73	0.03	0.03	0.21	0.00	0.25	0.25	-0.23	-0.29	-0.16	0.1079	0.0089	9.9	1.1	9.9	1.2		
Reading	5	1936	2	B.3.3.4	2	25135	0.81	0.81	0.04	0.12	0.03	0.00	0.33	0.33	-0.29	-0.18	-0.30	-0.4393	0.0174	1.1	1.0	1.9	1.0	A-	C-
Reading	5	2469	2	A.2.3.1	2	25135	0.91	0.04	0.91	0.02	0.03	0.00	0.31	-0.17	0.31	-0.20	-0.25	-1.4849	0.0238	-3.1	1.0	0.3	1.0	A-	B-
Reading	5	2651	2	B.2.1.1	2	75718	0.79	0.07	0.79	0.07	0.07	0.00	0.43	-0.38	0.43	-0.27	-0.30	-0.2875	0.0096	-9.9	0.9	-9.9	0.9		
Reading	5	3341	2	A.2.5.1	2	25135	0.79	0.09	0.05	0.07	0.79	0.00	0.45	-0.35	-0.36	-0.30	0.45	-0.2636	0.0167	-9.9	0.9	-9.9	0.8	A+	C-
Reading	5	4639	2	A.1.6.2	3	75718	0.47	0.05	0.32	0.47	0.15	0.00	0.26	-0.29	-0.21	0.26	-0.29	1.4476	0.0080	9.9	1.1	9.9	1.2		
Reading	5	4828	2	B.1.1.1	2	75718	0.66	0.66	0.12	0.04	0.18	0.00	0.26	0.26	-0.22	-0.19	-0.20	0.5051	0.0084	9.9	1.1	9.9	1.2		
Reading	5	5125	2	B.1.1.1	2	75718	0.87	0.01	0.05	0.87	0.07	0.00	0.35	-0.26	-0.32	0.35	-0.17	-0.9293	0.0114	-4.9	1.0	-1.3	1.0		
Reading	5	6213	2	B.3.3.4	1	25135	0.34	0.27	0.34	0.17	0.21	0.00	0.22	-0.24	0.22	-0.26	-0.19	2.0873	0.0144	9.9	1.1	9.9	1.3	A+	A-
Reading	5	7302	2	A.2.3.1	2	25135	0.47	0.07	0.03	0.43	0.47	0.00	0.22	-0.33	-0.35	-0.15	0.22	1.4500	0.0138	9.9	1.1	9.9	1.2	A-	A-
Reading	5	7590	2	B.3.3.3	2	25135	0.73	0.07	0.15	0.73	0.05	0.00	0.27	-0.22	-0.16	0.27	-0.28	0.1144	0.0155	9.9	1.1	9.6	1.1	A+	A-
Reading	5	8486	2	A.2.4.1	2	25135	0.72	0.05	0.16	0.07	0.72	0.00	0.46	-0.37	-0.37	-0.34	0.46	0.1524	0.0154	-9.9	0.9	-9.9	0.8	B-	A-
Reading	5	8726	2	A.1.3.1	3	75718	0.71	0.71	0.05	0.06	0.17	0.00	0.35	0.35	-0.32	-0.34	-0.23	0.1900	0.0088	4.7	1.0	6.0	1.0		
Reading	5	9178	2	A.2.4.1	2	25135	0.87	0.02	0.87	0.08	0.02	0.00	0.40	-0.27	0.40	-0.28	-0.29	-0.9908	0.0202	-6.4	0.9	-9.9	0.8	A+	B-
Reading	5	9333	2	B.1.1.1	2	75718	0.81	0.08	0.09	0.81	0.02	0.00	0.30	-0.20	-0.22	0.30	-0.23	-0.4198	0.0099	8.7	1.1	8.8	1.1		

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	793	3	A.1.4.1	1	75718	0.86	0.06	0.86	0.02	0.07	0.00	0.41	-0.30	0.41	-0.24	-0.30	-0.8262	0.0111	-9.9	0.9	-9.9	0.8		
Reading	5	1892	3	A.1.4.1	1	75718	0.73	0.73	0.03	0.03	0.21	0.00	0.25	0.25	-0.23	-0.29	-0.16	0.1079	0.0089	9.9	1.1	9.9	1.2		
Reading	5	2106	3	B.3.3.1	2	25164	0.66	0.06	0.22	0.06	0.66	0.00	0.45	-0.38	-0.37	-0.36	0.45	0.4823	0.0146	-9.9	0.9	-9.9	0.9	A+	A-
Reading	5	2651	3	B.2.1.1	2	75718	0.79	0.07	0.79	0.07	0.07	0.00	0.43	-0.38	0.43	-0.27	-0.30	-0.2875	0.0096	-9.9	0.9	-9.9	0.9		
Reading	5	4639	3	A.1.6.2	3	75718	0.47	0.05	0.32	0.47	0.15	0.00	0.26	-0.29	-0.21	0.26	-0.29	1.4476	0.0080	9.9	1.1	9.9	1.2		
Reading	5	4828	3	B.1.1.1	2	75718	0.66	0.66	0.12	0.04	0.18	0.00	0.26	0.26	-0.22	-0.19	-0.20	0.5051	0.0084	9.9	1.1	9.9	1.2		
Reading	5	5082	3	B.3.3.3	2	25164	0.72	0.05	0.19	0.72	0.04	0.00	0.42	-0.30	-0.37	0.42	-0.26	0.1703	0.0153	-6.6	1.0	-9.0	0.9	A+	A-
Reading	5	5125	3	B.1.1.1	2	75718	0.87	0.01	0.05	0.87	0.07	0.00	0.35	-0.26	-0.32	0.35	-0.17	-0.9293	0.0114	-4.9	1.0	-1.3	1.0		
Reading	5	5503	3	A.2.4.1	1	25164	0.69	0.19	0.09	0.03	0.69	0.00	0.41	-0.36	-0.30	-0.33	0.41	0.3204	0.0149	-6.1	1.0	-8.4	0.9	A+	A-
Reading	5	5544	3	A.2.2.1	2	25164	0.83	0.83	0.06	0.03	0.07	0.00	0.47	0.47	-0.33	-0.36	-0.33	-0.5748	0.0179	-9.9	0.9	-9.9	0.7	A-	A-
Reading	5	6774	3	A.2.6.2	2	25164	0.42	0.42	0.33	0.18	0.07	0.00	0.16	0.16	-0.12	-0.23	-0.14	1.6860	0.0139	9.9	1.2	9.9	1.3	A+	A-
Reading	5	7618	3	B.3.3.3	2	25164	0.87	0.03	0.03	0.87	0.07	0.00	0.34	-0.23	-0.23	0.34	-0.23	-0.9406	0.0198	-2.3	1.0	-4.5	0.9	A+	A-
Reading	5	7762	3	B.3.3.4	3	25164	0.62	0.11	0.11	0.16	0.62	0.00	0.32	-0.28	-0.30	-0.23	0.32	0.7265	0.0142	7.8	1.1	7.1	1.1	A+	A-
Reading	5	8726	3	A.1.3.1	3	75718	0.71	0.71	0.05	0.06	0.17	0.00	0.35	0.35	-0.32	-0.34	-0.23	0.1900	0.0088	4.7	1.0	6.0	1.0		
Reading	5	8826	3	A.2.4.1	1	25164	0.84	0.07	0.04	0.05	0.84	0.00	0.47	-0.35	-0.33	-0.33	0.47	-0.6796	0.0184	-9.9	0.9	-9.9	0.7	A+	A-
Reading	5	9097	3	B.3.1.1	2	25164	0.87	0.04	0.02	0.06	0.87	0.00	0.47	-0.36	-0.35	-0.29	0.47	-0.9994	0.0202	-9.9	0.9	-9.9	0.7	A+	A-
Reading	5	9265	3	B.3.3.2	2	25164	0.52	0.08	0.14	0.52	0.27	0.00	0.24	-0.27	-0.25	0.24	-0.17	1.2175	0.0138	9.9	1.1	9.9	1.2	A-	A-
Reading	5	9333	3	B.1.1.1	2	75718	0.81	0.08	0.09	0.81	0.02	0.00	0.30	-0.20	-0.22	0.30	-0.23	-0.4198	0.0099	8.7	1.1	8.8	1.1		
Reading	5	791	4	A.1.2.1	1	25119	0.68	0.10	0.16	0.68	0.06	0.00	0.41	-0.38	-0.33	0.41	-0.28	0.3988	0.0149	-4.4	1.0	-8.0	0.9	A-	A-
Reading	5	2638	4	B.3.3.1	3	50245	0.72	0.07	0.08	0.13	0.72	0.00	0.41	-0.36	-0.38	-0.24	0.41	0.1913	0.0108	-4.9	1.0	-8.7	0.9		
Reading	5	3152	4	A.1.2.2	2	25119	0.85	0.05	0.06	0.85	0.04	0.00	0.48	-0.37	-0.34	0.48	-0.31	-0.7809	0.0190	-9.9	0.9	-9.9	0.7	A-	C-
Reading	5	3406	4	A.1.1.1	2	25119	0.80	0.06	0.09	0.05	0.80	0.00	0.42	-0.30	-0.31	-0.32	0.42	-0.3387	0.0170	-6.8	0.9	-5.5	0.9	A-	A-
Reading	5	3653	4	A.2.6.2	2	50245	0.56	0.56	0.23	0.07	0.14	0.00	0.29	0.29	-0.19	-0.28	-0.33	1.0259	0.0099	9.9	1.1	9.9	1.1		
Reading	5	4586	4	A.2.3.1	2	50245	0.43	0.14	0.16	0.43	0.27	0.00	0.27	-0.27	-0.27	0.27	-0.25	1.6481	0.0099	9.9	1.1	9.9	1.2		
Reading	5	4780	4	A.2.4.1	1	50245	0.76	0.11	0.03	0.10	0.76	0.00	0.43	-0.41	-0.30	-0.25	0.43	-0.1031	0.0114	-8.7	1.0	-9.9	0.9		
Reading	5	4955	4	A.2.4.1	1	50245	0.75	0.04	0.12	0.09	0.75	0.00	0.46	-0.23	-0.41	-0.37	0.46	-0.0161	0.0112	-9.9	0.9	-9.9	0.8		
Reading	5	5649	4	A.1.4.1	1	25119	0.82	0.82	0.05	0.05	0.08	0.00	0.48	0.48	-0.35	-0.37	-0.33	-0.5321	0.0178	-9.9	0.9	-9.9	0.7	A+	B-
Reading	5	5992	4	B.1.1.1	2	25119	0.54	0.17	0.09	0.54	0.20	0.00	0.28	-0.18	-0.32	0.28	-0.27	1.1238	0.0139	9.9	1.1	9.9	1.2	A+	A-
Reading	5	6256	4	A.1.4.1	3	25119	0.79	0.04	0.79	0.11	0.06	0.00	0.41	-0.35	0.41	-0.29	-0.30	-0.2982	0.0168	-5.2	1.0	-5.4	0.9	A-	B-
Reading	5	6438	4	B.1.1.1	2	25119	0.72	0.11	0.72	0.12	0.05	0.00	0.32	-0.16	0.32	-0.30	-0.27	0.1396	0.0155	8.0	1.1	9.9	1.1	A-	A-
Reading	5	6834	4	A.2.3.1	3	50245	0.65	0.20	0.06	0.65	0.09	0.00	0.36	-0.28	-0.40	0.36	-0.24	0.5751	0.0103	3.7	1.0	2.7	1.0		
Reading	5	7534	4	B.2.1.1	2	25119	0.67	0.67	0.12	0.12	0.09	0.00	0.43	0.43	-0.36	-0.36	-0.33	0.4630	0.0147	-8.2	1.0	-9.9	0.9	A+	A-
Reading	5	7558	4	B.3.1.1	2	50245	0.80	0.06	0.80	0.08	0.06	0.00	0.43	-0.38	0.43	-0.28	-0.28	-0.3471	0.0121	-9.9	0.9	-9.9	0.9		
Reading	5	7679	4	B.1.1.1	2	25119	0.75	0.06	0.11	0.75	0.08	0.00	0.44	-0.34	-0.37	0.44	-0.29	-0.0317	0.0159	-8.5	0.9	-9.9	0.9	A-	B-
Reading	5	9391	4	A.2.3.2	2	50245	0.64	0.17	0.64	0.09	0.10	0.00	0.46	-0.41	0.46	-0.41	-0.30	0.6413	0.0102	-9.9	0.9	-9.9	0.9		
Reading	5	9612	4	B.2.2.1	2	25119	0.38	0.46	0.09	0.07	0.38	0.00	0.27	-0.24	-0.30	-0.37	0.27	1.8864	0.0142	9.9	1.1	9.9	1.2	A-	A-
Reading	5	1277	5	A.1.1.2	1	25126	0.81	0.03	0.13	0.81	0.03	0.00	0.36	-0.30	-0.24	0.36	-0.31	-0.4180	0.0174	-1.4	1.0	-0.5	1.0	A+	B-
Reading	5	2638	5	B.3.3.1	3	50245	0.72	0.07	0.08	0.13	0.72	0.00	0.41	-0.36	-0.38	-0.24	0.41	0.1913	0.0108	-4.9	1.0	-8.7	0.9		
Reading	5	3479	5	B.1.1.1	3	25126	0.65	0.17	0.65	0.08	0.10	0.00	0.37	-0.27	0.37	-0.34	-0.29	0.5653	0.0145	1.4	1.0	-1.2	1.0	A-	A-
Reading	5	3653	5	A.2.6.2	2	50245	0.56	0.56	0.23	0.07	0.14	0.00	0.29	0.29	-0.19	-0.28	-0.33	1.0259	0.0099	9.9	1.1	9.9	1.1		
Reading	5	3673	5	A.1.4.1	1	25126	0.56	0.37	0.05	0.02	0.56	0.00	0.41	-0.36	-0.44	-0.36	0.41	1.0217	0.0140	-9.5	1.0	-8.1	0.9	A-	B-
Reading	5	4586	5	A.2.3.1	2	50245	0.43	0.14	0.16	0.43	0.27	0.00	0.27	-0.27	-0.27	0.27	-0.25	1.6481	0.0099	9.9	1.1	9.9	1.2		
Reading	5	4780	5	A.2.4.1	1	50245	0.76	0.11	0.03	0.10	0.76	0.00	0.43	-0.41	-0.30	-0.25	0.43	-0.1031	0.0114	-8.7	1.0	-9.9	0.9		
Reading	5	4955	5	A.2.4.1	1	50245	0.75	0.04	0.12	0.09	0.75	0.00	0.46	-0.23	-0.41	-0.37	0.46	-0.0161	0.0112	-9.9	0.9	-9.9	0.8		
Reading	5	5196	5	A.1.6.1	3	25126	0.76	0.05	0.10	0.09	0.76	0.00	0.43	-0.37	-0.31	-0.32	0.43	-0.0570	0.0160	-8.8	0.9	-9.9	0.8	A-	B-
Reading	5	6018	5	A.1.3.1	2	25126	0.81	0.81	0.07	0.03	0.09	0.00	0.40	0.40	-0.29	-0.32	-0.27	-0.4120	0.0173	-5.3	1.0	-9.5	0.8	A+	B-
Reading	5	6395	5	B.1.1.1	2	25126	0.52	0.20	0.52	0.16	0.11	0.00	0.17	-0.27	0.17	-0.03	-0.10	1.2264	0.0138	9.9	1.2	9.9	1.3	A-	A-
Reading	5	6834	5	A.2.3.1	3	50245	0.65	0.20	0.06	0.65	0.09	0.00	0.36	-0.28	-0.40	0.36	-0.24	0.5751	0.0103	3.7	1.0	2.7	1.0		
Reading	5	7083	5	B.2.2.1	2	25126	0.69	0.69	0.20	0.06	0.05	0.00	0.41	0.41	-0.33	-0.31	-0.36	0.3593	0.0149	-6.5	1.0	-9.5	0.9	A-	A-

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	7558	5	B.3.1.1	2	50245	0.80	0.06	0.80	0.08	0.06	0.00	0.43	-0.38	0.43	-0.28	-0.28	-0.3471	0.0121	-9.9	0.9	-9.9	0.9		
Reading	5	8351	5	A.1.3.1	2	25126	0.74	0.09	0.07	0.10	0.74	0.00	0.47	-0.38	-0.37	-0.33	0.47	0.0878	0.0156	-9.9	0.9	-9.9	0.8	A+	B-
Reading	5	8565	5	B.1.1.1	3	25126	0.23	0.23	0.05	0.16	0.55	0.00	-0.02	-0.02	-0.38	-0.16	0.12	2.7268	0.0159	9.9	1.3	9.9	2.0	A-	A-
Reading	5	9235	5	A.1.5.1	2	25126	0.71	0.04	0.11	0.71	0.15	0.00	0.42	-0.40	-0.32	0.42	-0.33	0.2724	0.0151	-9.2	0.9	-9.9	0.9	A+	B-
Reading	5	9391	5	A.2.3.2	2	50245	0.64	0.17	0.64	0.09	0.10	0.00	0.46	-0.41	0.46	-0.41	-0.30	0.6413	0.0102	-9.9	0.9	-9.9	0.9		
Reading	6	156	0	A.1.1.2		126150	0.66	0.05	0.03	0.26	0.66	0.00	0.41	-0.35	-0.36	-0.34	0.41	0.2780	0.0066	-5.0	1.0	-6.9	1.0		
Reading	6	227	0	A.2.4.1	1	126150	0.55	0.09	0.34	0.03	0.55	0.00	0.36	-0.38	-0.30	-0.35	0.36	0.8977	0.0063	9.9	1.1	9.9	1.1		
Reading	6	240	0	B.3.3.3	2	126150	0.57	0.23	0.06	0.14	0.57	0.00	0.39	-0.36	-0.36	-0.31	0.39	0.7847	0.0063	2.4	1.0	5.1	1.0		
Reading	6	517	0	A.2.4.1	1	126150	0.75	0.03	0.75	0.14	0.08	0.00	0.40	-0.34	0.40	-0.27	-0.32	-0.2150	0.0071	-1.9	1.0	-9.9	0.9		
Reading	6	598	0	A.1.3.1		126150	0.61	0.12	0.11	0.61	0.16	0.00	0.44	-0.38	-0.38	0.44	-0.35	0.5508	0.0064	-9.9	1.0	-9.9	0.9		
Reading	6	703	0	A.2.6.1		126150	0.84	0.84	0.11	0.03	0.03	0.00	0.35	0.35	-0.23	-0.28	-0.25	-0.8702	0.0082	0.0	1.0	8.0	1.1		
Reading	6	1106	0	B.3.2.1	2	126150	0.83	0.07	0.05	0.83	0.05	0.00	0.50	-0.33	-0.37	0.50	-0.36	-0.7903	0.0080	-9.9	0.9	-9.9	0.7		
Reading	6	1251	0	A.1.1.1		126150	0.75	0.07	0.13	0.75	0.05	0.00	0.43	-0.32	-0.35	0.43	-0.28	-0.2145	0.0071	-9.9	1.0	-9.9	0.9		
Reading	6	1895	0	A.1.4.1		126150	0.81	0.81	0.04	0.14	0.01	0.00	0.35	0.35	-0.29	-0.25	-0.26	-0.6820	0.0078	2.9	1.0	3.9	1.0		
Reading	6	2635	0	A.2.4.1		126150	0.78	0.03	0.04	0.78	0.15	0.00	0.33	-0.27	-0.32	0.33	-0.21	-0.4114	0.0074	9.9	1.1	9.9	1.2		
Reading	6	3874	0	A.2.5.1		126150	0.74	0.07	0.74	0.12	0.06	0.00	0.46	-0.34	0.46	-0.35	-0.34	-0.1971	0.0071	-9.9	0.9	-9.9	0.9		
Reading	6	3899	0	A.2.4.1		126150	0.74	0.08	0.11	0.07	0.74	0.00	0.48	-0.39	-0.35	-0.37	0.48	-0.1736	0.0070	-9.9	0.9	-9.9	0.8		
Reading	6	4100	0	A.2.3.2		126150	0.71	0.11	0.13	0.71	0.05	0.00	0.42	-0.30	-0.33	0.42	-0.38	-0.0176	0.0068	-7.7	1.0	-5.7	1.0		
Reading	6	4465	0	A.1.3.1		126150	0.68	0.19	0.03	0.10	0.68	0.00	0.27	-0.20	-0.27	-0.20	0.27	0.2021	0.0066	9.9	1.1	9.9	1.2		
Reading	6	4899	0	B.1.1.1		126150	0.86	0.03	0.86	0.03	0.09	0.00	0.45	-0.28	0.45	-0.31	-0.35	-1.0589	0.0086	-9.9	0.9	-9.9	0.7		
Reading	6	5101	0	B.2.1.2		126150	0.72	0.72	0.17	0.02	0.08	0.00	0.41	0.41	-0.31	-0.37	-0.32	-0.0590	0.0069	-3.9	1.0	-9.9	0.9		
Reading	6	5200	0	B.1.2.1		126150	0.65	0.10	0.65	0.10	0.14	0.00	0.30	-0.29	0.30	-0.25	-0.19	0.3411	0.0065	9.9	1.1	9.9	1.1		
Reading	6	5289	0	A.2.3.1		126150	0.75	0.75	0.10	0.12	0.02	0.00	0.45	0.45	-0.40	-0.31	-0.28	-0.2370	0.0071	-9.9	0.9	-9.9	0.9		
Reading	6	5306	0	A.1.4.1		126150	0.61	0.16	0.61	0.16	0.06	0.00	0.40	-0.35	0.40	-0.31	-0.33	0.5521	0.0064	0.3	1.0	-5.9	1.0		
Reading	6	5419	0	A.2.2.1	2	126150	0.82	0.02	0.06	0.82	0.09	0.00	0.43	-0.32	-0.33	0.43	-0.29	-0.7494	0.0079	-9.9	0.9	-9.9	0.8		
Reading	6	5658	0	A.2.4.1		126150	0.65	0.07	0.65	0.13	0.14	0.00	0.39	-0.35	0.39	-0.37	-0.24	0.3305	0.0065	5.2	1.0	9.9	1.1		
Reading	6	6020	0	A.1.3.1		126150	0.73	0.13	0.12	0.73	0.02	0.00	0.30	-0.26	-0.20	0.30	-0.23	-0.1216	0.0070	9.9	1.1	9.9	1.1		
Reading	6	6099	0	B.3.3.2		126150	0.69	0.07	0.16	0.69	0.09	0.00	0.49	-0.39	-0.38	0.49	-0.39	0.1452	0.0067	-9.9	0.9	-9.9	0.8		
Reading	6	6114	0	B.3.3.3	2	126150	0.71	0.12	0.71	0.08	0.09	0.00	0.45	-0.34	0.45	-0.38	-0.33	0.0337	0.0068	-9.9	1.0	-9.9	0.9		
Reading	6	6118	0	B.1.1.1		126150	0.83	0.07	0.04	0.83	0.06	0.00	0.40	-0.35	-0.28	0.40	-0.21	-0.7834	0.0080	-8.8	1.0	-7.1	0.9		
Reading	6	6132	0	B.1.2.1		126150	0.43	0.43	0.29	0.08	0.20	0.00	0.31	0.31	-0.21	-0.39	-0.39	1.4953	0.0063	9.9	1.1	9.9	1.2		
Reading	6	6164	0	A.2.4.1		126150	0.73	0.05	0.09	0.13	0.73	0.00	0.42	-0.38	-0.28	-0.33	0.42	-0.0845	0.0069	-8.4	1.0	-5.4	1.0		
Reading	6	6242	0	A.1.3.1		126150	0.76	0.06	0.76	0.14	0.04	0.00	0.40	-0.31	0.40	-0.28	-0.32	-0.3012	0.0072	-1.9	1.0	-9.5	0.9		
Reading	6	6281	0	B.2.1.4		126150	0.76	0.03	0.17	0.05	0.76	0.00	0.34	-0.32	-0.20	-0.35	0.34	-0.2773	0.0072	9.9	1.0	9.9	1.1		
Reading	6	7403	0	B.1.1.1		126150	0.68	0.68	0.07	0.09	0.16	0.00	0.37	0.37	-0.35	-0.28	-0.28	0.2036	0.0066	9.0	1.0	8.2	1.0		
Reading	6	7574	0	A.1.2.2		126150	0.82	0.82	0.03	0.13	0.02	0.00	0.39	0.39	-0.26	-0.31	-0.27	-0.7715	0.0080	-6.5	1.0	-9.9	0.9		
Reading	6	7782	0	A.1.3.1		126150	0.64	0.64	0.14	0.06	0.16	0.00	0.54	0.54	-0.44	-0.47	-0.46	0.4213	0.0065	-9.9	0.8	-9.9	0.8		
Reading	6	8474	0	B.2.1.2		126150	0.91	0.04	0.91	0.03	0.02	0.00	0.42	-0.29	0.42	-0.26	-0.27	-1.6399	0.0103	-9.9	0.9	-9.9	0.7		
Reading	6	8482	0	A.1.6.1		126150	0.86	0.06	0.86	0.02	0.06	0.00	0.40	-0.31	0.40	-0.22	-0.27	-1.0599	0.0086	-9.9	1.0	-9.9	0.9		
Reading	6	8494	0	A.1.5.1		126150	0.72	0.09	0.12	0.07	0.72	0.00	0.38	-0.32	-0.28	-0.26	0.38	-0.0461	0.0069	5.1	1.0	0.7	1.0		
Reading	6	8655	0	A.2.2.2		126150	0.73	0.18	0.03	0.73	0.06	0.00	0.43	-0.32	-0.34	0.43	-0.37	-0.1034	0.0069	-9.9	1.0	-9.9	0.9		
Reading	6	9106	0	A.2.4.1	1	126150	0.69	0.69	0.14	0.03	0.13	0.00	0.44	0.44	-0.36	-0.38	-0.34	0.1213	0.0067	-9.9	1.0	-9.9	0.9		
Reading	6	9506	0	B.2.1.4		126150	0.83	0.05	0.05	0.83	0.07	0.00	0.49	-0.38	-0.36	0.49	-0.32	-0.8172	0.0081	-9.9	0.9	-9.9	0.7		
Reading	6	9714	0	B.3.3.3	2	126150	0.68	0.24	0.05	0.03	0.68	0.00	0.48	-0.41	-0.39	-0.38	0.48	0.1774	0.0067	-9.9	0.9	-9.9	0.9		
Reading	6	9857	0	A.2.4.1		126150	0.45	0.45	0.09	0.29	0.17	0.00	0.33	0.33	-0.30	-0.26	-0.39	1.3696	0.0062	9.9	1.1	9.9	1.1		
Reading	6	170	1	A.2.3.1	3	75770	0.93	0.01	0.03	0.03	0.93	0.00	0.40	-0.20	-0.27	-0.28	0.40	-1.9716	0.0149	-9.9	0.9	-9.9	0.6		
Reading	6	1455	1	A.2.4.1	2	25424	0.79	0.08	0.79	0.06	0.07	0.00	0.48	-0.39	0.48	-0.38	-0.29	-0.5155	0.0167	-9.9	0.9	-9.9	0.8	A+	A-
Reading	6	1739	1	A.2.3.1	2	25424	0.73	0.10	0.73	0.07	0.10	0.00	0.45	-0.34	0.45	-0.31	-0.38	-0.1453	0.0156	-7.6	0.9	-4.5	0.9	A-	A-
Reading	6	2361	1	A.2.3.1	3	25424	0.42	0.08	0.16	0.34	0.42	0.00	0.22	-0.34	-0.31	-0.13	0.22	1.5050	0.0140	9.9	1.2	9.9	1.3	A+	A-

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	2374	1	B.2.1.2	1	25424	0.73	0.10	0.14	0.73	0.02	0.00	0.34	-0.34	-0.20	0.34	-0.26	-0.1522	0.0156	6.8	1.1	7.0	1.1	A+	A+
Reading	6	2961	1	A.2.4.1	3	75770	0.58	0.05	0.25	0.12	0.58	0.00	0.32	-0.38	-0.26	-0.25	0.32	0.7039	0.0081	9.9	1.1	9.9	1.1		
Reading	6	3274	1	A.2.3.1	2	25424	0.50	0.13	0.08	0.50	0.29	0.00	0.16	-0.22	-0.24	0.16	-0.06	1.0838	0.0139	9.9	1.3	9.9	1.4	A+	A+
Reading	6	4460	1	A.2.4.1	1	25424	0.89	0.04	0.04	0.03	0.89	0.00	0.48	-0.30	-0.37	-0.31	0.48	-1.4071	0.0211	-9.9	0.8	-9.9	0.6	A+	A-
Reading	6	4763	1	B.3.3.2	2	75770	0.53	0.35	0.07	0.53	0.06	0.00	0.29	-0.20	-0.26	0.29	-0.45	0.9522	0.0081	9.9	1.1	9.9	1.2		
Reading	6	4920	1	B.2.1.3	1	25424	0.76	0.15	0.05	0.76	0.04	0.00	0.42	-0.33	-0.32	0.42	-0.32	-0.3347	0.0161	-4.9	1.0	-4.9	0.9	A+	A-
Reading	6	6618	1	B.3.3.3	2	75770	0.66	0.25	0.66	0.05	0.03	0.00	0.32	-0.25	0.32	-0.27	-0.32	0.2710	0.0085	9.9	1.1	9.9	1.1		
Reading	6	7879	1	B.3.3.1	2	25424	0.72	0.72	0.05	0.16	0.06	0.00	0.37	0.37	-0.31	-0.26	-0.31	-0.1049	0.0154	2.8	1.0	3.7	1.1	A-	A-
Reading	6	8132	1	B.2.1.1	2	75770	0.68	0.14	0.68	0.08	0.09	0.00	0.33	-0.25	0.33	-0.27	-0.26	0.1718	0.0086	9.9	1.1	9.9	1.1		
Reading	6	8427	1	A.2.3.1	2	75770	0.86	0.86	0.07	0.02	0.04	0.00	0.43	0.43	-0.36	-0.27	-0.25	-1.1304	0.0113	-9.9	0.9	-9.9	0.8		
Reading	6	8601	1	B.1.2.1	3	25424	0.65	0.22	0.06	0.65	0.06	0.00	0.41	-0.28	-0.39	0.41	-0.41	0.3148	0.0146	-0.9	1.0	-1.9	1.0	A+	A+
Reading	6	8994	1	A.2.4.1	1	75770	0.82	0.02	0.03	0.13	0.82	0.00	0.34	-0.29	-0.32	-0.20	0.34	-0.7422	0.0102	2.8	1.0	9.5	1.1		
Reading	6	9082	1	B.3.1.1	2	75770	0.79	0.03	0.12	0.79	0.06	0.00	0.35	-0.34	-0.21	0.35	-0.28	-0.5548	0.0098	2.9	1.0	9.0	1.1		
Reading	6	9159	1	A.1.4.1	3	25424	0.74	0.17	0.74	0.05	0.04	0.00	0.39	-0.29	0.39	-0.29	-0.33	-0.1840	0.0157	0.7	1.0	2.6	1.0	A+	A-
Reading	6	170	2	A.2.3.1	3	75770	0.93	0.01	0.03	0.03	0.93	0.00	0.40	-0.20	-0.27	-0.28	0.40	-1.9716	0.0149	-9.9	0.9	-9.9	0.6		
Reading	6	824	2	B.1.1.1	2	25163	0.74	0.74	0.04	0.08	0.14	0.00	0.35	0.35	-0.33	-0.27	-0.23	-0.1577	0.0157	4.3	1.0	5.8	1.1	A+	A-
Reading	6	1324	2	B.2.2.1	2	25163	0.62	0.23	0.62	0.07	0.08	0.00	0.38	-0.30	0.38	-0.42	-0.28	0.5248	0.0144	2.7	1.0	1.2	1.0	A-	A-
Reading	6	2407	2	A.1.6.1	2	25163	0.66	0.66	0.08	0.19	0.06	0.00	0.35	0.35	-0.32	-0.23	-0.35	0.2857	0.0147	8.1	1.1	6.8	1.1	A-	A+
Reading	6	2961	2	A.2.4.1	3	75770	0.58	0.05	0.25	0.12	0.58	0.00	0.32	-0.38	-0.26	-0.25	0.32	0.7039	0.0081	9.9	1.1	9.9	1.1		
Reading	6	4763	2	B.3.3.2	2	75770	0.53	0.35	0.07	0.53	0.06	0.00	0.29	-0.20	-0.26	0.29	-0.45	0.9522	0.0081	9.9	1.1	9.9	1.2		
Reading	6	5007	2	A.1.3.2	2	25163	0.63	0.22	0.10	0.04	0.63	0.00	0.44	-0.33	-0.42	-0.45	0.44	0.4516	0.0145	-8.2	1.0	-4.3	1.0	A-	B-
Reading	6	5913	2	A.1.4.1	1	25163	0.75	0.05	0.75	0.03	0.18	0.00	0.43	-0.41	0.43	-0.31	-0.32	-0.2293	0.0159	-6.0	1.0	-7.7	0.9	A-	A-
Reading	6	6485	2	B.2.1.2	3	25163	0.54	0.08	0.33	0.54	0.05	0.00	0.36	-0.41	-0.31	0.36	-0.28	0.9330	0.0140	6.1	1.0	6.7	1.1	A-	A-
Reading	6	6618	2	B.3.3.3	2	75770	0.66	0.25	0.66	0.05	0.03	0.00	0.32	-0.25	0.32	-0.27	-0.32	0.2710	0.0085	9.9	1.1	9.9	1.1		
Reading	6	8132	2	B.2.1.1	2	75770	0.68	0.14	0.68	0.08	0.09	0.00	0.33	-0.25	0.33	-0.27	-0.26	0.1718	0.0086	9.9	1.1	9.9	1.1		
Reading	6	8256	2	B.1.1.1	2	25163	0.71	0.06	0.15	0.08	0.71	0.00	0.31	-0.25	-0.15	-0.37	0.31	0.0376	0.0152	9.9	1.1	9.9	1.2	A-	A-
Reading	6	8427	2	A.2.3.1	2	75770	0.86	0.86	0.07	0.02	0.04	0.00	0.43	0.43	-0.36	-0.27	-0.25	-1.1304	0.0113	-9.9	0.9	-9.9	0.8		
Reading	6	8625	2	A.1.1.2	1	25163	0.59	0.03	0.59	0.30	0.07	0.00	0.38	-0.40	0.38	-0.30	-0.40	0.6535	0.0142	3.0	1.0	3.3	1.0	A-	B-
Reading	6	8994	2	A.2.4.1	1	75770	0.82	0.02	0.03	0.13	0.82	0.00	0.34	-0.29	-0.32	-0.20	0.34	-0.7422	0.0102	2.8	1.0	9.5	1.1		
Reading	6	9082	2	B.3.1.1	2	75770	0.79	0.03	0.12	0.79	0.06	0.00	0.35	-0.34	-0.21	0.35	-0.28	-0.5548	0.0098	2.9	1.0	9.0	1.1		
Reading	6	9262	2	A.1.5.1	3	25163	0.78	0.78	0.06	0.12	0.03	0.00	0.46	0.46	-0.36	-0.33	-0.36	-0.4328	0.0166	-9.9	0.9	-9.9	0.8	A-	A-
Reading	6	9918	2	A.1.3.1	2	25163	0.84	0.04	0.04	0.84	0.08	0.00	0.49	-0.33	-0.36	0.49	-0.35	-0.9012	0.0185	-9.9	0.9	-9.9	0.7	A-	B-
Reading	6	74	3	B.2.2.1	3	25183	0.38	0.11	0.38	0.28	0.23	0.00	0.18	-0.29	0.18	-0.20	-0.09	1.7008	0.0142	9.9	1.2	9.9	1.4	A+	A-
Reading	6	136	3	A.2.4.1	1	25183	0.79	0.05	0.79	0.07	0.09	0.00	0.47	-0.31	0.47	-0.39	-0.34	-0.5009	0.0168	-9.9	0.9	-9.9	0.8	A+	B-
Reading	6	170	3	A.2.3.1	3	75770	0.93	0.01	0.03	0.03	0.93	0.00	0.40	-0.20	-0.27	-0.28	0.40	-1.9716	0.0149	-9.9	0.9	-9.9	0.6		
Reading	6	1161	3	A.2.3.1	2	25183	0.61	0.02	0.61	0.25	0.12	0.00	0.22	-0.35	0.22	-0.13	-0.23	0.5832	0.0142	9.9	1.2	9.9	1.3	A-	A+
Reading	6	2961	3	A.2.4.1	3	75770	0.58	0.05	0.25	0.12	0.58	0.00	0.32	-0.38	-0.26	-0.25	0.32	0.7039	0.0081	9.9	1.1	9.9	1.1		
Reading	6	3170	3	B.1.1.1	3	25183	0.68	0.06	0.08	0.68	0.17	0.00	0.21	-0.14	-0.19	0.21	-0.15	0.1851	0.0148	9.9	1.2	9.9	1.4	A+	A+
Reading	6	3400	3	A.2.3.2	2	25183	0.39	0.06	0.14	0.39	0.41	0.00	0.15	-0.29	-0.24	0.15	-0.08	1.6625	0.0141	9.9	1.2	9.9	1.4	A+	A+
Reading	6	4628	3	A.2.3.1	2	25183	0.82	0.10	0.82	0.03	0.05	0.00	0.38	-0.25	0.38	-0.20	-0.36	-0.6860	0.0175	-2.6	1.0	-0.1	1.0	A+	A-
Reading	6	4763	3	B.3.3.2	2	75770	0.53	0.35	0.07	0.53	0.06	0.00	0.29	-0.20	-0.26	0.29	-0.45	0.9522	0.0081	9.9	1.1	9.9	1.2		
Reading	6	5029	3	A.2.1.1	2	25183	0.82	0.11	0.03	0.04	0.82	0.00	0.39	-0.24	-0.33	-0.32	0.39	-0.7002	0.0176	-4.5	1.0	-2.1	1.0	A+	A-
Reading	6	5408	3	A.2.5.1	3	25183	0.66	0.05	0.10	0.18	0.66	0.00	0.42	-0.43	-0.32	-0.33	0.42	0.2808	0.0147	-6.0	1.0	-6.9	0.9	A+	A+
Reading	6	6618	3	B.3.3.3	2	75770	0.66	0.25	0.66	0.05	0.03	0.00	0.32	-0.25	0.32	-0.27	-0.32	0.2710	0.0085	9.9	1.1	9.9	1.1		
Reading	6	7136	3	B.2.1.2	1	25183	0.81	0.08	0.03	0.08	0.81	0.00	0.49	-0.38	-0.36	-0.34	0.49	-0.6158	0.0172	-9.9	0.9	-9.9	0.7	A+	A-
Reading	6	7690	3	A.2.3.1	2	25183	0.76	0.12	0.76	0.06	0.06	0.00	0.32	-0.16	0.32	-0.25	-0.32	-0.3094	0.0161	9.9	1.1	9.9	1.2	A+	A+
Reading	6	8132	3	B.2.1.1	2	75770	0.68	0.14	0.68	0.08	0.09	0.00	0.33	-0.25	0.33	-0.27	-0.26	0.1718	0.0086	9.9	1.1	9.9	1.1		
Reading	6	8427	3	A.2.3.1	2	75770	0.86	0.86	0.07	0.02	0.04	0.00	0.43	0.43	-0.36	-0.27	-0.25	-1.1304	0.0113	-9.9	0.9	-9.9	0.8		
Reading	6	8994	3	A.2.4.1	1	75770	0.82	0.02	0.03	0.13	0.82	0.00	0.34	-0.29	-0.32	-0.20	0.34	-0.7422	0.0102	2.8	1.0	9.5	1.1		

Appendix I: Item Statistics Multiple Choice

Item Information					Classical													Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	9082	3	B.3.1.1	2	75770	0.79	0.03	0.12	0.79	0.06	0.00	0.35	-0.34	-0.21	0.35	-0.28	-0.5548	0.0098	2.9	1.0	9.0	1.1		
Reading	6	235	4	A.1.4.1	1	25218	0.52	0.30	0.11	0.52	0.06	0.00	0.33	-0.24	-0.31	0.33	-0.46	1.0125	0.0139	9.9	1.1	9.9	1.1	A+	A+
Reading	6	828	4	A.1.4.1	1	50380	0.74	0.12	0.13	0.02	0.74	0.00	0.41	-0.29	-0.36	-0.26	0.41	-0.1401	0.0111	-4.6	1.0	-8.0	0.9		
Reading	6	839	4	A.1.4.1	3	50380	0.46	0.46	0.13	0.34	0.06	0.00	0.31	0.31	-0.40	-0.24	-0.33	1.3162	0.0099	9.9	1.1	9.9	1.1		
Reading	6	2509	4	B.3.3.4	2	25218	0.65	0.08	0.23	0.65	0.04	0.00	0.36	-0.40	-0.25	0.36	-0.25	0.3489	0.0145	5.0	1.0	3.2	1.0	A-	B-
Reading	6	3764	4	A.1.4.1	3	25218	0.85	0.02	0.85	0.10	0.02	0.00	0.41	-0.29	0.41	-0.30	-0.29	-1.0005	0.0190	-7.8	0.9	-8.4	0.8	A+	A-
Reading	6	4257	4	B.3.3.4	2	25218	0.81	0.03	0.81	0.04	0.12	0.00	0.36	-0.30	0.36	-0.34	-0.20	-0.6343	0.0173	-1.8	1.0	0.6	1.0	A+	A-
Reading	6	4386	4	B.2.1.3	1	25218	0.65	0.65	0.08	0.10	0.16	0.00	0.30	0.30	-0.38	-0.28	-0.12	0.3727	0.0145	9.9	1.1	9.9	1.2	A+	A-
Reading	6	4643	4	A.1.1.1	2	50380	0.81	0.06	0.81	0.04	0.08	0.00	0.36	-0.30	0.36	-0.23	-0.23	-0.6647	0.0123	-1.1	1.0	-2.5	1.0		
Reading	6	5734	4	B.1.1.1	2	50380	0.71	0.12	0.08	0.71	0.08	0.00	0.28	-0.30	-0.18	0.28	-0.13	0.0272	0.0108	9.9	1.1	9.9	1.2		
Reading	6	5959	4	B.2.1.2	2	25218	0.60	0.06	0.20	0.60	0.14	0.00	0.24	-0.34	-0.18	0.24	-0.14	0.6446	0.0141	9.9	1.2	9.9	1.3	A+	A-
Reading	6	7495	4	B.1.1.1	2	50380	0.71	0.71	0.11	0.05	0.12	0.00	0.28	0.28	-0.32	-0.20	-0.10	0.0225	0.0108	9.9	1.1	9.9	1.2		
Reading	6	7562	4	B.1.1.1	2	50380	0.83	0.06	0.03	0.83	0.07	0.00	0.31	-0.14	-0.24	0.31	-0.27	-0.8113	0.0128	3.3	1.0	9.9	1.2		
Reading	6	7992	4	A.2.3.1	2	25218	0.75	0.06	0.05	0.14	0.75	0.00	0.45	-0.29	-0.37	-0.37	0.45	-0.1899	0.0157	-9.9	0.9	-9.9	0.8	A+	A-
Reading	6	8244	4	B.1.2.1	3	25218	0.76	0.04	0.12	0.08	0.76	0.00	0.30	-0.36	-0.13	-0.26	0.30	-0.2812	0.0160	6.9	1.1	9.9	1.2	A+	A-
Reading	6	8257	4	A.2.1.2	2	25218	0.35	0.35	0.23	0.19	0.22	0.00	0.18	0.18	-0.20	-0.28	-0.10	1.8729	0.0144	9.9	1.2	9.9	1.4	A-	A-
Reading	6	8953	4	B.2.2.2	3	50380	0.63	0.63	0.08	0.12	0.18	0.00	0.25	0.25	-0.27	-0.22	-0.16	0.4946	0.0101	9.9	1.2	9.9	1.3		
Reading	6	9718	4	A.1.4.1	1	50380	0.76	0.12	0.76	0.11	0.01	0.00	0.36	-0.40	0.36	-0.14	-0.23	-0.3155	0.0114	2.3	1.0	3.2	1.0		
Reading	6	9875	4	A.2.4.1	2	25218	0.57	0.57	0.05	0.30	0.08	0.00	0.31	0.31	-0.37	-0.21	-0.32	0.7834	0.0140	9.9	1.1	9.9	1.1	A-	A-
Reading	6	641	5	A.2.3.1	2	25162	0.75	0.07	0.10	0.08	0.75	0.00	0.41	-0.29	-0.31	-0.32	0.41	-0.2531	0.0160	-4.3	1.0	-4.9	0.9	A+	A-
Reading	6	828	5	A.1.4.1	1	50380	0.74	0.12	0.13	0.02	0.74	0.00	0.41	-0.29	-0.36	-0.26	0.41	-0.1401	0.0111	-4.6	1.0	-8.0	0.9		
Reading	6	839	5	A.1.4.1	3	50380	0.46	0.46	0.13	0.34	0.06	0.00	0.31	0.31	-0.40	-0.24	-0.33	1.3162	0.0099	9.9	1.1	9.9	1.1		
Reading	6	1519	5	B.3.1.1	3	25162	0.60	0.29	0.06	0.04	0.60	0.00	0.29	-0.23	-0.24	-0.32	0.29	0.5996	0.0143	9.9	1.1	9.9	1.2	A+	A-
Reading	6	1985	5	B.3.1.1	2	25162	0.89	0.02	0.03	0.89	0.06	0.00	0.37	-0.27	-0.25	0.37	-0.24	-1.3658	0.0212	-4.7	0.9	-7.1	0.8	B+	B-
Reading	6	3927	5	A.2.3.2	2	25162	0.35	0.35	0.13	0.24	0.28	0.00	0.34	0.34	-0.46	-0.37	-0.27	1.9091	0.0146	-2.8	1.0	9.9	1.2	A-	A-
Reading	6	4184	5	B.3.2.1	1	25162	0.49	0.20	0.11	0.20	0.49	0.00	0.33	-0.24	-0.37	-0.31	0.33	1.1766	0.0140	8.6	1.1	9.9	1.1	A-	A-
Reading	6	4643	5	A.1.1.1	2	50380	0.81	0.06	0.81	0.04	0.08	0.00	0.36	-0.30	0.36	-0.23	-0.23	-0.6647	0.0123	-1.1	1.0	-2.5	1.0		
Reading	6	5192	5	A.2.4.1	1	25162	0.85	0.06	0.06	0.85	0.03	0.00	0.47	-0.30	-0.37	0.47	-0.29	-1.0061	0.0191	-9.9	0.9	-9.9	0.7	A+	A-
Reading	6	5734	5	B.1.1.1	2	50380	0.71	0.12	0.08	0.71	0.08	0.00	0.28	-0.30	-0.18	0.28	-0.13	0.0272	0.0108	9.9	1.1	9.9	1.2		
Reading	6	5915	5	A.2.2.1	1	25162	0.85	0.06	0.03	0.85	0.06	0.00	0.45	-0.31	-0.32	0.45	-0.32	-0.9562	0.0188	-9.9	0.9	-9.9	0.7	A-	B-
Reading	6	7495	5	B.1.1.1	2	50380	0.71	0.71	0.11	0.05	0.12	0.00	0.28	0.28	-0.32	-0.20	-0.10	0.0225	0.0108	9.9	1.1	9.9	1.2		
Reading	6	7562	5	B.1.1.1	2	50380	0.83	0.06	0.03	0.83	0.07	0.00	0.31	-0.14	-0.24	0.31	-0.27	-0.8113	0.0128	3.3	1.0	9.9	1.2		
Reading	6	8538	5	B.3.3.1	2	25162	0.77	0.77	0.09	0.05	0.08	0.00	0.38	0.38	-0.28	-0.27	-0.29	-0.3551	0.0163	-1.1	1.0	-1.9	1.0	A+	A-
Reading	6	8953	5	B.2.2.2	3	50380	0.63	0.63	0.08	0.12	0.18	0.00	0.25	0.25	-0.27	-0.22	-0.16	0.4946	0.0101	9.9	1.2	9.9	1.3		
Reading	6	9349	5	B.3.3.2	2	25162	0.63	0.18	0.13	0.63	0.05	0.00	0.39	-0.30	-0.36	0.39	-0.31	0.4465	0.0145	1.7	1.0	3.8	1.0	A-	A-
Reading	6	9718	5	A.1.4.1	1	50380	0.76	0.12	0.76	0.11	0.01	0.00	0.36	-0.40	0.36	-0.14	-0.23	-0.3155	0.0114	2.3	1.0	3.2	1.0		
Reading	6	9996	5	A.2.4.1	2	25162	0.76	0.03	0.76	0.06	0.15	0.00	0.43	-0.37	0.43	-0.34	-0.31	-0.3041	0.0162	-7.0	0.9	-9.9	0.9	C-	B-
Reading	7	127	0	A.1.6.1		126871	0.69	0.10	0.03	0.69	0.19	0.00	0.27	-0.18	-0.28	0.27	-0.22	0.1579	0.0066	9.9	1.1	9.9	1.2		
Reading	7	205	0	B.2.1.2	3	126871	0.56	0.56	0.18	0.11	0.14	0.00	0.34	0.34	-0.29	-0.31	-0.26	0.8067	0.0062	9.9	1.0	9.9	1.1		
Reading	7	473	0	B.1.2.1	3	126871	0.64	0.64	0.05	0.22	0.08	0.00	0.29	0.29	-0.33	-0.19	-0.23	0.4015	0.0064	9.9	1.1	9.9	1.1		
Reading	7	586	0	B.2.1.1		126871	0.65	0.65	0.18	0.07	0.10	0.00	0.16	0.16	-0.04	-0.18	-0.20	0.3656	0.0064	9.9	1.2	9.9	1.3		
Reading	7	771	0	B.2.2.2		126871	0.54	0.18	0.18	0.54	0.10	0.00	0.35	-0.24	-0.35	0.35	-0.33	0.9271	0.0062	9.9	1.0	9.9	1.1		
Reading	7	879	0	B.2.1.1		126871	0.76	0.76	0.11	0.07	0.05	0.00	0.48	0.48	-0.40	-0.34	-0.31	-0.2942	0.0072	-9.9	0.9	-9.9	0.8		
Reading	7	1188	0	A.2.3.1		126871	0.78	0.03	0.10	0.08	0.78	0.00	0.46	-0.30	-0.35	-0.36	0.46	-0.4246	0.0074	-9.9	0.9	-9.9	0.8		
Reading	7	1337	0	A.2.4.1		126871	0.80	0.80	0.10	0.05	0.05	0.00	0.37	0.37	-0.23	-0.32	-0.26	-0.5410	0.0076	-4.9	1.0	-9.5	0.9		
Reading	7	1924	0	B.1.1.1		126871	0.81	0.10	0.81	0.06	0.02	0.00	0.31	-0.18	0.31	-0.22	-0.31	-0.5900	0.0076	5.5	1.0	9.9	1.2		
Reading	7	3159	0	A.2.2.1		126871	0.45	0.45	0.18	0.24	0.13	0.00	0.20	0.20	-0.29	-0.09	-0.22	1.3570	0.0062	9.9	1.2	9.9	1.3		
Reading	7	3169	0	A.2.3.1		126871	0.69	0.13	0.69	0.12	0.06	0.00	0.38	-0.21	0.38	-0.33	-0.37	0.1613	0.0066	-0.6	1.0	-1.7	1.0		
Reading	7	3177	0	B.1.1.1	2	126871	0.44	0.31	0.10	0.14	0.44	0.00	0.28	-0.31	-0.20	-0.23	0.28	1.3926	0.0062	9.9	1.1	9.9	1.2		

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	3453	0	A.1.2.1		126871	0.87	0.87	0.02	0.02	0.09	0.00	0.29	0.29	-0.20	-0.17	-0.22	-1.1184	0.0088	1.9	1.0	-0.1	1.0		
Reading	7	4635	0	A.2.3.1	2	126871	0.48	0.15	0.25	0.12	0.48	0.00	0.28	-0.26	-0.23	-0.30	0.28	1.1973	0.0061	9.9	1.1	9.9	1.2		
Reading	7	4688	0	A.1.1.2	2	126871	0.58	0.58	0.18	0.10	0.14	0.00	0.41	0.41	-0.28	-0.34	-0.43	0.7303	0.0062	-9.9	1.0	-9.9	1.0		
Reading	7	5142	0	A.2.2.2	2	126871	0.85	0.85	0.10	0.03	0.02	0.00	0.35	0.35	-0.23	-0.27	-0.26	-0.9384	0.0084	-5.4	1.0	-8.8	0.9		
Reading	7	5151	0	A.2.5.1		126871	0.66	0.14	0.15	0.66	0.05	0.00	0.45	-0.38	-0.34	0.45	-0.39	0.2976	0.0065	-9.9	0.9	-9.9	0.9		
Reading	7	5441	0	B.3.3.1	3	126871	0.53	0.12	0.53	0.13	0.22	0.00	0.31	-0.33	0.31	-0.28	-0.23	0.9719	0.0062	9.9	1.1	9.9	1.1		
Reading	7	5498	0	B.1.1.1		126871	0.88	0.04	0.88	0.03	0.05	0.00	0.35	-0.27	0.35	-0.22	-0.21	-1.1816	0.0090	-9.9	0.9	-4.2	1.0		
Reading	7	5647	0	B.3.1.1		126871	0.71	0.13	0.05	0.71	0.11	0.00	0.38	-0.33	-0.33	0.38	-0.23	0.0353	0.0067	-1.7	1.0	-5.1	1.0		
Reading	7	6377	0	A.1.3.1	2	126871	0.49	0.11	0.49	0.29	0.10	0.00	0.27	-0.32	0.27	-0.14	-0.38	1.1884	0.0061	9.9	1.1	9.9	1.2		
Reading	7	6442	0	A.1.3.1		126871	0.73	0.18	0.03	0.73	0.06	0.00	0.42	-0.30	-0.31	0.42	-0.38	-0.1031	0.0069	-9.9	1.0	-9.9	0.9		
Reading	7	6513	0	A.2.3.2		126871	0.70	0.70	0.09	0.12	0.09	0.00	0.45	0.45	-0.38	-0.42	-0.26	0.0852	0.0067	-9.9	0.9	-9.9	0.9		
Reading	7	6861	0	A.2.1.1		126871	0.70	0.09	0.03	0.17	0.70	0.00	0.46	-0.43	-0.44	-0.30	0.46	0.0797	0.0067	-9.9	0.9	-9.9	0.9		
Reading	7	6979	0	B.1.1.1		126871	0.75	0.05	0.08	0.75	0.12	0.00	0.27	-0.25	-0.15	0.27	-0.20	-0.1983	0.0070	9.9	1.1	9.9	1.2		
Reading	7	7065	0	B.1.1.1		126871	0.63	0.07	0.63	0.19	0.10	0.00	0.38	-0.35	0.38	-0.38	-0.17	0.4625	0.0064	0.0	1.0	0.2	1.0		
Reading	7	7090	0	A.1.1.2		126871	0.61	0.26	0.07	0.61	0.06	0.00	0.34	-0.29	-0.25	0.34	-0.30	0.5766	0.0063	9.9	1.0	9.9	1.1		
Reading	7	7297	0	A.2.4.1	1	126871	0.91	0.05	0.91	0.02	0.01	0.00	0.43	-0.34	0.43	-0.26	-0.21	-1.5681	0.0101	-9.9	0.9	-9.9	0.6		
Reading	7	7433	0	B.1.1.1		126871	0.67	0.67	0.09	0.04	0.20	0.00	0.30	0.30	-0.29	-0.34	-0.16	0.2657	0.0065	9.9	1.1	9.9	1.2		
Reading	7	7473	0	B.2.1.1	2	126871	0.78	0.05	0.06	0.78	0.10	0.00	0.32	-0.29	-0.29	0.32	-0.15	-0.4285	0.0074	6.5	1.0	9.9	1.1		
Reading	7	7921	0	B.2.1.2		126871	0.73	0.10	0.73	0.09	0.09	0.00	0.46	-0.29	0.46	-0.40	-0.38	-0.0625	0.0069	-9.9	0.9	-9.9	0.8		
Reading	7	8303	0	B.2.1.1		126871	0.87	0.03	0.87	0.08	0.02	0.00	0.42	-0.33	0.42	-0.27	-0.29	-1.1016	0.0088	-9.9	0.9	-9.9	0.9		
Reading	7	8652	0	A.1.4.1		126871	0.87	0.03	0.03	0.07	0.87	0.00	0.35	-0.23	-0.28	-0.21	0.35	-1.0861	0.0087	-6.8	1.0	-8.1	0.9		
Reading	7	8858	0	A.2.6.1		126871	0.86	0.03	0.02	0.09	0.86	0.00	0.40	-0.28	-0.29	-0.28	0.40	-1.0312	0.0086	-9.9	0.9	-9.9	0.8		
Reading	7	8980	0	A.2.4.1		126871	0.75	0.08	0.10	0.07	0.75	0.00	0.47	-0.38	-0.34	-0.35	0.47	-0.2104	0.0070	-9.9	0.9	-9.9	0.8		
Reading	7	9063	0	A.1.3.1	2	126871	0.68	0.07	0.19	0.05	0.68	0.00	0.52	-0.45	-0.39	-0.47	0.52	0.1827	0.0066	-9.9	0.9	-9.9	0.8		
Reading	7	9140	0	A.1.2.2		126871	0.78	0.78	0.10	0.04	0.08	0.00	0.45	0.45	-0.33	-0.34	-0.32	-0.4037	0.0073	-9.9	0.9	-9.9	0.8		
Reading	7	9143	0	A.2.3.1	2	126871	0.74	0.74	0.18	0.03	0.05	0.00	0.43	0.43	-0.33	-0.32	-0.38	-0.1395	0.0070	-9.9	0.9	-9.9	0.9		
Reading	7	9675	0	B.3.2.1	2	126871	0.43	0.13	0.09	0.34	0.43	0.00	0.31	-0.28	-0.27	-0.32	0.31	1.4512	0.0062	9.9	1.0	9.9	1.1		
Reading	7	9970	0	B.3.3.2		126871	0.60	0.14	0.60	0.20	0.06	0.00	0.29	-0.26	0.29	-0.21	-0.31	0.6253	0.0063	9.9	1.1	9.9	1.1		
Reading	7	144	1	B.1.1.1	3	76222	0.72	0.06	0.72	0.04	0.19	0.00	0.36	-0.39	0.36	-0.36	-0.20	-0.0234	0.0088	2.4	1.0	9.4	1.1		
Reading	7	800	1	B.2.1.1	2	25611	0.80	0.07	0.80	0.04	0.09	0.00	0.35	-0.26	0.35	-0.27	-0.22	-0.5704	0.0169	0.3	1.0	-0.8	1.0	A+	A-
Reading	7	1268	1	A.2.4.1	2	25611	0.90	0.90	0.02	0.03	0.05	0.00	0.45	0.45	-0.29	-0.30	-0.31	-1.5015	0.0220	-9.9	0.8	-9.9	0.6	A+	A-
Reading	7	1754	1	B.3.3.3	2	25611	0.84	0.11	0.03	0.84	0.02	0.00	0.45	-0.34	-0.34	0.45	-0.28	-0.8645	0.0182	-9.9	0.9	-9.9	0.8	A-	A-
Reading	7	2281	1	A.2.5.1	2	25611	0.65	0.16	0.65	0.07	0.11	0.00	0.35	-0.26	0.35	-0.36	-0.23	0.3600	0.0144	6.2	1.0	5.4	1.1	A+	A+
Reading	7	2827	1	B.1.1.1	2	76222	0.80	0.16	0.02	0.80	0.03	0.00	0.35	-0.25	-0.29	0.35	-0.29	-0.5165	0.0097	-2.2	1.0	4.8	1.1		
Reading	7	3063	1	B.1.1.1	3	25611	0.70	0.09	0.15	0.70	0.06	0.00	0.31	-0.31	-0.16	0.31	-0.30	0.1019	0.0149	9.9	1.1	9.9	1.2	A+	A-
Reading	7	3554	1	A.1.4.1	1	76222	0.69	0.69	0.09	0.15	0.06	0.00	0.45	0.45	-0.38	-0.33	-0.35	0.1617	0.0086	-9.9	0.9	-9.9	0.9		
Reading	7	3588	1	B.3.3.1	2	25611	0.84	0.04	0.84	0.02	0.10	0.00	0.40	-0.32	0.40	-0.22	-0.30	-0.8995	0.0184	-6.3	0.9	-6.9	0.9	A-	A-
Reading	7	5492	1	A.2.4.1	1	25611	0.89	0.01	0.07	0.89	0.04	0.00	0.31	-0.19	-0.19	0.31	-0.27	-1.3333	0.0208	-1.4	1.0	-1.6	1.0	A+	A+
Reading	7	6019	1	B.2.1.1	2	76222	0.78	0.05	0.06	0.10	0.78	0.00	0.46	-0.29	-0.31	-0.41	0.46	-0.3930	0.0094	-9.9	0.9	-9.9	0.8		
Reading	7	6837	1	A.1.1.2	1	76222	0.87	0.06	0.87	0.03	0.04	0.00	0.42	-0.30	0.42	-0.29	-0.28	-1.1582	0.0115	-9.9	0.9	-9.9	0.7		
Reading	7	6881	1	B.3.3.1	2	25611	0.86	0.07	0.03	0.04	0.86	0.00	0.43	-0.26	-0.35	-0.31	0.43	-1.0555	0.0192	-9.9	0.9	-9.9	0.7	A-	A-
Reading	7	8686	1	A.1.6.1	2	76222	0.86	0.05	0.03	0.06	0.86	0.00	0.41	-0.34	-0.32	-0.21	0.41	-1.0658	0.0112	-9.9	0.9	-9.9	0.8		
Reading	7	8928	1	B.3.3.3	2	25611	0.67	0.24	0.05	0.04	0.67	0.00	0.29	-0.19	-0.31	-0.30	0.29	0.2451	0.0146	9.9	1.1	9.9	1.1	A-	A-
Reading	7	9397	1	A.1.3.1	2	76222	0.77	0.06	0.09	0.77	0.08	0.00	0.39	-0.30	-0.27	0.39	-0.28	-0.3218	0.0093	-6.7	1.0	-4.1	1.0		
Reading	7	9398	1	A.2.2.1	2	25611	0.61	0.16	0.08	0.61	0.14	0.00	0.27	-0.23	-0.22	0.27	-0.19	0.5535	0.0141	9.9	1.1	9.9	1.1	A-	A-
Reading	7	9483	1	B.1.1.1	2	76222	0.54	0.04	0.18	0.54	0.24	0.00	0.30	-0.30	-0.26	0.30	-0.27	0.9064	0.0080	9.9	1.1	9.9	1.1		
Reading	7	144	2	B.1.1.1	3	76222	0.72	0.06	0.72	0.04	0.19	0.00	0.36	-0.39	0.36	-0.36	-0.20	-0.0234	0.0088	2.4	1.0	9.4	1.1		
Reading	7	1056	2	B.3.3.3	2	25249	0.77	0.05	0.10	0.77	0.08	0.00	0.45	-0.34	-0.32	0.45	-0.36	-0.3042	0.0161	-9.9	0.9	-9.9	0.8	A-	A-
Reading	7	1291	2	A.2.4.1	1	25249	0.68	0.15	0.06	0.11	0.68	0.00	0.40	-0.29	-0.36	-0.33	0.40	0.2199	0.0147	-5.0	1.0	-5.4	0.9	A-	A-

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	2328	2	A.2.2.2	2	25249	0.50	0.15	0.22	0.50	0.14	0.00	0.41	-0.39	-0.45	0.41	-0.25	1.1432	0.0138	-9.9	0.9	-5.6	1.0	A-	A-
Reading	7	2827	2	B.1.1.1	2	76222	0.80	0.16	0.02	0.80	0.03	0.00	0.35	-0.25	-0.29	0.35	-0.29	-0.5165	0.0097	-2.2	1.0	4.8	1.1		
Reading	7	3554	2	A.1.4.1	1	76222	0.69	0.69	0.09	0.15	0.06	0.00	0.45	0.45	-0.38	-0.33	-0.35	0.1617	0.0086	-9.9	0.9	-9.9	0.9		
Reading	7	5090	2	A.2.6.1	2	25249	0.73	0.05	0.05	0.17	0.73	0.00	0.41	-0.33	-0.34	-0.30	0.41	-0.0551	0.0154	-4.3	1.0	-5.5	0.9	A-	A+
Reading	7	5954	2	A.2.3.1	2	25249	0.57	0.57	0.29	0.05	0.09	0.00	0.34	0.34	-0.28	-0.41	-0.25	0.7867	0.0140	6.0	1.0	5.9	1.1	A-	B-
Reading	7	6019	2	B.2.1.1	2	76222	0.78	0.05	0.06	0.10	0.78	0.00	0.46	-0.29	-0.31	-0.41	0.46	-0.3930	0.0094	-9.9	0.9	-9.9	0.8		
Reading	7	6837	2	A.1.1.2	1	76222	0.87	0.06	0.87	0.03	0.04	0.00	0.42	-0.30	0.42	-0.29	-0.28	-1.1582	0.0115	-9.9	0.9	-9.9	0.7		
Reading	7	7215	2	B.3.1.1	3	25249	0.77	0.77	0.05	0.12	0.06	0.00	0.48	0.48	-0.35	-0.36	-0.38	-0.3071	0.0161	-9.9	0.9	-9.9	0.8	A-	B-
Reading	7	7701	2	A.2.4.1	2	25249	0.72	0.15	0.72	0.10	0.03	0.00	0.32	-0.22	0.32	-0.24	-0.33	-0.0018	0.0153	7.3	1.1	4.0	1.1	A+	A+
Reading	7	8266	2	B.3.3.2	2	25249	0.28	0.30	0.28	0.13	0.28	0.00	-0.01	0.05	-0.01	-0.12	0.03	2.2586	0.0151	9.9	1.3	9.0	1.9	A+	A-
Reading	7	8686	2	A.1.6.1	2	76222	0.86	0.05	0.03	0.06	0.86	0.00	0.41	-0.34	-0.32	-0.21	0.41	-1.0658	0.0112	-9.9	0.9	-9.9	0.8		
Reading	7	9239	2	A.2.1.1	2	25249	0.87	0.06	0.87	0.05	0.02	0.00	0.45	-0.30	0.45	-0.34	-0.28	-1.1444	0.0199	-9.9	0.9	-9.9	0.7	A-	B-
Reading	7	9397	2	A.1.3.1	2	76222	0.77	0.06	0.09	0.77	0.08	0.00	0.39	-0.30	-0.27	0.39	-0.28	-0.3218	0.0093	-6.7	1.0	-4.1	1.0		
Reading	7	9483	2	B.1.1.1	2	76222	0.54	0.04	0.18	0.54	0.24	0.00	0.30	-0.30	-0.26	0.30	-0.27	0.9064	0.0080	9.9	1.1	9.9	1.1		
Reading	7	9616	2	A.2.3.2	2	25249	0.86	0.86	0.04	0.06	0.03	0.00	0.46	0.46	-0.34	-0.32	-0.30	-1.0702	0.0195	-9.9	0.9	-9.9	0.7	A-	B-
Reading	7	144	3	B.1.1.1	3	76222	0.72	0.06	0.72	0.04	0.19	0.00	0.36	-0.39	0.36	-0.36	-0.20	-0.0234	0.0088	2.4	1.0	9.4	1.1		
Reading	7	172	3	A.2.3.1	3	25362	0.49	0.09	0.49	0.05	0.37	0.00	0.20	-0.27	0.20	-0.39	-0.09	1.1569	0.0138	9.9	1.2	9.9	1.3	A-	A-
Reading	7	494	3	A.2.2.1	2	25362	0.81	0.11	0.04	0.04	0.81	0.00	0.50	-0.37	-0.36	-0.38	0.50	-0.6083	0.0172	-9.9	0.8	-9.9	0.7	B-	C-
Reading	7	1351	3	A.2.4.1	2	25362	0.83	0.83	0.05	0.03	0.09	0.00	0.41	0.41	-0.37	-0.28	-0.25	-0.7675	0.0178	-7.9	0.9	-9.9	0.8	A-	B-
Reading	7	1563	3	B.3.3.1	2	25362	0.50	0.50	0.23	0.21	0.05	0.00	0.17	0.17	-0.14	-0.14	-0.24	1.1038	0.0138	9.9	1.2	9.9	1.3	A+	A+
Reading	7	1940	3	A.2.4.1	1	25362	0.87	0.02	0.09	0.87	0.03	0.00	0.45	-0.28	-0.37	0.45	-0.23	-1.1097	0.0196	-9.9	0.9	-9.9	0.7	A-	B-
Reading	7	2827	3	B.1.1.1	2	76222	0.80	0.16	0.02	0.80	0.03	0.00	0.35	-0.25	-0.29	0.35	-0.29	-0.5165	0.0097	-2.2	1.0	4.8	1.1		
Reading	7	3025	3	A.2.6.2	2	25362	0.72	0.12	0.05	0.11	0.72	0.00	0.50	-0.44	-0.44	-0.33	0.50	-0.0558	0.0153	-9.9	0.9	-9.9	0.8	A-	B-
Reading	7	3554	3	A.1.4.1	1	76222	0.69	0.69	0.09	0.15	0.06	0.00	0.45	0.45	-0.38	-0.33	-0.35	0.1617	0.0086	-9.9	0.9	-9.9	0.9		
Reading	7	4034	3	B.3.3.2	2	25362	0.75	0.07	0.11	0.75	0.07	0.00	0.46	-0.34	-0.39	0.46	-0.28	-0.2213	0.0158	-9.9	0.9	-9.9	0.8	A+	A-
Reading	7	4707	3	B.3.1.1	2	25362	0.66	0.16	0.03	0.15	0.66	0.00	0.39	-0.31	-0.40	-0.31	0.39	0.2927	0.0146	-2.9	1.0	-3.4	1.0	A+	A-
Reading	7	4734	3	A.2.3.1	2	25362	0.56	0.56	0.24	0.10	0.10	0.00	0.40	0.40	-0.31	-0.38	-0.37	0.8105	0.0139	-5.0	1.0	-3.2	1.0	A-	A-
Reading	7	4956	3	B.3.3.3	2	25362	0.54	0.30	0.54	0.07	0.08	0.00	0.36	-0.27	0.36	-0.41	-0.33	0.9050	0.0138	3.5	1.0	4.2	1.0	A-	A-
Reading	7	6019	3	B.2.1.1	2	76222	0.78	0.05	0.06	0.10	0.78	0.00	0.46	-0.29	-0.31	-0.41	0.46	-0.3930	0.0094	-9.9	0.9	-9.9	0.8		
Reading	7	6837	3	A.1.1.2	1	76222	0.87	0.06	0.87	0.03	0.04	0.00	0.42	-0.30	0.42	-0.29	-0.28	-1.1582	0.0115	-9.9	0.9	-9.9	0.7		
Reading	7	8686	3	A.1.6.1	2	76222	0.86	0.05	0.03	0.06	0.86	0.00	0.41	-0.34	-0.32	-0.21	0.41	-1.0658	0.0112	-9.9	0.9	-9.9	0.8		
Reading	7	9397	3	A.1.3.1	2	76222	0.77	0.06	0.09	0.77	0.08	0.00	0.39	-0.30	-0.27	0.39	-0.28	-0.3218	0.0093	-6.7	1.0	-4.1	1.0		
Reading	7	9483	3	B.1.1.1	2	76222	0.54	0.04	0.18	0.54	0.24	0.00	0.30	-0.30	-0.26	0.30	-0.27	0.9064	0.0080	9.9	1.1	9.9	1.1		
Reading	7	1545	4	B.1.1.1	2	25352	0.64	0.17	0.12	0.64	0.06	0.00	0.33	-0.30	-0.26	0.33	-0.19	0.4282	0.0143	7.3	1.0	6.9	1.1	A+	A-
Reading	7	1782	4	A.1.3.1	2	25352	0.92	0.92	0.03	0.03	0.02	0.00	0.35	0.35	-0.24	-0.17	-0.27	-1.7016	0.0239	-6.5	0.9	-5.1	0.9	A+	A-
Reading	7	1932	4	B.2.1.1	2	25352	0.66	0.03	0.66	0.27	0.04	0.00	0.31	-0.32	0.31	-0.22	-0.30	0.3381	0.0144	9.9	1.1	9.9	1.1	A-	A-
Reading	7	2181	4	A.2.3.1	2	25352	0.83	0.07	0.83	0.06	0.04	0.00	0.46	-0.34	0.46	-0.33	-0.29	-0.7634	0.0179	-9.9	0.9	-9.9	0.7	A-	A-
Reading	7	2262	4	B.2.1.1	2	25352	0.64	0.03	0.05	0.28	0.64	0.00	0.33	-0.35	-0.39	-0.23	0.33	0.4317	0.0143	6.3	1.0	6.1	1.1	A-	A-
Reading	7	3587	4	A.1.3.1	2	25352	0.82	0.12	0.03	0.03	0.82	0.00	0.52	-0.44	-0.33	-0.32	0.52	-0.6447	0.0173	-9.9	0.8	-9.9	0.7	A+	B-
Reading	7	3779	4	A.2.3.1	2	50649	0.53	0.53	0.07	0.09	0.31	0.00	0.27	0.27	-0.32	-0.34	-0.17	0.9735	0.0097	9.9	1.1	9.9	1.1		
Reading	7	4962	4	A.1.3.1	2	25352	0.75	0.03	0.11	0.75	0.12	0.00	0.31	-0.30	-0.24	0.31	-0.19	-0.1712	0.0156	5.2	1.0	8.3	1.1	A-	A-
Reading	7	5757	4	A.1.4.1	2	25352	0.90	0.90	0.04	0.04	0.02	0.00	0.43	0.43	-0.26	-0.29	-0.30	-1.4379	0.0218	-9.7	0.9	-9.9	0.7	A+	A+
Reading	7	6357	4	A.1.4.1	1	25352	0.78	0.16	0.78	0.04	0.02	0.00	0.39	-0.31	0.39	-0.33	-0.23	-0.3936	0.0164	-5.9	1.0	-5.2	0.9	A-	A-
Reading	7	6672	4	A.2.2.2	2	50649	0.73	0.20	0.02	0.04	0.73	0.00	0.36	-0.26	-0.30	-0.34	0.36	-0.0826	0.0109	0.7	1.0	0.1	1.0		
Reading	7	7220	4	A.1.6.2	2	25352	0.86	0.08	0.03	0.86	0.03	0.00	0.41	-0.26	-0.32	0.41	-0.28	-1.0167	0.0192	-8.2	0.9	-8.8	0.8	A+	B-
Reading	7	7493	4	A.2.5.1	2	50649	0.62	0.62	0.17	0.12	0.09	0.00	0.25	0.25	-0.18	-0.20	-0.24	0.5159	0.0100	9.9	1.1	9.9	1.2		
Reading	7	7795	4	A.2.3.1	2	50649	0.50	0.22	0.12	0.15	0.50	0.00	0.38	-0.34	-0.33	-0.35	0.38	1.0909	0.0097	-3.9	1.0	-1.2	1.0		
Reading	7	7923	4	A.2.6.2	2	50649	0.58	0.18	0.12	0.58	0.12	0.00	0.34	-0.27	-0.29	0.34	-0.30	0.7460	0.0098	8.3	1.0	6.2	1.0		
Reading	7	8728	4	B.2.1.1	2	50649	0.49	0.14	0.10	0.27	0.49	0.00	0.23	-0.23	-0.27	-0.17	0.23	1.1487	0.0097	9.9	1.1	9.9	1.2		

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	9212	4	A.2.4.1	2	50649	0.69	0.69	0.07	0.11	0.13	0.00	0.38	0.38	-0.31	-0.39	-0.20	0.1481	0.0105	-1.4	1.0	-0.4	1.0		
Reading	7	9496	4	A.2.4.1	1	50649	0.65	0.01	0.65	0.10	0.23	0.00	0.28	-0.24	0.28	-0.33	-0.18	0.3769	0.0102	9.9	1.1	9.9	1.1		
Reading	7	2173	5	B.2.1.2	2	25297	0.83	0.83	0.03	0.05	0.09	0.00	0.41	0.41	-0.31	-0.29	-0.27	-0.7350	0.0177	-7.5	0.9	-8.6	0.9	A-	A-
Reading	7	2538	5	A.1.4.1	1	25297	0.78	0.05	0.78	0.11	0.05	0.00	0.52	-0.37	0.52	-0.42	-0.37	-0.4131	0.0164	-9.9	0.8	-9.9	0.7	A+	A-
Reading	7	3316	5	A.1.3.1	2	25297	0.63	0.09	0.63	0.26	0.02	0.00	0.41	-0.39	0.41	-0.32	-0.38	0.4642	0.0143	-6.7	1.0	-7.5	0.9	A+	B-
Reading	7	3779	5	A.2.3.1	2	50649	0.53	0.53	0.07	0.09	0.31	0.00	0.27	0.27	-0.32	-0.34	-0.17	0.9735	0.0097	9.9	1.1	9.9	1.1		
Reading	7	4019	5	A.1.4.1	1	25297	0.85	0.85	0.04	0.06	0.06	0.00	0.47	0.47	-0.34	-0.38	-0.27	-0.9561	0.0188	-9.9	0.8	-9.9	0.7	A+	B-
Reading	7	6672	5	A.2.2.2	2	50649	0.73	0.20	0.02	0.04	0.73	0.00	0.36	-0.26	-0.30	-0.34	0.36	-0.0826	0.0109	0.7	1.0	0.1	1.0		
Reading	7	7493	5	A.2.5.1	2	50649	0.62	0.62	0.17	0.12	0.09	0.00	0.25	0.25	-0.18	-0.20	-0.24	0.5159	0.0100	9.9	1.1	9.9	1.2		
Reading	7	7795	5	A.2.3.1	2	50649	0.50	0.22	0.12	0.15	0.50	0.00	0.38	-0.34	-0.33	-0.35	0.38	1.0909	0.0097	-3.9	1.0	-1.2	1.0		
Reading	7	7923	5	A.2.6.2	2	50649	0.58	0.18	0.12	0.58	0.12	0.00	0.34	-0.27	-0.29	0.34	-0.30	0.7460	0.0098	8.3	1.0	6.2	1.0		
Reading	7	8247	5	A.1.1.2	2	25297	0.78	0.06	0.04	0.78	0.12	0.00	0.43	-0.26	-0.35	0.43	-0.33	-0.4258	0.0164	-9.7	0.9	-9.9	0.8	C-	C-
Reading	7	8433	5	A.1.3.1	2	25297	0.78	0.14	0.04	0.04	0.78	0.00	0.36	-0.21	-0.32	-0.33	0.36	-0.4008	0.0163	-2.4	1.0	-2.2	1.0	A-	A-
Reading	7	8497	5	A.1.3.2	2	25297	0.64	0.11	0.64	0.17	0.08	0.00	0.53	-0.46	0.53	-0.46	-0.40	0.4097	0.0143	-9.9	0.8	-9.9	0.8	A-	C-
Reading	7	8683	5	B.2.2.2	3	25297	0.52	0.03	0.18	0.52	0.26	0.00	0.18	-0.30	-0.24	0.18	-0.05	1.0061	0.0138	9.9	1.2	9.9	1.3	A+	A-
Reading	7	8728	5	B.2.1.1	2	50649	0.49	0.14	0.10	0.27	0.49	0.00	0.23	-0.23	-0.27	-0.17	0.23	1.1487	0.0097	9.9	1.1	9.9	1.2		
Reading	7	9212	5	A.2.4.1	2	50649	0.69	0.69	0.07	0.11	0.13	0.00	0.38	0.38	-0.31	-0.39	-0.20	0.1481	0.0105	-1.4	1.0	-0.4	1.0		
Reading	7	9303	5	A.1.4.1	2	25297	0.68	0.22	0.06	0.04	0.68	0.00	0.43	-0.35	-0.33	-0.38	0.43	0.2162	0.0147	-9.9	0.9	-9.9	0.9	A+	A-
Reading	7	9449	5	A.1.3.1	2	25297	0.70	0.12	0.70	0.12	0.05	0.00	0.42	-0.37	0.42	-0.28	-0.34	0.0764	0.0150	-7.8	1.0	-9.9	0.9	A+	A-
Reading	7	9496	5	A.2.4.1	1	50649	0.65	0.01	0.65	0.10	0.23	0.00	0.28	-0.24	0.28	-0.33	-0.18	0.3769	0.0102	9.9	1.1	9.9	1.1		
Reading	8	30	0	B.1.1.1		127088	0.74	0.74	0.04	0.12	0.09	0.00	0.40	0.40	-0.36	-0.23	-0.35	0.4285	0.0069	-5.3	1.0	-3.5	1.0		
Reading	8	202	0	A.1.6.1		127088	0.85	0.06	0.85	0.05	0.04	0.00	0.44	-0.33	0.44	-0.29	-0.28	-0.4267	0.0085	-9.9	0.9	-9.9	0.8		
Reading	8	447	0	B.2.2.2		127088	0.73	0.73	0.06	0.11	0.10	0.00	0.49	0.49	-0.39	-0.40	-0.36	0.4780	0.0069	-9.9	0.9	-9.9	0.9		
Reading	8	783	0	A.1.4.1		127088	0.76	0.09	0.05	0.10	0.76	0.00	0.29	-0.29	-0.25	-0.12	0.29	0.3086	0.0071	9.9	1.1	9.9	1.2		
Reading	8	900	0	A.2.1.1		127088	0.81	0.06	0.05	0.08	0.81	0.00	0.42	-0.27	-0.36	-0.29	0.42	-0.0556	0.0077	-9.9	0.9	-9.9	0.9		
Reading	8	1397	0	B.2.1.1	3	127088	0.66	0.14	0.13	0.66	0.06	0.00	0.41	-0.37	-0.31	0.41	-0.31	0.8999	0.0065	-8.9	1.0	-9.9	1.0		
Reading	8	1444	0	A.1.3.1		127088	0.72	0.07	0.17	0.72	0.04	0.00	0.25	-0.18	-0.19	0.25	-0.21	0.5417	0.0068	9.9	1.1	9.9	1.2		
Reading	8	1559	0	B.1.1.1		127088	0.82	0.82	0.09	0.03	0.06	0.00	0.31	0.31	-0.18	-0.33	-0.21	-0.1312	0.0078	6.6	1.0	6.3	1.1		
Reading	8	2143	0	B.3.3.1	3	127088	0.63	0.63	0.08	0.14	0.15	0.00	0.41	0.41	-0.47	-0.34	-0.26	1.0243	0.0064	-9.4	1.0	-6.0	1.0		
Reading	8	2444	0	A.1.1.1		127088	0.88	0.03	0.03	0.88	0.05	0.00	0.45	-0.34	-0.31	0.45	-0.26	-0.7282	0.0093	-9.9	0.9	-9.9	0.6		
Reading	8	2944	0	B.2.1.1		127088	0.47	0.47	0.23	0.13	0.17	0.00	0.32	0.32	-0.32	-0.38	-0.19	1.8548	0.0062	9.9	1.1	9.9	1.1		
Reading	8	3065	0	A.2.2.2		127088	0.86	0.07	0.86	0.03	0.04	0.00	0.39	-0.28	0.39	-0.28	-0.24	-0.4980	0.0086	-9.9	0.9	-9.9	0.9		
Reading	8	3111	0	B.2.1.2		127088	0.70	0.16	0.08	0.06	0.70	0.00	0.32	-0.26	-0.25	-0.23	0.32	0.6761	0.0067	9.9	1.1	9.9	1.1		
Reading	8	3402	0	B.3.1.1	2	127088	0.76	0.76	0.08	0.04	0.11	0.00	0.45	0.45	-0.34	-0.41	-0.30	0.2610	0.0072	-9.9	0.9	-9.9	0.9		
Reading	8	3815	0	A.1.3.1		127088	0.71	0.08	0.71	0.16	0.05	0.00	0.24	-0.29	0.24	-0.07	-0.29	0.5790	0.0068	9.9	1.1	9.9	1.3		
Reading	8	3894	0	A.2.6.2		127088	0.60	0.17	0.08	0.60	0.15	0.00	0.28	-0.29	-0.21	0.28	-0.17	1.1770	0.0063	9.9	1.1	9.9	1.2		
Reading	8	4276	0	B.3.3.3	3	127088	0.68	0.68	0.09	0.18	0.05	0.00	0.39	0.39	-0.31	-0.30	-0.30	0.7448	0.0066	0.2	1.0	-9.9	1.0		
Reading	8	5096	0	B.3.3.4		127088	0.62	0.16	0.03	0.62	0.18	0.00	0.29	-0.24	-0.38	0.29	-0.21	1.0881	0.0063	9.9	1.1	9.9	1.2		
Reading	8	5531	0	A.1.4.1		127088	0.87	0.06	0.03	0.04	0.87	0.00	0.44	-0.28	-0.30	-0.32	0.44	-0.5663	0.0088	-9.9	0.9	-9.9	0.8		
Reading	8	5895	0	A.1.4.1		127088	0.81	0.07	0.04	0.81	0.08	0.00	0.44	-0.34	-0.30	0.44	-0.31	-0.0617	0.0077	-9.9	0.9	-9.9	0.8		
Reading	8	6218	0	B.3.3.3	2	127088	0.63	0.05	0.15	0.17	0.63	0.00	0.32	-0.36	-0.21	-0.26	0.32	1.0445	0.0064	9.9	1.1	9.9	1.2		
Reading	8	6742	0	A.1.2.2		127088	0.84	0.08	0.04	0.84	0.05	0.00	0.42	-0.26	-0.30	0.42	-0.33	-0.2598	0.0081	-9.9	0.9	-9.9	0.8		
Reading	8	7054	0	A.1.5.1		127088	0.84	0.05	0.07	0.05	0.84	0.00	0.46	-0.38	-0.29	-0.32	0.46	-0.3039	0.0082	-9.9	0.9	-9.9	0.7		
Reading	8	7223	0	B.1.2.1		127088	0.70	0.70	0.11	0.08	0.10	0.00	0.35	0.35	-0.30	-0.32	-0.18	0.6323	0.0067	9.9	1.0	9.1	1.1		
Reading	8	7280	0	A.2.3.1		127088	0.76	0.08	0.76	0.10	0.06	0.00	0.48	-0.37	0.48	-0.36	-0.33	0.2870	0.0071	-9.9	0.9	-9.9	0.8		
Reading	8	7322	0	B.1.2.1		127088	0.60	0.60	0.05	0.25	0.09	0.00	0.30	0.30	-0.35	-0.16	-0.35	1.1860	0.0063	9.9	1.1	9.9	1.1		
Reading	8	7447	0	A.2.3.1		127088	0.81	0.81	0.05	0.10	0.03	0.00	0.35	0.35	-0.33	-0.20	-0.22	-0.0905	0.0078	0.1	1.0	0.1	1.0		
Reading	8	7507	0	A.2.4.1		127088	0.54	0.24	0.12	0.09	0.54	0.00	0.32	-0.21	-0.30	-0.39	0.32	1.4747	0.0062	9.9	1.1	9.9	1.1		
Reading	8	7513	0	A.1.5.1		127088	0.50	0.14	0.32	0.03	0.50	0.00	0.36	-0.37	-0.29	-0.42	0.36	1.6684	0.0062	5.8	1.0	9.9	1.0		

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	7597	0	A.1.6.2		127088	0.37	0.07	0.44	0.12	0.37	0.00	0.28	-0.37	-0.24	-0.33	0.28	2.3099	0.0063	9.9	1.1	9.9	1.2		
Reading	8	7860	0	A.2.3.1	2	127088	0.61	0.21	0.09	0.09	0.61	0.00	0.36	-0.30	-0.25	-0.36	0.36	1.1403	0.0063	9.9	1.0	9.9	1.1		
Reading	8	8834	0	B.3.3.4		127088	0.84	0.04	0.09	0.04	0.84	0.00	0.35	-0.33	-0.19	-0.26	0.35	-0.2714	0.0081	-3.5	1.0	1.7	1.0		
Reading	8	9164	0	A.1.2.2		127088	0.82	0.82	0.03	0.13	0.01	0.00	0.40	0.40	-0.29	-0.33	-0.22	-0.1591	0.0079	-9.9	0.9	-9.9	0.9		
Reading	8	9170	0	B.1.2.1		127088	0.77	0.77	0.07	0.09	0.06	0.00	0.42	0.42	-0.24	-0.35	-0.32	0.1956	0.0073	-9.9	1.0	-9.9	0.9		
Reading	8	9199	0	B.1.1.1		127088	0.55	0.05	0.15	0.55	0.25	0.00	0.31	-0.47	-0.23	0.31	-0.24	1.4547	0.0062	9.9	1.1	9.9	1.1		
Reading	8	9512	0	A.2.2.1		127088	0.84	0.05	0.84	0.08	0.03	0.00	0.43	-0.31	0.43	-0.28	-0.32	-0.2583	0.0081	-9.9	0.9	-9.9	0.9		
Reading	8	9538	0	B.1.1.1		127088	0.51	0.21	0.51	0.04	0.24	0.00	0.35	-0.31	0.35	-0.40	-0.31	1.6564	0.0062	9.9	1.0	9.9	1.1		
Reading	8	9676	0	B.2.2.1		127088	0.59	0.17	0.21	0.59	0.02	0.00	0.32	-0.32	-0.23	0.32	-0.32	1.2362	0.0063	9.9	1.1	9.9	1.1		
Reading	8	9729	0	A.2.4.1		127088	0.69	0.15	0.08	0.69	0.08	0.00	0.46	-0.36	-0.38	0.46	-0.34	0.6958	0.0067	-9.9	0.9	-9.9	0.9		
Reading	8	9759	0	A.1.3.1		127088	0.59	0.30	0.09	0.59	0.02	0.00	0.37	-0.33	-0.31	0.37	-0.34	1.2564	0.0063	1.9	1.0	1.8	1.0		
Reading	8	468	1	A.1.6.1	2	76416	0.62	0.07	0.20	0.62	0.10	0.00	0.36	-0.26	-0.32	0.36	-0.29	1.0577	0.0082	4.7	1.0	3.8	1.0		
Reading	8	814	1	A.1.3.1	2	76416	0.79	0.79	0.07	0.07	0.06	0.00	0.43	0.43	-0.25	-0.35	-0.33	0.0881	0.0096	-9.9	0.9	-9.9	0.8		
Reading	8	847	1	A.2.1.1	2	25729	0.80	0.06	0.80	0.05	0.08	0.00	0.47	-0.35	0.47	-0.33	-0.33	-0.0277	0.0169	-9.9	0.9	-9.9	0.7	A-	A-
Reading	8	2530	1	B.1.1.1	2	76416	0.73	0.13	0.10	0.73	0.03	0.00	0.36	-0.27	-0.27	0.36	-0.29	0.4471	0.0089	0.4	1.0	-5.2	1.0		
Reading	8	2902	1	B.2.1.1	3	76416	0.78	0.06	0.78	0.09	0.07	0.00	0.43	-0.34	0.43	-0.35	-0.24	0.1528	0.0094	-9.9	0.9	-9.9	0.8		
Reading	8	4237	1	A.2.6.1	2	25729	0.52	0.52	0.31	0.05	0.12	0.00	0.18	0.18	-0.06	-0.35	-0.24	1.5719	0.0137	9.9	1.2	9.9	1.3	A-	A-
Reading	8	4830	1	B.3.1.1	3	25729	0.47	0.13	0.19	0.47	0.21	0.00	0.28	-0.27	-0.26	0.28	-0.24	1.8239	0.0137	9.9	1.1	9.9	1.2	A-	A-
Reading	8	5354	1	A.2.4.1	1	25729	0.86	0.02	0.08	0.04	0.86	0.00	0.49	-0.29	-0.38	-0.34	0.49	-0.4810	0.0190	-9.9	0.8	-9.9	0.6	A+	A-
Reading	8	5720	1	A.2.3.1	2	25729	0.77	0.77	0.16	0.01	0.06	0.00	0.27	0.27	-0.18	-0.22	-0.25	0.1904	0.0161	9.1	1.1	9.9	1.2	A+	A-
Reading	8	6058	1	A.2.4.1	3	25729	0.61	0.61	0.05	0.11	0.23	0.00	0.38	0.38	-0.39	-0.33	-0.29	1.1393	0.0140	-0.7	1.0	-2.0	1.0	A+	A-
Reading	8	6661	1	A.1.3.1	2	76416	0.49	0.49	0.11	0.38	0.02	0.00	0.18	0.18	-0.19	-0.14	-0.19	1.7364	0.0079	9.9	1.2	9.9	1.3		
Reading	8	6662	1	B.1.1.1	2	76416	0.65	0.14	0.07	0.14	0.65	0.00	0.24	-0.10	-0.28	-0.23	0.24	0.9317	0.0083	9.9	1.1	9.9	1.2		
Reading	8	6761	1	A.2.5.1	2	25729	0.61	0.12	0.17	0.09	0.61	0.00	0.34	-0.29	-0.24	-0.32	0.34	1.1183	0.0140	7.9	1.1	7.8	1.1	A+	A+
Reading	8	6889	1	B.1.1.1	1	76416	0.82	0.09	0.06	0.04	0.82	0.00	0.46	-0.36	-0.34	-0.28	0.46	-0.1282	0.0101	-9.9	0.9	-9.9	0.7		
Reading	8	8361	1	B.3.3.3	2	25729	0.75	0.06	0.75	0.04	0.15	0.00	0.38	-0.33	0.38	-0.27	-0.28	0.3441	0.0156	-1.9	1.0	-0.2	1.0	A+	A-
Reading	8	8825	1	B.1.1.1	2	76416	0.60	0.14	0.60	0.18	0.08	0.00	0.37	-0.38	0.37	-0.33	-0.19	1.1769	0.0081	0.4	1.0	-0.4	1.0		
Reading	8	9216	1	B.3.3.2	3	25729	0.40	0.20	0.31	0.40	0.09	0.00	0.23	-0.26	-0.18	0.23	-0.23	2.1383	0.0139	9.9	1.1	9.9	1.3	A-	A-
Reading	8	9909	1	B.3.3.4	2	25729	0.48	0.27	0.48	0.06	0.19	0.00	0.26	-0.25	0.26	-0.36	-0.18	1.7817	0.0137	9.9	1.1	9.9	1.2	A+	A-
Reading	8	468	2	A.1.6.1	2	76416	0.62	0.07	0.20	0.62	0.10	0.00	0.36	-0.26	-0.32	0.36	-0.29	1.0577	0.0082	4.7	1.0	3.8	1.0		
Reading	8	814	2	A.1.3.1	2	76416	0.79	0.79	0.07	0.07	0.06	0.00	0.43	0.43	-0.25	-0.35	-0.33	0.0881	0.0096	-9.9	0.9	-9.9	0.8		
Reading	8	1387	2	A.2.4.1	2	25361	0.57	0.22	0.09	0.12	0.57	0.00	0.43	-0.37	-0.36	-0.42	0.43	1.3596	0.0139	-9.9	0.9	-9.9	0.9	A-	A-
Reading	8	2128	2	B.3.3.1	2	25361	0.71	0.12	0.12	0.05	0.71	0.00	0.47	-0.29	-0.42	-0.41	0.47	0.6082	0.0150	-9.9	0.9	-9.9	0.8	A-	A-
Reading	8	2530	2	B.1.1.1	2	76416	0.73	0.13	0.10	0.73	0.03	0.00	0.36	-0.27	-0.27	0.36	-0.29	0.4471	0.0089	0.4	1.0	-5.2	1.0		
Reading	8	2902	2	B.2.1.1	3	76416	0.78	0.06	0.78	0.09	0.07	0.00	0.43	-0.34	0.43	-0.35	-0.24	0.1528	0.0094	-9.9	0.9	-9.9	0.8		
Reading	8	2981	2	A.2.3.1	2	25361	0.49	0.05	0.14	0.49	0.31	0.00	0.32	-0.42	-0.30	0.32	-0.25	1.7165	0.0138	6.0	1.0	9.0	1.1	A-	A-
Reading	8	5583	2	B.3.2.1	2	25361	0.35	0.35	0.20	0.17	0.29	0.00	0.10	0.10	-0.13	-0.10	-0.09	2.4368	0.0143	9.9	1.2	9.9	1.5	A+	A-
Reading	8	6387	2	B.3.1.1	2	25361	0.73	0.73	0.06	0.16	0.04	0.00	0.39	0.39	-0.34	-0.29	-0.27	0.4587	0.0154	-3.0	1.0	-1.2	1.0	A-	A-
Reading	8	6661	2	A.1.3.1	2	76416	0.49	0.49	0.11	0.38	0.02	0.00	0.18	0.18	-0.19	-0.14	-0.19	1.7364	0.0079	9.9	1.2	9.9	1.3		
Reading	8	6662	2	B.1.1.1	2	76416	0.65	0.14	0.07	0.14	0.65	0.00	0.24	-0.10	-0.28	-0.23	0.24	0.9317	0.0083	9.9	1.1	9.9	1.2		
Reading	8	6889	2	B.1.1.1	1	76416	0.82	0.09	0.06	0.04	0.82	0.00	0.46	-0.36	-0.34	-0.28	0.46	-0.1282	0.0101	-9.9	0.9	-9.9	0.7		
Reading	8	7193	2	B.3.1.1	2	25361	0.49	0.16	0.30	0.49	0.04	0.00	0.26	-0.19	-0.22	0.26	-0.40	1.7066	0.0138	9.9	1.1	9.9	1.2	A-	A-
Reading	8	7593	2	A.2.4.1	2	25361	0.46	0.04	0.46	0.47	0.04	0.00	0.35	-0.43	0.35	-0.30	-0.43	1.8702	0.0138	-0.5	1.0	4.3	1.0	A-	A-
Reading	8	8304	2	A.2.6.1	2	25361	0.53	0.32	0.53	0.09	0.06	0.00	0.29	-0.26	0.29	-0.22	-0.28	1.5331	0.0138	9.9	1.1	9.9	1.1	A+	A-
Reading	8	8349	2	B.1.2.1	3	25361	0.55	0.13	0.55	0.07	0.26	0.00	0.29	-0.41	0.29	-0.29	-0.14	1.4473	0.0138	9.9	1.1	9.9	1.1	A-	A-
Reading	8	8825	2	B.1.1.1	2	76416	0.60	0.14	0.60	0.18	0.08	0.00	0.37	-0.38	0.37	-0.33	-0.19	1.1769	0.0081	0.4	1.0	-0.4	1.0		
Reading	8	9233	2	B.1.2.1	2	25361	0.49	0.25	0.17	0.49	0.08	0.00	0.31	-0.31	-0.25	0.31	-0.28	1.7131	0.0138	8.3	1.0	9.9	1.1	A+	A-
Reading	8	209	3	B.3.3.1	2	25326	0.90	0.07	0.90	0.02	0.01	0.00	0.37	-0.30	0.37	-0.17	-0.25	-0.9109	0.0221	-5.8	0.9	-6.0	0.8	A+	A-
Reading	8	468	3	A.1.6.1	2	76416	0.62	0.07	0.20	0.62	0.10	0.00	0.36	-0.26	-0.32	0.36	-0.29	1.0577	0.0082	4.7	1.0	3.8	1.0		

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	814	3	A.1.3.1	2	76416	0.79	0.79	0.07	0.07	0.06	0.00	0.43	0.43	-0.25	-0.35	-0.33	0.0881	0.0096	-9.9	0.9	-9.9	0.8		
Reading	8	2467	3	A.2.6.1	2	25326	0.71	0.19	0.02	0.07	0.71	0.00	0.36	-0.27	-0.35	-0.30	0.36	0.5991	0.0151	0.8	1.0	-2.1	1.0	A-	A+
Reading	8	2530	3	B.1.1.1	2	76416	0.73	0.13	0.10	0.73	0.03	0.00	0.36	-0.27	-0.27	0.36	-0.29	0.4471	0.0089	0.4	1.0	-5.2	1.0		
Reading	8	2902	3	B.2.1.1	3	76416	0.78	0.06	0.78	0.09	0.07	0.00	0.43	-0.34	0.43	-0.35	-0.24	0.1528	0.0094	-9.9	0.9	-9.9	0.8		
Reading	8	5872	3	B.3.1.1	2	25326	0.82	0.82	0.05	0.10	0.03	0.00	0.43	0.43	-0.31	-0.30	-0.34	-0.1501	0.0177	-9.7	0.9	-9.9	0.8	A+	A-
Reading	8	6585	3	B.1.1.1	2	25326	0.53	0.43	0.03	0.02	0.53	0.00	0.18	-0.13	-0.31	-0.31	0.18	1.5529	0.0138	9.9	1.2	9.9	1.3	A-	A-
Reading	8	6600	3	A.2.3.2	2	25326	0.74	0.09	0.04	0.12	0.74	0.00	0.44	-0.33	-0.38	-0.32	0.44	0.4078	0.0156	-9.1	0.9	-8.1	0.9	A+	A+
Reading	8	6661	3	A.1.3.1	2	76416	0.49	0.49	0.11	0.38	0.02	0.00	0.18	0.18	-0.19	-0.14	-0.19	1.7364	0.0079	9.9	1.2	9.9	1.3		
Reading	8	6662	3	B.1.1.1	2	76416	0.65	0.14	0.07	0.14	0.65	0.00	0.24	-0.10	-0.28	-0.23	0.24	0.9317	0.0083	9.9	1.1	9.9	1.2		
Reading	8	6889	3	B.1.1.1	1	76416	0.82	0.09	0.06	0.04	0.82	0.00	0.46	-0.36	-0.34	-0.28	0.46	-0.1282	0.0101	-9.9	0.9	-9.9	0.7		
Reading	8	7398	3	A.2.4.1	1	25326	0.60	0.26	0.60	0.09	0.05	0.00	0.40	-0.35	0.40	-0.34	-0.34	1.2128	0.0141	-6.2	1.0	-7.4	0.9	A+	A+
Reading	8	7671	3	A.2.4.1	2	25326	0.77	0.09	0.08	0.77	0.06	0.00	0.40	-0.31	-0.33	0.40	-0.23	0.2327	0.0162	-5.2	1.0	-7.1	0.9	A+	A+
Reading	8	8555	3	A.2.4.1	1	25326	0.73	0.07	0.11	0.10	0.73	0.00	0.50	-0.37	-0.33	-0.47	0.50	0.4890	0.0154	-9.9	0.9	-9.9	0.8	A-	A-
Reading	8	8825	3	B.1.1.1	2	76416	0.60	0.14	0.60	0.18	0.08	0.00	0.37	-0.38	0.37	-0.33	-0.19	1.1769	0.0081	9.4	1.0	-0.4	1.0		
Reading	8	9034	3	B.3.3.2	3	25326	0.46	0.46	0.19	0.20	0.15	0.00	0.20	0.20	-0.12	-0.21	-0.23	1.9112	0.0138	9.9	1.2	9.9	1.3	A+	A-
Reading	8	9165	3	A.2.5.1	2	25326	0.54	0.09	0.32	0.54	0.05	0.00	0.25	-0.34	-0.16	0.25	-0.27	1.5135	0.0138	9.9	1.1	9.9	1.2	A+	A+
Reading	8	501	4	A.1.6.1	2	25320	0.81	0.81	0.10	0.03	0.05	0.00	0.40	0.40	-0.27	-0.30	-0.30	-0.0741	0.0174	-5.1	1.0	-5.7	0.9	A+	A+
Reading	8	519	4	B.3.1.1	2	50672	0.84	0.12	0.02	0.84	0.02	0.00	0.37	-0.27	-0.30	0.37	-0.27	-0.3054	0.0130	-4.9	1.0	-4.8	0.9		
Reading	8	773	4	B.2.1.1	2	25320	0.82	0.07	0.82	0.03	0.09	0.00	0.31	-0.22	0.31	-0.24	-0.20	-0.1238	0.0176	4.5	1.1	3.0	1.1	A+	A-
Reading	8	813	4	B.2.1.1	3	50672	0.59	0.10	0.25	0.07	0.59	0.00	0.28	-0.25	-0.19	-0.33	0.28	1.2686	0.0100	9.9	1.1	9.9	1.2		
Reading	8	3242	4	A.1.4.1	2	25320	0.73	0.15	0.06	0.06	0.73	0.00	0.42	-0.30	-0.35	-0.34	0.42	0.4830	0.0155	-6.8	1.0	-8.5	0.9	A+	A-
Reading	8	3454	4	A.2.3.1	2	50672	0.65	0.04	0.22	0.09	0.65	0.00	0.40	-0.32	-0.33	-0.32	0.40	0.9241	0.0103	-1.0	1.0	-7.0	1.0		
Reading	8	4382	4	B.1.2.1	2	25320	0.78	0.04	0.16	0.78	0.02	0.00	0.28	-0.28	-0.16	0.28	-0.29	0.1394	0.0166	8.4	1.1	9.9	1.3	A+	A+
Reading	8	4497	4	A.1.3.1	2	25320	0.72	0.02	0.19	0.72	0.07	0.00	0.34	-0.26	-0.29	0.34	-0.22	0.5440	0.0154	6.3	1.1	4.2	1.1	A-	B-
Reading	8	5324	4	B.1.1.1	3	25320	0.71	0.07	0.14	0.71	0.08	0.00	0.44	-0.37	-0.33	0.44	-0.34	0.6207	0.0152	-9.7	0.9	-9.8	0.9	A-	A-
Reading	8	5899	4	A.2.1.1	2	50672	0.85	0.02	0.85	0.09	0.04	0.00	0.37	-0.30	0.37	-0.27	-0.22	-0.4242	0.0135	-5.2	1.0	-6.0	0.9		
Reading	8	6643	4	B.2.1.2	3	25320	0.70	0.13	0.70	0.03	0.13	0.00	0.34	-0.20	0.34	-0.34	-0.30	0.6637	0.0151	6.7	1.1	7.1	1.1	A+	A-
Reading	8	7577	4	B.2.1.2	2	50672	0.65	0.14	0.07	0.15	0.65	0.00	0.43	-0.36	-0.39	-0.33	0.43	0.9637	0.0102	-9.9	1.0	-9.9	0.9		
Reading	8	7867	4	A.2.4.1	1	50672	0.82	0.82	0.04	0.09	0.04	0.00	0.43	0.43	-0.32	-0.34	-0.23	-0.1710	0.0126	-9.9	0.9	-9.9	0.8		
Reading	8	8527	4	A.1.4.1	2	25320	0.77	0.05	0.06	0.12	0.77	0.00	0.47	-0.35	-0.30	-0.39	0.47	0.2010	0.0164	-9.9	0.9	-9.9	0.8	A+	A-
Reading	8	9081	4	B.1.1.1	3	25320	0.71	0.12	0.71	0.09	0.08	0.00	0.47	-0.41	0.47	-0.34	-0.32	0.5878	0.0152	-9.9	0.9	-9.9	0.8	A-	A-
Reading	8	9495	4	A.2.4.1	3	50672	0.68	0.68	0.05	0.08	0.19	0.00	0.50	0.50	-0.37	-0.40	-0.43	0.7788	0.0105	-9.9	0.9	-9.9	0.9		
Reading	8	9549	4	A.1.3.1	2	25320	0.86	0.86	0.04	0.04	0.06	0.00	0.30	0.30	-0.16	-0.18	-0.25	-0.5199	0.0195	0.7	1.0	5.2	1.1	A-	A-
Reading	8	9819	4	A.2.6.2	2	50672	0.55	0.13	0.55	0.12	0.21	0.00	0.42	-0.34	0.42	-0.47	-0.33	1.4710	0.0099	-9.9	1.0	-9.4	1.0		
Reading	8	82	5	A.1.3.1	2	25352	0.58	0.27	0.58	0.11	0.04	0.00	0.16	-0.13	0.16	-0.13	-0.17	1.3303	0.0140	9.9	1.3	9.9	1.3	A+	A+
Reading	8	175	5	A.1.3.2	2	25352	0.89	0.89	0.05	0.03	0.04	0.00	0.49	0.49	-0.34	-0.34	-0.33	-0.7445	0.0209	-9.9	0.8	-9.9	0.6	A-	A-
Reading	8	519	5	B.3.1.1	2	50672	0.84	0.12	0.02	0.84	0.02	0.00	0.37	-0.27	-0.30	0.37	-0.27	-0.3054	0.0130	-4.9	1.0	-4.8	0.9		
Reading	8	813	5	B.2.1.1	3	50672	0.59	0.10	0.25	0.07	0.59	0.00	0.28	-0.25	-0.19	-0.33	0.28	1.2686	0.0100	9.9	1.1	9.9	1.2		
Reading	8	905	5	A.1.4.1	1	25352	0.72	0.10	0.14	0.03	0.72	0.00	0.50	-0.35	-0.46	-0.35	0.50	0.5377	0.0153	-9.9	0.9	-9.9	0.8	A-	C-
Reading	8	1593	5	B.1.1.1	2	25352	0.53	0.53	0.06	0.31	0.10	0.00	0.26	0.26	-0.25	-0.16	-0.38	1.5330	0.0139	9.9	1.1	9.9	1.2	A-	A-
Reading	8	3454	5	A.2.3.1	2	50672	0.65	0.04	0.22	0.09	0.65	0.00	0.40	-0.32	-0.33	-0.32	0.40	0.9241	0.0103	-1.0	1.0	-7.0	1.0		
Reading	8	3477	5	A.1.2.2	2	25352	0.81	0.05	0.05	0.81	0.09	0.00	0.46	-0.30	-0.31	0.46	-0.37	-0.0648	0.0173	-9.9	0.9	-9.9	0.8	A-	B-
Reading	8	3852	5	B.1.1.1	3	25352	0.82	0.05	0.82	0.08	0.06	0.00	0.38	-0.30	0.38	-0.26	-0.24	-0.0912	0.0175	-3.6	1.0	-1.6	1.0	A+	A-
Reading	8	4036	5	B.2.1.1	3	25352	0.37	0.06	0.20	0.37	0.37	0.00	0.14	-0.30	-0.25	-0.04	0.14	2.3567	0.0142	9.9	1.2	9.9	1.4	A+	A+
Reading	8	4681	5	B.2.1.1	2	25352	0.80	0.04	0.05	0.11	0.80	0.00	0.42	-0.35	-0.36	-0.26	0.42	-0.0018	0.0171	-8.0	0.9	-6.8	0.9	A+	A-
Reading	8	5849	5	B.2.2.1	2	25352	0.76	0.06	0.15	0.76	0.03	0.00	0.41	-0.33	-0.31	0.41	-0.29	0.2751	0.0161	-4.4	1.0	-5.3	0.9	A+	A+
Reading	8	5899	5	A.2.1.1	2	50672	0.85	0.02	0.85	0.09	0.04	0.00	0.37	-0.30	0.37	-0.27	-0.22	-0.4242	0.0135	-5.2	1.0	-6.0	0.9		
Reading	8	7577	5	B.2.1.2	2	50672	0.65	0.14	0.07	0.15	0.65	0.00	0.43	-0.36	-0.39	-0.33	0.43	0.9637	0.0102	-9.9	1.0	-9.9	0.9		
Reading	8	7867	5	A.2.4.1	1	50672	0.82	0.82	0.04	0.09	0.04	0.00	0.43	0.43	-0.32	-0.34	-0.23	-0.1710	0.0126	-9.9	0.9	-9.9	0.8		

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	9495	5	A.2.4.1	3	50672	0.68	0.68	0.05	0.08	0.19	0.00	0.50	0.50	-0.37	-0.40	-0.43	0.7788	0.0105	-9.9	0.9	-9.9	0.8		
Reading	8	9697	5	A.1.6.1	2	25352	0.37	0.36	0.16	0.11	0.37	0.00	0.12	0.03	-0.18	-0.44	0.12	2.3582	0.0142	9.9	1.3	9.9	1.5	A-	A-
Reading	8	9819	5	A.2.6.2	2	50672	0.55	0.13	0.55	0.12	0.21	0.00	0.42	-0.34	0.42	-0.47	-0.33	1.4710	0.0099	-9.9	1.0	-9.4	1.0		
Reading	11	28	0	B.3.1.1	2	127998	0.80	0.06	0.80	0.11	0.03	0.00	0.49	-0.37	0.49	-0.40	-0.29	-0.5685	0.0075	-9.9	0.9	-9.9	0.7		
Reading	11	247	0	A.2.2.2		127998	0.87	0.02	0.08	0.87	0.03	0.00	0.35	-0.29	-0.19	0.35	-0.26	-1.2005	0.0088	-6.4	1.0	-2.2	1.0		
Reading	11	772	0	B.1.2.1		127998	0.80	0.15	0.03	0.80	0.02	0.00	0.17	-0.06	-0.28	0.17	-0.17	-0.5731	0.0075	9.9	1.2	9.9	1.4		
Reading	11	1096	0	A.2.6.2		127998	0.75	0.75	0.04	0.20	0.02	0.00	0.25	0.25	-0.29	-0.15	-0.25	-0.2321	0.0070	9.9	1.1	9.9	1.2		
Reading	11	1112	0	A.1.4.1		127998	0.78	0.09	0.02	0.78	0.11	0.00	0.42	-0.33	-0.31	0.42	-0.30	-0.4524	0.0073	-9.9	0.9	-9.9	0.9		
Reading	11	1366	0	B.1.2.1		127998	0.85	0.03	0.08	0.04	0.85	0.00	0.38	-0.27	-0.25	-0.30	0.38	-1.0022	0.0083	-9.9	1.0	-9.9	0.9		
Reading	11	1375	0	B.3.1.1	2	127998	0.86	0.86	0.04	0.06	0.05	0.00	0.40	0.40	-0.31	-0.29	-0.22	-1.0664	0.0085	-9.9	0.9	-9.9	0.8		
Reading	11	2046	0	A.2.3.1		127998	0.83	0.09	0.83	0.04	0.04	0.00	0.50	-0.35	0.50	-0.39	-0.34	-0.8286	0.0080	-9.9	0.9	-9.9	0.7		
Reading	11	2074	0	A.2.6.2	2	127998	0.61	0.14	0.19	0.61	0.05	0.00	0.37	-0.31	-0.32	0.37	-0.28	0.5036	0.0063	2.7	1.0	0.7	1.0		
Reading	11	2129	0	A.2.3.1		127998	0.43	0.43	0.53	0.02	0.02	0.00	0.35	0.35	-0.33	-0.38	-0.34	1.3812	0.0062	-1.6	1.0	9.9	1.0		
Reading	11	2147	0	B.2.1.1		127998	0.61	0.09	0.61	0.12	0.18	0.00	0.40	-0.31	0.40	-0.42	-0.28	0.4944	0.0063	-8.9	1.0	-3.9	1.0		
Reading	11	2385	0	A.2.2.2		127998	0.69	0.69	0.15	0.06	0.09	0.00	0.49	0.49	-0.46	-0.30	-0.35	0.0694	0.0066	-9.9	0.9	-9.9	0.8		
Reading	11	2522	0	B.3.2.1		127998	0.75	0.08	0.08	0.75	0.08	0.00	0.36	-0.32	-0.25	0.36	-0.21	-0.2779	0.0070	2.8	1.0	-3.4	1.0		
Reading	11	2661	0	B.3.2.1		127998	0.58	0.16	0.58	0.03	0.23	0.00	0.36	-0.30	0.36	-0.42	-0.29	0.6828	0.0062	8.3	1.0	8.1	1.0		
Reading	11	2672	0	A.2.2.1		127998	0.55	0.04	0.23	0.18	0.55	0.00	0.23	-0.31	-0.24	-0.10	0.23	0.8014	0.0062	9.9	1.2	9.9	1.2		
Reading	11	2896	0	A.1.1.1		127998	0.59	0.07	0.29	0.59	0.04	0.00	0.26	-0.28	-0.18	0.26	-0.32	0.6013	0.0062	9.9	1.1	9.9	1.2		
Reading	11	3423	0	A.2.3.2		127998	0.63	0.63	0.24	0.11	0.01	0.00	0.42	0.42	-0.31	-0.45	-0.33	0.4078	0.0063	-9.9	1.0	-9.9	0.9		
Reading	11	3966	0	B.1.2.1		127998	0.58	0.23	0.14	0.58	0.05	0.00	0.32	-0.26	-0.24	0.32	-0.36	0.6928	0.0062	9.9	1.1	9.9	1.1		
Reading	11	4006	0	B.3.3.2	3	127998	0.63	0.28	0.05	0.04	0.63	0.00	0.41	-0.32	-0.41	-0.41	0.41	0.4257	0.0063	-9.9	1.0	-9.9	1.0		
Reading	11	4294	0	A.1.2.1		127998	0.58	0.21	0.13	0.08	0.58	0.00	0.36	-0.33	-0.28	-0.31	0.36	0.6919	0.0062	3.9	1.0	2.2	1.0		
Reading	11	4548	0	A.1.3.1		127998	0.71	0.71	0.08	0.11	0.10	0.00	0.37	0.37	-0.27	-0.33	-0.25	-0.0197	0.0067	1.7	1.0	-0.4	1.0		
Reading	11	4799	0	B.2.2.1		127998	0.61	0.61	0.12	0.17	0.09	0.00	0.36	0.36	-0.37	-0.26	-0.29	0.4983	0.0063	6.9	1.0	2.6	1.0		
Reading	11	4986	0	B.3.3.2		127998	0.63	0.22	0.12	0.63	0.02	0.00	0.40	-0.39	-0.25	0.40	-0.28	0.3908	0.0063	-8.8	1.0	-9.9	0.9		
Reading	11	5782	0	A.2.3.1		127998	0.80	0.08	0.80	0.06	0.06	0.00	0.44	-0.30	0.44	-0.33	-0.31	-0.6014	0.0075	-9.9	0.9	-9.9	0.8		
Reading	11	5792	0	A.2.3.1	3	127998	0.80	0.80	0.13	0.02	0.05	0.00	0.40	0.40	-0.30	-0.28	-0.28	-0.5698	0.0075	-9.9	1.0	-9.9	0.9		
Reading	11	6380	0	A.2.4.1		127998	0.96	0.01	0.96	0.03	0.00	0.00	0.29	-0.18	0.29	-0.20	-0.16	-2.5113	0.0141	-7.0	0.9	-9.9	0.7		
Reading	11	6413	0	B.3.3.2		127998	0.87	0.04	0.04	0.06	0.87	0.00	0.43	-0.28	-0.30	-0.30	0.43	-1.1510	0.0087	-9.9	0.9	-9.9	0.8		
Reading	11	7503	0	A.2.1.2	2	127998	0.67	0.08	0.01	0.67	0.24	0.00	0.28	-0.32	-0.27	0.28	-0.18	0.2289	0.0065	9.9	1.1	9.9	1.1		
Reading	11	7605	0	B.2.1.1		127998	0.62	0.08	0.09	0.21	0.62	0.00	0.39	-0.34	-0.32	-0.32	0.39	0.4730	0.0063	-2.8	1.0	-6.5	1.0		
Reading	11	7773	0	A.1.3.1		127998	0.61	0.61	0.31	0.05	0.03	0.00	0.28	0.28	-0.22	-0.29	-0.27	0.5191	0.0063	9.9	1.1	9.9	1.1		
Reading	11	7810	0	A.1.4.1		127998	0.84	0.06	0.04	0.06	0.84	0.00	0.42	-0.25	-0.31	-0.31	0.42	-0.9536	0.0082	-9.9	0.9	-9.9	0.8		
Reading	11	7956	0	B.1.1.1		127998	0.48	0.02	0.48	0.27	0.23	0.00	0.32	-0.34	0.32	-0.37	-0.21	1.1644	0.0061	9.9	1.1	9.9	1.1		
Reading	11	8121	0	A.2.4.1	2	127998	0.72	0.02	0.19	0.72	0.07	0.00	0.43	-0.32	-0.35	0.43	-0.33	-0.0616	0.0067	-9.9	1.0	-9.9	0.9		
Reading	11	8590	0	B.2.1.2		127998	0.76	0.03	0.16	0.05	0.76	0.00	0.37	-0.24	-0.27	-0.36	0.37	-0.2987	0.0070	-3.1	1.0	9.1	1.1		
Reading	11	8675	0	B.1.1.1		127998	0.72	0.72	0.18	0.03	0.07	0.00	0.48	0.48	-0.39	-0.38	-0.37	-0.0715	0.0068	-9.9	0.9	-9.9	0.8		
Reading	11	8900	0	A.2.3.1		127998	0.63	0.09	0.20	0.63	0.08	0.00	0.26	-0.16	-0.12	0.26	-0.42	0.4338	0.0063	9.9	1.1	9.9	1.2		
Reading	11	9267	0	A.2.4.1		127998	0.82	0.82	0.05	0.06	0.06	0.00	0.46	0.46	-0.36	-0.37	-0.24	-0.7510	0.0078	-9.9	0.9	-9.9	0.8		
Reading	11	9310	0	B.3.2.1		127998	0.67	0.08	0.05	0.19	0.67	0.00	0.49	-0.31	-0.44	-0.43	0.49	0.2012	0.0065	-9.9	0.9	-9.9	0.8		
Reading	11	9435	0	A.2.4.1	1	127998	0.77	0.19	0.77	0.01	0.02	0.00	0.39	-0.34	0.39	-0.19	-0.26	-0.4120	0.0072	-6.1	1.0	-9.9	0.9		
Reading	11	9845	0	B.1.2.1		127998	0.79	0.08	0.79	0.08	0.05	0.00	0.40	-0.28	0.40	-0.31	-0.27	-0.5041	0.0074	-9.9	1.0	-9.9	0.9		
Reading	11	165	1	B.3.1.1	2	25885	0.80	0.05	0.80	0.10	0.04	0.00	0.51	-0.34	0.51	-0.41	-0.36	-0.6299	0.0168	-9.9	0.9	-9.9	0.7	A-	A-
Reading	11	440	1	B.2.1.1	2	76952	0.61	0.09	0.61	0.21	0.08	0.00	0.20	-0.04	0.20	-0.17	-0.28	0.4952	0.0081	9.9	1.2	9.9	1.3		
Reading	11	1625	1	B.3.3.3	3	25885	0.62	0.25	0.11	0.62	0.02	0.00	0.33	-0.22	-0.38	0.33	-0.29	0.4477	0.0141	9.5	1.1	7.9	1.1	A+	A+
Reading	11	1991	1	A.1.3.1	2	76952	0.63	0.63	0.26	0.04	0.07	0.00	0.24	0.24	-0.13	-0.32	-0.28	0.4300	0.0081	9.9	1.1	9.9	1.2		
Reading	11	2502	1	A.2.6.1	3	25885	0.86	0.02	0.86	0.04	0.86	0.00	0.44	-0.33	-0.35	-0.23	0.44	-1.0919	0.0190	-9.5	0.9	-9.9	0.7	A-	A-
Reading	11	3208	1	A.2.1.2	2	25885	0.68	0.07	0.68	0.08	0.16	0.00	0.30	-0.29	0.30	-0.32	-0.14	0.1583	0.0145	9.9	1.1	8.7	1.1	A-	A-

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	3258	1	A.2.3.1	2	25885	0.45	0.17	0.22	0.16	0.45	0.00	0.25	-0.12	-0.23	-0.37	0.25	1.2966	0.0137	9.9	1.1	9.9	1.2	B-	A-
Reading	11	3790	1	A.2.2.1	2	25885	0.58	0.34	0.04	0.58	0.04	0.00	0.37	-0.29	-0.40	0.37	-0.38	0.6708	0.0138	1.0	1.0	2.2	1.0	A-	A-
Reading	11	4524	1	B.2.1.2	2	76952	0.90	0.90	0.04	0.02	0.04	0.00	0.37	0.37	-0.26	-0.27	-0.21	-1.5753	0.0128	-9.9	0.9	-9.9	0.8		
Reading	11	4679	1	A.2.4.1	1	25885	0.80	0.04	0.06	0.80	0.10	0.00	0.50	-0.34	-0.35	0.50	-0.38	-0.6491	0.0169	-9.9	0.9	-9.9	0.7	A-	A-
Reading	11	5559	1	A.1.3.1	2	76952	0.75	0.11	0.07	0.75	0.08	0.00	0.49	-0.43	-0.40	0.49	-0.27	-0.2553	0.0090	-9.9	0.9	-9.9	0.8		
Reading	11	6575	1	B.3.3.1	2	25885	0.89	0.89	0.04	0.04	0.03	0.00	0.46	0.46	-0.32	-0.34	-0.27	-1.4254	0.0210	-9.9	0.8	-9.9	0.6	A+	B-
Reading	11	7112	1	B.1.1.1	3	76952	0.70	0.18	0.02	0.10	0.70	0.00	0.22	-0.03	-0.28	-0.34	0.22	0.0140	0.0086	9.9	1.1	9.9	1.3		
Reading	11	7739	1	B.3.3.2	3	25885	0.79	0.14	0.79	0.05	0.03	0.00	0.34	-0.20	0.34	-0.34	-0.29	-0.5085	0.0164	0.3	1.0	3.2	1.1	A-	A-
Reading	11	7876	1	A.2.3.1	2	25885	0.59	0.12	0.23	0.05	0.59	0.00	0.35	-0.30	-0.27	-0.37	0.35	0.6037	0.0139	5.7	1.0	6.9	1.1	A-	A-
Reading	11	8557	1	B.1.1.1	3	76952	0.67	0.08	0.67	0.21	0.04	0.00	0.22	-0.15	0.22	-0.15	-0.30	0.1789	0.0084	9.9	1.2	9.9	1.4		
Reading	11	8831	1	A.1.4.1	1	76952	0.76	0.10	0.06	0.76	0.08	0.00	0.31	-0.25	-0.23	0.31	-0.20	-0.2997	0.0091	8.5	1.0	7.2	1.1		
Reading	11	9800	1	B.1.1.1	2	76952	0.59	0.59	0.11	0.16	0.14	0.00	0.29	0.29	-0.29	-0.29	-0.15	0.5921	0.0080	9.9	1.1	9.9	1.1		
Reading	11	440	2	B.2.1.1	2	76952	0.61	0.09	0.61	0.21	0.08	0.00	0.20	-0.04	0.20	-0.17	-0.28	0.4952	0.0081	9.9	1.2	9.9	1.3		
Reading	11	1191	2	A.2.3.1	2	25578	0.64	0.21	0.03	0.64	0.11	0.00	0.50	-0.47	-0.39	0.50	-0.33	0.3417	0.0142	-9.9	0.9	-9.9	0.8	A-	A-
Reading	11	1991	2	A.1.3.1	2	76952	0.63	0.63	0.26	0.04	0.07	0.00	0.24	0.24	-0.13	-0.32	-0.28	0.4300	0.0081	9.9	1.1	9.9	1.2		
Reading	11	2201	2	A.2.4.1	2	25578	0.76	0.76	0.06	0.03	0.15	0.00	0.38	0.38	-0.35	-0.31	-0.25	-0.3092	0.0158	-3.9	1.0	-2.9	1.0	A-	B-
Reading	11	3075	2	A.2.4.1	2	25578	0.71	0.06	0.19	0.71	0.04	0.00	0.30	-0.19	-0.25	0.30	-0.24	-0.0174	0.0149	8.5	1.1	8.8	1.1	A-	A-
Reading	11	3652	2	A.2.3.1	2	25578	0.65	0.04	0.65	0.17	0.14	0.00	0.19	-0.21	0.19	-0.22	-0.06	0.3274	0.0143	9.9	1.2	9.9	1.3	A-	A-
Reading	11	4140	2	A.2.3.1	2	25578	0.49	0.09	0.17	0.24	0.49	0.00	0.29	-0.42	-0.17	-0.26	0.29	1.0836	0.0136	9.9	1.1	9.9	1.1	A-	A-
Reading	11	4524	2	B.2.1.2	2	76952	0.90	0.90	0.04	0.02	0.04	0.00	0.37	0.37	-0.26	-0.27	-0.21	-1.5753	0.0128	-9.9	0.9	-9.9	0.8		
Reading	11	4738	2	B.2.1.2	2	25578	0.87	0.87	0.08	0.04	0.01	0.00	0.40	0.40	-0.28	-0.31	-0.23	-1.1651	0.0195	-7.8	0.9	-7.3	0.8	A-	C-
Reading	11	5559	2	A.1.3.1	2	76952	0.75	0.11	0.07	0.75	0.08	0.00	0.49	-0.43	-0.40	0.49	-0.27	-0.2553	0.0090	-9.9	0.9	-9.9	0.8		
Reading	11	5650	2	A.2.1.2	2	25578	0.82	0.06	0.03	0.09	0.82	0.00	0.46	-0.32	-0.30	-0.36	0.46	-0.7433	0.0174	-9.9	0.9	-9.9	0.7	B-	C-
Reading	11	5844	2	A.2.2.1	2	25578	0.84	0.02	0.07	0.07	0.84	0.00	0.27	-0.23	-0.22	-0.13	0.27	-0.8813	0.0180	2.9	1.0	9.9	1.3	A+	A+
Reading	11	7112	2	B.1.1.1	3	76952	0.70	0.18	0.02	0.10	0.70	0.00	0.22	-0.03	-0.28	-0.34	0.22	0.0140	0.0086	9.9	1.1	9.9	1.3		
Reading	11	7172	2	A.2.3.1	2	25578	0.85	0.07	0.04	0.85	0.04	0.00	0.33	-0.21	-0.23	0.33	-0.23	-1.0320	0.0188	-1.4	1.0	-5.2	0.9	A-	A-
Reading	11	7578	2	B.3.1.1	2	25578	0.24	0.35	0.24	0.22	0.20	0.00	0.14	-0.08	0.14	-0.32	-0.12	2.4148	0.0156	9.9	1.1	9.9	1.6	A+	A+
Reading	11	8557	2	B.1.1.1	3	76952	0.67	0.08	0.67	0.21	0.04	0.00	0.22	-0.15	0.22	-0.15	-0.30	0.1789	0.0084	9.9	1.2	9.9	1.4		
Reading	11	8831	2	A.1.4.1	1	76952	0.76	0.10	0.06	0.76	0.08	0.00	0.31	-0.25	-0.23	0.31	-0.20	-0.2997	0.0091	8.5	1.0	7.2	1.1		
Reading	11	9800	2	B.1.1.1	2	76952	0.59	0.59	0.11	0.16	0.14	0.00	0.29	0.29	-0.29	-0.29	-0.15	0.5921	0.0080	9.9	1.1	9.9	1.1		
Reading	11	440	3	B.2.1.1	2	76952	0.61	0.09	0.61	0.21	0.08	0.00	0.20	-0.04	0.20	-0.17	-0.28	0.4952	0.0081	9.9	1.2	9.9	1.3		
Reading	11	708	3	A.2.3.1	2	25489	0.80	0.11	0.04	0.06	0.80	0.00	0.32	-0.15	-0.29	-0.27	0.32	-0.5582	0.0167	0.9	1.0	3.3	1.1	A-	B-
Reading	11	1991	3	A.1.3.1	2	76952	0.63	0.63	0.26	0.04	0.07	0.00	0.24	0.24	-0.13	-0.32	-0.28	0.4300	0.0081	9.9	1.1	9.9	1.2		
Reading	11	3369	3	A.2.4.1	2	25489	0.78	0.03	0.78	0.17	0.01	0.00	0.28	-0.24	0.28	-0.20	-0.20	-0.4773	0.0163	6.3	1.1	7.5	1.1	A+	A-
Reading	11	4494	3	A.2.3.2	2	25489	0.59	0.59	0.03	0.10	0.28	0.00	0.33	0.33	-0.37	-0.44	-0.19	0.6350	0.0139	6.2	1.0	4.2	1.0	A-	A-
Reading	11	4524	3	B.2.1.2	2	76952	0.90	0.90	0.04	0.02	0.04	0.00	0.37	0.37	-0.26	-0.27	-0.21	-1.5753	0.0128	-9.9	0.9	-9.9	0.8		
Reading	11	5035	3	A.2.2.1	1	25489	0.71	0.06	0.05	0.17	0.71	0.00	0.38	-0.28	-0.34	-0.28	0.38	0.0015	0.0149	-3.2	1.0	-6.7	0.9	C-	B-
Reading	11	5559	3	A.1.3.1	2	76952	0.75	0.11	0.07	0.75	0.08	0.00	0.49	-0.43	-0.40	0.49	-0.27	-0.2553	0.0090	-9.9	0.9	-9.9	0.8		
Reading	11	6588	3	B.3.3.1	2	25489	0.57	0.03	0.14	0.57	0.26	0.00	0.34	-0.37	-0.33	0.34	-0.25	0.7317	0.0138	4.5	1.0	6.6	1.1	A-	A-
Reading	11	6878	3	B.3.3.2	3	25489	0.62	0.02	0.14	0.62	0.21	0.00	0.21	-0.32	-0.12	0.21	-0.18	0.4461	0.0141	9.9	1.2	9.9	1.2	A+	A-
Reading	11	7112	3	B.1.1.1	3	76952	0.70	0.18	0.02	0.10	0.70	0.00	0.22	-0.03	-0.28	-0.34	0.22	0.0140	0.0086	9.9	1.1	9.9	1.3		
Reading	11	7331	3	A.2.4.1	2	25489	0.81	0.12	0.81	0.03	0.04	0.00	0.17	-0.06	0.17	-0.18	-0.19	-0.6494	0.0170	9.9	1.1	9.9	1.4	A-	A-
Reading	11	7369	3	A.2.6.1	2	25489	0.93	0.02	0.93	0.02	0.02	0.00	0.33	-0.24	0.33	-0.18	-0.21	-1.8789	0.0249	-4.9	0.9	-5.9	0.8	A-	B-
Reading	11	7487	3	A.2.2.2	2	25489	0.73	0.73	0.02	0.12	0.12	0.00	0.23	0.23	-0.28	-0.12	-0.18	-0.1465	0.0153	9.9	1.1	9.9	1.2	A+	A-
Reading	11	7866	3	B.3.1.1	2	25489	0.76	0.18	0.05	0.76	0.02	0.00	0.40	-0.31	-0.32	0.40	-0.28	-0.2986	0.0157	-5.0	1.0	-6.5	0.9	A-	A-
Reading	11	8557	3	B.1.1.1	3	76952	0.67	0.08	0.67	0.21	0.04	0.00	0.22	-0.15	0.22	-0.15	-0.30	0.1789	0.0084	9.9	1.2	9.9	1.4		
Reading	11	8831	3	A.1.4.1	1	76952	0.76	0.10	0.06	0.76	0.08	0.00	0.31	-0.25	-0.23	0.31	-0.20	-0.2997	0.0091	8.5	1.0	7.2	1.1		
Reading	11	9800	3	B.1.1.1	2	76952	0.59	0.59	0.11	0.16	0.14	0.00	0.29	0.29	-0.29	-0.29	-0.15	0.5921	0.0080	9.9	1.1	9.9	1.1		
Reading	11	300	4	B.2.2.1	3	25547	0.92	0.03	0.92	0.03	0.02	0.00	0.42	-0.27	0.42	-0.28	-0.27	-1.8396	0.0245	-8.5	0.9	-9.9	0.6	A+	A-

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	886	4	A.1.2.1	2	25547	0.43	0.20	0.31	0.43	0.06	0.00	0.24	-0.29	-0.15	0.24	-0.35	1.4271	0.0138	9.9	1.1	9.9	1.2	A-	A-
Reading	11	1267	4	B.2.1.1	3	25547	0.83	0.04	0.02	0.83	0.11	0.00	0.40	-0.29	-0.27	0.40	-0.30	-0.8202	0.0178	-6.2	0.9	-6.6	0.9	A+	A-
Reading	11	1434	4	A.2.1.1	2	51046	0.85	0.02	0.85	0.09	0.04	0.00	0.34	-0.25	0.34	-0.20	-0.27	-1.0092	0.0133	-1.2	1.0	-3.9	0.9		
Reading	11	3332	4	A.1.2.2	2	25547	0.13	0.02	0.13	0.71	0.13	0.00	-0.07	-0.24	-0.04	0.12	-0.07	3.3010	0.0195	9.9	1.3	9.9	2.5	A+	A-
Reading	11	4032	4	A.1.2.2	2	25547	0.53	0.22	0.11	0.14	0.53	0.00	0.43	-0.42	-0.37	-0.35	0.43	0.9303	0.0137	-9.9	0.9	-9.9	0.9	A+	A-
Reading	11	4255	4	B.1.1.1	3	25547	0.14	0.14	0.16	0.61	0.09	0.00	-0.01	-0.01	-0.18	0.09	-0.26	3.1732	0.0188	9.9	1.2	9.9	2.2	A+	A+
Reading	11	4788	4	A.2.3.1	2	51046	0.55	0.55	0.22	0.03	0.20	0.00	0.33	0.33	-0.31	-0.33	-0.27	0.8440	0.0097	9.9	1.0	9.9	1.1		
Reading	11	5061	4	A.2.3.1	2	51046	0.81	0.10	0.81	0.04	0.04	0.00	0.43	-0.33	0.43	-0.30	-0.27	-0.7045	0.0122	-9.9	0.9	-9.9	0.8		
Reading	11	6772	4	A.2.6.2	2	51046	0.63	0.05	0.07	0.63	0.25	0.00	0.25	-0.23	-0.29	0.25	-0.16	0.4024	0.0101	9.9	1.1	9.9	1.2		
Reading	11	6788	4	B.3.3.1	3	51046	0.80	0.09	0.06	0.80	0.06	0.00	0.43	-0.32	-0.33	0.43	-0.27	-0.5842	0.0119	-9.9	0.9	-9.9	0.8		
Reading	11	7414	4	B.3.1.1	2	51046	0.85	0.85	0.07	0.05	0.03	0.00	0.46	0.46	-0.37	-0.28	-0.32	-0.9807	0.0132	-9.9	0.9	-9.9	0.7		
Reading	11	7980	4	A.1.3.1	2	25547	0.79	0.12	0.06	0.03	0.79	0.00	0.39	-0.27	-0.30	-0.29	0.39	-0.5217	0.0166	-4.1	1.0	-4.4	0.9	A-	A-
Reading	11	8714	4	B.2.1.1	3	25547	0.50	0.16	0.17	0.16	0.50	0.00	0.17	-0.26	-0.06	-0.15	0.17	1.0790	0.0137	9.9	1.2	9.9	1.3	A+	A-
Reading	11	9118	4	A.1.3.1	2	25547	0.78	0.03	0.16	0.03	0.78	0.00	0.25	-0.22	-0.17	-0.22	0.25	-0.4393	0.0163	9.7	1.1	9.9	1.2	A+	A+
Reading	11	9286	4	A.2.3.2	2	51046	0.80	0.05	0.80	0.03	0.12	0.00	0.43	-0.35	0.43	-0.30	-0.30	-0.5908	0.0119	-9.9	0.9	-9.9	0.8		
Reading	11	9463	4	B.3.3.2	2	51046	0.63	0.63	0.06	0.09	0.22	0.00	0.39	0.39	-0.36	-0.36	-0.28	0.4296	0.0100	-1.7	1.0	-5.7	1.0		
Reading	11	9633	4	B.1.1.1	3	25547	0.62	0.07	0.62	0.23	0.08	0.00	0.29	-0.35	0.29	-0.24	-0.13	0.4809	0.0141	9.9	1.1	9.9	1.1	A+	A-
Reading	11	272	5	A.1.6.2	3	25499	0.67	0.02	0.67	0.23	0.07	0.00	0.13	-0.30	0.13	-0.04	-0.12	0.1879	0.0146	9.9	1.3	9.9	1.5	A+	A-
Reading	11	1434	5	A.2.1.1	2	51046	0.85	0.02	0.85	0.09	0.04	0.00	0.34	-0.25	0.34	-0.20	-0.27	-1.0092	0.0133	-1.2	1.0	-3.9	0.9		
Reading	11	1640	5	A.1.4.1	2	25499	0.87	0.87	0.05	0.03	0.05	0.00	0.49	0.49	-0.34	-0.35	-0.32	-1.2261	0.0200	-9.9	0.8	-9.9	0.6	A+	C-
Reading	11	2845	5	A.1.2.2	2	25499	0.55	0.19	0.09	0.17	0.55	0.00	0.39	-0.37	-0.34	-0.31	0.39	0.8073	0.0138	-5.6	1.0	-4.9	1.0	A-	C-
Reading	11	4788	5	A.2.3.1	2	51046	0.55	0.55	0.22	0.03	0.20	0.00	0.33	0.33	-0.31	-0.33	-0.27	0.8440	0.0097	9.9	1.0	9.9	1.1		
Reading	11	5061	5	A.2.3.1	2	51046	0.81	0.10	0.81	0.04	0.04	0.00	0.43	-0.33	0.43	-0.30	-0.27	-0.7045	0.0122	-9.9	0.9	-9.9	0.8		
Reading	11	6403	5	A.1.3.1	2	25499	0.60	0.06	0.60	0.11	0.23	0.00	0.20	-0.25	0.20	-0.23	-0.08	0.5587	0.0140	9.9	1.2	9.9	1.3	A-	A-
Reading	11	6772	5	A.2.6.2	2	51046	0.63	0.05	0.07	0.63	0.25	0.00	0.25	-0.23	-0.29	0.25	-0.16	0.4024	0.0101	9.9	1.1	9.9	1.2		
Reading	11	6773	5	B.2.2.1	2	25499	0.85	0.85	0.04	0.10	0.02	0.00	0.41	0.41	-0.35	-0.27	-0.27	-0.9560	0.0185	-7.0	0.9	-8.9	0.8	A+	A-
Reading	11	6788	5	B.3.3.1	3	51046	0.80	0.09	0.06	0.80	0.06	0.00	0.43	-0.32	-0.33	0.43	-0.27	-0.5842	0.0119	-9.9	0.9	-9.9	0.8		
Reading	11	7414	5	B.3.1.1	2	51046	0.85	0.85	0.07	0.05	0.03	0.00	0.46	0.46	-0.37	-0.28	-0.32	-0.9807	0.0132	-9.9	0.9	-9.9	0.7		
Reading	11	7749	5	B.1.1.1	2	25499	0.68	0.11	0.02	0.68	0.18	0.00	0.28	-0.30	-0.32	0.28	-0.14	0.1491	0.0147	9.9	1.1	9.9	1.2	A+	A-
Reading	11	7784	5	B.1.1.1	2	25499	0.65	0.06	0.65	0.13	0.16	0.00	0.30	-0.37	0.30	-0.31	-0.10	0.3168	0.0144	9.9	1.1	9.6	1.1	A+	A-
Reading	11	8091	5	B.2.1.1	3	25499	0.74	0.15	0.04	0.74	0.07	0.00	0.32	-0.24	-0.30	0.32	-0.20	-0.1648	0.0154	6.2	1.1	6.3	1.1	A+	A+
Reading	11	8208	5	B.1.1.1	3	25499	0.17	0.30	0.06	0.48	0.17	0.00	0.05	-0.05	-0.39	-0.02	0.05	2.9751	0.0178	9.9	1.2	9.9	1.9	A-	A-
Reading	11	9286	5	A.2.3.2	2	51046	0.80	0.05	0.80	0.03	0.12	0.00	0.43	-0.35	0.43	-0.30	-0.30	-0.5908	0.0119	-9.9	0.9	-9.9	0.8		
Reading	11	9463	5	B.3.3.2	2	51046	0.63	0.63	0.06	0.09	0.22	0.00	0.39	0.39	-0.36	-0.36	-0.28	0.4296	0.0100	-1.7	1.0	-5.7	1.0		
Reading	11	9841	5	A.1.1.2	1	25499	0.56	0.56	0.09	0.20	0.16	0.00	0.28	0.28	-0.42	-0.15	-0.20	0.7894	0.0138	9.9	1.1	9.9	1.1	B-	A+
Science	4	14	0	A.1.3.3	2	128104	0.85	0.06	0.05	0.03	0.85	0.00	0.40	-0.30	-0.28	-0.24	0.40	-0.8257	0.0084	-9.9	0.9	-9.9	0.8		
Science	4	37	0	B.1.1.5	2	128104	0.79	0.09	0.05	0.79	0.07	0.00	0.39	-0.27	-0.29	0.39	-0.30	-0.3154	0.0074	-9.9	1.0	-9.0	0.9		
Science	4	567	0	A.3.1.1	2	128104	0.67	0.08	0.67	0.09	0.16	0.00	0.46	-0.34	0.46	-0.24	-0.47	0.4072	0.0065	-9.9	0.9	-9.9	0.9		
Science	4	620	0	B.3.3.4	1	128104	0.49	0.19	0.14	0.49	0.18	0.00	0.29	-0.21	-0.32	0.29	-0.27	1.3173	0.0061	9.9	1.1	9.9	1.1		
Science	4	654	0	D.1.3.2	2	128104	0.79	0.11	0.04	0.07	0.79	0.00	0.49	-0.38	-0.37	-0.33	0.49	-0.3011	0.0074	-9.9	0.9	-9.9	0.8		
Science	4	709	0	C.3.1.3		128104	0.58	0.16	0.21	0.05	0.58	0.00	0.36	-0.24	-0.37	-0.33	0.36	0.9028	0.0062	4.9	1.0	3.2	1.0		
Science	4	804	0	A.3.2.1	2	128104	0.87	0.87	0.04	0.06	0.02	0.00	0.38	0.38	-0.26	-0.24	-0.26	-0.9966	0.0089	-9.9	0.9	-9.9	0.9		
Science	4	840	0	B.1.1.4	2	128104	0.79	0.05	0.04	0.11	0.79	0.00	0.35	-0.33	-0.28	-0.20	0.35	-0.3510	0.0074	-1.8	1.0	1.6	1.0		
Science	4	1058	0	A.2.1.2	2	128104	0.69	0.69	0.08	0.12	0.11	0.00	0.41	0.41	-0.36	-0.31	-0.31	0.3297	0.0066	-9.9	1.0	-9.9	1.0		
Science	4	1160	0	C.2.1.1		128104	0.54	0.09	0.24	0.54	0.12	0.00	0.31	-0.26	-0.25	0.31	-0.30	1.0631	0.0061	9.9	1.1	9.9	1.1		
Science	4	1180	0	D.2.1.2		128104	0.50	0.09	0.09	0.33	0.50	0.00	0.32	-0.33	-0.15	-0.33	0.32	1.3052	0.0061	9.9	1.1	9.9	1.1		
Science	4	1248	0	A.1.1.2	2	128104	0.91	0.03	0.03	0.91	0.04	0.00	0.43	-0.26	-0.29	0.43	-0.29	-1.4470	0.0103	-9.9	0.9	-9.9	0.7		
Science	4	1467	0	A.1.1.1	2	128104	0.78	0.78	0.06	0.05	0.11	0.00	0.46	0.46	-0.32	-0.33	-0.37	-0.2481	0.0073	-9.9	0.9	-9.9	0.8		
Science	4	1834	0	A.3.3.2	2	128104	0.68	0.07	0.68	0.05	0.20	0.00	0.36	-0.17	0.36	-0.30	-0.34	0.3799	0.0065	6.4	1.0	6.5	1.0		

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	2121	0	A.2.1.3	3	128104	0.57	0.08	0.17	0.18	0.57	0.00	0.41	-0.40	-0.42	-0.28	0.41	0.9321	0.0062	-9.9	1.0	-9.9	1.0		
Science	4	2457	0	B.3.2.3	2	128104	0.79	0.79	0.05	0.04	0.13	0.00	0.30	0.30	-0.23	-0.29	-0.18	-0.3200	0.0074	9.9	1.0	9.9	1.1		
Science	4	2557	0	B.2.1.2	2	128104	0.87	0.04	0.04	0.87	0.04	0.00	0.50	-0.36	-0.37	0.50	-0.31	-1.0035	0.0089	-9.9	0.8	-9.9	0.6		
Science	4	2596	0	A.3.3.1	2	128104	0.71	0.06	0.07	0.16	0.71	0.00	0.26	-0.25	-0.21	-0.17	0.26	0.1917	0.0067	9.9	1.1	9.9	1.2		
Science	4	2678	0	D.1.1.1	2	128104	0.53	0.12	0.53	0.10	0.25	0.00	0.30	-0.38	0.30	-0.28	-0.19	1.1279	0.0061	9.9	1.1	9.9	1.1		
Science	4	2755	0	D.1.2.3	2	128104	0.57	0.04	0.19	0.57	0.21	0.00	0.26	-0.33	-0.17	0.26	-0.24	0.9612	0.0062	9.9	1.1	9.9	1.2		
Science	4	2811	0	A.3.1.1	1	128104	0.83	0.03	0.08	0.83	0.06	0.00	0.50	-0.28	-0.40	0.50	-0.37	-0.6433	0.0080	-9.9	0.9	-9.9	0.7		
Science	4	3106	0	D.1.2.2		128104	0.54	0.18	0.54	0.10	0.18	0.00	0.28	-0.24	0.28	-0.26	-0.24	1.0937	0.0061	9.9	1.1	9.9	1.2		
Science	4	3606	0	C.2.1.3	2	128104	0.64	0.15	0.64	0.10	0.12	0.00	0.29	-0.18	0.29	-0.24	-0.29	0.5992	0.0063	9.9	1.1	9.9	1.1		
Science	4	3637	0	A.2.2.1	1	128104	0.79	0.03	0.03	0.16	0.79	0.00	0.23	-0.16	-0.11	-0.19	0.23	-0.2969	0.0073	9.9	1.1	9.9	1.3		
Science	4	4264	0	A.1.1.2	2	128104	0.78	0.12	0.04	0.78	0.06	0.00	0.41	-0.30	-0.33	0.41	-0.30	-0.2530	0.0073	-9.9	1.0	-9.9	0.9		
Science	4	4301	0	A.2.1.1	2	128104	0.58	0.09	0.13	0.58	0.20	0.00	0.33	-0.34	-0.22	0.33	-0.31	0.9117	0.0062	9.9	1.0	9.9	1.1		
Science	4	4303	0	A.3.1.1	2	128104	0.74	0.74	0.05	0.18	0.04	0.00	0.40	0.40	-0.32	-0.31	-0.31	0.0396	0.0069	-8.9	1.0	-9.9	0.9		
Science	4	4592	0	A.1.3.2	2	128104	0.93	0.02	0.02	0.93	0.03	0.00	0.36	-0.24	-0.25	0.36	-0.20	-1.7519	0.0115	-9.5	0.9	-9.9	0.8		
Science	4	4760	0	C.2.1.3		128104	0.81	0.06	0.06	0.07	0.81	0.00	0.37	-0.28	-0.23	-0.26	0.37	-0.4523	0.0076	-4.6	1.0	-9.9	0.9		
Science	4	4834	0	A.2.1.1	2	128104	0.79	0.07	0.09	0.05	0.79	0.00	0.50	-0.37	-0.38	-0.36	0.50	-0.3320	0.0074	-9.9	0.9	-9.9	0.7		
Science	4	4850	0	C.3.1.2		128104	0.79	0.08	0.79	0.05	0.08	0.00	0.43	-0.31	0.43	-0.28	-0.33	-0.2877	0.0073	-9.9	0.9	-9.9	0.9		
Science	4	5018	0	D.1.2.1	1	128104	0.85	0.02	0.03	0.85	0.09	0.00	0.42	-0.24	-0.26	0.42	-0.35	-0.8158	0.0084	-9.9	0.9	-9.9	0.8		
Science	4	5086	0	B.3.1.2	2	128104	0.67	0.67	0.15	0.11	0.06	0.00	0.35	0.35	-0.21	-0.32	-0.33	0.4244	0.0065	7.7	1.0	1.6	1.0		
Science	4	5219	0	C.3.1.2		128104	0.71	0.13	0.71	0.07	0.08	0.00	0.44	-0.35	0.44	-0.35	-0.33	0.1659	0.0067	-9.9	0.9	-9.9	0.9		
Science	4	5621	0	B.3.2.1	2	128104	0.79	0.05	0.15	0.79	0.02	0.00	0.46	-0.33	-0.38	0.46	-0.29	-0.3111	0.0074	-9.9	0.9	-9.9	0.8		
Science	4	5818	0	A.1.3.3	2	128104	0.84	0.08	0.03	0.05	0.84	0.00	0.41	-0.23	-0.34	-0.35	0.41	-0.7066	0.0081	-9.9	0.9	-7.3	0.9		
Science	4	5870	0	B.2.2.1		128104	0.59	0.14	0.15	0.12	0.59	0.00	0.39	-0.27	-0.36	-0.38	0.39	0.8303	0.0062	-5.7	1.0	-3.8	1.0		
Science	4	6123	0	B.3.3.2	2	128104	0.68	0.14	0.07	0.68	0.11	0.00	0.36	-0.27	-0.33	0.36	-0.25	0.3848	0.0065	5.3	1.0	1.5	1.0		
Science	4	6174	0	A.1.3.4	2	128104	0.75	0.18	0.03	0.75	0.04	0.00	0.48	-0.44	-0.30	0.48	-0.29	-0.0662	0.0070	-9.9	0.9	-9.9	0.8		
Science	4	6274	0	B.1.1.1	2	128104	0.59	0.16	0.09	0.59	0.16	0.00	0.38	-0.31	-0.34	0.38	-0.32	0.8536	0.0062	-1.5	1.0	-3.3	1.0		
Science	4	6327	0	A.3.3.1	2	128104	0.81	0.08	0.05	0.81	0.07	0.00	0.42	-0.33	-0.34	0.42	-0.25	-0.4477	0.0076	-9.9	0.9	-9.9	0.9		
Science	4	6361	0	A.3.1.2	2	128104	0.58	0.16	0.21	0.05	0.58	0.00	0.41	-0.37	-0.31	-0.44	0.41	0.8832	0.0062	-9.9	1.0	-9.9	1.0		
Science	4	6824	0	A.2.1.1	2	128104	0.72	0.72	0.11	0.06	0.11	0.00	0.43	0.43	-0.32	-0.37	-0.33	0.1173	0.0068	-9.9	0.9	-9.9	0.9		
Science	4	6999	0	D.3.1.1		128104	0.58	0.21	0.14	0.58	0.07	0.00	0.38	-0.34	-0.27	0.38	-0.36	0.8901	0.0062	-6.2	1.0	-9.6	1.0		
Science	4	7311	0	A.1.3.2	2	128104	0.72	0.04	0.72	0.14	0.10	0.00	0.38	-0.30	0.38	-0.25	-0.34	0.1532	0.0067	-2.6	1.0	-6.8	1.0		
Science	4	7432	0	D.2.1.3	1	128104	0.58	0.58	0.05	0.22	0.15	0.00	0.40	0.40	-0.37	-0.26	-0.45	0.8799	0.0062	-9.9	1.0	-9.2	1.0		
Science	4	7454	0	A.3.3.1	1	128104	0.78	0.78	0.08	0.07	0.07	0.00	0.39	0.39	-0.29	-0.33	-0.24	-0.2225	0.0072	-8.6	1.0	-9.9	0.9		
Science	4	7459	0	A.3.1.2	2	128104	0.65	0.07	0.20	0.08	0.65	0.00	0.41	-0.33	-0.32	-0.37	0.41	0.5275	0.0064	-9.9	1.0	-9.9	0.9		
Science	4	7572	0	B.3.3.5	2	128104	0.77	0.18	0.77	0.02	0.03	0.00	0.33	-0.24	0.33	-0.28	-0.29	-0.1872	0.0072	6.5	1.0	9.9	1.1		
Science	4	7708	0	A.3.1.2	2	128104	0.72	0.72	0.04	0.03	0.21	0.00	0.27	0.27	-0.27	-0.17	-0.20	0.1444	0.0067	9.9	1.1	9.9	1.2		
Science	4	8163	0	C.2.1.1		128104	0.59	0.06	0.59	0.14	0.21	0.00	0.30	-0.30	0.30	-0.15	-0.29	0.8392	0.0062	9.9	1.1	9.9	1.1		
Science	4	8383	0	C.2.1.4	1	128104	0.77	0.12	0.04	0.07	0.77	0.00	0.45	-0.37	-0.31	-0.31	0.45	-0.1557	0.0071	-9.9	0.9	-9.9	0.8		
Science	4	8681	0	B.3.2.1	2	128104	0.75	0.11	0.75	0.09	0.04	0.00	0.29	-0.15	0.29	-0.22	-0.32	-0.0667	0.0070	9.9	1.1	9.9	1.1		
Science	4	8765	0	A.1.3.1	2	128104	0.65	0.65	0.13	0.10	0.12	0.00	0.40	0.40	-0.32	-0.32	-0.32	0.5333	0.0064	-8.1	1.0	-9.9	1.0		
Science	4	9077	0	A.1.3.5	2	128104	0.62	0.11	0.62	0.22	0.04	0.00	0.27	-0.25	0.27	-0.17	-0.32	0.6617	0.0063	9.9	1.1	9.9	1.1		
Science	4	9281	0	A.1.1.1	2	128104	0.82	0.05	0.08	0.82	0.06	0.00	0.43	-0.28	-0.32	0.43	-0.30	-0.5363	0.0078	-9.9	0.9	-9.9	0.9		
Science	4	9840	0	D.1.1.2	1	128104	0.65	0.11	0.10	0.14	0.65	0.00	0.37	-0.32	-0.29	-0.29	0.37	0.5412	0.0064	-0.2	1.0	-7.3	1.0		
Science	4	9879	0	A.3.2.3	2	128104	0.67	0.07	0.06	0.67	0.20	0.00	0.31	-0.34	-0.35	0.31	-0.16	0.3988	0.0065	9.9	1.1	9.9	1.1		
Science	4	502	1	B.3.1.1	2	10957	0.70	0.06	0.08	0.70	0.16	0.00	0.33	-0.30	-0.22	0.33	-0.25	0.1886	0.0229	5.6	1.1	4.6	1.1	A-	A-
Science	4	3991	1	B.2.2.1	2	10957	0.77	0.77	0.09	0.07	0.07	0.00	0.45	0.45	-0.33	-0.31	-0.37	-0.2226	0.0246	-6.5	0.9	-8.0	0.8	A+	A-
Science	4	5182	1	A.2.1.1	2	10957	0.47	0.12	0.31	0.10	0.47	0.00	0.40	-0.44	-0.31	-0.47	0.40	1.4006	0.0211	-3.8	1.0	-0.6	1.0		
Science	4	5986	1	D.1.2.3	1	10957	0.73	0.12	0.06	0.73	0.09	0.00	0.48	-0.35	-0.37	0.48	-0.38	0.0371	0.0234	-8.4	0.9	-9.4	0.8		
Science	4	6202	1	A.3.1.3	2	10957	0.38	0.35	0.19	0.09	0.38	0.00	0.25	-0.15	-0.31	-0.44	0.25	1.8492	0.0217	9.4	1.1	9.9	1.2	A+	A-

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	6272	1	A.2.1.2	2	10957	0.65	0.05	0.65	0.12	0.18	0.00	0.41	-0.40	0.41	-0.34	-0.30	0.4913	0.0220	-2.0	1.0	-2.3	1.0	A-	A+
Science	4	6502	1	C.3.1.3	1	10957	0.83	0.04	0.83	0.05	0.08	0.00	0.38	-0.29	0.38	-0.24	-0.26	-0.6785	0.0273	-2.5	1.0	-1.6	1.0	A+	A-
Science	4	7160	1	A.1.1.1	2	10957	0.74	0.06	0.74	0.07	0.12	0.00	0.45	-0.32	0.45	-0.35	-0.35	-0.0684	0.0238	-6.2	0.9	-7.4	0.9	A+	A-
Science	4	8507	1	D.2.1.2	2	10957	0.68	0.68	0.08	0.17	0.06	0.00	0.37	0.37	-0.33	-0.25	-0.32	0.2842	0.0225	1.7	1.0	1.2	1.0	A+	A-
Science	4	9285	1	B.1.1.3	1	10957	0.92	0.02	0.02	0.03	0.92	0.00	0.41	-0.28	-0.25	-0.26	0.41	-1.6706	0.0371	-4.7	0.9	-8.5	0.6	B+	B-
Science	4	3622	2	B.3.3.5	2	10654	0.43	0.05	0.43	0.07	0.44	0.00	0.19	-0.40	0.19	-0.39	-0.08	1.6114	0.0213	9.9	1.2	9.9	1.3	A-	A+
Science	4	4248	2	B.3.3.4	1	10654	0.48	0.48	0.24	0.16	0.11	0.00	0.25	0.25	-0.18	-0.23	-0.29	1.3657	0.0212	9.9	1.1	9.9	1.2	A+	A+
Science	4	4309	2	A.3.1.4	2	10654	0.60	0.13	0.60	0.08	0.19	0.00	0.41	-0.30	0.41	-0.41	-0.34	0.7885	0.0216	-3.7	1.0	-3.8	1.0	A+	A-
Science	4	4376	2	A.3.2.1	2	10654	0.58	0.20	0.12	0.58	0.09	0.00	0.39	-0.26	-0.37	0.39	-0.43	0.9012	0.0215	-2.5	1.0	-2.4	1.0		
Science	4	5268	2	D.1.2.3	2	10654	0.72	0.15	0.72	0.08	0.06	0.00	0.35	-0.20	0.35	-0.33	-0.33	0.1618	0.0234	1.2	1.0	1.0	1.0		
Science	4	6587	2	C.3.1.3	2	10654	0.66	0.08	0.13	0.12	0.66	0.00	0.37	-0.32	-0.33	-0.23	0.37	0.4647	0.0224	0.3	1.0	-0.8	1.0	A-	A-
Science	4	7296	2	A.1.1.1	2	10654	0.61	0.14	0.16	0.61	0.09	0.00	0.35	-0.21	-0.31	0.35	-0.37	0.7499	0.0217	2.2	1.0	0.0	1.0	A+	A-
Science	4	7898	2	A.2.1.3	2	10654	0.79	0.06	0.79	0.04	0.11	0.00	0.33	-0.21	0.33	-0.25	-0.25	-0.2924	0.0255	1.1	1.0	3.6	1.1	A+	A-
Science	4	8876	2	B.1.1.2	2	10654	0.82	0.05	0.05	0.82	0.08	0.00	0.42	-0.29	-0.23	0.42	-0.34	-0.5033	0.0269	-4.9	0.9	-6.7	0.8	A+	A-
Science	4	9318	2	D.1.3.3	2	10654	0.38	0.38	0.08	0.12	0.42	0.00	0.18	0.18	-0.27	-0.29	-0.12	1.8516	0.0217	9.9	1.2	9.9	1.3	A-	A-
Science	4	859	3	C.2.1.4	2	10662	0.72	0.14	0.06	0.07	0.72	0.00	0.49	-0.44	-0.36	-0.33	0.49	0.1105	0.0234	-9.9	0.9	-9.9	0.8		
Science	4	1486	3	D.1.1.1	1	10662	0.29	0.39	0.29	0.17	0.15	0.00	0.16	-0.12	0.16	-0.26	-0.22	2.2997	0.0228	9.9	1.1	9.9	1.4	A-	A-
Science	4	3016	3	B.3.2.1	2	10662	0.65	0.65	0.14	0.08	0.13	0.00	0.31	0.31	-0.22	-0.34	-0.20	0.5158	0.0221	6.4	1.1	7.6	1.1	A+	A-
Science	4	3164	3	D.1.3.3	2	10662	0.27	0.27	0.27	0.33	0.13	0.00	0.14	0.14	-0.06	-0.13	-0.37	2.4270	0.0233	9.9	1.1	9.9	1.4	A-	A-
Science	4	3753	3	B.1.1.2	2	10662	0.65	0.12	0.17	0.65	0.06	0.00	0.18	-0.21	-0.06	0.18	-0.19	0.5470	0.0220	9.9	1.2	9.9	1.3	A-	A-
Science	4	4307	3	A.2.1.3	2	10662	0.20	0.18	0.56	0.05	0.20	0.01	0.10	-0.23	-0.04	-0.33	0.10	2.8581	0.0255	9.0	1.1	9.9	1.6	A-	A-
Science	4	5978	3	C.1.1.1	2	10662	0.36	0.36	0.12	0.24	0.28	0.00	0.08	0.08	-0.16	0.03	-0.13	1.9425	0.0218	9.9	1.2	9.9	1.5	A+	A-
Science	4	7853	3	A.1.1.2	2	10662	0.75	0.10	0.09	0.06	0.75	0.00	0.42	-0.30	-0.33	-0.31	0.42	-0.0128	0.0240	-4.6	1.0	-5.8	0.9	A-	A-
Science	4	8090	3	A.3.1.4	1	10662	0.52	0.52	0.45	0.01	0.01	0.00	0.36	0.36	-0.34	-0.32	-0.30	1.1639	0.0211	-0.6	1.0	1.2	1.0	A+	A-
Science	4	9544	3	A.3.1.2	1	10662	0.55	0.19	0.07	0.19	0.55	0.00	0.26	-0.25	-0.37	-0.14	0.26	1.0434	0.0212	9.9	1.1	9.9	1.1		
Science	4	936	4	D.2.1.3	1	10648	0.55	0.06	0.12	0.27	0.55	0.00	0.42	-0.39	-0.47	-0.33	0.42	1.0521	0.0212	-7.8	0.9	-7.1	0.9		
Science	4	1159	4	A.3.2.1	2	10648	0.39	0.20	0.28	0.39	0.13	0.00	0.15	-0.19	-0.05	0.15	-0.28	1.7862	0.0216	9.9	1.2	9.9	1.3	A+	A-
Science	4	2048	4	A.1.3.3	2	10648	0.83	0.83	0.10	0.05	0.02	0.01	0.20	0.20	-0.07	-0.24	-0.18	-0.6172	0.0275	5.8	1.1	8.9	1.3		
Science	4	2055	4	A.2.1.4	2	10648	0.69	0.09	0.69	0.11	0.11	0.00	0.39	-0.38	0.39	-0.35	-0.18	0.2747	0.0228	-1.8	1.0	-1.1	1.0	A+	A-
Science	4	2921	4	B.3.2.1	2	10648	0.83	0.06	0.06	0.05	0.83	0.00	0.47	-0.32	-0.34	-0.34	0.47	-0.5870	0.0273	-8.1	0.9	-9.9	0.7	A+	A-
Science	4	3310	4	C.1.1.2	2	10648	0.43	0.43	0.35	0.13	0.09	0.00	0.27	0.27	-0.28	-0.23	-0.25	1.6176	0.0213	9.6	1.1	9.9	1.1	A-	A-
Science	4	6553	4	B.1.1.3	2	10648	0.93	0.02	0.02	0.93	0.02	0.00	0.39	-0.25	-0.24	0.39	-0.24	-1.7750	0.0401	-3.9	0.9	-8.2	0.6	A+	C-
Science	4	7928	4	D.1.1.1	2	10648	0.55	0.09	0.19	0.55	0.16	0.00	0.25	-0.34	-0.10	0.25	-0.26	1.0021	0.0213	9.9	1.1	9.9	1.2	A+	A-
Science	4	8774	4	A.2.1.4	2	10648	0.31	0.15	0.40	0.31	0.14	0.00	0.14	-0.09	-0.13	0.14	-0.27	2.2150	0.0226	9.9	1.2	9.9	1.4	A+	A+
Science	4	9528	4	D.2.1.1	2	10648	0.45	0.16	0.23	0.16	0.45	0.00	0.18	-0.24	-0.12	-0.16	0.18	1.5107	0.0212	9.9	1.2	9.9	1.3	A-	A-
Science	4	1462	5	B.1.1.1	2	10655	0.50	0.31	0.50	0.09	0.10	0.00	0.37	-0.34	0.37	-0.33	-0.32	1.2684	0.0213	0.5	1.0	2.1	1.0	A+	A-
Science	4	2471	5	D.1.3.1	2	10655	0.68	0.68	0.14	0.09	0.08	0.00	0.42	0.42	-0.38	-0.29	-0.32	0.3771	0.0227	-4.5	1.0	-4.4	0.9	A+	A-
Science	4	3185	5	A.1.3.5	2	10655	0.55	0.14	0.13	0.55	0.17	0.00	0.33	-0.29	-0.28	0.33	-0.28	1.0177	0.0214	3.7	1.0	3.7	1.0	A-	A-
Science	4	3239	5	A.2.2.1	1	10655	0.86	0.06	0.04	0.04	0.86	0.00	0.43	-0.28	-0.31	-0.32	0.43	-0.8879	0.0298	-5.6	0.9	-7.5	0.8		
Science	4	3787	5	A.1.3.2	2	10655	0.89	0.04	0.04	0.03	0.89	0.00	0.49	-0.34	-0.34	-0.31	0.49	-1.1585	0.0324	-7.8	0.8	-9.9	0.6	A-	C-
Science	4	4347	5	C.2.1.2	2	10655	0.29	0.34	0.07	0.31	0.29	0.00	0.24	-0.22	-0.41	-0.27	0.24	2.3732	0.0232	5.7	1.1	9.9	1.3	A-	A-
Science	4	5257	5	A.3.2.1	2	10655	0.74	0.09	0.09	0.07	0.74	0.00	0.40	-0.31	-0.33	-0.28	0.40	0.0263	0.0240	-2.9	1.0	-3.3	0.9	A+	A-
Science	4	7284	5	B.3.2.2	3	10655	0.35	0.16	0.33	0.35	0.16	0.00	0.13	-0.16	-0.05	0.13	-0.24	2.0523	0.0222	9.9	1.2	9.9	1.4	A-	A-
Science	4	8214	5	D.1.1.2	2	10655	0.83	0.08	0.03	0.83	0.06	0.00	0.39	-0.28	-0.32	0.39	-0.24	-0.5648	0.0273	-3.6	0.9	-1.9	1.0	A+	B-
Science	4	8835	5	B.1.1.3	2	10655	0.75	0.06	0.05	0.75	0.14	0.00	0.41	-0.31	-0.30	0.41	-0.32	-0.0357	0.0242	-3.4	1.0	-4.2	0.9		
Science	4	660	6	D.1.1.3	2	10668	0.15	0.35	0.32	0.17	0.15	0.00	0.01	0.09	-0.02	-0.22	0.01	3.3136	0.0287	9.7	1.2	9.9	1.9	A-	A+
Science	4	1345	6	C.2.1.3	2	10668	0.58	0.16	0.09	0.58	0.17	0.00	0.25	-0.20	-0.27	0.25	-0.18	0.9093	0.0214	9.9	1.1	9.9	1.2	A-	C-
Science	4	1684	6	A.2.2.1	2	10668	0.41	0.45	0.06	0.41	0.07	0.00	0.39	-0.37	-0.39	0.39	-0.40	1.7046	0.0214	-6.6	1.0	-1.1	1.0		
Science	4	1832	6	A.1.3.3	2	10668	0.64	0.03	0.17	0.64	0.16	0.00	0.40	-0.34	-0.29	0.40	-0.37	0.5753	0.0220	-3.7	1.0	-5.5	0.9	A+	A-

Appendix I: Item Statistics Multiple Choice

Item Information						Classical													Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	2762	6	B.3.2.2	2	10668	0.80	0.06	0.80	0.07	0.07	0.00	0.42	-0.25	0.42	-0.36	-0.31	-0.3636	0.0259	-5.4	0.9	-3.6	0.9			
Science	4	2897	6	B.1.1.4	2	10668	0.63	0.63	0.26	0.08	0.03	0.00	0.30	0.30	-0.24	-0.25	-0.29	0.6581	0.0218	6.5	1.1	6.5	1.1	A-	A-	
Science	4	3528	6	A.2.2.1	2	10668	0.69	0.12	0.11	0.08	0.69	0.00	0.41	-0.33	-0.29	-0.36	0.41	0.3426	0.0226	-4.3	1.0	-4.7	0.9	A-	B-	
Science	4	4848	6	A.3.2.2	2	10668	0.52	0.04	0.15	0.52	0.29	0.00	0.40	-0.46	-0.40	0.40	-0.31	1.1700	0.0212	-5.1	1.0	-3.9	1.0	A-	A-	
Science	4	8496	6	B.3.2.2	2	10668	0.36	0.28	0.36	0.16	0.20	0.00	0.21	-0.14	0.21	-0.30	-0.24	1.9687	0.0219	9.9	1.1	9.9	1.3	A-	A+	
Science	4	9442	6	D.2.1.3	1	10668	0.75	0.05	0.07	0.75	0.12	0.00	0.33	-0.26	-0.22	0.33	-0.25	-0.0519	0.0242	1.3	1.0	0.4	1.0	A-	A-	
Science	4	472	7	A.3.2.2	2	10658	0.27	0.07	0.33	0.27	0.33	0.00	0.18	-0.42	-0.24	0.18	-0.09	2.4623	0.0235	8.2	1.1	9.9	1.4	A+	A-	
Science	4	702	7	D.2.1.3	2	10658	0.73	0.08	0.13	0.05	0.73	0.00	0.34	-0.29	-0.18	-0.35	0.34	0.0713	0.0237	2.1	1.0	4.8	1.1	A+	A-	
Science	4	1835	7	D.1.2.1	1	10658	0.93	0.03	0.02	0.93	0.02	0.00	0.41	-0.27	-0.26	0.41	-0.27	-1.6517	0.0385	-4.7	0.9	-8.9	0.6	A+	B-	
Science	4	3220	7	B.1.1.5	2	10658	0.90	0.05	0.03	0.02	0.90	0.00	0.30	-0.13	-0.28	-0.20	0.30	-1.2620	0.0336	-1.7	1.0	2.7	1.1	A+	A-	
Science	4	4329	7	C.2.1.4	1	10658	0.80	0.80	0.08	0.08	0.03	0.00	0.42	0.42	-0.34	-0.29	-0.27	-0.4038	0.0262	-4.6	0.9	-6.8	0.8			
Science	4	5088	7	A.3.1.1	2	10658	0.42	0.30	0.22	0.06	0.42	0.00	0.37	-0.34	-0.35	-0.45	0.37	1.6665	0.0214	-5.3	1.0	1.9	1.0	A-	A-	
Science	4	6510	7	C.2.1.3	2	10658	0.50	0.29	0.15	0.06	0.50	0.00	0.25	-0.22	-0.24	-0.17	0.25	1.2890	0.0212	9.9	1.1	9.9	1.2	A-	A-	
Science	4	8694	7	A.2.1.3	3	10658	0.51	0.51	0.24	0.10	0.15	0.00	0.30	0.30	-0.16	-0.43	-0.30	1.2632	0.0212	8.4	1.1	8.8	1.1			
Science	4	9689	7	B.3.3.1	2	10658	0.67	0.18	0.67	0.08	0.07	0.00	0.38	-0.33	0.38	-0.28	-0.30	0.4466	0.0224	-0.7	1.0	-0.2	1.0	A+	A-	
Science	4	9854	7	A.1.3.4	3	10658	0.57	0.23	0.57	0.14	0.05	0.00	0.41	-0.37	0.41	-0.33	-0.41	0.9370	0.0214	-4.5	1.0	-2.2	1.0	A+	A-	
Science	4	23	8	A.3.1.1	2	10623	0.78	0.10	0.78	0.05	0.07	0.00	0.49	-0.40	0.49	-0.34	-0.36	-0.2188	0.0250	-9.9	0.9	-9.9	0.8	A+	A-	
Science	4	443	8	B.1.1.5	2	10623	0.48	0.06	0.05	0.42	0.48	0.00	0.19	-0.19	-0.21	-0.16	0.19	1.3612	0.0212	9.9	1.2	9.9	1.2	A-	A-	
Science	4	670	8	D.1.1.3	2	10623	0.41	0.26	0.16	0.17	0.41	0.00	0.23	-0.22	-0.24	-0.23	0.23	1.7077	0.0215	9.9	1.1	9.9	1.2	A-	A+	
Science	4	3867	8	B.1.1.2	2	10623	0.80	0.11	0.80	0.04	0.04	0.00	0.41	-0.29	0.41	-0.29	-0.33	-0.3953	0.0260	-4.7	0.9	-5.7	0.9			
Science	4	4427	8	A.1.3.3	2	10623	0.37	0.37	0.18	0.32	0.13	0.00	0.23	0.23	-0.22	-0.16	-0.38	1.8902	0.0218	8.8	1.1	9.9	1.2	A-	A-	
Science	4	4718	8	C.2.1.4	2	10623	0.36	0.17	0.06	0.42	0.36	0.00	0.15	-0.20	-0.31	-0.10	0.15	1.9262	0.0219	9.9	1.2	9.9	1.3	A-	A-	
Science	4	6790	8	B.3.2.3	2	10623	0.80	0.05	0.05	0.10	0.80	0.00	0.37	-0.25	-0.38	-0.20	0.37	-0.3577	0.0257	-2.5	1.0	-0.1	1.0	A+	B-	
Science	4	7886	8	D.3.1.2	2	10623	0.45	0.27	0.17	0.45	0.11	0.00	0.24	-0.28	-0.19	0.24	-0.15	1.5068	0.0213	9.9	1.1	9.9	1.2	A-	A-	
Science	4	7892	8	A.3.2.3	2	10623	0.62	0.62	0.16	0.14	0.08	0.00	0.31	0.31	-0.24	-0.22	-0.31	0.6610	0.0218	6.3	1.1	5.6	1.1	A+	A-	
Science	4	9396	8	A.1.3.5	2	10623	0.56	0.12	0.18	0.14	0.56	0.00	0.36	-0.25	-0.29	-0.37	0.36	0.9988	0.0213	0.2	1.0	-1.1	1.0			
Science	4	18	9	C.2.1.4	2	10657	0.59	0.59	0.12	0.18	0.11	0.00	0.33	0.33	-0.31	-0.23	-0.32	0.8247	0.0215	4.1	1.0	3.3	1.0	A+	A-	
Science	4	194	9	B.3.3.5	2	10657	0.79	0.07	0.10	0.79	0.04	0.00	0.46	-0.35	-0.33	0.46	-0.32	-0.3305	0.0257	-7.0	0.9	-8.8	0.8			
Science	4	1190	9	B.2.1.1	2	10657	0.38	0.11	0.24	0.38	0.27	0.00	0.25	-0.27	-0.17	0.25	-0.30	1.8451	0.0217	8.1	1.1	9.9	1.2	A-	A-	
Science	4	3644	9	D.3.1.1	3	10657	0.55	0.21	0.55	0.13	0.11	0.00	0.37	-0.28	0.37	-0.34	-0.39	1.0275	0.0213	-1.5	1.0	-1.8	1.0	A-	A-	
Science	4	3987	9	A.3.2.3	3	10657	0.58	0.14	0.07	0.58	0.22	0.00	0.33	-0.35	-0.34	0.33	-0.20	0.9067	0.0214	5.1	1.0	3.8	1.0	A+	A-	
Science	4	5938	9	A.2.2.1	2	10657	0.67	0.25	0.06	0.67	0.02	0.00	0.23	-0.21	-0.10	0.23	-0.22	0.4246	0.0224	9.9	1.1	9.9	1.2	A+	A+	
Science	4	6095	9	B.3.3.1	2	10657	0.80	0.04	0.80	0.06	0.10	0.00	0.43	-0.28	0.43	-0.28	-0.35	-0.3733	0.0259	-5.5	0.9	-5.9	0.9	A+	B-	
Science	4	6758	9	A.1.3.4	2	10657	0.29	0.29	0.48	0.05	0.18	0.00	0.03	0.03	0.11	-0.33	-0.23	2.3408	0.0230	9.9	1.3	9.9	1.6	A+	A+	
Science	4	7565	9	D.1.2.2	1	10657	0.61	0.12	0.10	0.17	0.61	0.00	0.30	-0.28	-0.28	-0.20	0.30	0.7343	0.0217	7.5	1.1	6.8	1.1	A-	A-	
Science	4	8942	9	B.3.3.2	2	10657	0.84	0.03	0.06	0.06	0.84	0.00	0.34	-0.21	-0.26	-0.22	0.34	-0.7215	0.0284	-1.1	1.0	-1.1	1.0			
Science	4	1778	10	C.3.1.1	2	10662	0.45	0.45	0.44	0.08	0.03	0.00	0.30	0.30	-0.24	-0.35	-0.41	1.5328	0.0214	8.2	1.1	9.9	1.1	A-	A-	
Science	4	2436	10	D.3.1.2	2	10662	0.50	0.50	0.17	0.05	0.28	0.00	0.27	0.27	-0.22	-0.38	-0.23	1.2993	0.0213	9.9	1.1	9.9	1.1	A-	A+	
Science	4	3008	10	A.1.3.1	2	10662	0.63	0.63	0.08	0.27	0.02	0.00	0.48	0.48	-0.49	-0.40	-0.34	0.6509	0.0220	-9.9	0.9	-9.8	0.9			
Science	4	4203	10	B.3.3.4	1	10662	0.35	0.07	0.35	0.28	0.29	0.00	0.26	-0.43	0.26	-0.23	-0.24	2.0242	0.0221	6.7	1.1	9.9	1.2	A-	A-	
Science	4	4827	10	A.3.1.2	2	10662	0.74	0.06	0.74	0.04	0.15	0.00	0.36	-0.31	0.36	-0.31	-0.24	-0.0056	0.0241	0.3	1.0	0.9	1.0	A+	A-	
Science	4	5291	10	A.3.3.1	2	10662	0.74	0.08	0.06	0.74	0.13	0.00	0.47	-0.38	-0.40	0.47	-0.32	0.0309	0.0239	-7.9	0.9	-8.5	0.8	A+	A-	
Science	4	6252	10	C.1.1.2	2	10662	0.74	0.08	0.11	0.74	0.06	0.00	0.42	-0.30	-0.33	0.42	-0.32	-0.0136	0.0241	-4.1	1.0	-6.0	0.9			
Science	4	7826	10	C.3.1.2	2	10662	0.82	0.10	0.06	0.82	0.01	0.00	0.34	-0.24	-0.27	0.34	-0.21	-0.5600	0.0272	-0.3	1.0	-0.5	1.0	A+	A-	
Science	4	8097	10	B.2.1.1	2	10662	0.93	0.93	0.03	0.02	0.02	0.00	0.40	0.40	-0.25	-0.26	-0.27	-1.7116	0.0392	-4.3	0.9	-7.2	0.7	A+	A-	
Science	4	9849	10	A.1.3.1	3	10662	0.53	0.16	0.53	0.20	0.10	0.00	0.33	-0.28	0.33	-0.25	-0.38	1.1162	0.0213	6.7	1.1	6.4	1.1	A-	A-	
Science	4	95	11	D.3.1.3	2	10614	0.28	0.41	0.10	0.28	0.21	0.00	0.14	-0.08	-0.38	0.14	-0.16	2.3782	0.0232	9.9	1.1	9.9	1.4	A-	A-	
Science	4	421	11	A.2.1.1	2	10614	0.55	0.28	0.11	0.06	0.55	0.00	0.33	-0.20	-0.41	-0.39	0.33	1.0209	0.0213	5.2	1.0	5.9	1.1	A+	A-	
Science	4	581	11	C.2.1.2	2	10614	0.54	0.05	0.54	0.27	0.14	0.00	0.28	-0.34	0.28	-0.17	-0.33	1.0705	0.0212	9.3	1.1	9.4	1.1			

Appendix I: Item Statistics Multiple Choice

Item Information						Classical													Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	1470	11	A.1.1.1	2	10614	0.85	0.04	0.85	0.05	0.05	0.00	0.46	-0.36	0.46	-0.28	-0.33	-0.8349	0.0293	-6.7	0.9	-8.2	0.8			
Science	4	2727	11	D.1.2.2	2	10614	0.37	0.22	0.19	0.21	0.37	0.00	0.15	-0.13	-0.15	-0.17	0.15	1.8964	0.0218	9.9	1.2	9.9	1.3	A-	A-	
Science	4	3250	11	D.1.2.3	1	10614	0.82	0.06	0.02	0.09	0.82	0.00	0.28	-0.20	-0.25	-0.16	0.28	-0.5665	0.0272	1.7	1.0	5.8	1.2	A+	A-	
Science	4	4853	11	B.2.1.2	2	10614	0.84	0.03	0.07	0.84	0.06	0.00	0.51	-0.30	-0.39	0.51	-0.39	-0.6751	0.0280	-9.9	0.8	-9.9	0.7	A-	B-	
Science	4	5955	11	B.3.3.3	2	10614	0.50	0.50	0.27	0.12	0.11	0.00	0.28	0.28	-0.18	-0.31	-0.34	1.2518	0.0212	9.0	1.1	9.1	1.1	A-	A-	
Science	4	6577	11	A.3.3.2	2	10614	0.36	0.16	0.36	0.35	0.12	0.00	0.14	-0.23	0.14	-0.07	-0.23	1.9270	0.0218	9.9	1.2	9.9	1.3	A-	A-	
Science	4	9432	11	A.3.1.2	1	10614	0.16	0.04	0.16	0.07	0.73	0.00	0.06	-0.35	0.06	-0.28	-0.02	3.2078	0.0281	5.9	1.1	9.9	1.8	A-	A+	
Science	4	533	12	B.3.3.3	2	10646	0.44	0.44	0.21	0.19	0.16	0.00	0.31	0.31	-0.26	-0.30	-0.31	1.5637	0.0214	3.7	1.0	8.1	1.1	A+	A-	
Science	4	748	12	B.2.1.2	2	10646	0.86	0.03	0.06	0.86	0.05	0.00	0.49	-0.35	-0.38	0.49	-0.31	-0.8456	0.0295	-8.3	0.9	-9.9	0.7			
Science	4	1195	12	B.1.1.1	2	10646	0.45	0.32	0.45	0.11	0.13	0.00	0.30	-0.28	0.30	-0.25	-0.34	1.5445	0.0213	7.4	1.1	8.4	1.1	A+	A-	
Science	4	1800	12	D.1.3.1	2	10646	0.35	0.24	0.10	0.35	0.32	0.00	0.22	-0.35	-0.17	0.22	-0.16	2.0399	0.0222	9.9	1.1	9.9	1.3	A+	A-	
Science	4	3273	12	C.3.1.3	2	10646	0.57	0.09	0.17	0.17	0.57	0.00	0.33	-0.32	-0.28	-0.26	0.33	0.9578	0.0214	4.0	1.0	2.4	1.0	A-	A-	
Science	4	5075	12	D.3.1.3	2	10646	0.44	0.37	0.44	0.11	0.07	0.00	0.32	-0.23	0.32	-0.41	-0.45	1.5569	0.0214	4.3	1.0	6.5	1.1	A-	B-	
Science	4	6998	12	A.2.1.2	2	10646	0.59	0.59	0.12	0.16	0.12	0.00	0.31	0.31	-0.30	-0.26	-0.22	0.8261	0.0216	8.9	1.1	9.2	1.1	A-	A-	
Science	4	7030	12	B.2.1.2	2	10646	0.86	0.05	0.05	0.05	0.86	0.00	0.44	-0.25	-0.35	-0.30	0.44	-0.8143	0.0292	-6.3	1.1	9.9	6.6	0.8	A+	B-
Science	4	7870	12	A.3.1.3	1	10646	0.94	0.02	0.02	0.94	0.03	0.00	0.33	-0.22	-0.21	0.33	-0.21	-1.8384	0.0413	-2.5	0.9	-5.5	0.7	A+	B-	
Science	4	8008	12	A.1.1.1	2	10646	0.70	0.07	0.10	0.70	0.12	0.00	0.35	-0.33	-0.31	0.35	-0.17	0.2412	0.0231	2.4	1.0	1.5	1.0			
Science	8	232	0	A.2.1.6	2	127076	0.57	0.13	0.57	0.17	0.12	0.00	0.39	-0.34	0.39	-0.28	-0.36	0.2268	0.0062	4.5	1.0	5.9	1.0			
Science	8	607	0	A.3.3.1	2	127076	0.51	0.08	0.30	0.11	0.51	0.00	0.35	-0.32	-0.30	-0.36	0.35	0.5361	0.0062	9.9	1.0	9.9	1.1			
Science	8	774	0	A.1.3.3	2	127076	0.53	0.15	0.23	0.08	0.53	0.00	0.40	-0.33	-0.32	-0.45	0.40	0.4323	0.0062	-4.1	1.0	-5.3	1.0			
Science	8	782	0	A.2.1.3	2	127076	0.49	0.49	0.22	0.13	0.16	0.00	0.34	0.34	-0.22	-0.40	-0.31	0.6612	0.0062	9.9	1.1	9.9	1.1			
Science	8	1006	0	C.2.1.1	2	127076	0.65	0.65	0.14	0.11	0.10	0.00	0.44	0.44	-0.33	-0.40	-0.31	-0.1444	0.0064	-9.9	1.0	-9.9	0.9			
Science	8	1341	0	A.2.1.1	2	127076	0.74	0.74	0.09	0.09	0.07	0.00	0.56	0.56	-0.42	-0.45	-0.39	-0.7096	0.0070	-9.9	0.8	-9.9	0.7			
Science	8	1432	0	C.2.2.3	2	127076	0.53	0.15	0.53	0.21	0.12	0.00	0.43	-0.35	0.43	-0.36	-0.42	0.4652	0.0062	-9.9	1.0	-9.9	1.0			
Science	8	1448	0	C.2.2.1	2	127076	0.68	0.68	0.06	0.12	0.13	0.00	0.39	0.39	-0.36	-0.33	-0.24	-0.3530	0.0066	-3.9	1.0	-2.1	1.0			
Science	8	1499	0	A.1.1.4	2	127076	0.60	0.13	0.60	0.13	0.15	0.00	0.34	-0.26	0.34	-0.35	-0.23	0.1100	0.0063	9.9	1.1	9.9	1.1			
Science	8	1709	0	B.3.1.3	2	127076	0.39	0.13	0.39	0.27	0.21	0.00	0.31	-0.30	0.31	-0.31	-0.30	1.1260	0.0063	9.9	1.1	9.9	1.2			
Science	8	2312	0	B.1.1.2	2	127076	0.82	0.06	0.07	0.82	0.05	0.00	0.42	-0.33	-0.24	0.42	-0.31	-1.2376	0.0078	-9.9	0.9	-9.9	0.8			
Science	8	2666	0	A.1.2.1	2	127076	0.55	0.07	0.32	0.55	0.06	0.00	0.29	-0.36	-0.16	0.29	-0.40	0.3722	0.0062	9.9	1.1	9.9	1.1			
Science	8	2708	0	A.2.1.5	2	127076	0.58	0.09	0.13	0.58	0.20	0.00	0.39	-0.34	-0.34	0.39	-0.31	0.1944	0.0062	1.6	1.0	-2.4	1.0			
Science	8	2892	0	A.3.2.2	2	127076	0.65	0.05	0.19	0.65	0.11	0.00	0.33	-0.40	-0.17	0.33	-0.32	-0.1757	0.0064	9.9	1.1	9.9	1.1			
Science	8	2909	0	B.3.3.3	2	127076	0.55	0.23	0.08	0.13	0.55	0.00	0.45	-0.40	-0.36	-0.40	0.45	0.3243	0.0062	-9.9	0.9	-9.9	0.9			
Science	8	3011	0	C.1.1.3	2	127076	0.52	0.08	0.14	0.26	0.52	0.00	0.52	-0.46	-0.47	-0.46	0.52	0.5151	0.0062	-9.9	0.9	-9.9	0.8			
Science	8	3105	0	C.1.1.2	2	127076	0.64	0.05	0.64	0.09	0.22	0.00	0.33	-0.38	0.33	-0.34	-0.18	-0.1167	0.0064	9.9	1.1	9.9	1.1			
Science	8	3363	0	A.2.2.2	2	127076	0.64	0.64	0.17	0.08	0.11	0.00	0.43	0.43	-0.34	-0.37	-0.33	-0.1147	0.0064	-9.9	1.0	-9.9	0.9			
Science	8	3659	0	A.3.1.3	1	127076	0.66	0.09	0.12	0.13	0.66	0.00	0.42	-0.30	-0.33	-0.34	0.42	-0.2336	0.0065	-9.9	1.0	-9.9	0.9			
Science	8	3685	0	B.1.1.4	2	127076	0.67	0.14	0.12	0.67	0.07	0.00	0.50	-0.38	-0.42	0.50	-0.37	-0.2635	0.0065	-9.9	0.9	-9.9	0.8			
Science	8	3929	0	A.2.2.1	2	127076	0.69	0.11	0.11	0.09	0.69	0.00	0.56	-0.45	-0.45	-0.41	0.56	-0.3796	0.0066	-9.9	0.8	-9.9	0.8			
Science	8	4029	0	B.2.2.1	1	127076	0.70	0.10	0.70	0.10	0.11	0.00	0.44	-0.36	0.44	-0.32	-0.32	-0.4429	0.0067	-9.9	0.9	-9.9	0.9			
Science	8	4045	0	A.2.2.1	2	127076	0.65	0.15	0.09	0.12	0.65	0.00	0.50	-0.41	-0.42	-0.39	0.50	-0.1455	0.0064	-9.9	0.9	-9.9	0.8			
Science	8	4595	0	A.3.1.4	2	127076	0.48	0.14	0.19	0.18	0.48	0.00	0.31	-0.23	-0.30	-0.31	0.31	0.6883	0.0062	9.9	1.1	9.9	1.1			
Science	8	4618	0	A.1.2.3	2	127076	0.59	0.25	0.10	0.59	0.06	0.00	0.35	-0.20	-0.41	0.35	-0.35	0.1389	0.0063	9.9	1.1	9.9	1.1			
Science	8	4721	0	A.3.1.1	2	127076	0.72	0.09	0.08	0.72	0.11	0.00	0.41	-0.26	-0.35	0.41	-0.30	-0.5803	0.0068	-9.9	1.0	-9.9	0.9			
Science	8	4795	0	A.1.3.2	2	127076	0.53	0.16	0.53	0.11	0.20	0.00	0.38	-0.36	0.38	-0.43	-0.24	0.4629	0.0062	2.0	1.0	-1.0	1.0			
Science	8	4930	0	A.3.1.4	2	127076	0.56	0.13	0.56	0.17	0.14	0.00	0.35	-0.30	0.35	-0.35	-0.24	0.3199	0.0062	9.9	1.1	9.9	1.1			
Science	8	5234	0	C.3.1.3	2	127076	0.79	0.09	0.07	0.04	0.79	0.00	0.49	-0.40	-0.35	-0.28	0.49	-1.0358	0.0074	-9.9	0.9	-9.9	0.8			
Science	8	5253	0	A.3.3.2	2	127076	0.62	0.62	0.14	0.15	0.10	0.00	0.40	0.40	-0.32	-0.35	-0.29	-0.0122	0.0063	-3.4	1.0	-9.9	1.0			
Science	8	5269	0	A.2.1.4	3	127076	0.64	0.09	0.13	0.64	0.14	0.00	0.39	-0.33	-0.35	0.39	-0.27	-0.1067	0.0064	-1.0	1.0	1.6	1.0			
Science	8	5303	0	C.2.1.2	2	127076	0.74	0.05	0.10	0.74	0.10	0.00	0.38	-0.29	-0.27	0.38	-0.28	-0.7045	0.0070	-6.5	1.0	9.2	1.1			

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	5326	0	B.2.2.2		127076	0.61	0.61	0.16	0.14	0.09	0.00	0.45	0.45	-0.34	-0.43	-0.32	0.0212	0.0063	-9.9	1.0	-9.9	0.9		
Science	8	5333	0	C.1.1.3	2	127076	0.51	0.19	0.13	0.51	0.17	0.00	0.30	-0.28	-0.32	0.30	-0.18	0.5325	0.0062	9.9	1.1	9.9	1.1		
Science	8	5612	0	C.3.1.1	2	127076	0.74	0.06	0.08	0.11	0.74	0.00	0.42	-0.31	-0.28	-0.34	0.42	-0.6927	0.0069	-9.9	0.9	-7.8	1.0		
Science	8	5642	0	A.3.1.2	2	127076	0.72	0.05	0.07	0.16	0.72	0.00	0.41	-0.33	-0.28	-0.32	0.41	-0.5358	0.0068	-9.8	1.0	-9.1	1.0		
Science	8	5819	0	D.1.3.1	2	127076	0.77	0.05	0.77	0.09	0.08	0.00	0.45	-0.32	0.45	-0.35	-0.29	-0.8854	0.0072	-9.9	0.9	-9.9	0.8		
Science	8	5821	0	C.1.1.1	2	127076	0.63	0.63	0.11	0.14	0.12	0.00	0.33	0.33	-0.30	-0.21	-0.29	-0.0442	0.0064	9.9	1.1	9.9	1.1		
Science	8	6113	0	A.1.1.2		127076	0.57	0.14	0.18	0.11	0.57	0.00	0.43	-0.35	-0.40	-0.34	0.43	0.2535	0.0062	-9.9	1.0	-9.4	1.0		
Science	8	6316	0	D.1.3.3		127076	0.63	0.06	0.17	0.14	0.63	0.00	0.42	-0.38	-0.35	-0.33	0.42	-0.0606	0.0064	-9.9	1.0	-6.8	1.0		
Science	8	6429	0	A.3.2.3	3	127076	0.74	0.07	0.10	0.74	0.09	0.00	0.38	-0.24	-0.30	0.38	-0.29	-0.6852	0.0069	-3.3	1.0	-3.7	1.0		
Science	8	6531	0	B.2.1.4		127076	0.66	0.10	0.15	0.66	0.10	0.00	0.46	-0.38	-0.36	0.46	-0.36	-0.2092	0.0065	-9.9	0.9	-9.9	0.9		
Science	8	6776	0	A.2.1.4	2	127076	0.64	0.08	0.12	0.16	0.64	0.00	0.45	-0.43	-0.44	-0.27	0.45	-0.1078	0.0064	-9.9	0.9	-9.9	1.0		
Science	8	6781	0	D.3.1.3	2	127076	0.70	0.07	0.70	0.14	0.09	0.00	0.49	-0.39	0.49	-0.40	-0.34	-0.4427	0.0067	-9.9	0.9	-9.9	0.8		
Science	8	6839	0	A.1.3.1	2	127076	0.66	0.07	0.66	0.07	0.20	0.00	0.33	-0.23	0.33	-0.27	-0.27	-0.2136	0.0065	9.9	1.1	9.9	1.1		
Science	8	6888	0	B.3.3.2	2	127076	0.49	0.13	0.19	0.19	0.49	0.00	0.30	-0.31	-0.22	-0.30	0.30	0.6556	0.0062	9.9	1.1	9.9	1.1		
Science	8	6957	0	D.1.1.3	1	127076	0.64	0.22	0.03	0.12	0.64	0.00	0.37	-0.27	-0.34	-0.34	0.37	-0.1174	0.0064	6.7	1.0	7.7	1.0		
Science	8	7693	0	A.1.2.3	1	127076	0.68	0.68	0.07	0.15	0.11	0.00	0.48	0.48	-0.42	-0.33	-0.38	-0.3167	0.0066	-9.9	0.9	-9.9	0.9		
Science	8	7978	0	D.1.2.2	1	127076	0.65	0.09	0.65	0.07	0.19	0.00	0.28	-0.24	0.28	-0.33	-0.15	-0.1573	0.0064	9.9	1.1	9.9	1.1		
Science	8	8406	0	D.1.3.2	2	127076	0.78	0.78	0.05	0.12	0.05	0.00	0.46	0.46	-0.35	-0.34	-0.32	-0.9437	0.0073	-9.9	0.9	-9.9	0.8		
Science	8	8452	0	D.3.1.2	1	127076	0.67	0.67	0.11	0.15	0.06	0.00	0.32	0.32	-0.33	-0.15	-0.29	-0.3033	0.0065	9.9	1.1	9.9	1.1		
Science	8	8667	0	D.1.2.1	2	127076	0.76	0.76	0.04	0.12	0.08	0.00	0.49	0.49	-0.33	-0.39	-0.35	-0.8057	0.0071	-9.9	0.9	-9.9	0.8		
Science	8	8992	0	A.2.1.5	2	127076	0.76	0.04	0.07	0.76	0.13	0.00	0.40	-0.33	-0.30	0.40	-0.27	-0.7817	0.0071	-9.9	1.0	-9.9	0.9		
Science	8	9039	0	B.1.1.3		127076	0.46	0.13	0.23	0.18	0.46	0.00	0.29	-0.32	-0.26	-0.24	0.29	0.8014	0.0062	9.9	1.1	9.9	1.1		
Science	8	9105	0	C.2.2.2		127076	0.60	0.10	0.16	0.60	0.14	0.00	0.36	-0.35	-0.31	0.36	-0.23	0.0974	0.0063	9.9	1.0	6.6	1.0		
Science	8	9592	0	A.1.1.4	3	127076	0.73	0.08	0.12	0.73	0.06	0.00	0.51	-0.38	-0.40	0.51	-0.36	-0.6433	0.0069	-9.9	0.9	-9.9	0.8		
Science	8	9638	0	A.2.2.3	2	127076	0.77	0.77	0.09	0.08	0.07	0.00	0.49	0.49	-0.39	-0.38	-0.29	-0.8478	0.0072	-9.9	0.9	-9.9	0.8		
Science	8	9935	0	A.1.3.2	2	127076	0.64	0.07	0.18	0.64	0.11	0.00	0.39	-0.30	-0.33	0.39	-0.29	-0.1237	0.0064	0.3	1.0	-8.5	1.0		
Science	8	736	1	B.1.1.1	2	10931	0.55	0.15	0.55	0.11	0.19	0.00	0.47	-0.48	0.47	-0.37	-0.37	0.3058	0.0214	-7.6	0.9	-7.9	0.9	A-	A-
Science	8	3002	1	D.1.3.2	2	10931	0.62	0.15	0.62	0.14	0.08	0.00	0.45	-0.34	0.45	-0.41	-0.31	-0.0782	0.0219	-4.8	1.0	-6.2	0.9	A-	B-
Science	8	3047	1	A.1.2.1	2	21509	0.54	0.15	0.14	0.17	0.54	0.00	0.45	-0.35	-0.42	-0.40	0.45	0.3640	0.0151	-7.7	1.0	-5.9	1.0		
Science	8	6163	1	A.1.1.4	2	10931	0.40	0.20	0.40	0.29	0.11	0.00	0.20	-0.19	0.20	-0.14	-0.30	1.0791	0.0217	9.9	1.2	9.9	1.4	A+	A-
Science	8	6378	1	B.3.1.3	2	10931	0.72	0.09	0.08	0.72	0.11	0.00	0.55	-0.42	-0.41	0.55	-0.44	-0.5891	0.0232	-9.9	0.8	-9.9	0.7	A+	A-
Science	8	6539	1	B.3.1.3	2	10931	0.76	0.76	0.08	0.10	0.05	0.00	0.48	0.48	-0.36	-0.33	-0.35	-0.8697	0.0244	-9.6	0.9	-9.9	0.8	A+	A-
Science	8	8358	1	B.3.1.1	2	10931	0.71	0.71	0.11	0.13	0.05	0.00	0.52	0.52	-0.43	-0.39	-0.37	-0.5648	0.0231	-9.9	0.9	-9.9	0.8	A+	A-
Science	8	8642	1	D.1.1.1	2	10931	0.35	0.17	0.35	0.15	0.33	0.00	0.18	-0.26	0.18	-0.29	-0.07	1.3210	0.0222	9.9	1.2	9.9	1.4	A-	A+
Science	8	8807	1	C.1.1.2		10931	0.62	0.08	0.13	0.62	0.16	0.00	0.35	-0.33	-0.37	0.35	-0.18	-0.0528	0.0218	6.9	1.1	7.3	1.1		
Science	8	9043	1	A.2.1.1	2	10931	0.64	0.64	0.12	0.18	0.05	0.00	0.50	0.50	-0.41	-0.39	-0.42	-0.1761	0.0221	-9.9	0.9	-9.9	0.9	A-	A-
Science	8	9629	1	C.2.2.2	2	10931	0.37	0.26	0.22	0.16	0.37	0.00	0.35	-0.23	-0.46	-0.41	0.35	1.2395	0.0220	2.8	1.0	6.6	1.1	A-	A-
Science	8	9667	1	A.1.3.2	3	10931	0.64	0.08	0.14	0.64	0.15	0.00	0.44	-0.39	-0.37	0.44	-0.31	-0.1440	0.0220	-4.4	1.0	-5.1	0.9	A-	A-
Science	8	507	2	C.2.2.3	1	21128	0.60	0.13	0.13	0.14	0.60	0.00	0.49	-0.41	-0.44	-0.36	0.49	0.0833	0.0154	-9.9	0.9	-9.9	0.9		
Science	8	634	2	C.1.1.1	2	10554	0.34	0.07	0.21	0.39	0.34	0.00	0.23	-0.39	-0.28	-0.16	0.23	1.4016	0.0225	9.9	1.1	9.9	1.3	A-	A-
Science	8	1189	2	A.2.2.3	2	10554	0.52	0.19	0.18	0.11	0.52	0.00	0.38	-0.30	-0.29	-0.44	0.38	0.5002	0.0214	1.6	1.0	2.8	1.0	A+	A-
Science	8	4522	2	C.3.1.2	2	10554	0.58	0.07	0.11	0.24	0.58	0.00	0.27	-0.31	-0.33	-0.13	0.27	0.1738	0.0217	9.9	1.1	9.9	1.2	A+	A-
Science	8	5251	2	A.1.1.2	2	10554	0.49	0.49	0.14	0.26	0.11	0.00	0.42	0.42	-0.44	-0.32	-0.42	0.6331	0.0214	-5.3	1.0	-3.9	1.0	A-	A-
Science	8	5890	2	D.1.1.2	2	10554	0.44	0.25	0.44	0.12	0.18	0.00	0.34	-0.32	0.34	-0.36	-0.27	0.8626	0.0215	4.3	1.0	6.1	1.1	A-	A-
Science	8	6652	2	A.1.2.2	2	21128	0.43	0.43	0.14	0.25	0.17	0.00	0.34	0.34	-0.41	-0.25	-0.33	0.9520	0.0153	4.3	1.0	7.7	1.1		
Science	8	6924	2	B.2.2.1	2	10554	0.39	0.13	0.37	0.11	0.39	0.00	0.24	-0.27	-0.15	-0.41	0.24	1.1296	0.0219	9.9	1.1	9.9	1.2	A+	A+
Science	8	7365	2	D.1.3.3	2	10554	0.60	0.16	0.14	0.60	0.10	0.00	0.40	-0.33	-0.34	0.40	-0.31	0.1085	0.0217	-1.4	1.0	-1.2	1.0	A-	A-
Science	8	7807	2	A.1.2.4	2	10554	0.57	0.17	0.57	0.19	0.07	0.00	0.25	-0.20	0.25	-0.12	-0.39	0.2600	0.0216	9.9	1.2	9.9	1.2	A+	A-
Science	8	8659	2	C.3.1.1	2	10554	0.41	0.41	0.26	0.25	0.08	0.00	0.18	0.18	-0.04	-0.25	-0.33	0.9998	0.0217	9.9	1.2	9.9	1.3	A+	A+

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	9225	2	A.3.2.3	3	10554	0.24	0.14	0.47	0.15	0.24	0.00	0.04	-0.15	0.04	-0.18	0.04	1.9630	0.0246	9.9	1.3	9.9	1.7	A+	A-
Science	8	1240	3	C.2.1.2	2	21101	0.59	0.13	0.11	0.17	0.59	0.00	0.43	-0.38	-0.44	-0.30	0.43	0.1588	0.0153	-7.6	1.0	-6.6	0.9		
Science	8	1882	3	D.1.1.2	2	10559	0.51	0.23	0.11	0.51	0.15	0.00	0.27	-0.15	-0.34	0.27	-0.27	0.5543	0.0214	9.9	1.1	9.9	1.2	A+	A-
Science	8	2848	3	B.2.2.2	2	21101	0.72	0.11	0.72	0.09	0.07	0.00	0.52	-0.36	0.52	-0.44	-0.39	-0.5651	0.0167	-9.9	0.9	-9.9	0.8		
Science	8	4801	3	A.1.2.3	2	10559	0.48	0.12	0.15	0.48	0.25	0.00	0.25	-0.25	-0.28	0.25	-0.17	0.6888	0.0214	9.9	1.1	9.9	1.2	A+	A-
Science	8	5002	3	A.3.3.1	2	10559	0.77	0.15	0.77	0.05	0.03	0.00	0.38	-0.27	0.38	-0.29	-0.29	-0.8354	0.0248	-2.8	1.0	-1.1	1.0	A+	A-
Science	8	5703	3	A.1.3.4	2	10559	0.63	0.20	0.09	0.09	0.63	0.00	0.28	-0.13	-0.32	-0.32	0.28	-0.0271	0.0220	9.9	1.1	9.9	1.2	A+	A-
Science	8	6544	3	D.1.3.1	2	10559	0.30	0.45	0.30	0.16	0.08	0.00	0.07	0.04	0.07	-0.26	-0.23	1.5977	0.0230	9.9	1.3	9.9	1.5	A-	A-
Science	8	6868	3	A.2.1.2	3	10559	0.39	0.19	0.39	0.11	0.31	0.00	0.19	-0.14	0.19	-0.34	-0.14	1.1122	0.0218	9.9	1.2	9.9	1.3	A+	A-
Science	8	7551	3	B.2.1.5	2	10559	0.71	0.14	0.06	0.08	0.71	0.00	0.45	-0.31	-0.40	-0.33	0.45	-0.4965	0.0233	-7.0	0.9	-7.0	0.9	A+	A-
Science	8	7633	3	D.1.3.2	2	10559	0.26	0.11	0.26	0.53	0.10	0.00	0.06	-0.33	0.06	0.04	-0.26	1.8320	0.0239	9.9	1.2	9.9	1.6	A-	A-
Science	8	7772	3	C.1.1.1	2	10559	0.37	0.37	0.19	0.18	0.25	0.00	0.19	0.19	-0.23	-0.26	-0.10	1.2291	0.0220	9.9	1.2	9.9	1.3	A-	A-
Science	8	9543	3	A.3.3.2	2	10559	0.62	0.11	0.06	0.20	0.62	0.00	0.36	-0.31	-0.38	-0.25	0.36	0.0102	0.0219	2.6	1.0	2.2	1.0	A-	A+
Science	8	1773	4	A.1.1.4	2	10588	0.37	0.37	0.32	0.16	0.15	0.00	0.25	0.25	-0.20	-0.29	-0.26	1.2639	0.0221	9.9	1.1	9.9	1.2		
Science	8	1982	4	A.1.2.1	2	10588	0.61	0.61	0.16	0.16	0.07	0.00	0.35	0.35	-0.21	-0.34	-0.37	0.0688	0.0218	4.7	1.0	5.9	1.1	A-	A-
Science	8	2346	4	A.1.1.4	1	10588	0.53	0.18	0.17	0.53	0.12	0.00	0.37	-0.26	-0.35	0.37	-0.36	0.4287	0.0214	3.1	1.0	3.0	1.0	A-	A-
Science	8	2391	4	A.1.2.2	2	10588	0.33	0.33	0.38	0.16	0.13	0.00	0.28	0.28	-0.23	-0.38	-0.33	1.4254	0.0225	5.3	1.1	9.9	1.2	A-	A-
Science	8	3370	4	B.2.2.2	1	10588	0.60	0.60	0.06	0.11	0.22	0.00	0.32	0.32	-0.33	-0.40	-0.16	0.0987	0.0218	8.0	1.1	9.9	1.2		
Science	8	5194	4	B.2.1.1	2	10588	0.71	0.12	0.09	0.71	0.07	0.00	0.48	-0.29	-0.44	0.48	-0.38	-0.5128	0.0233	-9.9	0.9	-9.3	0.8	A+	A-
Science	8	5558	4	A.1.3.1	1	10588	0.46	0.46	0.20	0.13	0.20	0.00	0.31	0.31	-0.27	-0.40	-0.22	0.7660	0.0214	9.9	1.1	9.8	1.1	A-	A-
Science	8	7719	4	D.1.3.4	2	10588	0.34	0.09	0.12	0.34	0.45	0.00	0.27	-0.38	-0.39	0.27	-0.20	1.4092	0.0224	6.3	1.1	9.9	1.2	A+	A+
Science	8	8204	4	C.3.1.3	2	10588	0.33	0.19	0.33	0.23	0.25	0.00	0.08	-0.18	0.08	-0.08	-0.01	1.4361	0.0225	9.9	1.3	9.9	1.5	A-	A-
Science	8	8524	4	D.1.1.3	2	10588	0.22	0.24	0.09	0.45	0.22	0.00	0.11	-0.09	-0.30	-0.10	0.11	2.1163	0.0253	9.9	1.2	9.9	1.6	A-	A-
Science	8	8772	4	D.3.1.3	2	10588	0.55	0.12	0.12	0.20	0.55	0.00	0.44	-0.35	-0.41	-0.36	0.44	0.3260	0.0215	-5.8	1.0	-5.9	0.9	A-	A-
Science	8	9160	4	D.1.1.1	1	10588	0.53	0.53	0.24	0.09	0.15	0.00	0.26	0.26	-0.19	-0.35	-0.18	0.4545	0.0214	9.9	1.1	9.9	1.2	A-	A-
Science	8	1146	5	A.3.1.4	2	10571	0.44	0.12	0.44	0.27	0.16	0.00	0.29	-0.39	0.29	-0.24	-0.20	0.8468	0.0214	8.2	1.1	9.8	1.1	A-	A-
Science	8	1885	5	B.2.1.2	2	10571	0.41	0.09	0.42	0.41	0.08	0.00	0.24	-0.38	-0.14	0.24	-0.40	0.9966	0.0216	9.9	1.1	9.9	1.2	A+	A-
Science	8	3006	5	D.1.3.4		10571	0.51	0.18	0.51	0.18	0.13	0.00	0.18	-0.11	0.18	-0.17	-0.18	0.5483	0.0213	9.9	1.2	9.9	1.3	A-	A-
Science	8	3042	5	A.2.2.3	2	10571	0.52	0.52	0.11	0.18	0.20	0.00	0.34	0.34	-0.39	-0.26	-0.27	0.5025	0.0213	6.2	1.1	6.5	1.1		
Science	8	4758	5	D.1.3.1	2	10571	0.49	0.18	0.12	0.49	0.20	0.00	0.36	-0.31	-0.36	0.36	-0.31	0.6027	0.0213	2.0	1.0	2.4	1.0	A-	A-
Science	8	6187	5	C.3.1.1	2	10571	0.33	0.15	0.33	0.41	0.11	0.00	0.03	-0.18	0.03	0.10	-0.23	1.4461	0.0225	9.9	1.3	9.9	1.6	A+	A-
Science	8	6751	5	A.1.2.1	2	10571	0.36	0.15	0.28	0.36	0.20	0.00	0.18	-0.28	-0.07	0.18	-0.26	1.2438	0.0220	9.9	1.2	9.9	1.3	A-	A-
Science	8	7109	5	D.1.1.4	2	10571	0.77	0.10	0.08	0.77	0.05	0.00	0.51	-0.37	-0.36	0.51	-0.38	-0.8616	0.0248	-9.9	0.9	-9.9	0.7	A+	A-
Science	8	7157	5	A.3.1.1	2	10571	0.54	0.17	0.16	0.13	0.54	0.00	0.44	-0.29	-0.44	-0.46	0.44	0.3930	0.0214	-7.1	0.9	-5.3	0.9	A+	A-
Science	8	8068	5	C.2.2.1	1	10571	0.82	0.82	0.04	0.07	0.07	0.00	0.34	0.34	-0.31	-0.22	-0.19	-1.2223	0.0269	-1.5	1.0	3.3	1.1		
Science	8	8706	5	A.3.2.2	2	10571	0.46	0.21	0.17	0.46	0.16	0.00	0.26	-0.21	-0.31	0.26	-0.21	0.7842	0.0214	9.9	1.1	9.9	1.2	A-	A-
Science	8	9732	5	C.2.1.3	2	10571	0.35	0.35	0.13	0.35	0.17	0.00	0.19	0.19	-0.25	-0.13	-0.25	1.2972	0.0221	9.9	1.2	9.9	1.3	A-	A-
Science	8	511	6	A.3.2.1	2	10578	0.70	0.05	0.07	0.18	0.70	0.00	0.45	-0.40	-0.39	-0.32	0.45	-0.4474	0.0231	-7.8	0.9	-5.5	0.9	A+	A-
Science	8	810	6	A.1.3.1	2	10578	0.43	0.16	0.28	0.43	0.13	0.00	0.17	-0.15	-0.10	0.17	-0.29	0.9111	0.0216	9.9	1.2	9.9	1.3	A-	A+
Science	8	1849	6	C.2.1.2	2	10578	0.36	0.30	0.17	0.36	0.17	0.00	0.28	-0.28	-0.40	0.28	-0.15	1.2524	0.0221	9.0	1.1	9.9	1.2	A-	A-
Science	8	2577	6	B.3.1.2	2	10578	0.29	0.28	0.29	0.29	0.14	0.00	0.12	-0.10	-0.05	0.12	-0.30	1.6381	0.0232	9.9	1.2	9.9	1.5	A+	A-
Science	8	3047	6	A.1.2.1	2	21509	0.54	0.15	0.14	0.17	0.54	0.00	0.45	-0.35	-0.42	-0.40	0.45	0.3640	0.0151	-7.7	1.0	-5.9	1.0		
Science	8	3358	6	D.1.2.2	2	10578	0.56	0.56	0.16	0.14	0.13	0.00	0.40	0.40	-0.32	-0.37	-0.34	0.2764	0.0216	-1.4	1.0	-0.8	1.0		
Science	8	3560	6	B.1.1.2	2	10578	0.52	0.19	0.18	0.52	0.10	0.00	0.32	-0.34	-0.19	0.32	-0.32	0.4543	0.0214	8.9	1.1	8.2	1.1	A-	A-
Science	8	4153	6	A.1.2.3	2	10578	0.53	0.53	0.09	0.14	0.24	0.00	0.43	0.43	-0.45	-0.34	-0.36	0.4460	0.0214	-5.6	1.0	-6.0	0.9	A-	A-
Science	8	8874	6	A.1.3.3	3	10578	0.39	0.39	0.18	0.27	0.16	0.00	0.28	0.28	-0.35	-0.25	-0.22	1.0957	0.0218	9.9	1.1	9.9	1.2	A-	A-
Science	8	9243	6	D.1.3.1	2	10578	0.72	0.10	0.11	0.72	0.06	0.00	0.46	-0.33	-0.36	0.46	-0.33	-0.5784	0.0236	-7.4	0.9	-8.1	0.9	A-	B-
Science	8	9529	6	C.1.1.3	2	10578	0.50	0.11	0.50	0.14	0.26	0.00	0.31	-0.31	0.31	-0.30	-0.22	0.5969	0.0214	9.0	1.1	9.0	1.1	A+	A-
Science	8	9650	6	C.2.1.3	2	10578	0.25	0.25	0.30	0.25	0.20	0.00	0.01	-0.15	0.04	0.01	0.08	1.8910	0.0242	9.9	1.3	9.9	1.8	A-	A-

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	169	7	A.2.1.5	2	10574	0.60	0.12	0.60	0.20	0.08	0.00	0.39	-0.32	0.39	-0.30	-0.37	0.0907	0.0218	-0.7	1.0	-0.8	1.0	A+	A-
Science	8	466	7	B.1.1.4	3	10574	0.56	0.16	0.16	0.56	0.11	0.00	0.41	-0.32	-0.34	0.41	-0.39	0.2647	0.0215	-3.5	1.0	-4.8	0.9	A-	A-
Science	8	507	7	C.2.2.3	1	21128	0.60	0.13	0.13	0.14	0.60	0.00	0.49	-0.41	-0.44	-0.36	0.49	0.0833	0.0154	-9.9	0.9	-9.9	0.9		
Science	8	837	7	D.1.2.2	2	10574	0.38	0.15	0.28	0.19	0.38	0.00	0.32	-0.30	-0.26	-0.40	0.32	1.1639	0.0219	4.0	1.0	7.4	1.1	A-	A-
Science	8	4887	7	A.3.1.4	2	10574	0.33	0.20	0.27	0.20	0.33	0.00	0.25	-0.20	-0.23	-0.36	0.25	1.4179	0.0225	9.5	1.1	9.9	1.2	A-	A+
Science	8	5570	7	D.2.1.3	2	10574	0.49	0.33	0.10	0.49	0.08	0.00	0.25	-0.16	-0.29	0.25	-0.35	0.6160	0.0214	9.9	1.2	9.9	1.2	A-	A-
Science	8	5722	7	B.3.3.4	2	10574	0.65	0.06	0.08	0.20	0.65	0.00	0.48	-0.45	-0.45	-0.34	0.48	-0.1778	0.0223	-9.9	0.9	-9.0	0.9	A+	A-
Science	8	5795	7	C.1.1.3	2	10574	0.45	0.07	0.19	0.29	0.45	0.00	0.22	-0.36	-0.23	-0.14	0.22	0.8316	0.0215	9.9	1.2	9.9	1.2	A+	A-
Science	8	6652	7	A.1.2.2	2	21128	0.43	0.43	0.14	0.25	0.17	0.00	0.34	0.34	-0.41	-0.25	-0.33	0.9520	0.0153	4.3	1.0	7.7	1.1		
Science	8	6931	7	A.2.1.6	2	10574	0.28	0.42	0.28	0.22	0.08	0.00	-0.03	0.10	-0.03	-0.02	-0.16	1.6932	0.0234	9.9	1.3	9.9	1.8	A-	A-
Science	8	8891	7	D.1.3.2	3	10574	0.36	0.14	0.29	0.36	0.21	0.00	0.14	-0.19	-0.08	0.14	-0.17	1.2661	0.0221	9.9	1.2	9.9	1.4	A-	A-
Science	8	9346	7	C.1.1.1	1	10574	0.57	0.57	0.11	0.22	0.09	0.00	0.41	0.41	-0.39	-0.33	-0.33	0.2194	0.0216	-3.6	1.0	-3.7	1.0	A-	A-
Science	8	110	8	A.1.3.1	3	10553	0.25	0.25	0.31	0.27	0.17	0.00	0.13	0.13	-0.13	-0.14	-0.19	1.9006	0.0243	9.9	1.2	9.9	1.5	A-	A+
Science	8	2123	8	A.2.2.1	2	10553	0.61	0.06	0.08	0.25	0.61	0.00	0.30	-0.31	-0.29	-0.20	0.30	0.0467	0.0219	9.9	1.1	9.9	1.2		
Science	8	2180	8	A.2.1.4	3	10553	0.36	0.36	0.18	0.38	0.08	0.00	0.24	0.24	-0.20	-0.22	-0.40	1.2597	0.0222	9.9	1.1	9.9	1.2	A+	A+
Science	8	2552	8	C.2.1.3	2	10553	0.47	0.47	0.17	0.22	0.14	0.00	0.38	0.38	-0.41	-0.35	-0.27	0.7469	0.0215	-0.2	1.0	1.1	1.0	A-	A-
Science	8	2702	8	B.3.1.1	2	10553	0.23	0.10	0.09	0.23	0.57	0.00	0.13	-0.46	-0.37	0.13	-0.03	1.9974	0.0248	9.9	1.1	9.9	1.6	A-	A+
Science	8	3147	8	D.1.3.1	2	10553	0.65	0.11	0.65	0.15	0.08	0.00	0.43	-0.36	0.43	-0.31	-0.37	-0.1663	0.0223	-5.0	1.0	-5.4	0.9	A+	A-
Science	8	3638	8	D.3.1.1	2	10553	0.22	0.25	0.43	0.10	0.22	0.00	0.12	-0.17	-0.05	-0.42	0.12	2.0976	0.0253	9.9	1.2	9.9	1.6	A-	A-
Science	8	4048	8	C.1.1.3	2	10553	0.55	0.09	0.13	0.22	0.55	0.00	0.43	-0.41	-0.37	-0.34	0.43	0.3253	0.0215	-4.8	1.0	-6.0	0.9	A-	A-
Science	8	4323	8	A.1.3.3	2	10553	0.32	0.32	0.14	0.25	0.29	0.00	0.14	0.14	-0.39	-0.13	-0.04	1.5040	0.0228	9.9	1.2	9.9	1.4	A-	A-
Science	8	4338	8	B.1.1.3	2	10553	0.28	0.18	0.28	0.31	0.23	0.00	0.12	-0.19	0.12	-0.01	-0.23	1.7369	0.0236	9.9	1.2	9.9	1.5	A-	A-
Science	8	4553	8	D.3.1.3	2	10553	0.56	0.19	0.16	0.09	0.56	0.00	0.46	-0.36	-0.39	-0.45	0.46	0.3200	0.0215	-8.3	0.9	-8.2	0.9		
Science	8	8617	8	C.2.1.1	2	10553	0.66	0.66	0.14	0.09	0.11	0.00	0.45	0.45	-0.29	-0.45	-0.35	-0.2003	0.0224	-7.4	0.9	-8.2	0.9	A-	B-
Science	8	721	9	B.1.1.4	2	10546	0.52	0.15	0.52	0.19	0.14	0.00	0.35	-0.32	0.35	-0.31	-0.29	0.4745	0.0215	4.8	1.0	3.5	1.0	A-	A+
Science	8	1137	9	D.1.2.2	2	10546	0.49	0.25	0.16	0.10	0.49	0.00	0.32	-0.25	-0.30	-0.34	0.32	0.6593	0.0215	7.6	1.1	6.5	1.1	A-	A-
Science	8	1308	9	A.1.2.1	2	10546	0.52	0.14	0.18	0.52	0.16	0.00	0.42	-0.29	-0.39	0.42	-0.42	0.5163	0.0215	-4.2	1.0	-2.4	1.0		
Science	8	3534	9	D.1.2.1	2	10546	0.45	0.12	0.16	0.45	0.26	0.00	0.29	-0.36	-0.31	0.29	-0.17	0.8132	0.0216	9.9	1.1	9.9	1.1	A-	A-
Science	8	4151	9	A.2.1.6	2	10546	0.53	0.18	0.22	0.53	0.07	0.00	0.34	-0.29	-0.31	0.34	-0.28	0.4675	0.0215	6.1	1.1	4.7	1.1	A-	A-
Science	8	4613	9	D.1.3.1	1	10546	0.56	0.21	0.56	0.10	0.13	0.00	0.38	-0.26	0.38	-0.40	-0.32	0.2933	0.0216	2.0	1.0	0.9	1.0	A-	A-
Science	8	4953	9	A.1.1.1	1	10546	0.65	0.17	0.09	0.10	0.65	0.00	0.44	-0.30	-0.46	-0.34	0.44	-0.1382	0.0223	-5.6	1.0	-1.4	1.0	A+	A-
Science	8	6690	9	C.1.1.2	2	10546	0.39	0.12	0.39	0.17	0.31	0.00	0.33	-0.44	0.33	-0.38	-0.23	1.1354	0.0220	5.3	1.1	8.1	1.1	A-	A+
Science	8	7625	9	D.2.1.2	2	10546	0.40	0.12	0.36	0.13	0.40	0.00	0.35	-0.42	-0.28	-0.42	0.35	1.0874	0.0219	2.7	1.0	4.8	1.1	A-	A-
Science	8	8324	9	D.1.2.1	1	10546	0.62	0.21	0.62	0.09	0.07	0.00	0.41	-0.28	0.41	-0.41	-0.34	-0.0194	0.0220	-2.0	1.0	-3.8	1.0	A-	A-
Science	8	9184	9	B.3.2.1	2	10546	0.40	0.13	0.09	0.38	0.40	0.00	0.29	-0.31	-0.45	-0.22	0.29	1.0638	0.0219	9.9	1.1	9.9	1.1	A+	A+
Science	8	9359	9	C.2.2.2	2	10546	0.49	0.07	0.49	0.33	0.11	0.00	0.36	-0.44	0.36	-0.28	-0.34	0.6692	0.0215	1.7	1.0	2.0	1.0		
Science	8	671	10	B.2.1.1	2	10553	0.67	0.67	0.07	0.19	0.07	0.00	0.43	0.43	-0.38	-0.30	-0.36	-0.2946	0.0227	-3.9	1.0	-3.9	0.9		
Science	8	1738	10	D.3.1.3	2	10553	0.48	0.15	0.14	0.23	0.48	0.00	0.35	-0.35	-0.40	-0.22	0.35	0.6845	0.0215	4.8	1.0	4.9	1.1	A-	A-
Science	8	1805	10	A.1.1.1	2	10553	0.63	0.09	0.16	0.12	0.63	0.00	0.54	-0.41	-0.44	-0.46	0.54	-0.0748	0.0222	-9.9	0.9	-9.9	0.8	A+	A+
Science	8	2562	10	B.2.2.2	2	10553	0.23	0.27	0.23	0.26	0.23	0.00	-0.01	-0.03	-0.01	0.03	0.03	2.0239	0.0248	9.9	1.3	9.9	1.8	A+	A-
Science	8	2763	10	A.2.1.2	2	10553	0.37	0.10	0.31	0.37	0.21	0.00	0.31	-0.40	-0.34	0.31	-0.19	1.2290	0.0221	4.7	1.0	9.9	1.2	A-	A-
Science	8	2911	10	C.3.1.3	2	10553	0.19	0.19	0.20	0.33	0.29	0.00	0.01	0.01	-0.13	-0.02	0.08	2.3402	0.0267	9.9	1.2	9.9	2.0	A-	A-
Science	8	4942	10	D.1.1.3	2	10553	0.27	0.27	0.13	0.11	0.49	0.00	0.07	0.07	-0.32	-0.26	0.04	1.7824	0.0237	9.9	1.3	9.9	1.6	A-	A-
Science	8	5690	10	A.3.2.2	2	10553	0.67	0.10	0.09	0.15	0.67	0.00	0.56	-0.45	-0.46	-0.44	0.56	-0.2724	0.0227	-9.9	0.8	-9.9	0.7	A+	A-
Science	8	5743	10	D.1.3.3	2	10553	0.47	0.24	0.21	0.47	0.08	0.00	0.40	-0.31	-0.43	0.40	-0.36	0.7467	0.0215	-2.0	1.0	0.5	1.0	A+	A-
Science	8	6873	10	C.2.1.1	1	10553	0.37	0.24	0.37	0.25	0.14	0.00	0.26	-0.29	0.26	-0.23	-0.26	1.2354	0.0221	9.9	1.1	9.9	1.2	B-	A-
Science	8	7034	10	A.1.1.3	3	10553	0.55	0.25	0.55	0.14	0.06	0.00	0.32	-0.19	0.32	-0.33	-0.40	0.3352	0.0216	9.3	1.1	7.9	1.1		
Science	8	8529	10	A.2.2.1	1	10553	0.53	0.53	0.06	0.15	0.25	0.00	0.36	0.36	-0.42	-0.37	-0.23	0.4221	0.0215	4.0	1.0	2.8	1.0	A-	A-
Science	8	1240	11	C.2.1.2	2	21101	0.59	0.13	0.11	0.17	0.59	0.00	0.43	-0.38	-0.44	-0.30	0.43	0.1588	0.0153	-7.6	1.0	-6.6	0.9		

Appendix I: Item Statistics Multiple Choice

Item Information						Classical													Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	1393	11	D.2.1.2	2	10542	0.37	0.11	0.09	0.43	0.37	0.00	0.20	-0.39	-0.37	-0.08	0.20	1.2483	0.0221	9.9	1.2	9.9	1.3	A-	A-	
Science	8	1456	11	C.3.1.3	3	10542	0.35	0.23	0.21	0.35	0.20	0.00	0.06	-0.11	-0.12	0.06	0.06	1.3345	0.0222	9.9	1.3	9.9	1.5	A+	A+	
Science	8	2151	11	A.1.3.3	2	10542	0.39	0.27	0.12	0.39	0.21	0.00	0.16	-0.05	-0.41	0.16	-0.13	1.1203	0.0218	9.9	1.2	9.9	1.3	A-	A-	
Science	8	2848	11	B.2.2.2	2	21101	0.72	0.11	0.72	0.09	0.07	0.00	0.52	-0.36	0.52	-0.44	-0.39	-0.5651	0.0167	-9.9	0.9	-9.9	0.8			
Science	8	3186	11	B.2.1.4	2	10542	0.35	0.41	0.35	0.09	0.15	0.00	0.27	-0.16	0.27	-0.51	-0.34	1.3380	0.0223	7.8	1.1	9.9	1.2	A-	A+	
Science	8	4226	11	A.2.1.4	2	10542	0.42	0.42	0.15	0.26	0.16	0.00	0.31	0.31	-0.40	-0.22	-0.29	0.9684	0.0216	6.2	1.1	8.3	1.1	A-	A-	
Science	8	4337	11	A.1.1.2	2	10542	0.63	0.07	0.08	0.22	0.63	0.00	0.41	-0.43	-0.43	-0.25	0.41	-0.0596	0.0221	-3.3	1.0	-2.0	1.0	A+	A-	
Science	8	5216	11	C.1.1.2	3	10542	0.43	0.26	0.16	0.15	0.43	0.00	0.25	-0.13	-0.33	-0.31	0.25	0.9189	0.0215	9.9	1.1	9.9	1.2	A+	A-	
Science	8	7789	11	A.3.1.1	2	10542	0.46	0.25	0.12	0.16	0.46	0.00	0.27	-0.11	-0.36	-0.36	0.27	0.7640	0.0214	9.9	1.1	9.9	1.2	A-	A-	
Science	8	7895	11	C.1.1.1	2	10542	0.65	0.12	0.65	0.13	0.10	0.00	0.44	-0.35	0.44	-0.37	-0.33	-0.1541	0.0223	-6.5	0.9	-8.0	0.9	A+	A+	
Science	8	8950	11	D.1.2.1	2	10542	0.55	0.06	0.08	0.55	0.31	0.00	0.25	-0.41	-0.40	0.25	-0.08	0.3514	0.0215	9.9	1.2	9.9	1.2	A+	A-	
Science	8	1222	12	B.3.1.2	2	10527	0.40	0.34	0.18	0.07	0.40	0.00	0.22	-0.13	-0.21	-0.45	0.22	1.0887	0.0218	9.9	1.2	9.9	1.3	A+	A-	
Science	8	2041	12	C.2.2.1	1	10527	0.69	0.09	0.12	0.69	0.10	0.00	0.34	-0.34	-0.27	0.34	-0.18	-0.3533	0.0230	3.4	1.0	4.2	1.1	A+	A-	
Science	8	2600	12	B.2.1.3	2	10527	0.59	0.10	0.21	0.10	0.59	0.00	0.30	-0.28	-0.20	-0.32	0.30	0.1892	0.0218	9.9	1.1	9.9	1.2	A+	A+	
Science	8	2939	12	A.1.1.4	1	10527	0.78	0.07	0.78	0.08	0.07	0.00	0.52	-0.34	0.52	-0.43	-0.35	-0.8929	0.0253	-9.9	0.8	-9.9	0.7	A+	A-	
Science	8	3381	12	D.2.1.2	2	10527	0.70	0.70	0.15	0.09	0.06	0.00	0.50	0.50	-0.37	-0.41	-0.40	-0.4073	0.0232	-9.9	0.9	-9.9	0.8			
Science	8	3651	12	A.3.1.2	2	10527	0.71	0.09	0.12	0.71	0.08	0.00	0.49	-0.34	-0.44	0.49	-0.32	-0.4963	0.0235	-9.9	0.9	-9.9	0.8	A+	A-	
Science	8	4102	12	A.1.1.3	2	10527	0.63	0.13	0.07	0.17	0.63	0.00	0.42	-0.35	-0.42	-0.28	0.42	-0.0560	0.0222	-2.7	1.0	-4.3	0.9	A-	A-	
Science	8	4723	12	D.2.1.1	3	10527	0.61	0.18	0.06	0.16	0.61	0.00	0.33	-0.19	-0.35	-0.32	0.33	0.0766	0.0220	7.7	1.1	7.5	1.1	A-	A-	
Science	8	8358	12	B.3.1.1	2	10527	0.73	0.73	0.10	0.12	0.05	0.00	0.51	0.51	-0.42	-0.38	-0.37	-0.5859	0.0239	-9.9	0.9	-9.9	0.8	A+	A-	
Science	8	8922	12	D.1.1.4	2	10527	0.38	0.08	0.38	0.25	0.28	0.00	0.18	-0.35	0.18	-0.14	-0.14	1.1937	0.0220	9.9	1.2	9.9	1.3	A-	A-	
Science	8	9315	12	A.1.3.1	2	10527	0.59	0.26	0.05	0.59	0.10	0.00	0.41	-0.36	-0.40	0.41	-0.27	0.1519	0.0219	-1.6	1.0	-2.4	1.0	A-	A-	
Science	8	9366	12	A.1.1.1	2	10527	0.55	0.16	0.22	0.55	0.06	0.00	0.21	-0.20	-0.09	0.21	-0.35	0.3679	0.0216	9.9	1.2	9.9	1.3			
Science	11	99	0	C.3.1.5		125318	0.56	0.12	0.56	0.27	0.05	0.00	0.25	-0.20	0.25	-0.21	-0.22	0.2127	0.0062	9.9	1.1	9.9	1.1			
Science	11	217	0	C.3.1.1	2	125318	0.37	0.20	0.13	0.29	0.37	0.00	0.23	-0.24	-0.28	-0.19	0.23	1.1180	0.0063	9.9	1.1	9.9	1.2			
Science	11	538	0	A.2.2.2	1	125318	0.76	0.08	0.05	0.76	0.10	0.00	0.50	-0.41	-0.37	0.50	-0.30	-0.8679	0.0071	-9.9	0.9	-9.9	0.7			
Science	11	716	0	D.1.2.2	2	125318	0.61	0.13	0.61	0.21	0.05	0.00	0.38	-0.33	0.38	-0.29	-0.35	-0.0428	0.0063	-6.9	1.0	-2.7	1.0			
Science	11	739	0	A.3.3.3		125318	0.64	0.09	0.64	0.17	0.09	0.00	0.38	-0.27	0.38	-0.31	-0.31	-0.1975	0.0064	-6.3	1.0	-8.4	1.0			
Science	11	903	0	A.3.1.1	3	125318	0.61	0.05	0.09	0.61	0.25	0.00	0.35	-0.37	-0.35	0.35	-0.22	-0.0398	0.0063	3.6	1.0	-3.9	1.0			
Science	11	968	0	D.1.1.2	1	125318	0.55	0.12	0.22	0.12	0.55	0.00	0.35	-0.31	-0.33	-0.25	0.35	0.2701	0.0061	5.2	1.0	4.3	1.0			
Science	11	1339	0	A.2.1.5	2	125318	0.70	0.70	0.07	0.06	0.17	0.00	0.25	0.25	-0.09	-0.15	-0.26	-0.5332	0.0066	9.9	1.1	9.9	1.2			
Science	11	1623	0	A.1.1.1	1	125318	0.55	0.05	0.55	0.25	0.13	0.02	0.29	-0.31	0.29	-0.21	-0.26	0.2618	0.0061	9.9	1.1	9.9	1.1			
Science	11	2236	0	A.1.3.2		125318	0.65	0.06	0.65	0.24	0.05	0.00	0.34	-0.36	0.34	-0.24	-0.28	-0.2522	0.0064	3.7	1.0	6.0	1.0			
Science	11	2275	0	D.3.1.2	1	125318	0.54	0.15	0.18	0.13	0.54	0.00	0.26	-0.23	-0.26	-0.16	0.26	0.2994	0.0061	9.9	1.1	9.9	1.1			
Science	11	2490	0	B.3.2.2	2	125318	0.69	0.69	0.19	0.08	0.04	0.01	0.37	0.37	-0.28	-0.30	-0.27	-0.4562	0.0066	-7.5	1.0	-3.2	1.0			
Science	11	2766	0	A.3.2.2		125318	0.55	0.10	0.27	0.55	0.08	0.00	0.37	-0.39	-0.25	0.37	-0.38	0.2725	0.0061	0.0	1.0	-2.2	1.0			
Science	11	3468	0	A.2.2.2	1	125318	0.67	0.67	0.09	0.14	0.09	0.01	0.46	0.46	-0.38	-0.33	-0.37	-0.3327	0.0065	-9.9	0.9	-9.9	0.8			
Science	11	3670	0	A.2.2.2	1	125318	0.52	0.20	0.13	0.14	0.52	0.00	0.30	-0.13	-0.34	-0.35	0.30	0.3750	0.0061	9.9	1.1	9.9	1.1			
Science	11	3885	0	C.3.1.1		125318	0.40	0.40	0.14	0.14	0.31	0.00	0.40	0.40	-0.48	-0.51	-0.28	0.9715	0.0062	-9.9	1.0	-9.9	1.0			
Science	11	4143	0	A.1.3.1	2	125318	0.85	0.85	0.07	0.03	0.05	0.00	0.25	0.25	-0.19	-0.18	-0.13	-1.5296	0.0083	-0.1	1.0	9.9	1.1			
Science	11	4349	0	B.3.3.1		125318	0.56	0.11	0.05	0.56	0.28	0.00	0.45	-0.36	-0.37	0.45	-0.40	0.1984	0.0062	-9.9	0.9	-9.9	0.9			
Science	11	4859	0	C.3.1.1	2	125318	0.52	0.12	0.52	0.18	0.18	0.01	0.33	-0.33	0.33	-0.27	-0.26	0.4180	0.0061	9.9	1.0	9.9	1.0			
Science	11	5027	0	B.2.1.2		125318	0.42	0.42	0.19	0.27	0.12	0.00	0.31	0.31	-0.37	-0.25	-0.28	0.8987	0.0062	9.9	1.0	9.9	1.1			
Science	11	5172	0	D.1.1.2		125318	0.61	0.61	0.22	0.14	0.03	0.00	0.34	0.34	-0.27	-0.29	-0.27	-0.0378	0.0063	8.7	1.0	9.9	1.0			
Science	11	5193	0	B.2.2.3	1	125318	0.59	0.17	0.16	0.08	0.59	0.01	0.48	-0.41	-0.38	-0.41	0.48	0.0664	0.0062	-9.9	0.9	-9.9	0.9			
Science	11	5568	0	A.1.3.1	2	125318	0.68	0.15	0.12	0.68	0.04	0.00	0.25	-0.21	-0.18	0.25	-0.16	-0.4071	0.0065	9.9	1.1	9.9	1.2			
Science	11	5598	0	D.1.3.2	2	125318	0.59	0.09	0.16	0.59	0.15	0.01	0.35	-0.35	-0.29	0.35	-0.24	0.0462	0.0062	6.0	1.0	9.9	1.0			
Science	11	5778	0	D.2.1.1		125318	0.57	0.23	0.14	0.57	0.06	0.00	0.39	-0.32	-0.38	0.39	-0.27	0.1459	0.0062	-9.9	1.0	-9.8	1.0			
Science	11	6131	0	A.2.2.2	2	125318	0.76	0.08	0.05	0.76	0.10	0.01	0.46	-0.33	-0.36	0.46	-0.31	-0.8459	0.0070	-9.9	0.9	-9.9	0.8			

Appendix I: Item Statistics Multiple Choice

Item Information						Classical													Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	6334	0	A.2.1.5	2	125318	0.69	0.13	0.69	0.11	0.07	0.01	0.38	-0.20	0.38	-0.30	-0.38	-0.4491	0.0066	-9.4	1.0	-9.9	1.0			
Science	11	6444	0	A.1.2.1	1	125318	0.68	0.20	0.05	0.07	0.68	0.00	0.38	-0.27	-0.37	-0.31	0.38	-0.4084	0.0065	-9.9	1.0	-7.1	1.0			
Science	11	6694	0	A.2.2.1	2	125318	0.81	0.05	0.07	0.06	0.81	0.01	0.35	-0.19	-0.32	-0.19	0.35	-1.2062	0.0076	-9.9	0.9	-1.6	1.0			
Science	11	6821	0	C.1.1.2	2	125318	0.38	0.38	0.24	0.29	0.09	0.00	0.29	0.29	-0.43	-0.17	-0.28	1.0527	0.0063	9.9	1.1	9.9	1.1			
Science	11	6876	0	C.1.1.1	2	125318	0.53	0.27	0.53	0.15	0.05	0.00	0.53	-0.46	0.53	-0.52	-0.39	0.3513	0.0061	-9.9	0.8	-9.9	0.8			
Science	11	6954	0	A.3.1.4		125318	0.68	0.68	0.05	0.22	0.05	0.00	0.40	0.40	-0.21	-0.39	-0.20	-0.3778	0.0065	-9.9	1.0	-9.9	0.9			
Science	11	6973	0	A.2.1.3		125318	0.74	0.74	0.18	0.04	0.03	0.00	0.31	0.31	-0.22	-0.27	-0.24	-0.7516	0.0069	5.0	1.0	1.2	1.0			
Science	11	7047	0	D.2.1.1		125318	0.62	0.12	0.13	0.12	0.62	0.00	0.45	-0.35	-0.32	-0.41	0.45	-0.0843	0.0063	-9.9	0.9	-9.9	0.9			
Science	11	7179	0	A.3.3.1		125318	0.69	0.10	0.69	0.14	0.06	0.00	0.45	-0.30	0.45	-0.36	-0.36	-0.4596	0.0066	-9.9	0.9	-9.9	0.9			
Science	11	7289	0	B.1.1.1		125318	0.50	0.26	0.50	0.12	0.12	0.00	0.35	-0.22	0.35	-0.42	-0.35	0.4874	0.0061	5.5	1.0	5.0	1.0			
Science	11	7552	0	B.3.1.3	2	125318	0.64	0.16	0.14	0.64	0.05	0.00	0.49	-0.37	-0.42	0.49	-0.39	-0.2146	0.0064	-9.9	0.9	-9.9	0.8			
Science	11	7560	0	C.1.1.6	2	125318	0.63	0.20	0.10	0.63	0.06	0.00	0.35	-0.27	-0.24	0.35	-0.35	-0.1168	0.0063	3.4	1.0	-0.7	1.0			
Science	11	7688	0	A.2.2.2	2	125318	0.69	0.11	0.07	0.13	0.69	0.00	0.40	-0.29	-0.34	-0.29	0.40	-0.4371	0.0065	-9.9	1.0	-9.9	0.9			
Science	11	7877	0	A.3.1.2	2	125318	0.69	0.07	0.03	0.69	0.21	0.00	0.42	-0.34	-0.31	0.42	-0.33	-0.4262	0.0065	-9.9	1.0	-9.9	0.9			
Science	11	8407	0	D.1.1.1		125318	0.42	0.42	0.36	0.10	0.11	0.00	0.26	0.26	-0.25	-0.35	-0.15	0.8870	0.0062	9.9	1.1	9.9	1.1			
Science	11	8573	0	A.2.2.1		125318	0.71	0.22	0.04	0.71	0.04	0.00	0.37	-0.26	-0.33	0.37	-0.29	-0.5595	0.0067	-5.6	1.0	-8.8	1.0			
Science	11	8856	0	C.1.1.6	2	125318	0.50	0.50	0.18	0.25	0.07	0.00	0.30	0.30	-0.22	-0.28	-0.27	0.4878	0.0061	9.9	1.1	9.9	1.1			
Science	11	9016	0	A.1.1.2	2	125318	0.71	0.71	0.10	0.16	0.03	0.00	0.32	0.32	-0.20	-0.27	-0.25	-0.5422	0.0067	6.3	1.0	7.3	1.0			
Science	11	9083	0	B.2.2.3	3	125318	0.63	0.19	0.63	0.10	0.07	0.01	0.46	-0.31	0.46	-0.42	-0.40	-0.1578	0.0063	-9.9	0.9	-9.9	0.9			
Science	11	9157	0	D.3.1.2	2	125318	0.48	0.16	0.23	0.48	0.13	0.00	0.26	-0.27	-0.25	0.26	-0.14	0.5847	0.0061	9.9	1.1	9.9	1.1			
Science	11	9735	0	D.1.3.2		125318	0.52	0.12	0.52	0.27	0.08	0.00	0.34	-0.28	0.34	-0.29	-0.34	0.3800	0.0061	9.9	1.0	9.9	1.0			
Science	11	9824	0	B.2.1.4	2	125318	0.59	0.13	0.08	0.59	0.19	0.00	0.45	-0.39	-0.42	0.45	-0.32	0.0504	0.0062	-9.9	0.9	-9.9	0.9			
Science	11	9890	0	A.1.1.2	2	125318	0.55	0.10	0.55	0.32	0.03	0.00	0.26	-0.27	0.26	-0.21	-0.22	0.2617	0.0061	9.9	1.1	9.9	1.1			
Science	11	9988	0	A.3.3.3	2	125318	0.86	0.02	0.08	0.04	0.86	0.00	0.42	-0.24	-0.30	-0.29	0.42	-1.5699	0.0084	-9.9	0.9	-9.9	0.7			
Science	11	1104	1	A.2.1.2	2	15929	0.77	0.09	0.77	0.08	0.05	0.00	0.53	-0.42	0.53	-0.38	-0.32	-0.9179	0.0200	-9.9	0.8	-9.9	0.7	B+	A-	
Science	11	1844	1	A.2.1.4	2	15929	0.40	0.40	0.22	0.09	0.29	0.00	0.33	0.33	-0.37	-0.43	-0.21	0.9618	0.0176	4.7	1.0	9.1	1.1	A+	A+	
Science	11	2034	1	D.1.1.3	2	15929	0.58	0.18	0.11	0.58	0.13	0.00	0.34	-0.31	-0.34	0.34	-0.19	0.0770	0.0175	4.7	1.0	4.8	1.0	A-	A-	
Science	11	2060	1	D.1.1.2	2	15929	0.26	0.31	0.26	0.32	0.10	0.00	0.19	-0.14	0.19	-0.23	-0.28	1.7179	0.0194	9.9	1.1	9.9	1.4			
Science	11	3480	1	A.1.2.1	2	15929	0.69	0.06	0.13	0.11	0.69	0.01	0.44	-0.36	-0.30	-0.35	0.44	-0.4781	0.0185	-9.0	0.9	-9.3	0.9	A+	A-	
Science	11	4389	1	A.1.3.3	3	15929	0.60	0.15	0.60	0.15	0.10	0.00	0.34	-0.21	0.34	-0.34	-0.25	0.0152	0.0176	5.1	1.0	3.2	1.0			
Science	11	5023	1	D.3.1.1	1	15929	0.47	0.23	0.13	0.47	0.16	0.01	0.32	-0.30	-0.36	0.32	-0.19	0.6100	0.0173	7.7	1.1	9.1	1.1	A-	A-	
Science	11	6182	1	B.3.3.3	2	15929	0.76	0.09	0.09	0.76	0.06	0.00	0.45	-0.29	-0.38	0.45	-0.26	-0.9164	0.0200	-9.9	0.9	-9.9	0.8	A+	A-	
Science	11	6330	1	C.1.1.2	2	15929	0.46	0.34	0.46	0.13	0.07	0.00	0.06	-0.05	0.06	-0.09	0.02	0.6856	0.0173	9.9	1.3	9.9	1.4	A-	A-	
Science	11	7982	1	A.3.3.2	2	15929	0.59	0.08	0.59	0.14	0.18	0.00	0.43	-0.35	0.43	-0.42	-0.31	0.0330	0.0175	-8.1	1.0	-7.1	0.9	A+	A-	
Science	11	8868	1	B.3.3.1	2	15929	0.24	0.39	0.24	0.04	0.32	0.00	0.16	-0.09	0.16	-0.46	-0.23	1.8087	0.0197	9.9	1.1	9.9	1.4	A-	A-	
Science	11	9706	1	C.2.2.3	1	15929	0.64	0.10	0.64	0.10	0.15	0.01	0.48	-0.42	0.48	-0.38	-0.35	-0.2304	0.0179	-9.9	0.9	-9.9	0.8	B-	A-	
Science	11	1374	2	D.2.1.2	2	15644	0.67	0.13	0.10	0.10	0.67	0.00	0.47	-0.24	-0.43	-0.42	0.47	-0.3414	0.0183	-9.9	0.9	-9.9	0.9	A-	A-	
Science	11	2333	2	B.3.1.1	2	15644	0.36	0.36	0.36	0.18	0.09	0.01	0.20	-0.11	0.20	-0.31	-0.31	1.1460	0.0179	9.9	1.1	9.9	1.2	A+	A+	
Science	11	2427	2	D.1.1.1	2	15644	0.27	0.27	0.25	0.20	0.27	0.00	0.24	0.24	-0.27	-0.23	-0.28	1.6250	0.0191	5.8	1.1	9.9	1.2	A-	A-	
Science	11	2735	2	C.2.1.4	2	15644	0.38	0.09	0.38	0.27	0.26	0.00	0.25	-0.21	0.25	-0.28	-0.20	1.0851	0.0178	9.9	1.1	9.9	1.2	A-	A-	
Science	11	2832	2	A.1.2.1	2	15644	0.58	0.58	0.16	0.07	0.19	0.01	0.40	0.40	-0.30	-0.41	-0.31	0.1304	0.0175	-5.6	1.0	-5.7	1.0			
Science	11	3426	2	A.3.2.1	2	15644	0.23	0.23	0.23	0.31	0.24	0.00	0.05	0.14	0.05	-0.20	-0.04	1.9257	0.0203	9.9	1.2	9.9	1.7	A-	A+	
Science	11	3617	2	D.1.1.2	2	15644	0.54	0.26	0.54	0.15	0.04	0.00	0.27	-0.19	0.27	-0.28	-0.29	0.2810	0.0174	9.9	1.1	9.9	1.1	A-	A+	
Science	11	5277	2	A.3.2.2	2	15644	0.27	0.27	0.35	0.25	0.13	0.00	0.20	0.20	-0.11	-0.33	-0.31	1.6471	0.0192	9.3	1.1	9.9	1.2	A-	A-	
Science	11	5921	2	B.3.1.2	2	15644	0.45	0.17	0.45	0.19	0.19	0.00	0.38	-0.42	0.38	-0.31	-0.31	0.7577	0.0174	-3.6	1.0	-1.0	1.0			
Science	11	6467	2	D.1.1.1	1	15644	0.28	0.22	0.28	0.22	0.28	0.00	0.19	-0.29	-0.14	-0.22	0.19	1.6202	0.0191	9.9	1.1	9.9	1.2	A-	A+	
Science	11	7881	2	A.2.1.1	2	15644	0.44	0.18	0.44	0.19	0.18	0.01	0.24	-0.16	0.24	-0.23	-0.26	0.7546	0.0174	9.9	1.1	9.9	1.2	A+	A-	
Science	11	8596	2	A.1.3.2	2	15644	0.28	0.37	0.28	0.22	0.12	0.00	0.20	-0.10	0.20	-0.33	-0.31	1.6020	0.0190	9.9	1.1	9.9	1.3	A-	A-	
Science	11		4	B.3.3.2	2	15749	0.53	0.53	0.11	0.19	0.17	0.00	0.31	0.31	-0.36	-0.22	-0.25	0.3388	0.0172	6.7	1.0	6.2	1.1			

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	310	3	A.1.1.4	1	15749	0.46	0.46	0.15	0.09	0.29	0.00	0.30	0.30	-0.52	-0.38	-0.07	0.6858	0.0172	8.8	1.1	8.4	1.1		
Science	11	732	3	C.2.2.1	2	15749	0.71	0.05	0.71	0.13	0.09	0.01	0.37	-0.27	0.37	-0.28	-0.28	-0.5800	0.0188	-4.6	1.0	-2.4	1.0	A+	A-
Science	11	1171	3	A.2.1.1	2	15749	0.30	0.21	0.30	0.26	0.22	0.00	0.17	-0.07	0.17	-0.27	-0.18	1.4697	0.0185	9.9	1.1	9.9	1.3	A+	A-
Science	11	1817	3	A.3.2.3	1	15749	0.35	0.35	0.41	0.12	0.12	0.00	0.25	0.25	-0.19	-0.32	-0.29	1.2281	0.0179	8.3	1.1	9.9	1.2	B-	A-
Science	11	1826	3	A.1.1.5	2	15749	0.25	0.41	0.27	0.25	0.06	0.00	0.12	-0.08	-0.19	0.12	-0.13	1.7360	0.0194	9.9	1.1	9.9	1.4	A+	A+
Science	11	2116	3	D.1.1.2	2	15749	0.42	0.09	0.18	0.42	0.31	0.00	0.17	-0.35	-0.21	0.17	-0.05	0.8720	0.0174	9.9	1.2	9.9	1.2	A-	A-
Science	11	2566	3	B.3.3.2	2	15749	0.41	0.09	0.12	0.37	0.41	0.01	0.36	-0.41	-0.39	-0.30	0.36	0.8997	0.0174	-2.1	1.0	-0.1	1.0	A-	A-
Science	11	6486	3	B.2.1.2	1	15749	0.52	0.21	0.16	0.52	0.10	0.01	0.14	-0.03	-0.09	0.14	-0.31	0.3988	0.0172	9.9	1.2	9.9	1.3	A+	A-
Science	11	8862	3	A.2.1.1	3	15749	0.38	0.19	0.38	0.25	0.19	0.00	0.08	-0.10	0.08	-0.04	-0.08	1.0671	0.0176	9.9	1.2	9.9	1.4	A-	A-
Science	11	9244	3	D.2.1.4	2	15749	0.56	0.56	0.20	0.20	0.04	0.01	0.25	0.25	-0.28	-0.15	-0.18	0.2143	0.0173	9.9	1.1	9.9	1.1	A+	A-
Science	11	9415	3	B.2.1.1	2	15749	0.26	0.47	0.26	0.08	0.18	0.00	0.24	-0.20	0.24	-0.52	-0.28	1.7013	0.0193	4.9	1.1	9.9	1.2	A+	A-
Science	11	1978	4	C.3.1.4	2	15667	0.58	0.09	0.21	0.12	0.58	0.00	0.49	-0.40	-0.39	-0.44	0.49	0.1261	0.0175	-9.9	0.9	-9.9	0.9	A-	A-
Science	11	2362	4	C.1.1.5	2	15667	0.39	0.39	0.18	0.11	0.31	0.01	0.25	0.25	-0.36	-0.30	-0.14	1.0145	0.0177	9.9	1.1	9.9	1.2		
Science	11	2903	4	B.3.1.5	3	15667	0.39	0.10	0.17	0.33	0.39	0.00	0.26	-0.27	-0.26	-0.24	0.26	0.9965	0.0177	9.9	1.1	9.9	1.1	A+	A-
Science	11	2948	4	B.1.1.2	2	15667	0.57	0.17	0.57	0.07	0.19	0.00	0.29	-0.27	0.29	-0.34	-0.14	0.1670	0.0175	9.9	1.1	8.5	1.1	A-	A+
Science	11	2960	4	D.1.3.2	2	15667	0.69	0.11	0.09	0.69	0.11	0.00	0.18	-0.11	-0.16	0.18	-0.11	-0.4326	0.0185	9.9	1.2	9.9	1.2	A-	A-
Science	11	5092	4	A.2.2.2	2	15667	0.32	0.12	0.40	0.15	0.32	0.00	0.14	-0.35	-0.06	-0.19	0.14	1.3819	0.0184	9.9	1.2	9.9	1.3	A+	A-
Science	11	5346	4	C.1.1.6	2	15667	0.47	0.47	0.14	0.32	0.07	0.00	0.40	0.40	-0.46	-0.32	-0.28	0.6256	0.0174	-5.6	1.0	-1.7	1.0	A-	A-
Science	11	5820	4	C.3.1.5	2	15667	0.27	0.17	0.27	0.36	0.20	0.00	0.10	-0.23	0.10	-0.06	-0.10	1.6582	0.0193	9.9	1.2	9.9	1.5	A-	A+
Science	11	6133	4	A.1.1.2	3	15667	0.62	0.07	0.10	0.21	0.62	0.01	0.46	-0.37	-0.39	-0.35	0.46	-0.1086	0.0178	-9.9	0.9	-9.9	0.9		
Science	11	8302	4	A.2.1.5	2	15667	0.78	0.06	0.78	0.08	0.08	0.00	0.36	-0.23	0.36	-0.23	-0.29	-1.0199	0.0206	-3.8	1.0	-2.1	1.0	A-	B-
Science	11	8442	4	A.3.1.2	2	15667	0.26	0.21	0.26	0.16	0.35	0.02	0.10	-0.15	0.10	-0.24	0.00	1.6894	0.0194	9.9	1.2	9.9	1.5	A+	A+
Science	11	9782	4	B.2.1.4	2	15667	0.79	0.07	0.09	0.79	0.05	0.00	0.51	-0.35	-0.39	0.51	-0.34	-1.0797	0.0209	-9.9	0.8	-9.9	0.7	A+	A-
Science	11	461	5	A.3.1.3	2	15669	0.70	0.15	0.09	0.06	0.70	0.00	0.37	-0.16	-0.38	-0.36	0.37	-0.4920	0.0186	-3.3	1.0	-1.2	1.0		
Science	11	973	5	C.3.1.6	2	15669	0.48	0.43	0.05	0.48	0.04	0.01	0.03	0.07	-0.31	0.03	-0.27	0.5838	0.0172	9.9	1.3	9.9	1.4	A-	A-
Science	11	1823	5	A.2.1.4	2	15669	0.51	0.14	0.16	0.51	0.18	0.00	0.39	-0.28	-0.35	0.39	-0.38	0.4260	0.0172	-5.8	1.0	-5.4	1.0	A+	A+
Science	11	2903	5	B.3.1.5	3	15669	0.40	0.11	0.16	0.32	0.40	0.00	0.23	-0.29	-0.19	-0.21	0.23	0.9595	0.0175	9.9	1.1	9.9	1.2	A+	A-
Science	11	2948	5	B.1.1.2	2	15669	0.57	0.16	0.57	0.07	0.19	0.00	0.28	-0.27	0.28	-0.32	-0.13	0.1460	0.0174	9.9	1.1	7.3	1.1	A-	A+
Science	11	3438	5	B.2.2.3	2	15669	0.23	0.21	0.41	0.23	0.15	0.01	0.02	0.11	0.00	0.02	-0.24	1.9018	0.0201	9.9	1.2	9.9	1.6	A+	A+
Science	11	3968	5	C.2.1.2	2	15669	0.29	0.05	0.48	0.29	0.18	0.00	0.03	-0.13	-0.05	0.03	0.07	1.5363	0.0188	9.9	1.2	9.9	1.5	A+	A+
Science	11	4105	5	A.3.1.4	2	15669	0.59	0.59	0.08	0.24	0.08	0.01	0.31	0.31	-0.30	-0.24	-0.25	0.0836	0.0175	6.0	1.0	8.6	1.1	A-	A-
Science	11	5846	5	D.2.1.1	2	15669	0.26	0.26	0.31	0.15	0.26	0.01	0.14	-0.15	-0.16	-0.17	0.14	1.6888	0.0193	9.9	1.1	9.9	1.3	A-	A-
Science	11	5909	5	C.2.1.3	3	15669	0.17	0.21	0.17	0.49	0.10	0.02	0.05	-0.19	0.05	0.00	-0.07	2.2675	0.0220	8.4	1.1	9.9	1.7	A-	A-
Science	11	8798	5	C.2.1.2		15669	0.47	0.08	0.29	0.47	0.15	0.01	0.32	-0.33	-0.31	0.32	-0.20	0.6386	0.0172	2.6	1.0	4.6	1.0		
Science	11	9229	5	A.3.2.2	3	15669	0.31	0.20	0.33	0.16	0.31	0.00	0.16	-0.17	-0.11	-0.29	0.16	1.4306	0.0184	9.9	1.1	9.9	1.3	A+	A-
Science	11	647	6	A.1.1.3	2	15586	0.68	0.07	0.11	0.14	0.68	0.00	0.44	-0.33	-0.34	-0.35	0.44	-0.3988	0.0185	-9.9	0.9	-7.3	0.9	B+	A-
Science	11	941	6	A.1.3.1	2	15586	0.54	0.54	0.23	0.16	0.06	0.00	0.37	0.37	-0.21	-0.40	-0.40	0.2880	0.0174	0.4	1.0	-0.4	1.0	A-	A-
Science	11	1695	6	D.3.1.3	2	15586	0.25	0.28	0.23	0.25	0.23	0.00	0.02	0.04	-0.18	0.02	0.07	1.7719	0.0197	9.9	1.2	9.9	1.7	A-	A-
Science	11	2942	6	B.1.1.2	2	15586	0.37	0.24	0.21	0.18	0.37	0.00	0.22	-0.15	-0.24	-0.30	0.22	1.1362	0.0179	9.9	1.1	9.9	1.2	A-	A-
Science	11	3304	6	B.2.1.2	2	15586	0.34	0.34	0.22	0.16	0.27	0.00	0.14	0.14	-0.15	-0.15	-0.12	1.2858	0.0182	9.9	1.2	9.9	1.4	A-	A-
Science	11	6078	6	D.1.1.2	2	15586	0.40	0.18	0.40	0.13	0.29	0.00	0.29	-0.29	0.29	-0.33	-0.23	0.9684	0.0177	6.5	1.0	9.9	1.1		
Science	11	6228	6	A.2.2.1	2	15586	0.50	0.29	0.50	0.08	0.11	0.01	0.27	-0.16	0.27	-0.33	-0.30	0.4800	0.0174	9.9	1.1	9.9	1.1		
Science	11	6266	6	D.1.3.1	2	15586	0.67	0.67	0.13	0.08	0.11	0.00	0.46	0.46	-0.41	-0.41	-0.27	-0.3417	0.0184	-9.9	0.9	-9.9	0.9	A-	A-
Science	11	7100	6	B.3.2.3	2	15586	0.39	0.25	0.28	0.39	0.06	0.01	0.39	-0.39	-0.34	0.39	-0.46	1.0141	0.0177	-6.2	1.0	-0.1	1.0	A-	A-
Science	11	7437	6	C.3.1.2	2	15586	0.54	0.13	0.18	0.54	0.15	0.00	0.37	-0.38	-0.25	0.37	-0.33	0.3121	0.0174	-0.4	1.0	-0.4	1.0	A-	A-
Science	11	7863	6	A.2.2.1	2	15586	0.75	0.03	0.75	0.14	0.08	0.00	0.34	-0.31	0.34	-0.24	-0.23	-0.7813	0.0197	-1.2	1.0	-0.4	1.0	A+	A-
Science	11	8157	6	C.1.1.4	2	15586	0.57	0.14	0.20	0.57	0.09	0.00	0.36	-0.28	-0.30	0.36	-0.30	0.1496	0.0176	2.0	1.0	-0.4	1.0	A+	A-
Science	11	1987	7	D.3.1.2	2	15661	0.31	0.31	0.15	0.43	0.11	0.00	0.17	0.17	-0.37	-0.08	-0.27	1.4329	0.0185	9.9	1.1	9.9	1.3	A-	A-
Science	11	3522	7	A.3.1.3	2	15661	0.60	0.12	0.19	0.60	0.08	0.00	0.42	-0.34	-0.36	0.42	-0.31	0.0049	0.0176	-8.0	1.0	-9.5	0.9	A-	A-

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	6026	7	D.1.1.2	2	15661	0.62	0.19	0.08	0.11	0.62	0.00	0.50	-0.42	-0.43	-0.38	0.50	-0.0775	0.0178	-9.9	0.9	-9.9	0.9	A+	A-
Science	11	6206	7	C.1.1.3	3	15661	0.46	0.46	0.17	0.19	0.17	0.00	0.15	0.15	-0.19	-0.18	-0.04	0.6623	0.0173	9.9	1.2	9.9	1.2	A+	A-
Science	11	6623	7	A.3.3.3	2	15661	0.58	0.06	0.11	0.58	0.25	0.00	0.19	-0.16	-0.11	0.19	-0.19	0.1245	0.0175	9.9	1.2	9.9	1.2	A-	A+
Science	11	7021	7	D.1.1.3	2	15661	0.25	0.22	0.38	0.25	0.14	0.00	-0.12	0.05	0.21	-0.12	0.12	1.7465	0.0195	9.9	1.4	9.9	1.8	A+	A+
Science	11	7293	7	A.2.1.5	2	15661	0.64	0.13	0.09	0.13	0.64	0.01	0.46	-0.35	-0.41	-0.35	0.46	-0.1928	0.0180	-9.9	0.9	-9.9	0.9	A+	A-
Science	11	7329	7	D.1.2.2	2	15661	0.46	0.35	0.07	0.46	0.12	0.00	0.20	-0.06	-0.43	0.20	-0.27	0.6692	0.0173	9.9	1.2	9.9	1.2	A-	A-
Science	11	7569	7	A.2.1.3	2	15661	0.32	0.26	0.08	0.32	0.33	0.01	0.19	-0.13	-0.39	0.19	-0.18	1.3854	0.0184	9.9	1.1	9.9	1.3	A-	A+
Science	11	7848	7	A.1.1.2	2	15661	0.83	0.06	0.07	0.83	0.04	0.00	0.47	-0.29	-0.34	0.47	-0.33	-1.3133	0.0222	-9.9	0.9	-9.9	0.7		
Science	11	8864	7	C.3.1.1	2	15661	0.32	0.35	0.12	0.32	0.21	0.01	0.23	-0.26	-0.23	0.23	-0.19	1.3843	0.0184	7.0	1.1	9.9	1.3	C-	A+
Science	11	9787	7	C.3.1.5	2	15661	0.34	0.32	0.27	0.34	0.06	0.00	0.24	-0.25	-0.26	0.24	-0.16	1.2897	0.0181	9.9	1.1	9.9	1.2		
Science	11	69	8	A.1.3.1	2	15413	0.50	0.18	0.08	0.50	0.23	0.02	0.30	-0.24	-0.38	0.30	-0.24	0.4937	0.0174	8.9	1.1	8.8	1.1	A+	A-
Science	11	664	8	B.3.3.1	2	15413	0.32	0.32	0.23	0.21	0.24	0.01	0.18	0.18	-0.25	-0.16	-0.16	1.3932	0.0186	9.9	1.1	9.9	1.3		
Science	11	3315	8	D.1.3.3	2	15413	0.55	0.55	0.14	0.16	0.13	0.02	0.33	0.33	-0.29	-0.30	-0.25	0.2167	0.0175	3.8	1.0	4.9	1.0	A+	A-
Science	11	3951	8	C.3.1.5	2	15413	0.53	0.25	0.53	0.17	0.05	0.00	0.16	-0.06	0.16	-0.21	-0.23	0.3541	0.0174	9.9	1.2	9.9	1.3	A-	A-
Science	11	4803	8	B.2.2.1	2	15413	0.39	0.39	0.16	0.31	0.14	0.01	0.36	0.36	-0.42	-0.32	-0.29	0.9918	0.0178	-1.9	1.0	1.8	1.0	A+	A-
Science	11	6182	8	B.3.3.3	2	15413	0.77	0.08	0.09	0.77	0.06	0.00	0.44	-0.28	-0.38	0.44	-0.26	-0.9328	0.0204	-9.9	0.9	-9.9	0.8	A+	A-
Science	11	6305	8	A.3.1.3	2	15413	0.54	0.16	0.54	0.10	0.20	0.00	0.37	-0.37	0.37	-0.38	-0.22	0.2700	0.0175	-0.6	1.0	-1.5	1.0	A+	A-
Science	11	7699	8	A.3.1.2	2	15413	0.16	0.12	0.15	0.57	0.16	0.00	0.04	-0.17	-0.21	0.03	0.04	2.4175	0.0232	7.3	1.1	9.9	1.9	A-	A+
Science	11	7790	8	C.2.1.1	2	15413	0.40	0.21	0.40	0.13	0.26	0.00	0.07	-0.03	0.07	-0.15	-0.04	0.9737	0.0177	9.9	1.3	9.9	1.4	A-	A-
Science	11	8027	8	A.1.1.3	2	15413	0.82	0.04	0.10	0.82	0.04	0.00	0.33	-0.28	-0.20	0.33	-0.22	-1.2611	0.0220	-3.9	1.0	1.4	1.0		
Science	11	8986	8	A.3.1.3	2	15413	0.55	0.08	0.22	0.55	0.15	0.00	0.24	-0.27	-0.16	0.24	-0.21	0.2472	0.0175	9.9	1.1	9.9	1.1	A-	A-
Science	11	9863	8	C.3.1.4	2	15413	0.34	0.30	0.20	0.34	0.15	0.01	0.09	-0.08	-0.08	0.09	-0.10	1.2649	0.0183	9.9	1.2	9.9	1.4	A-	A+
Writing	5	1609	0	B.5	2	128827	0.75	0.15	0.05	0.05	0.75	0.00	0.39	-0.32	-0.23	-0.31	0.39	0.6405	0.0083	9.9	1.5	9.9	9.9		
Writing	5	2130	0	B.5	2	128827	0.57	0.14	0.57	0.18	0.11	0.00	0.30	-0.31	0.30	-0.14	-0.37	2.1422	0.0075	9.9	1.9	9.9	9.9		
Writing	5	2980	0	B.5	2	128827	0.93	0.93	0.03	0.01	0.02	0.00	0.38	0.38	-0.25	-0.24	-0.23	-1.8881	0.0145	9.9	1.5	9.9	6.0		
Writing	5	3612	0	B.5	2	128827	0.65	0.18	0.65	0.02	0.15	0.00	0.39	-0.29	0.39	-0.33	-0.34	1.4552	0.0077	9.9	1.6	9.9	9.9		
Writing	5	3625	0	B.6	1	128827	0.78	0.08	0.02	0.12	0.78	0.00	0.31	-0.18	-0.30	-0.23	0.31	0.3635	0.0086	9.9	1.6	9.9	9.9		
Writing	5	3866	0	B.5	2	128827	0.88	0.88	0.04	0.01	0.07	0.00	0.35	0.35	-0.19	-0.20	-0.29	-0.8610	0.0110	9.9	1.6	9.9	9.9		
Writing	5	5675	0	B.6	1	128827	0.54	0.03	0.37	0.54	0.07	0.00	0.29	-0.28	-0.24	0.29	-0.28	2.3950	0.0075	9.9	1.9	9.9	9.9		
Writing	5	6804	0	B.6	1	128827	0.68	0.15	0.11	0.06	0.68	0.00	0.37	-0.30	-0.29	-0.28	0.37	1.2658	0.0078	9.9	1.6	9.9	9.9		
Writing	5	7214	0	B.5	2	128827	0.57	0.57	0.12	0.19	0.12	0.00	0.34	0.34	-0.33	-0.26	-0.28	2.1196	0.0075	9.9	1.8	9.9	9.9		
Writing	5	7480	0	B.5	2	128827	0.80	0.08	0.04	0.80	0.08	0.00	0.41	-0.34	-0.34	0.41	-0.23	0.1558	0.0089	9.9	1.5	9.9	9.9		
Writing	5	8400	0	B.6	1	128827	0.64	0.64	0.11	0.13	0.13	0.00	0.27	0.27	-0.14	-0.28	-0.21	1.5960	0.0076	9.9	1.9	9.9	9.9		
Writing	5	9559	0	B.5	2	128827	0.86	0.10	0.02	0.86	0.02	0.00	0.38	-0.29	-0.26	0.38	-0.25	-0.5019	0.0101	9.9	1.5	9.9	9.9		
Writing	5	815	1	B.6	2	21589	0.87	0.07	0.87	0.03	0.03	0.00	0.41	-0.28	0.41	-0.29	-0.27	-0.5628	0.0248	9.9	1.3	9.9	9.9	A-	B-
Writing	5	1280	1	B.6	1	21589	0.77	0.05	0.77	0.14	0.04	0.00	0.32	-0.35	0.32	-0.16	-0.26	0.4692	0.0206	9.9	1.6	9.9	9.9	A+	B-
Writing	5	5822	1	B.5	2	21589	0.55	0.17	0.21	0.07	0.55	0.00	0.31	-0.30	-0.23	-0.29	0.31	2.2038	0.0184	9.9	1.9	9.9	9.9	A-	A-
Writing	5	5956	1	B.6	1	21589	0.93	0.02	0.02	0.93	0.03	0.00	0.40	-0.23	-0.24	0.40	-0.28	-1.7598	0.0337	8.4	1.2	7.8	9.9	A+	B-
Writing	5	8343	1	B.6	2	21589	0.58	0.10	0.25	0.58	0.07	0.00	0.37	-0.36	-0.29	0.37	-0.31	2.0174	0.0185	9.9	1.8	9.9	9.9	A-	A-
Writing	5	8424	1	B.5	2	21589	0.76	0.02	0.04	0.76	0.18	0.00	0.41	-0.29	-0.28	0.41	-0.34	0.5954	0.0203	9.9	1.5	9.9	9.9	A-	B-
Writing	5	9502	1	B.6	1	21589	0.76	0.03	0.07	0.15	0.76	0.00	0.35	-0.30	-0.26	-0.24	0.35	0.6203	0.0202	9.9	1.6	9.9	9.9	A+	A-
Writing	5	9901	1	B.5	2	21589	0.82	0.82	0.03	0.13	0.03	0.00	0.31	0.31	-0.21	-0.22	-0.25	-0.0041	0.0222	9.9	1.6	9.9	9.9	A+	A-
Writing	5	986	2	B.6	1	21444	0.84	0.08	0.04	0.84	0.04	0.00	0.44	-0.30	-0.33	0.44	-0.31	-0.1054	0.0231	9.9	1.3	9.9	4.9	A-	B-
Writing	5	3189	2	B.6	1	21444	0.47	0.47	0.26	0.09	0.18	0.00	0.31	0.31	-0.24	-0.36	-0.30	2.8408	0.0182	9.9	1.8	9.9	9.9	A+	A-
Writing	5	4877	2	B.5	2	21444	0.83	0.05	0.83	0.03	0.09	0.00	0.39	-0.33	0.39	-0.27	-0.23	-0.0819	0.0230	9.9	1.4	9.9	8.2	A-	B-
Writing	5	4929	2	B.5	2	21444	0.50	0.17	0.50	0.26	0.06	0.00	0.33	-0.29	0.33	-0.28	-0.40	2.6264	0.0182	9.9	1.8	9.9	9.9	A-	B-
Writing	5	6238	2	B.6	1	21444	0.66	0.13	0.12	0.09	0.66	0.00	0.35	-0.29	-0.26	-0.28	0.35	1.4822	0.0187	9.9	1.7	9.9	9.9	A+	A-
Writing	5	6499	2	B.6	1	21444	0.70	0.70	0.21	0.06	0.02	0.00	0.34	0.34	-0.28	-0.24	-0.25	1.1136	0.0193	9.9	1.7	9.9	9.9	A-	B-
Writing	5	6894	2	B.5	2	21444	0.46	0.18	0.31	0.46	0.05	0.00	0.29	-0.37	-0.17	0.29	-0.36	2.9015	0.0183	9.9	1.9	9.9	9.9	A-	A-

Appendix I: Item Statistics Multiple Choice

Item Information						Classical													Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	8637	2	B.6	1	21444	0.58	0.30	0.08	0.04	0.58	0.00	0.28	-0.19	-0.29	-0.34	0.28	2.0452	0.0182	9.9	1.9	9.9	9.9	A+	A-	
Writing	5	219	3	B.5	2	21506	0.78	0.12	0.06	0.04	0.78	0.00	0.38	-0.30	-0.24	-0.27	0.38	0.4349	0.0209	9.9	1.5	9.9	9.9	A-	A-	
Writing	5	812	3	B.6	1	21506	0.36	0.45	0.36	0.06	0.12	0.00	0.14	-0.05	0.14	-0.31	-0.32	3.5895	0.0189	9.9	2.2	9.9	9.9	A+	A-	
Writing	5	1802	3	B.5	2	21506	0.86	0.05	0.04	0.05	0.86	0.00	0.42	-0.32	-0.29	-0.24	0.42	-0.4899	0.0248	9.9	1.4	9.9	9.9	A+	A-	
Writing	5	3379	3	B.6	2	21506	0.63	0.21	0.63	0.13	0.03	0.00	0.43	-0.35	0.43	-0.38	-0.37	1.6723	0.0185	9.9	1.6	9.9	8.4	A+	A-	
Writing	5	4816	3	B.5	2	21506	0.65	0.15	0.15	0.65	0.04	0.00	0.33	-0.30	-0.27	0.33	-0.17	1.4800	0.0187	9.9	1.7	9.9	9.9	A-	A-	
Writing	5	4898	3	B.6	1	21506	0.48	0.48	0.09	0.29	0.13	0.00	0.34	0.34	-0.38	-0.25	-0.35	2.7157	0.0182	9.9	1.8	9.9	9.9	A+	A-	
Writing	5	6121	3	B.6	1	21506	0.46	0.21	0.46	0.26	0.06	0.00	0.26	-0.22	0.26	-0.24	-0.29	2.8717	0.0183	9.9	1.9	9.9	9.9	A-	A-	
Writing	5	6767	3	B.6	1	21506	0.76	0.05	0.03	0.76	0.16	0.00	0.29	-0.24	-0.20	0.29	-0.21	0.5813	0.0204	9.9	1.7	9.9	9.9	A+	A+	
Writing	5	861	4	B.6	2	21524	0.52	0.14	0.17	0.17	0.52	0.00	0.31	-0.44	-0.18	-0.23	0.31	2.4366	0.0181	9.9	1.9	9.9	9.9	A-	A-	
Writing	5	1850	4	B.6	1	21524	0.67	0.67	0.10	0.12	0.11	0.00	0.38	0.38	-0.37	-0.27	-0.26	1.3194	0.0189	9.9	1.6	9.9	9.9	A+	B-	
Writing	5	2687	4	B.5	2	21524	0.76	0.08	0.76	0.04	0.11	0.00	0.45	-0.37	0.45	-0.34	-0.31	0.6282	0.0202	9.9	1.4	9.9	8.5	A-	B-	
Writing	5	5988	4	B.5	2	21524	0.53	0.14	0.11	0.21	0.53	0.00	0.24	-0.25	-0.28	-0.15	0.24	2.3279	0.0181	9.9	2.0	9.9	9.9	A-	A-	
Writing	5	7250	4	B.5	2	21524	0.79	0.09	0.79	0.07	0.05	0.00	0.39	-0.29	0.39	-0.29	-0.25	0.3072	0.0212	9.9	1.5	9.9	9.9	A-	A-	
Writing	5	7537	4	B.6	1	21524	0.66	0.16	0.09	0.66	0.09	0.00	0.43	-0.35	-0.39	0.43	-0.29	1.4177	0.0187	9.9	1.5	9.9	9.9	A+	A-	
Writing	5	8043	4	B.6	1	21524	0.52	0.52	0.04	0.33	0.11	0.00	0.16	0.16	-0.35	-0.05	-0.24	2.3999	0.0181	9.9	2.2	9.9	9.9	A-	A+	
Writing	5	8865	4	B.6	1	21524	0.52	0.15	0.21	0.12	0.52	0.00	0.36	-0.34	-0.27	-0.37	0.36	2.4207	0.0181	9.9	1.7	9.9	9.9	A-	A-	
Writing	5	1506	5	B.6	1	21565	0.71	0.10	0.71	0.02	0.17	0.00	0.36	-0.28	0.36	-0.27	-0.29	1.0136	0.0195	9.9	1.7	9.9	9.9	A-	A-	
Writing	5	2254	5	B.6	1	21565	0.92	0.03	0.92	0.03	0.02	0.00	0.37	-0.20	0.37	-0.27	-0.25	-1.4539	0.0311	9.9	1.3	9.9	9.9	A+	A-	
Writing	5	3697	5	B.6	1	21565	0.68	0.07	0.13	0.11	0.68	0.00	0.43	-0.33	-0.33	-0.35	0.43	1.2128	0.0192	9.9	1.5	9.9	9.9	A-	B-	
Writing	5	4025	5	B.6	1	21565	0.63	0.05	0.63	0.10	0.22	0.00	0.35	-0.30	0.35	-0.34	-0.24	1.6034	0.0187	9.9	1.8	9.9	9.9	A-	A-	
Writing	5	4510	5	B.5	2	21565	0.57	0.57	0.13	0.22	0.08	0.00	0.21	0.21	-0.23	-0.10	-0.27	2.0919	0.0184	9.9	2.1	9.9	9.9	A-	A-	
Writing	5	5373	5	B.5	2	21565	0.63	0.13	0.16	0.63	0.08	0.00	0.42	-0.36	-0.32	0.42	-0.34	1.6349	0.0187	9.9	1.6	9.9	9.9	A-	A-	
Writing	5	6576	5	B.6	2	21565	0.90	0.90	0.03	0.03	0.04	0.00	0.45	0.45	-0.29	-0.31	-0.30	-1.1169	0.0285	9.9	1.2	3.1	2.3	A+	A-	
Writing	5	8516	5	B.5	2	21565	0.86	0.07	0.86	0.04	0.03	0.00	0.44	-0.29	0.44	-0.31	-0.30	-0.4148	0.0242	9.9	1.3	9.9	9.9	A+	A-	
Writing	5	3	6	B.6	2	21199	0.83	0.08	0.83	0.04	0.05	0.00	0.35	-0.28	0.35	-0.22	-0.21	-0.0712	0.0229	9.9	1.5	9.9	9.9	A+	A-	
Writing	5	1252	6	B.6	1	21199	0.73	0.03	0.02	0.21	0.73	0.00	0.25	-0.26	-0.25	-0.17	0.25	0.8983	0.0198	9.9	1.8	9.9	9.9	A+	A-	
Writing	5	3091	6	B.5	2	21199	0.66	0.12	0.66	0.12	0.09	0.00	0.35	-0.30	0.35	-0.26	-0.25	1.4492	0.0189	9.9	1.7	9.9	9.9	A-	A-	
Writing	5	4820	6	B.6	1	21199	0.88	0.05	0.88	0.04	0.02	0.00	0.41	-0.30	0.41	-0.27	-0.25	-0.7140	0.0264	9.9	1.3	9.9	9.9	A+	A-	
Writing	5	5603	6	B.6	2	21199	0.63	0.63	0.15	0.13	0.09	0.00	0.28	0.28	-0.19	-0.26	-0.22	1.6599	0.0187	9.9	1.9	9.9	9.9	A+	A+	
Writing	5	6540	6	B.5	2	21199	0.58	0.20	0.09	0.12	0.58	0.00	0.19	-0.13	-0.22	-0.16	0.19	2.0398	0.0185	9.9	2.1	9.9	9.9	A+	A-	
Writing	5	6926	6	B.5	2	21199	0.90	0.03	0.03	0.90	0.04	0.00	0.37	-0.20	-0.24	0.37	-0.28	-1.0578	0.0288	9.9	1.4	7.7	6.0	A+	B-	
Writing	5	7247	6	B.6	2	21199	0.59	0.12	0.12	0.59	0.17	0.00	0.35	-0.29	-0.32	0.35	-0.25	1.9604	0.0185	9.9	1.8	9.9	9.9	A+	A-	
Writing	8	237	0	B.5	2	129588	0.90	0.03	0.03	0.05	0.90	0.00	0.43	-0.28	-0.29	-0.29	0.43	-0.9551	0.0116	9.9	1.3	9.9	5.7			
Writing	8	1474	0	B.5	2	129588	0.82	0.09	0.02	0.07	0.82	0.00	0.42	-0.35	-0.28	-0.25	0.42	0.0965	0.0092	9.9	1.4	9.9	9.9			
Writing	8	1600	0	B.6	1	129588	0.78	0.78	0.16	0.04	0.02	0.00	0.25	0.25	-0.19	-0.16	-0.18	0.4505	0.0087	9.9	1.8	9.9	9.9			
Writing	8	2242	0	B.6	2	129588	0.57	0.06	0.57	0.25	0.12	0.00	0.30	-0.28	0.30	-0.25	-0.23	2.2769	0.0075	9.9	1.9	9.9	9.9			
Writing	8	3975	0	B.6	1	129588	0.64	0.07	0.64	0.06	0.23	0.00	0.28	-0.33	0.28	-0.27	-0.15	1.7588	0.0076	9.9	1.9	9.9	9.9			
Writing	8	4997	0	B.5	2	129588	0.57	0.17	0.12	0.57	0.13	0.00	0.32	-0.25	-0.26	0.32	-0.29	2.3162	0.0075	9.9	1.8	9.9	9.9			
Writing	8	5838	0	B.6	1	129588	0.79	0.05	0.79	0.11	0.05	0.00	0.36	-0.28	0.36	-0.25	-0.26	0.3593	0.0088	9.9	1.5	9.9	9.9			
Writing	8	6032	0	B.5	2	129588	0.88	0.01	0.88	0.04	0.07	0.00	0.25	-0.16	0.25	-0.17	-0.17	-0.6192	0.0107	9.9	1.6	9.9	9.9			
Writing	8	6787	0	B.5	2	129588	0.59	0.10	0.19	0.59	0.11	0.00	0.21	-0.23	-0.08	0.21	-0.24	2.0951	0.0075	9.9	2.1	9.9	9.9			
Writing	8	6833	0	B.5	2	129588	0.53	0.01	0.28	0.53	0.17	0.00	0.30	-0.35	-0.25	0.30	-0.27	2.5553	0.0074	9.9	1.8	9.9	9.9			
Writing	8	8701	0	B.5	2	129588	0.84	0.84	0.08	0.03	0.05	0.00	0.41	0.41	-0.29	-0.28	-0.27	-0.1342	0.0096	9.9	1.4	9.9	8.7			
Writing	8	8979	0	B.6	1	129588	0.76	0.02	0.76	0.04	0.19	0.00	0.32	-0.20	0.32	-0.32	-0.24	0.7085	0.0084	9.9	1.6	9.9	9.9			
Writing	8	2440	1	B.5	2	21694	0.68	0.02	0.03	0.28	0.68	0.00	0.33	-0.30	-0.33	-0.25	0.33	1.4023	0.0189	9.9	1.7	9.9	9.9	A-	A-	
Writing	8	2717	1	B.6	1	21694	0.72	0.72	0.12	0.12	0.03	0.00	0.40	0.40	-0.34	-0.27	-0.31	1.0310	0.0195	9.9	1.5	9.9	8.3	A+	A-	
Writing	8	3081	1	B.6	2	21694	0.70	0.70	0.06	0.17	0.07	0.00	0.39	0.39	-0.34	-0.30	-0.26	1.1961	0.0192	9.9	1.5	9.9	9.8	A+	B-	
Writing	8	3642	1	B.5	2	21694	0.78	0.04	0.05	0.13	0.78	0.00	0.43	-0.32	-0.36	-0.30	0.43	0.5026	0.0208	9.9	1.4	9.9	9.9	A+	A-	

Appendix I: Item Statistics Multiple Choice

Item Information						Classical												Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	4513	1	B.6	1	21694	0.72	0.72	0.04	0.05	0.19	0.00	0.38	0.38	-0.33	-0.31	-0.28	1.0581	0.0195	9.9	1.6	9.9	9.9	A-	B-
Writing	8	5487	1	B.6	1	21694	0.40	0.34	0.09	0.40	0.17	0.00	0.22	-0.18	-0.34	0.22	-0.20	3.4057	0.0184	9.9	2.0	9.9	9.9	A-	A-
Writing	8	5761	1	B.6	1	21694	0.71	0.08	0.17	0.71	0.04	0.00	0.44	-0.35	-0.34	0.44	-0.32	1.1394	0.0193	9.9	1.4	9.9	6.7	A+	A-
Writing	8	6381	1	B.5	2	21694	0.63	0.11	0.05	0.21	0.63	0.00	0.24	-0.23	-0.30	-0.14	0.24	1.7314	0.0185	9.9	1.9	9.9	9.9	A+	A-
Writing	8	2050	2	B.6	1	21633	0.79	0.02	0.79	0.07	0.12	0.00	0.32	-0.22	0.32	-0.28	-0.20	0.4790	0.0210	9.9	1.6	9.9	9.9	A+	B-
Writing	8	4603	2	B.5	2	21633	0.66	0.12	0.03	0.66	0.19	0.00	0.31	-0.30	-0.31	0.31	-0.18	1.5545	0.0188	9.9	1.8	9.9	9.9	A+	A-
Writing	8	5473	2	B.5	2	21633	0.48	0.48	0.14	0.27	0.10	0.00	0.29	0.29	-0.38	-0.19	-0.27	2.8798	0.0181	9.9	1.9	9.9	9.9	A-	A-
Writing	8	7265	2	B.6	1	21633	0.74	0.74	0.06	0.13	0.07	0.00	0.44	0.44	-0.36	-0.33	-0.30	0.9021	0.0199	9.9	1.4	9.9	7.0	A+	B-
Writing	8	8086	2	B.6	1	21633	0.86	0.86	0.07	0.03	0.04	0.00	0.43	0.43	-0.29	-0.30	-0.29	-0.3575	0.0245	9.9	1.3	6.8	3.2	A+	C-
Writing	8	8729	2	B.5	2	21633	0.32	0.34	0.09	0.24	0.32	0.00	0.23	-0.26	-0.29	-0.18	0.23	4.0244	0.0192	9.9	1.9	9.9	9.9	A-	A-
Writing	8	8863	2	B.5	1	21633	0.79	0.06	0.04	0.79	0.11	0.00	0.44	-0.33	-0.25	0.44	-0.35	0.4696	0.0211	9.9	1.4	9.9	7.0	A-	A-
Writing	8	9898	2	B.6	1	21633	0.48	0.22	0.48	0.09	0.20	0.00	0.28	-0.29	0.28	-0.34	-0.16	2.8614	0.0181	9.9	1.9	9.9	9.9	A+	A-
Writing	8	2311	3	B.6	1	21653	0.35	0.08	0.35	0.09	0.49	0.00	0.23	-0.35	0.23	-0.42	-0.16	3.8184	0.0186	9.9	1.8	9.9	9.9	A+	A-
Writing	8	3215	3	B.5	2	21653	0.51	0.51	0.13	0.16	0.20	0.00	0.34	0.34	-0.33	-0.30	-0.29	2.6418	0.0179	9.9	1.7	9.9	9.6	A-	A-
Writing	8	4582	3	B.5	2	21653	0.91	0.03	0.91	0.04	0.02	0.00	0.41	-0.27	0.41	-0.28	-0.25	-1.0826	0.0295	9.9	1.3	4.3	2.8	A+	A-
Writing	8	4735	3	B.6	1	21653	0.72	0.11	0.72	0.01	0.16	0.00	0.25	-0.24	0.25	-0.21	-0.16	1.1508	0.0194	9.9	1.8	9.9	9.9	A+	A-
Writing	8	4996	3	B.6	1	21653	0.88	0.04	0.04	0.88	0.04	0.00	0.44	-0.31	-0.31	0.44	-0.27	-0.4772	0.0254	9.9	1.2	4.0	2.1	A-	C-
Writing	8	5102	3	B.6	2	21653	0.48	0.13	0.20	0.18	0.48	0.00	0.33	-0.39	-0.18	-0.37	0.33	2.8463	0.0179	9.9	1.7	9.9	9.5	A-	A-
Writing	8	5414	3	B.6	1	21653	0.42	0.10	0.41	0.07	0.42	0.00	0.21	-0.35	-0.10	-0.44	0.21	3.3007	0.0180	9.9	2.0	9.9	9.9	A+	A-
Writing	8	9632	3	B.5	2	21653	0.53	0.53	0.36	0.06	0.05	0.00	0.09	0.09	0.01	-0.31	-0.20	2.5301	0.0179	9.9	2.3	9.9	9.9	A+	A+
Writing	8	544	4	B.6	1	21587	0.93	0.93	0.02	0.02	0.03	0.00	0.41	0.41	-0.28	-0.26	-0.25	-1.5179	0.0330	9.6	1.2	3.0	2.5	A+	C-
Writing	8	1411	4	B.6	1	21587	0.22	0.11	0.22	0.31	0.36	0.00	0.06	-0.10	0.06	-0.13	0.01	5.0590	0.0220	9.9	2.3	9.9	9.9	A-	A+
Writing	8	1578	4	B.6	2	21587	0.13	0.22	0.10	0.13	0.55	0.00	-0.09	0.12	-0.10	-0.09	0.15	6.2255	0.0279	9.9	2.8	9.9	9.9	A-	A+
Writing	8	2296	4	B.5	2	21587	0.88	0.88	0.04	0.06	0.03	0.00	0.40	0.40	-0.28	-0.27	-0.25	-0.5484	0.0257	9.9	1.4	9.9	8.6	A-	A-
Writing	8	3409	4	B.5	2	21587	0.66	0.26	0.03	0.04	0.66	0.00	0.31	-0.22	-0.34	-0.30	0.31	1.5988	0.0191	9.9	1.8	9.9	9.9	A-	A-
Writing	8	4393	4	B.5	2	21587	0.66	0.08	0.11	0.14	0.66	0.00	0.47	-0.35	-0.38	-0.39	0.47	1.5993	0.0191	9.9	1.5	9.9	6.5	A-	C-
Writing	8	5897	4	B.6	2	21587	0.72	0.22	0.02	0.72	0.04	0.00	0.40	-0.33	-0.33	0.40	-0.31	1.1351	0.0197	9.9	1.6	9.9	9.8	A+	A-
Writing	8	6480	4	B.6	1	21587	0.81	0.81	0.06	0.08	0.05	0.00	0.46	0.46	-0.35	-0.32	-0.31	0.2791	0.0219	9.9	1.4	9.9	5.1	A-	B-
Writing	8	1908	5	B.5	2	21517	0.59	0.12	0.09	0.20	0.59	0.00	0.32	-0.27	-0.33	-0.22	0.32	2.1392	0.0184	9.9	1.8	9.9	9.9	A+	A+
Writing	8	6567	5	B.5	2	21517	0.55	0.11	0.14	0.55	0.19	0.00	0.27	-0.27	-0.26	0.27	-0.19	2.4158	0.0183	9.9	2.0	9.9	9.9	A-	A+
Writing	8	6870	5	B.6	1	21517	0.81	0.81	0.06	0.06	0.07	0.00	0.35	0.35	-0.29	-0.25	-0.19	0.3103	0.0219	9.9	1.5	9.9	9.9	A+	A-
Writing	8	7252	5	B.6	1	21517	0.63	0.63	0.09	0.08	0.20	0.00	0.38	0.38	-0.31	-0.34	-0.30	1.8597	0.0187	9.9	1.7	9.9	8.9	A+	A-
Writing	8	8186	5	B.6	1	21517	0.33	0.33	0.19	0.29	0.19	0.00	0.33	0.33	-0.38	-0.37	-0.27	4.0446	0.0192	9.9	1.6	9.9	9.9	A+	A-
Writing	8	8572	5	B.6	1	21517	0.88	0.04	0.88	0.05	0.03	0.00	0.28	-0.21	0.28	-0.15	-0.21	-0.5199	0.0258	9.9	1.5	9.9	9.9	A+	A-
Writing	8	9141	5	B.6	2	21517	0.48	0.37	0.05	0.48	0.09	0.00	0.32	-0.25	-0.42	0.32	-0.31	2.9439	0.0182	9.9	1.7	9.9	9.9	A+	A-
Writing	8	9280	5	B.5	2	21517	0.89	0.03	0.04	0.04	0.89	0.00	0.48	-0.33	-0.34	-0.32	0.48	-0.6804	0.0268	9.7	1.2	4.7	2.6	A+	A-
Writing	8	752	6	B.5	2	21504	0.92	0.02	0.03	0.03	0.92	0.00	0.38	-0.24	-0.27	-0.22	0.38	-1.3025	0.0311	9.9	1.3	9.9	9.9	A+	A-
Writing	8	2268	6	B.5	2	21504	0.51	0.51	0.24	0.20	0.05	0.00	0.27	0.27	-0.22	-0.23	-0.31	2.7152	0.0184	9.9	2.0	9.9	9.9	A-	A-
Writing	8	3450	6	B.6	2	21504	0.73	0.06	0.07	0.13	0.73	0.00	0.38	-0.34	-0.36	-0.21	0.38	1.0306	0.0199	9.9	1.6	9.9	9.9	A-	A-
Writing	8	4009	6	B.6	1	21504	0.90	0.04	0.04	0.90	0.02	0.00	0.42	-0.28	-0.29	0.42	-0.26	-0.9401	0.0282	9.9	1.2	9.9	8.4	A+	A-
Writing	8	4501	6	B.6	1	21504	0.93	0.02	0.03	0.93	0.02	0.00	0.38	-0.24	-0.28	0.38	-0.20	-1.4611	0.0325	9.9	1.3	6.9	6.4	A+	A-
Writing	8	7979	6	B.5	2	21504	0.62	0.62	0.19	0.10	0.09	0.00	0.39	0.39	-0.30	-0.37	-0.31	1.9281	0.0187	9.9	1.7	9.9	9.9	A-	A+
Writing	8	8134	6	B.6	2	21504	0.72	0.06	0.72	0.16	0.06	0.00	0.31	-0.25	0.31	-0.20	-0.27	1.0631	0.0198	9.9	1.8	9.9	9.9	A-	A-
Writing	8	9505	6	B.5	2	21504	0.83	0.06	0.03	0.83	0.08	0.00	0.30	-0.20	-0.26	0.30	-0.18	0.0383	0.0228	9.9	1.6	9.9	9.9	A+	A-
Writing	11	3530	0	B.5	2	128771	0.85	0.07	0.06	0.85	0.02	0.00	0.31	-0.15	-0.26	0.31	-0.24	-0.4201	0.0101	9.9	1.7	9.9	9.9		
Writing	11	3604	0	B.6	1	128771	0.59	0.06	0.59	0.03	0.31	0.00	0.39	-0.39	0.39	-0.42	-0.31	2.0469	0.0076	9.9	1.7	9.9	8.4		
Writing	11	4339	0	B.5	2	128771	0.78	0.78	0.07	0.06	0.09	0.00	0.33	0.33	-0.32	-0.23	-0.17	0.3061	0.0090	9.9	1.8	9.9	9.9		
Writing	11	4507	0	B.6	1	128771	0.70	0.26	0.02	0.70	0.01	0.00	0.43	-0.39	-0.35	0.43	-0.18	1.1315	0.0081	9.9	1.6	9.9	9.9		
Writing	11	4928	0	B.6	2	128771	0.85	0.02	0.85	0.04	0.08	0.00	0.38	-0.24	0.38	-0.31	-0.23	-0.5415	0.0103	9.9	1.6	9.9	9.9		

Appendix I: Item Statistics Multiple Choice

Item Information						Classical											Rasch		Infit		Outfit		DIF		
Cont	Grade	PubID	Form	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	5504	0	B.5	2	128771	0.72	0.72	0.15	0.10	0.02	0.00	0.40	0.40	-0.26	-0.42	-0.18	0.9157	0.0083	9.9	1.7	9.9	9.9		
Writing	11	5790	0	B.6	1	128771	0.52	0.18	0.12	0.18	0.52	0.00	0.42	-0.35	-0.39	-0.40	0.42	2.6242	0.0075	9.9	1.6	9.9	8.0		
Writing	11	6153	0	B.5	2	128771	0.71	0.09	0.12	0.71	0.08	0.00	0.36	-0.29	-0.27	0.36	-0.26	0.9974	0.0082	9.9	1.8	9.9	9.9		
Writing	11	7451	0	B.5	2	128771	0.80	0.03	0.01	0.80	0.16	0.00	0.44	-0.25	-0.23	0.44	-0.40	0.1735	0.0091	9.9	1.5	9.9	8.6		
Writing	11	8231	0	B.6	1	128771	0.71	0.02	0.14	0.13	0.71	0.00	0.45	-0.32	-0.41	-0.33	0.45	1.0395	0.0082	9.9	1.5	9.9	9.9		
Writing	11	9012	0	B.5	2	128771	0.92	0.04	0.92	0.02	0.02	0.00	0.39	-0.30	0.39	-0.25	-0.19	-1.6231	0.0131	9.9	1.5	9.9	9.9		
Writing	11	9481	0	B.5	2	128771	0.83	0.06	0.83	0.07	0.03	0.00	0.26	-0.27	0.26	-0.10	-0.17	-0.2584	0.0098	9.9	1.9	9.9	9.9		
Writing	11	2072	1	B.6	1	21537	0.77	0.11	0.05	0.77	0.07	0.00	0.45	-0.33	-0.32	0.45	-0.34	0.4440	0.0213	9.9	1.5	9.9	8.3	A-	A-
Writing	11	2125	1	B.6	1	21537	0.69	0.69	0.26	0.03	0.02	0.00	0.32	0.32	-0.23	-0.33	-0.33	1.1880	0.0196	9.9	1.9	9.9	9.9	A-	A-
Writing	11	2356	1	B.5	2	21537	0.55	0.03	0.05	0.55	0.37	0.00	0.26	-0.35	-0.39	0.26	-0.17	2.2604	0.0184	9.9	2.0	9.9	9.9	A+	A-
Writing	11	2843	1	B.5	2	21537	0.89	0.05	0.89	0.03	0.03	0.00	0.38	-0.28	0.38	-0.24	-0.23	-1.0747	0.0277	9.9	1.5	9.9	9.9	A+	A-
Writing	11	3030	1	B.6	1	21537	0.40	0.45	0.40	0.08	0.06	0.00	0.28	-0.22	0.28	-0.41	-0.32	3.3282	0.0189	9.9	1.9	9.9	9.9	A-	A-
Writing	11	6910	1	B.6	1	21537	0.77	0.11	0.09	0.02	0.77	0.00	0.50	-0.37	-0.42	-0.34	0.50	0.4270	0.0213	9.9	1.4	9.9	8.2	A-	C-
Writing	11	7918	1	B.6	1	21537	0.58	0.58	0.12	0.13	0.17	0.00	0.32	0.32	-0.17	-0.33	-0.30	2.0244	0.0186	9.9	1.8	9.9	9.9	A-	B-
Writing	11	9792	1	B.5	2	21537	0.74	0.10	0.07	0.08	0.74	0.00	0.45	-0.31	-0.39	-0.34	0.45	0.7365	0.0206	9.9	1.5	9.9	9.9	A+	A-
Writing	11	1747	2	B.6	1	21487	0.69	0.05	0.11	0.15	0.69	0.00	0.47	-0.37	-0.37	-0.39	0.47	1.1896	0.0197	9.9	1.5	9.9	9.9	A+	A-
Writing	11	1886	2	B.6	1	21487	0.57	0.03	0.08	0.32	0.57	0.00	0.36	-0.37	-0.37	-0.28	0.36	2.1646	0.0185	9.9	1.8	9.9	9.9	A-	A-
Writing	11	2032	2	B.5	2	21487	0.70	0.70	0.14	0.14	0.02	0.00	0.41	0.41	-0.32	-0.35	-0.30	1.1313	0.0198	9.9	1.6	9.9	9.9	A+	B-
Writing	11	2847	2	B.6	1	21487	0.87	0.87	0.03	0.07	0.03	0.00	0.43	0.43	-0.32	-0.30	-0.27	-0.6910	0.0258	9.9	1.4	9.9	9.9	A+	A-
Writing	11	2910	2	B.5	2	21487	0.82	0.04	0.82	0.07	0.06	0.00	0.43	-0.27	0.43	-0.34	-0.30	-0.0346	0.0230	9.9	1.5	9.9	9.9	A-	A-
Writing	11	4212	2	B.5	2	21487	0.47	0.47	0.31	0.09	0.12	0.00	0.33	0.33	-0.31	-0.39	-0.23	2.8835	0.0185	9.9	1.8	9.9	9.9	A-	A-
Writing	11	6526	2	B.6	1	21487	0.59	0.02	0.32	0.06	0.59	0.00	0.29	-0.33	-0.21	-0.34	0.29	1.9612	0.0187	9.9	1.9	9.9	9.9	A-	A-
Writing	11	9116	2	B.6	1	21487	0.84	0.06	0.84	0.07	0.04	0.00	0.45	-0.30	0.45	-0.37	-0.26	-0.2693	0.0239	9.9	1.4	9.9	9.9	A+	A-
Writing	11	280	3	B.6	2	21618	0.59	0.14	0.11	0.16	0.59	0.00	0.49	-0.42	-0.45	-0.41	0.49	2.0227	0.0185	9.9	1.4	9.9	6.4	A+	B-
Writing	11	602	3	B.6	1	21618	0.55	0.15	0.07	0.55	0.22	0.00	0.32	-0.33	-0.32	0.32	-0.22	2.2577	0.0184	9.9	1.8	9.9	9.9	A+	A-
Writing	11	970	3	B.6	1	21618	0.90	0.90	0.03	0.02	0.05	0.00	0.38	0.38	-0.30	-0.27	-0.20	-1.1297	0.0284	9.9	1.4	9.9	9.9	A-	A-
Writing	11	7924	3	B.5	2	21618	0.76	0.05	0.08	0.12	0.76	0.00	0.28	-0.24	-0.26	-0.16	0.28	0.6194	0.0209	9.9	1.8	9.9	9.9	A+	A+
Writing	11	8354	3	B.5	2	21618	0.74	0.09	0.05	0.12	0.74	0.00	0.35	-0.21	-0.26	-0.32	0.35	0.7723	0.0205	9.9	1.7	9.9	9.9	A-	B-
Writing	11	8663	3	B.6	1	21618	0.58	0.13	0.12	0.58	0.17	0.00	0.42	-0.34	-0.39	0.42	-0.33	2.0798	0.0185	9.9	1.6	9.9	9.3	A+	A-
Writing	11	9514	3	B.5	2	21618	0.59	0.08	0.06	0.27	0.59	0.00	0.18	-0.22	-0.37	-0.04	0.18	1.9855	0.0185	9.9	2.2	9.9	9.9	A+	A+
Writing	11	9747	3	B.6	1	21618	0.78	0.14	0.78	0.03	0.06	0.00	0.43	-0.37	0.43	-0.31	-0.25	0.4410	0.0213	9.9	1.5	9.9	9.9	A+	A-
Writing	11	400	4	B.5	2	21482	0.68	0.15	0.04	0.14	0.68	0.00	0.40	-0.32	-0.38	-0.31	0.40	1.3495	0.0196	9.9	1.7	9.9	9.9	A-	B-
Writing	11	500	4	B.6	2	21482	0.41	0.29	0.14	0.16	0.41	0.00	0.30	-0.26	-0.32	-0.34	0.30	3.3519	0.0188	9.9	1.9	9.9	9.9	A-	A-
Writing	11	540	4	B.6	1	21482	0.63	0.63	0.03	0.32	0.01	0.00	0.37	0.37	-0.24	-0.35	-0.22	1.7208	0.0190	9.9	1.8	9.9	9.9	A+	B-
Writing	11	1163	4	B.5	2	21482	0.85	0.08	0.02	0.85	0.04	0.00	0.35	-0.22	-0.21	0.35	-0.29	-0.4327	0.0247	9.9	1.6	9.9	9.9	A+	A-
Writing	11	1520	4	B.6	1	21482	0.91	0.03	0.02	0.91	0.04	0.00	0.40	-0.27	-0.24	0.40	-0.28	-1.4153	0.0304	9.9	1.4	8.6	7.7	A+	A-
Writing	11	4360	4	B.5	2	21482	0.43	0.43	0.26	0.07	0.24	0.00	0.18	0.18	-0.21	-0.43	-0.01	3.2058	0.0187	9.9	2.2	9.9	9.9	A+	A-
Writing	11	5868	4	B.5	2	21482	0.80	0.06	0.80	0.11	0.02	0.00	0.37	-0.35	0.37	-0.23	-0.21	0.1748	0.0224	9.9	1.6	9.9	9.9	A+	A+
Writing	11	8235	4	B.6	1	21482	0.10	0.84	0.04	0.01	0.10	0.00	0.11	-0.10	-0.45	-0.53	0.11	7.1560	0.0324	9.9	2.6	9.9	9.9	A+	A-
Writing	11	315	5	B.6	1	21400	0.49	0.27	0.49	0.22	0.02	0.00	0.30	-0.28	0.30	-0.27	-0.27	2.8067	0.0184	9.9	1.8	9.9	9.9	A+	A-
Writing	11	1603	5	B.5	2	21400	0.30	0.30	0.18	0.37	0.14	0.00	0.13	0.13	-0.22	-0.07	-0.20	4.2807	0.0210	9.9	2.6	9.9	9.9	A-	A-
Writing	11	3049	5	B.5	2	21400	0.88	0.88	0.03	0.05	0.03	0.00	0.43	0.43	-0.29	-0.30	-0.28	-0.8139	0.0270	9.9	1.4	9.9	9.9	A-	B-
Writing	11	4002	5	B.6	1	21400	0.45	0.35	0.14	0.06	0.45	0.00	0.29	-0.17	-0.39	-0.42	0.29	3.0533	0.0185	9.9	1.9	9.9	9.9	A+	A-
Writing	11	4363	5	B.5	2	21400	0.81	0.05	0.10	0.81	0.03	0.00	0.36	-0.25	-0.28	0.36	-0.23	0.1332	0.0227	9.9	1.7	9.9	9.9	A-	A-
Writing	11	5940	5	B.6	1	21400	0.60	0.14	0.20	0.06	0.60	0.00	0.43	-0.30	-0.39	-0.44	0.43	2.0184	0.0186	9.9	1.6	9.9	8.6	A-	A-
Writing	11	7119	5	B.5	2	21400	0.63	0.04	0.63	0.24	0.09	0.00	0.11	-0.26	0.11	-0.04	-0.06	1.7232	0.0190	9.9	2.3	9.9	9.9	A-	A-
Writing	11	8957	5	B.6	2	21400	0.69	0.69	0.11	0.09	0.10	0.00	0.35	0.35	-0.29	-0.23	-0.28	1.2625	0.0197	9.9	1.8	9.9	9.9	A+	A-
Writing	11	698	6	B.6	2	21247	0.65	0.65	0.04	0.24	0.08	0.00	0.43	0.43	-0.39	-0.37	-0.32	1.6298	0.0190	9.9	1.6	9.9	6.1	A-	A-
Writing	11	2750	6	B.6	1	21247	0.59	0.15	0.08	0.18	0.59	0.00	0.39	-0.30	-0.33	-0.36	0.39	2.0573	0.0185	9.9	1.6	9.9	9.9	A-	A-

Appendix I: Item Statistics Multiple Choice

Item Information						Classical											Rasch		Infit		Outfit		DIF		
Cont	Grade	PubID	Form	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	2913	6	B.5	2	21247	0.45	0.45	0.11	0.05	0.39	0.00	0.11	0.11	-0.35	-0.37	0.05	3.0783	0.0185	9.9	2.3	9.9	9.9	A+	A-
Writing	11	3461	6	B.6	1	21247	0.66	0.66	0.05	0.21	0.09	0.00	0.33	0.33	-0.27	-0.32	-0.16	1.5380	0.0192	9.9	1.8	9.9	9.9	A+	A-
Writing	11	6110	6	B.5	2	21247	0.71	0.20	0.71	0.06	0.03	0.00	0.30	-0.21	0.30	-0.29	-0.24	1.1331	0.0199	9.9	1.8	9.9	9.9	A+	A-
Writing	11	6269	6	B.5	2	21247	0.73	0.11	0.08	0.73	0.07	0.00	0.31	-0.24	-0.23	0.31	-0.23	0.9242	0.0204	9.9	1.8	9.9	9.9	A+	A-
Writing	11	7684	6	B.5	2	21247	0.34	0.24	0.34	0.21	0.22	0.00	0.18	-0.15	0.18	-0.16	-0.24	3.9334	0.0200	9.9	2.2	9.9	9.9	A+	A+
Writing	11	9408	6	B.6	2	21247	0.76	0.03	0.12	0.08	0.76	0.00	0.41	-0.38	-0.25	-0.35	0.41	0.6568	0.0211	9.9	1.6	9.9	9.9	A-	B-

Appendix I: Item Statistics Open Ended

Item Information						Classical														Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	2432	0	A.1	3	124752	2.30	0.08	0.25	0.18	0.25	0.23	0.00	0.60	-0.44	-0.34	0.06	0.24	0.33	2.4587	0.0033	9.9	1.1	9.9	1.1		
Math	3	6918	0	B.1	3	124752	2.36	0.05	0.19	0.35	0.19	0.23	0.00	0.57	-0.40	-0.33	-0.01	0.20	0.34	2.2293	0.0035	9.9	1.1	9.9	1.1		
Math	3	8628	0	D.2	3	124752	2.57	0.07	0.14	0.20	0.32	0.27	0.00	0.62	-0.53	-0.27	-0.04	0.21	0.33	2.1576	0.0035	9.9	1.2	9.9	1.2		
Math	3	5495	1	C.1	2	1100	2.58	0.03	0.16	0.25	0.33	0.24	0.00	0.59	-0.32	-0.39	-0.12	0.21	0.35	1.9124	0.0392	3.5	1.2	3.5	1.2	A+	A-
Math	3	1992	2	E.1	2	1100	3.11	0.04	0.07	0.13	0.29	0.48	0.00	0.64	-0.46	-0.35	-0.18	0.04	0.43	1.3476	0.0410	3.1	1.2	3.0	1.2	A+	C-
Math	3	9341	3	E.1	2	1100	3.55	0.01	0.03	0.08	0.16	0.72	0.00	0.52	-0.26	-0.33	-0.21	-0.13	0.42	0.3982	0.0504	5.7	1.4	5.4	1.7	A-	C-
Math	3	4477	4	C.1	2	1100	3.14	0.01	0.06	0.14	0.37	0.42	0.00	0.62	-0.18	-0.40	-0.34	0.02	0.44	0.8224	0.0453	1.4	1.1	0.7	1.0	A+	A-
Math	3	9581	5	E.1	2	1100	3.37	0.01	0.03	0.09	0.30	0.57	0.00	0.51	-0.36	-0.35	-0.14	-0.04	0.32	0.6994	0.0479	6.4	1.4	6.7	1.5	A+	A-
Math	4	6655	0	A.2		125600	2.24	0.13	0.13	0.20	0.44	0.09	0.01	0.57	-0.41	-0.22	-0.07	0.32	0.29	1.3847	0.0033	9.9	1.2	9.9	1.3		
Math	4	7380	0	D.1	2	125600	2.52	0.08	0.17	0.15	0.34	0.26	0.00	0.59	-0.43	-0.28	-0.06	0.21	0.34	0.8454	0.0031	9.9	1.2	9.9	1.2		
Math	4	8221	0	C.3	2	125600	2.49	0.06	0.12	0.25	0.40	0.17	0.00	0.53	-0.33	-0.26	-0.14	0.22	0.31	0.8990	0.0034	9.9	1.2	9.9	1.2		
Math	4	7012	1	C.1	2	1100	2.28	0.08	0.19	0.26	0.30	0.17	0.00	0.49	-0.33	-0.24	-0.05	0.24	0.26	1.1027	0.0341	7.7	1.3	7.7	1.4	A+	C-
Math	4	7253	2	C.3	2	1100	2.39	0.07	0.12	0.31	0.32	0.17	0.00	0.59	-0.35	-0.27	-0.15	0.23	0.38	1.0066	0.0360	2.1	1.1	2.3	1.1	A+	A-
Math	4	7554	3	E.1	2	1100	3.14	0.03	0.11	0.06	0.29	0.51	0.00	0.60	-0.25	-0.42	-0.16	-0.06	0.48	0.0363	0.0366	1.1	1.1	2.3	1.2	A+	C-
Math	4	3240	4	E.3	3	1100	2.64	0.03	0.11	0.31	0.30	0.25	0.00	0.59	-0.26	-0.28	-0.28	0.14	0.45	0.5044	0.0376	1.4	1.1	1.5	1.1	A+	C-
Math	4	577	5	E.1	3	1100	3.10	0.02	0.09	0.12	0.30	0.46	0.00	0.57	-0.25	-0.42	-0.21	0.07	0.39	-0.0538	0.0380	1.5	1.1	3.1	1.2	A+	A-
Math	5	1741	0	D.1	3	126578	2.19	0.03	0.10	0.57	0.24	0.05	0.00	0.55	-0.26	-0.24	-0.21	0.38	0.27	1.5085	0.0043	-5.7	1.0	-5.0	1.0		
Math	5	7661	0	A.2		126578	2.23	0.06	0.23	0.26	0.30	0.15	0.00	0.60	-0.32	-0.35	-0.05	0.27	0.36	1.4223	0.0034	9.9	1.1	9.9	1.1		
Math	5	7777	0	B.1	2	126578	1.68	0.15	0.35	0.23	0.20	0.07	0.01	0.64	-0.47	-0.27	0.20	0.36	0.27	2.2090	0.0034	2.4	1.0	-1.1	1.0		
Math	5	4527	1	D.1	3	1100	1.90	0.21	0.13	0.37	0.17	0.13	0.00	0.61	-0.53	-0.06	0.04	0.27	0.33	1.9383	0.0336	4.1	1.2	4.3	1.2	A+	A-
Math	5	1177	2	E.3	3	1100	2.48	0.08	0.08	0.30	0.38	0.16	0.00	0.58	-0.41	-0.24	-0.11	0.20	0.35	1.2667	0.0374	2.5	1.1	3.0	1.1	A+	C-
Math	5	2648	3	E.1	3	1100	2.64	0.04	0.13	0.16	0.47	0.19	0.00	0.60	-0.26	-0.34	-0.27	0.22	0.39	0.9640	0.0380	1.0	1.1	1.9	1.1	A+	A-
Math	5	8419	4	E.2	3	1100	2.31	0.08	0.23	0.15	0.40	0.15	0.00	0.58	-0.35	-0.34	-0.02	0.24	0.36	1.4080	0.0350	4.1	1.2	4.4	1.2	A+	A-
Math	5	5060	5	C.1	3	1100	1.94	0.17	0.22	0.21	0.29	0.10	0.00	0.66	-0.50	-0.24	0.07	0.36	0.32	1.9320	0.0343	1.2	1.1	0.8	1.0	A+	B-
Math	6	1664	0	E.1	3	126606	1.93	0.13	0.33	0.17	0.20	0.17	0.02	0.53	-0.41	-0.15	-0.02	0.20	0.37	1.4657	0.0032	9.9	1.4	9.9	1.5		
Math	6	2394	0	A.2		126606	1.61	0.11	0.40	0.33	0.12	0.05	0.00	0.48	-0.34	-0.20	0.18	0.23	0.22	1.9682	0.0038	9.9	1.3	9.9	1.3		
Math	6	2793	0	B.2		126606	2.76	0.04	0.11	0.13	0.50	0.22	0.00	0.51	-0.34	-0.26	-0.15	0.15	0.29	0.4526	0.0037	9.9	1.3	9.9	1.4		
Math	6	4177	1	C.3	2	1100	1.76	0.13	0.30	0.31	0.19	0.07	0.00	0.55	-0.39	-0.21	0.09	0.32	0.25	1.8181	0.0376	3.8	1.2	3.7	1.2	A+	A-
Math	6	7804	2	D.2	3	1100	2.79	0.05	0.11	0.18	0.29	0.36	0.00	0.62	-0.38	-0.29	-0.23	0.10	0.46	0.4508	0.0358	3.3	1.2	2.4	1.1	A+	B-
Math	6	1742	3	B.1	2	1101	0.90	0.54	0.20	0.11	0.09	0.05	0.00	0.58	-0.59	0.20	0.23	0.27	0.28	2.8171	0.0367	0.1	1.0	0.1	1.0	A+	B-
Math	6	1928	4	D.1	3	1100	1.59	0.10	0.43	0.29	0.13	0.05	0.00	0.54	-0.33	-0.29	0.20	0.30	0.23	1.9552	0.0404	1.3	1.1	1.7	1.1	A-	A+
Math	6	4889	5	D.2	2	1100	1.87	0.10	0.28	0.32	0.25	0.05	0.00	0.65	-0.45	-0.32	0.13	0.38	0.25	1.7672	0.0392	-0.4	1.0	-0.3	1.0	A+	A-
Math	7	966	0	D.2		126959	2.16	0.19	0.10	0.24	0.28	0.18	0.03	0.65	-0.50	-0.20	-0.04	0.26	0.41	1.2600	0.0031	9.9	1.2	9.9	1.2		
Math	7	4071	0	C.1	3	126959	2.15	0.03	0.29	0.32	0.22	0.14	0.00	0.63	-0.29	-0.47	0.04	0.28	0.37	0.8874	0.0036	9.9	1.0	9.5	1.0		
Math	7	7873	0	B.1	3	126959	1.64	0.15	0.31	0.34	0.17	0.03	0.00	0.68	-0.51	-0.24	0.21	0.40	0.23	2.0347	0.0037	-9.9	0.9	-9.9	0.9		
Math	7	2331	1	E.2	2	1100	2.63	0.09	0.14	0.12	0.34	0.30	0.00	0.64	-0.43	-0.29	-0.12	0.11	0.46	0.6222	0.0346	3.9	1.2	4.5	1.2	A+	A-
Math	7	2586	2	A.2	2	1100	2.21	0.15	0.15	0.19	0.38	0.13	0.00	0.61	-0.52	-0.12	-0.05	0.26	0.36	1.2496	0.0350	5.4	1.3	6.4	1.3	C+	A-
Math	7	5852	3	A.3	3	1100	1.59	0.29	0.19	0.20	0.30	0.02	0.00	0.68	-0.57	-0.10	0.07	0.51	0.20	2.2684	0.0355	0.3	1.0	0.3	1.0	A-	A-
Math	7	734	4	A.1	2	1100	1.49	0.19	0.41	0.18	0.14	0.08	0.00	0.64	-0.49	-0.18	0.23	0.33	0.31	1.9436	0.0363	-1.4	0.9	-1.5	0.9	A-	A-
Math	7	2844	5	B.1	2	1100	1.28	0.41	0.14	0.25	0.17	0.04	0.00	0.69	-0.65	0.02	0.28	0.40	0.23	2.4698	0.0355	-2.4	0.9	-2.2	0.9	A-	B-
Math	8	1016	0	A.2	3	126750	1.65	0.19	0.38	0.10	0.25	0.08	0.00	0.62	-0.44	-0.22	0.11	0.38	0.31	1.9441	0.0033	9.9	1.1	9.9	1.1		
Math	8	6616	0	D.1	3	126750	1.75	0.13	0.36	0.24	0.16	0.10	0.02	0.64	-0.37	-0.37	0.17	0.34	0.34	1.7237	0.0034	-5.4	1.0	-9.1	1.0		
Math	8	8284	0	E.3	3	126750	2.10	0.09	0.26	0.26	0.22	0.16	0.00	0.65	-0.49	-0.30	0.05	0.28	0.36	1.2547	0.0033	9.9	1.1	9.9	1.1		
Math	8	8830	1	A.3	3	1100	2.84	0.02	0.19	0.10	0.30	0.39	0.00	0.49	-0.17	-0.35	-0.13	0.02	0.40	0.1898	0.0363	9.9	1.6	9.9	1.8	A+	C-
Math	8	3935	2	B.2	3	1100	2.37	0.10	0.20	0.14	0.36	0.20	0.00	0.67	-0.44	-0.36	-0.02	0.23	0.42	1.0274	0.0349	2.0	1.1	2.0	1.1	A+	A-
Math	8	1457	3	B.2	3	1100	1.32	0.41	0.22	0.10	0.17	0.10	0.00	0.67	-0.64	0.08	0.12	0.36	0.36	2.2865	0.0331	-1.9	0.9	-1.6	0.9	A+	A+
Math	8	3257	4	C.3	2	1100	1.92	0.06	0.29	0.35	0.26	0.03	0.00	0.64	-0.43	-0.33	0.05	0.42	0.22	1.6874	0.0418	-1.3	1.0	-1.1	1.0	A-	A-
Math	8	3540	5	B.1	3	1100	2.09	0.15	0.22	0.21	0.24	0.19	0.00	0.73	-0.59	-0.26	0.07	0.31	0.41	1.3687	0.0336	-1.9	0.9	-1.7	0.9	A+	B-
Math	11	4241	0	A.1	3	127794	2.29	0.11	0.12	0.35	0.22	0.20	0.03	0.66	-0.44	-0.22	-0.17	0.26	0.45	0.4562	0.0033	9.9	1.1	9.9	1.1		
Math	11	8381	0	D.2		127794	1.53	0.32	0.25	0.14	0.13	0.15	0.01	0.65	-0.56	-0.06	0.15	0.27	0.41	1.3327	0.0031	9.9	1.1	9.9	1.1		
Math	11	9036	0	C.3	2	127794	1.43	0.23	0.34	0.24	0.15	0.04	0.01	0.70	-0.60	-0.09	0.27	0.38	0.23	1.7537	0.0036	-9.9	0.9	-9.9	0.9		

Appendix I: Item Statistics Open Ended

Item Information						Classical														Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	11	342	1	C.1	3	1100	0.74	0.49	0.34	0.11	0.06	0.00	0.02	0.56	-0.52	0.20	0.30	0.29	0.07	3.3554	0.0452	-0.7	1.0	-1.7	0.9	A+	A-
Math	11	2614	2	B.2	2	1100	1.12	0.34	0.40	0.12	0.07	0.07	0.01	0.66	-0.63	0.11	0.30	0.25	0.31	1.8173	0.0369	-2.0	0.9	-4.0	0.8	A-	A-
Math	11	764	3	B.2	3	1100	0.77	0.53	0.30	0.07	0.08	0.02	0.02	0.57	-0.61	0.31	0.23	0.27	0.19	2.5551	0.0413	1.5	1.1	-0.4	1.0	A-	A-
Math	11	1013	4	B.2	3	1100	1.36	0.15	0.60	0.03	0.16	0.06	0.01	0.56	-0.50	-0.02	0.10	0.29	0.29	1.5853	0.0396	5.4	1.3	4.8	1.3	B-	A-
Math	11	9899	5	C.3	3	1100	1.42	0.36	0.26	0.11	0.15	0.12	0.01	0.71	-0.66	0.03	0.18	0.32	0.41	1.4796	0.0334	-1.3	0.9	-2.6	0.9	A+	A-
Reading	3	448	0	B.1.2.1	3	124681	1.40	0.13	0.43	0.36	0.08		0.00	0.48	-0.39	-0.14	0.28	0.23		1.3432	0.0044	9.9	1.2	9.9	1.2		
Reading	3	5700	0	B.1.1.1		124681	1.62	0.06	0.38	0.45	0.11		0.00	0.47	-0.38	-0.22	0.25	0.22		0.7432	0.0046	9.9	1.2	9.9	1.2		
Reading	3	313	1	B.1.2.1	3	1100	1.29	0.23	0.34	0.33	0.10		0.00	0.50	-0.45	-0.03	0.29	0.24		1.5258	0.0419	3.8	1.2	4.1	1.2	A-	C-
Reading	3	1003	2	A.1.4.1	2	1100	1.74	0.10	0.28	0.40	0.22		0.00	0.58	-0.44	-0.28	0.23	0.34		0.6163	0.0432	0.8	1.0	0.8	1.0	A+	B-
Reading	3	760	3	A.2.4.1	3	1100	1.77	0.12	0.27	0.33	0.28		0.00	0.57	-0.35	-0.32	0.13	0.43		0.5887	0.0411	2.3	1.1	2.0	1.1	A-	B-
Reading	3	4561	4	A.1.5.1	2	1100	2.05	0.04	0.19	0.46	0.31		0.00	0.60	-0.32	-0.39	0.01	0.45		-0.1055	0.0474	-1.5	0.9	-1.8	0.9	A+	A+
Reading	3	5571	5	B.1.2.1	3	1100	1.32	0.16	0.50	0.20	0.14		0.00	0.41	-0.36	-0.04	0.15	0.26		1.2856	0.0426	6.6	1.3	7.1	1.3	A+	A-
Reading	4	912	0	B.1.1.1		124530	1.93	0.04	0.25	0.46	0.25		0.00	0.53	-0.32	-0.36	0.13	0.35		0.1847	0.0042	-8.2	1.0	-8.3	1.0		
Reading	4	2607	0	A.2.4.1		124530	1.96	0.08	0.19	0.43	0.30		0.00	0.53	-0.40	-0.27	0.10	0.35		0.3438	0.0039	5.2	1.0	2.3	1.0		
Reading	4	6236	0	B.1.1.1		124530	1.70	0.04	0.37	0.44	0.15		0.00	0.36	-0.22	-0.24	0.18	0.20		0.5330	0.0043	9.9	1.2	9.9	1.2		
Reading	4	9943	0	A.1.3.1	2	124530	2.09	0.11	0.17	0.24	0.48		0.00	0.43	-0.30	-0.20	-0.04	0.37		0.2631	0.0036	9.9	1.4	9.9	1.4		
Reading	4	8976	1	B.1.1.1	3	1100	1.86	0.11	0.24	0.33	0.32		0.00	0.57	-0.41	-0.25	0.08	0.42		0.5195	0.0389	-0.2	1.0	-0.4	1.0	C+	A+
Reading	4	4138	2	A.1.5.1	3	1100	2.17	0.03	0.18	0.39	0.40		0.00	0.52	-0.28	-0.35	-0.03	0.40		-0.1973	0.0444	-0.5	1.0	-0.7	1.0	A+	B-
Reading	4	989	3	A.2.5.1	3	1100	1.36	0.13	0.44	0.35	0.07		0.00	0.50	-0.39	-0.14	0.31	0.23		1.3890	0.0448	-0.5	1.0	-0.4	1.0	A+	A-
Reading	4	186	4	A.2.5.1	3	1100	1.73	0.09	0.30	0.41	0.20		0.00	0.52	-0.35	-0.27	0.18	0.34		0.6781	0.0418	0.3	1.0	0.3	1.0	A+	A-
Reading	4	1148	5	A.2.3.1	2	1100	1.31	0.07	0.59	0.31	0.03		0.00	0.50	-0.35	-0.23	0.36	0.19		1.4608	0.0526	-2.6	0.9	-2.7	0.9	A+	A-
Reading	5	3918	0	B.1.1.1		125963	1.60	0.11	0.27	0.52	0.10		0.00	0.56	-0.47	-0.19	0.31	0.25		1.2526	0.0042	-9.9	1.0	-9.9	1.0		
Reading	5	4066	0	A.2.3.1		125963	1.74	0.05	0.34	0.44	0.17		0.00	0.48	-0.34	-0.28	0.19	0.29		0.6710	0.0043	9.9	1.0	9.9	1.0		
Reading	5	4473	0	A.1.5.1	3	125963	1.89	0.02	0.18	0.67	0.12		0.00	0.49	-0.30	-0.35	0.22	0.25		0.4089	0.0052	-8.2	1.0	-7.0	1.0		
Reading	5	8860	0	A.2.3.1		125963	1.57	0.03	0.49	0.35	0.13		0.00	0.33	-0.28	-0.16	0.14	0.20		0.7796	0.0044	9.9	1.2	9.9	1.3		
Reading	5	253	1	B.1.1.1	3	1100	2.17	0.03	0.19	0.35	0.43		0.00	0.50	-0.34	-0.31	0.01	0.36		-0.0604	0.0439	1.6	1.1	1.1	1.1	B+	A+
Reading	5	1227	2	B.3.3.4	3	1100	1.37	0.11	0.53	0.25	0.11		0.00	0.46	-0.30	-0.20	0.23	0.29		1.3432	0.0442	0.3	1.0	0.3	1.0	A+	B-
Reading	5	3067	3	B.3.3.3	3	1100	1.51	0.06	0.52	0.29	0.14		0.00	0.38	-0.38	-0.11	0.15	0.22		0.9580	0.0449	3.6	1.2	4.7	1.2	A+	A-
Reading	5	3352	4	B.1.1.1	3	1100	1.86	0.09	0.21	0.46	0.24		0.00	0.60	-0.47	-0.30	0.22	0.34		0.6854	0.0430	-2.5	0.9	-2.5	0.9	B+	C-
Reading	5	4398	5	B.1.1.1	3	1100	2.03	0.05	0.22	0.38	0.35		0.00	0.58	-0.37	-0.33	0.02	0.44		0.3013	0.0426	-1.8	0.9	-2.5	0.9	A+	A-
Reading	6	2482	0	B.1.2.1		126150	1.92	0.02	0.30	0.43	0.25		0.00	0.45	-0.22	-0.31	0.04	0.34		-0.1257	0.0044	9.9	1.1	9.9	1.1		
Reading	6	6167	0	A.2.3.2		126150	1.64	0.06	0.37	0.43	0.14		0.00	0.39	-0.25	-0.20	0.14	0.25		0.7226	0.0043	9.9	1.2	9.9	1.2		
Reading	6	7872	0	A.2.3.1	3	126150	1.96	0.02	0.16	0.64	0.17		0.00	0.49	-0.29	-0.34	0.12	0.29		0.0281	0.0050	-3.6	1.0	-4.1	1.0		
Reading	6	9853	0	B.1.1.1		126150	2.00	0.04	0.14	0.59	0.22		0.00	0.54	-0.34	-0.34	0.10	0.33		0.1468	0.0046	-8.0	1.0	-5.7	1.0		
Reading	6	5328	1	A.1.2.1	3	1100	1.74	0.05	0.28	0.54	0.12		0.00	0.57	-0.35	-0.36	0.26	0.33		0.6154	0.0490	-2.5	0.9	-2.6	0.9	A+	A+
Reading	6	1919	2	B.1.1.1	3	1100	1.94	0.05	0.22	0.49	0.25		0.00	0.58	-0.39	-0.36	0.15	0.36		0.2030	0.0460	-2.1	0.9	-2.0	0.9	B+	A-
Reading	6	1626	3	A.2.3.1	3	1100	2.18	0.02	0.13	0.51	0.35		0.00	0.49	-0.25	-0.36	-0.03	0.35		-0.4522	0.0498	0.3	1.0	0.1	1.0	C+	A-
Reading	6	9191	4	B.1.2.1	3	1100	1.72	0.03	0.35	0.49	0.13		0.00	0.55	-0.34	-0.35	0.23	0.33		0.4388	0.0494	-2.2	0.9	-2.2	0.9	C+	A-
Reading	6	1130	5	A.2.3.1	3	1100	1.99	0.01	0.11	0.76	0.12		0.00	0.39	-0.16	-0.33	0.14	0.20		-0.1856	0.0650	0.0	1.0	-0.3	1.0	C+	A+
Reading	7	1572	0	A.2.5.1		126871	1.67	0.09	0.34	0.38	0.19		0.00	0.55	-0.38	-0.27	0.20	0.36		0.7351	0.0039	-9.9	1.0	-9.9	1.0		
Reading	7	2955	0	A.1.3.1		126871	1.78	0.05	0.29	0.50	0.16		0.00	0.55	-0.33	-0.35	0.21	0.33		0.4775	0.0044	-9.9	0.9	-9.9	0.9		
Reading	7	5667	0	A.2.3.1	2	126871	1.80	0.05	0.28	0.50	0.17		0.00	0.48	-0.35	-0.26	0.16	0.29		0.4523	0.0043	9.9	1.1	9.9	1.1		
Reading	7	8619	0	B.1.2.1	3	126871	1.51	0.13	0.34	0.41	0.11		0.00	0.54	-0.41	-0.19	0.25	0.33		1.1297	0.0040	-7.1	1.0	-6.6	1.0		
Reading	7	6686	1	A.2.6.2	3	1100	1.98	0.05	0.24	0.39	0.32		0.01	0.52	-0.37	-0.29	0.08	0.35		0.1639	0.0428	1.7	1.1	1.6	1.1	A+	A+
Reading	7	2954	2	B.1.1.1	3	1100	1.94	0.09	0.20	0.39	0.32		0.00	0.57	-0.34	-0.33	0.04	0.45		0.3938	0.0408	0.6	1.0	0.3	1.0	A+	A+
Reading	7	6432	3	A.2.3.1	3	1100	1.89	0.05	0.23	0.49	0.23		0.00	0.55	-0.38	-0.29	0.10	0.38		0.3355	0.0451	-1.5	0.9	-1.5	0.9	B+	A-
Reading	7	4190	4	B.1.1.1	3	1100	1.87	0.06	0.28	0.41	0.26		0.00	0.57	-0.40	-0.30	0.09	0.41		0.3315	0.0425	-2.4	0.9	-2.4	0.9	B+	A+
Reading	7	9727	5	B.1.1.1	3	1100	2.18	0.03	0.13	0.49	0.35		0.00	0.60	-0.28	-0.40	-0.09	0.47		-0.2665	0.0482	-3.5	0.9	-3.7	0.9	C+	A-
Reading	8	2534	0	A.1.3.1		127088	2.02	0.01	0.17	0.60	0.22		0.00	0.54	-0.24	-0.40	0.05	0.37		0.3271	0.0049	-9.9	0.9	-9.9	0.9		
Reading	8	4260	0	B.1.1.1		127088	1.68	0.07	0.30	0.50	0.13		0.01	0.54	-0.35	-0.30	0.24	0.32		1.3412	0.0043	-6.6	1.0	-7.7	1.0		
Reading	8	4708	0	B.1.2.1		127088	1.71	0.06	0.32	0.47	0.15		0.00	0.56	-0.34	-0.33	0.22	0.35		1.2291	0.0043	-9.9	1.0	-9.9	0.9		

Appendix I: Item Statistics Open Ended

Item Information						Classical														Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	8	9419	0	B.1.2.1		127088	2.08	0.02	0.15	0.56	0.27		0.00	0.57	-0.27	-0.39	-0.01	0.41		0.3192	0.0047	-9.9	0.9	-9.9	0.9		
Reading	8	3237	1	A.2.3.1	3	1100	2.08	0.03	0.16	0.50	0.31		0.00	0.59	-0.35	-0.34	-0.03	0.44		0.5290	0.0468	-2.9	0.9	-3.3	0.9	A+	A+
Reading	8	1876	2	B.1.2.1	3	1100	2.22	0.02	0.16	0.38	0.43		0.00	0.61	-0.28	-0.49	0.01	0.44		0.1787	0.0458	-3.4	0.9	-2.3	0.9	C+	A-
Reading	8	2152	3	A.2.6.2	3	1100	2.17	0.05	0.16	0.35	0.44		0.00	0.55	-0.38	-0.26	-0.07	0.44		0.5111	0.0429	0.5	1.0	0.2	1.0	A+	A+
Reading	8	1613	4	B.1.2.1	3	1100	2.15	0.02	0.14	0.51	0.33		0.00	0.57	-0.28	-0.38	-0.06	0.43		0.2257	0.0495	-2.2	0.9	-2.5	0.9	C+	A+
Reading	8	4234	5	B.1.1.1	3	1100	1.98	0.05	0.22	0.42	0.30		0.00	0.62	-0.39	-0.37	0.06	0.45		0.7211	0.0439	-3.2	0.9	-3.3	0.9	A+	A-
Reading	11	2381	0	B.1.2.1		127998	1.94	0.04	0.23	0.49	0.25		0.01	0.53	-0.31	-0.35	0.10	0.36		0.0880	0.0043	-1.2	1.0	-0.4	1.0		
Reading	11	4653	0	B.1.2.1		127998	2.12	0.03	0.14	0.50	0.33		0.01	0.53	-0.33	-0.31	-0.03	0.39		-0.1729	0.0044	-4.8	1.0	-3.6	1.0		
Reading	11	8107	0	B.2.1.2		127998	1.60	0.06	0.40	0.40	0.13		0.02	0.56	-0.42	-0.26	0.25	0.32		0.7334	0.0042	-9.9	0.9	-9.9	0.9		
Reading	11	8869	0	B.1.1.1		127998	1.98	0.04	0.17	0.56	0.23		0.01	0.59	-0.37	-0.37	0.10	0.38		0.1047	0.0045	-9.9	0.9	-9.9	0.9		
Reading	11	7880	1	B.3.3.3	3	1100	1.99	0.06	0.21	0.40	0.33		0.01	0.51	-0.38	-0.30	0.14	0.31		0.1380	0.0423	1.6	1.1	1.8	1.1	A+	C-
Reading	11	9758	2	B.3.1.1	2	1100	1.81	0.04	0.34	0.40	0.22		0.01	0.56	-0.41	-0.32	0.16	0.37		0.2599	0.0438	-1.9	0.9	-1.7	0.9	A+	A-
Reading	11	6988	3	A.2.5.1	2	1099	2.18	0.04	0.10	0.51	0.35		0.01	0.55	-0.38	-0.33	-0.01	0.37		-0.2199	0.0479	-2.1	0.9	-2.1	0.9	B+	A-
Reading	11	9087	4	B.2.1.1	3	1100	2.14	0.03	0.17	0.45	0.36		0.01	0.54	-0.32	-0.29	-0.09	0.43		-0.2503	0.0463	-0.8	1.0	-0.5	1.0	A+	A-
Reading	11	7035	5	B.2.1.2	2	1100	1.29	0.10	0.59	0.22	0.09		0.02	0.42	-0.44	0.00	0.20	0.18		1.2235	0.0464	2.7	1.1	3.3	1.2	A+	A+
Science	4	606	0	C.2.1.1	2	128104	1.30	0.21	0.28	0.51			0.00	0.47	-0.37	-0.17	0.45			0.6178	0.0043	9.9	1.1	9.9	1.1		
Science	4	3657	0	D.1.3.2	2	128104	1.64	0.03	0.31	0.66			0.01	0.38	-0.19	-0.31	0.37			-0.8643	0.0058	9.4	1.0	9.9	1.1		
Science	4	5020	0	A.1.3.4	2	128104	1.47	0.14	0.24	0.61			0.00	0.40	-0.39	-0.05	0.32			0.1772	0.0046	9.9	1.2	9.9	1.3		
Science	4	5185	0	A.1.1.1	2	128104	1.53	0.07	0.34	0.59			0.00	0.42	-0.36	-0.17	0.34			-0.2401	0.0052	9.9	1.1	9.9	1.1		
Science	4	7542	0	B.2.1.2	2	128104	1.46	0.14	0.26	0.60			0.01	0.42	-0.30	-0.21	0.41			0.2076	0.0046	9.9	1.2	9.9	1.1		
Science	4	5991	1	B.3.2.2	3	1100	0.70	0.44	0.43	0.13			0.01	0.36	-0.34	0.18	0.24			2.0961	0.0509	3.0	1.1	3.4	1.2	A-	A+
Science	4	2999	2	B.3.1.2	2	1100	1.17	0.26	0.31	0.43			0.01	0.44	-0.38	-0.05	0.39			0.9118	0.0445	2.9	1.1	2.3	1.1	A+	B-
Science	4	8657	3	A.2.1.1	3	1100	1.03	0.17	0.63	0.20			0.01	0.40	-0.43	0.16	0.21			1.1469	0.0558	0.5	1.0	0.5	1.0	A+	A-
Science	4	9686	4	A.1.3.5	2	1100	0.84	0.36	0.44	0.20			0.02	0.48	-0.45	0.16	0.34			1.6692	0.0477	-1.2	1.0	-1.6	0.9	A+	A-
Science	4	7337	5	D.3.1.3	2	1100	0.23	0.81	0.14	0.05			0.01	0.30	-0.32	0.25	0.17			3.2961	0.0644	0.7	1.1	1.5	1.2	A+	A-
Science	4	4781	6	B.1.1.4	3	1100	1.12	0.28	0.31	0.40			0.01	0.49	-0.49	0.09	0.37			1.0178	0.0443	0.9	1.0	1.5	1.1	A+	A-
Science	4	4614	7	A.3.1.2	3	1100	1.23	0.28	0.22	0.50			0.02	0.44	-0.39	-0.08	0.41			0.8240	0.0434	4.0	1.2	3.8	1.2	A-	A-
Science	4	8173	8	A.1.3.1	3	1100	1.16	0.21	0.42	0.37			0.01	0.43	-0.38	-0.02	0.34			0.8610	0.0477	2.3	1.1	2.5	1.1	A+	A-
Science	4	3584	9	C.3.1.1	2	1100	0.61	0.52	0.35	0.13			0.01	0.32	-0.32	0.20	0.20			2.2175	0.0494	3.6	1.2	5.3	1.3	A-	A-
Science	4	216	10	B.3.1.1	2	1100	1.60	0.08	0.23	0.68			0.01	0.37	-0.27	-0.20	0.35			-0.2395	0.0550	2.9	1.1	2.6	1.2	A+	C-
Science	4	3256	11	A.3.1.2	3	1100	0.61	0.62	0.14	0.24			0.01	0.37	-0.34	0.03	0.36			1.9991	0.0430	2.2	1.1	5.1	1.5	A-	A+
Science	4	5397	12	A.1.3.3	2	1100	1.53	0.04	0.38	0.57			0.01	0.30	-0.24	-0.15	0.25			-0.4438	0.0586	4.0	1.2	4.5	1.2	A+	A-
Science	8	3172	0	D.1.3.2	3	127076	0.77	0.43	0.38	0.20			0.02	0.51	-0.49	0.20	0.36			1.1614	0.0045	-0.2	1.0	-2.5	1.0		
Science	8	3300	0	D.3.1.3	2	127076	1.11	0.22	0.46	0.33			0.00	0.33	-0.25	-0.08	0.30			0.3009	0.0046	9.9	1.3	9.9	1.3		
Science	8	3305	0	A.1.2.4	2	127076	0.88	0.24	0.64	0.12			0.02	0.33	-0.29	0.12	0.21			1.0406	0.0054	9.9	1.1	9.9	1.1		
Science	8	3589	0	B.3.1.3	3	127076	1.20	0.20	0.40	0.40			0.02	0.52	-0.45	-0.07	0.43			0.0700	0.0045	-2.0	1.0	-4.4	1.0		
Science	8	7852	0	A.1.3.4	2	127076	1.26	0.27	0.21	0.53			0.01	0.54	-0.48	-0.09	0.49			0.0448	0.0041	9.7	1.0	7.7	1.0		
Science	8	1959	1	B.3.2.3	2	1100	1.22	0.27	0.24	0.49			0.02	0.44	-0.41	-0.03	0.39			0.1066	0.0448	5.6	1.2	5.0	1.3	A-	C-
Science	8	857	2	C.3.1.2	2	1100	0.28	0.80	0.13	0.07			0.02	0.39	-0.40	0.27	0.26			2.3172	0.0579	0.1	1.0	-1.3	0.9	A+	A-
Science	8	480	3	A.3.2.1	2	1100	1.06	0.16	0.61	0.23			0.01	0.31	-0.26	0.00	0.23			0.3730	0.0549	4.0	1.2	4.2	1.2	A+	C-
Science	8	3957	4	D.1.1.2	2	1100	0.21	0.81	0.17	0.02			0.03	0.37	-0.37	0.31	0.19			2.9657	0.0709	-1.6	0.9	-1.7	0.8	B-	A-
Science	8	6443	5	D.1.1.1	2	1100	0.31	0.76	0.17	0.07			0.03	0.36	-0.34	0.20	0.27			2.3021	0.0581	0.1	1.0	0.4	1.0	A-	A-
Science	8	8392	6	B.1.1.4	2	1100	1.27	0.18	0.37	0.45			0.01	0.41	-0.37	-0.04	0.33			-0.0728	0.0479	4.0	1.2	5.2	1.3	A-	C-
Science	8	7275	7	C.1.1.1	2	1100	0.85	0.35	0.45	0.20			0.03	0.52	-0.43	0.08	0.42			0.9904	0.0491	-1.1	1.0	-1.3	1.0	A+	A-
Science	8	6240	8	A.2.1.3	3	1100	0.63	0.50	0.37	0.13			0.03	0.49	-0.45	0.23	0.35			1.5548	0.0507	-0.4	1.0	-0.2	1.0	A+	A-
Science	8	9829	9	D.1.2.2	3	1100	0.85	0.42	0.30	0.27			0.02	0.58	-0.55	0.13	0.47			0.9223	0.0452	-1.7	0.9	-2.1	0.9	A+	B-
Science	8	3541	10	B.1.1.2	2	1100	0.97	0.26	0.51	0.23			0.02	0.38	-0.29	-0.01	0.32			0.6683	0.0503	3.8	1.2	3.7	1.1	A+	A-
Science	8	6817	11	B.3.2.3	2	1100	1.48	0.13	0.27	0.60			0.01	0.42	-0.39	-0.09	0.35			-0.5537	0.0501	2.3	1.1	2.1	1.1	A+	C-
Science	8	3495	12	A.1.2.3	2	1100	0.50	0.56	0.38	0.06			0.03	0.45	-0.47	0.40	0.17			2.1270	0.0568	-0.2	1.0	-0.5	1.0	A+	A-
Science	11	1560	0	B.3.1.2	2	125318	1.33	0.27	0.31	0.26	0.13	0.03	0.05	0.59	-0.51	-0.05	0.26	0.32	0.19	1.3925	0.0033	-5.5	1.0	-9.9	1.0		
Science	11	2470	0	A.1.1.3	3	125318	1.00	0.32	0.35	0.32			0.05	0.51	-0.48	0.08	0.39			0.4862	0.0042	0.1	1.0	-0.7	1.0		

Appendix I: Item Statistics Open Ended

Item Information						Classical														Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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	3174	0	C.1.1.5	2	125318	2.14	0.14	0.18	0.25	0.28	0.16	0.04	0.69	-0.48	-0.28	-0.03	0.31	0.40	0.3789	0.0030	-9.9	0.9	-9.9	0.9		
Science	11	3736	0	A.2.1.1	2	125318	0.58	0.56	0.30	0.14			0.06	0.45	-0.45	0.28	0.28			1.4516	0.0045	9.9	1.1	-1.5	1.0		
Science	11	4223	0	C.1.1.6	2	125318	1.09	0.26	0.39	0.35			0.09	0.54	-0.49	0.02	0.43			0.2791	0.0043	-9.9	0.9	-9.9	0.9		
Science	11	4296	0	A.1.1.5	2	125318	0.58	0.47	0.47	0.06			0.03	0.32	-0.29	0.19	0.21			1.8281	0.0053	9.9	1.1	9.9	1.1		
Science	11	4626	0	A.2.1.1	3	125318	1.32	0.31	0.28	0.23	0.13	0.05	0.07	0.63	-0.53	-0.05	0.24	0.33	0.27	1.2850	0.0031	-9.9	0.9	-9.9	0.9		
Science	11	8079	0	B.1.1.3	2	125318	0.50	0.62	0.25	0.13			0.11	0.50	-0.48	0.26	0.36			1.6078	0.0046	-9.9	0.9	-9.9	0.9		
Science	11	8225	0	A.3.2.1	3	125318	0.71	0.47	0.35	0.18			0.06	0.49	-0.47	0.21	0.35			1.1402	0.0044	-3.7	1.0	-9.9	1.0		
Science	11	5198	1	D.1.2.2	2	1099	0.69	0.52	0.27	0.21			0.06	0.57	-0.55	0.23	0.43			1.1399	0.0449	-3.4	0.9	-3.5	0.8	A-	A-
Science	11	6801	1	A.3.1.2	3	1099	0.96	0.47	0.26	0.15	0.10	0.03	0.07	0.52	-0.48	0.10	0.20	0.29	0.21	1.6994	0.0347	1.6	1.1	1.4	1.1	A+	A-
Science	11	2073	2	C.3.1.1	3	1100	0.66	0.53	0.27	0.19			0.07	0.49	-0.49	0.24	0.34			1.2059	0.0451	0.2	1.0	-0.5	1.0	A-	B-
Science	11	4204	2	A.3.1.2	2	1100	1.52	0.28	0.27	0.21	0.13	0.11	0.07	0.63	-0.56	-0.05	0.20	0.25	0.34	0.9486	0.0309	-0.1	1.0	-0.9	1.0	A+	A-
Science	11	1261	3	B.1.1.3	3	1100	0.56	0.58	0.28	0.14			0.08	0.44	-0.38	0.14	0.36			1.4640	0.0477	-0.3	1.0	-0.2	1.0	A+	A-
Science	11	4947	3	A.1.3.2	3	1100	0.49	0.67	0.21	0.09	0.02	0.01	0.13	0.47	-0.44	0.20	0.29	0.18	0.17	2.2317	0.0428	-1.8	0.9	-1.3	0.9	A+	A-
Science	11	510	4	C.1.1.5	2	1099	0.99	0.34	0.32	0.34			0.05	0.60	-0.54	0.04	0.50			0.5000	0.0437	-3.8	0.9	-3.7	0.9	A-	B-
Science	11	2595	4	A.2.1.1	3	1099	0.56	0.60	0.29	0.08	0.03	0.01	0.06	0.52	-0.49	0.27	0.25	0.25	0.15	2.3657	0.0445	-1.6	0.9	-3.0	0.8	A+	A-
Science	11	3116	5	C.1.1.6	2	1100	0.27	0.76	0.22	0.02			0.12	0.45	-0.44	0.38	0.21			2.7118	0.0664	-2.6	0.9	-4.2	0.7	A-	A-
Science	11	6335	5	A.3.1.1	3	1100	0.85	0.46	0.29	0.21	0.04	0.01	0.07	0.38	-0.29	-0.01	0.25	0.21	0.09	2.1611	0.0393	4.2	1.2	4.3	1.2	A-	A-
Science	11	353	6	D.2.1.3	2	1100	0.24	0.80	0.15	0.05			0.05	0.37	-0.37	0.29	0.21			2.4191	0.0628	-0.5	1.0	-1.7	0.8	A-	A-
Science	11	4123	6	A.2.1.4	3	1100	0.99	0.51	0.18	0.16	0.09	0.05	0.07	0.55	-0.50	0.08	0.20	0.31	0.26	1.5251	0.0323	1.0	1.0	0.6	1.0	A+	A-
Science	11	8743	7	B.2.1.2	2	1100	0.29	0.76	0.18	0.06			0.08	0.48	-0.46	0.30	0.34			2.2476	0.0590	-3.3	0.8	-4.0	0.7	A-	A-
Science	11	8842	7	A.1.3.2	3	1100	1.25	0.29	0.34	0.24	0.10	0.03	0.10	0.61	-0.51	-0.04	0.26	0.31	0.23	1.4138	0.0355	-1.9	0.9	-2.3	0.9	A+	A-
Science	11	934	8	A.3.1.1	3	1099	1.72	0.27	0.19	0.19	0.25	0.10	0.06	0.64	-0.52	-0.13	0.06	0.38	0.32	0.8610	0.0303	-1.1	1.0	-1.7	0.9	A+	A-
Science	11	4401	8	A.1.1.4	3	1099	1.20	0.20	0.39	0.40			0.08	0.41	-0.35	-0.05	0.34			0.0208	0.0465	2.3	1.1	2.5	1.1	B+	A-
Writing	5	7183	0	A.2	3	128827	2.65		0.04	0.35	0.54	0.08	0.00	0.69		-0.39	-0.47	0.42	0.34	2.1808	0.0064	-9.9	0.6	-9.9	0.6		
Writing	5	7183	0	B.6	3	128827	2.65		0.04	0.35	0.53	0.08	0.00	0.70		-0.41	-0.47	0.43	0.35	2.2337	0.0063	-9.9	0.7	-9.9	0.7		
Writing	5	9936	0	A.3	3	128827	2.54		0.05	0.42	0.48	0.06	0.00	0.67		-0.40	-0.42	0.45	0.30	2.7019	0.0064	-9.9	0.7	-9.9	0.6		
Writing	5	9936	0	B.6	3	128827	2.57		0.05	0.39	0.50	0.06	0.00	0.69		-0.43	-0.42	0.45	0.32	2.6811	0.0063	-9.9	0.8	-9.9	0.8		
Writing	5	6471	1	A.1	3	1095	2.72		0.04	0.31	0.51	0.13	0.00	0.61		-0.38	-0.37	0.26	0.36	1.9042	0.0636	-6.4	0.7	-6.0	0.7	B+	B-
Writing	5	6471	1	B.6	3	1095	2.73		0.05	0.30	0.53	0.13	0.00	0.65		-0.40	-0.41	0.30	0.36	1.9315	0.0634	-4.8	0.8	-3.5	0.8	B+	B-
Writing	5	3324	2	A.3	3	1093	2.55		0.08	0.37	0.48	0.08	0.00	0.67		-0.47	-0.34	0.41	0.32	2.7095	0.0633	-9.6	0.6	-9.5	0.6	A+	A-
Writing	5	3324	2	B.6	3	1093	2.56		0.07	0.37	0.48	0.08	0.00	0.70		-0.49	-0.38	0.45	0.32	2.6276	0.0638	-7.1	0.7	-6.2	0.7	A+	A-
Writing	5	9658	3	A.1	3	1099	2.61		0.05	0.37	0.49	0.09	0.00	0.60		-0.42	-0.33	0.32	0.32	2.2827	0.0644	-6.0	0.8	-6.5	0.7	A+	A-
Writing	5	9658	3	B.6	3	1099	2.60		0.05	0.38	0.47	0.09	0.00	0.66		-0.43	-0.40	0.38	0.34	2.2859	0.0640	-5.0	0.8	-5.2	0.8	B+	A-
Writing	5	1030	4	A.3	3	1095	2.56		0.06	0.38	0.49	0.07	0.00	0.68		-0.42	-0.41	0.45	0.31	2.7300	0.0647	-9.9	0.6	-9.9	0.6	A+	A-
Writing	5	1030	4	B.6	3	1095	2.55		0.06	0.39	0.48	0.07	0.00	0.68		-0.43	-0.40	0.44	0.32	2.7147	0.0647	-6.1	0.8	-5.5	0.8	B+	A-
Writing	5	3608	5	A.1	3	1098	2.49		0.08	0.42	0.42	0.07	0.00	0.63		-0.44	-0.30	0.37	0.32	2.8572	0.0630	-6.7	0.8	-6.8	0.7	C+	B-
Writing	5	3608	5	B.6	3	1098	2.54		0.07	0.40	0.45	0.08	0.00	0.67		-0.45	-0.37	0.41	0.34	2.6313	0.0632	-5.0	0.8	-5.1	0.8	C+	A-
Writing	5	5925	6	A.3	3	1098	2.67		0.06	0.29	0.57	0.08	0.00	0.69		-0.44	-0.39	0.36	0.38	2.3096	0.0666	-9.9	0.6	-9.9	0.5	B+	C-
Writing	5	5925	6	B.6	3	1098	2.69		0.06	0.29	0.56	0.09	0.00	0.71		-0.45	-0.42	0.36	0.39	2.2003	0.0659	-7.5	0.7	-6.8	0.7	B+	C-
Writing	8	7151	0	A.2	3	129588	2.69		0.03	0.32	0.57	0.07	0.00	0.69		-0.36	-0.51	0.43	0.34	2.1101	0.0065	-9.9	0.6	-9.9	0.5		
Writing	8	7151	0	B.6	3	129588	2.68		0.03	0.33	0.56	0.07	0.00	0.71		-0.37	-0.52	0.44	0.34	2.1810	0.0065	-9.9	0.7	-9.9	0.6		
Writing	8	7292	0	A.3	3	129588	2.62		0.04	0.36	0.53	0.07	0.00	0.67		-0.38	-0.46	0.43	0.33	2.4939	0.0063	-9.9	0.6	-9.9	0.6		
Writing	8	7292	0	B.6	3	129588	2.62		0.05	0.36	0.52	0.07	0.00	0.70		-0.41	-0.46	0.44	0.34	2.5426	0.0062	-9.9	0.8	-9.9	0.7		
Writing	8	5985	1	A.2	3	1098	2.71		0.03	0.33	0.54	0.10	0.00	0.65		-0.34	-0.46	0.33	0.36	1.9842	0.0668	-7.9	0.7	-8.1	0.6	B+	A-
Writing	8	5985	1	B.6	3	1098	2.74		0.03	0.30	0.57	0.10	0.00	0.69		-0.35	-0.50	0.36	0.38	1.9869	0.0672	-6.0	0.8	-6.2	0.7	B+	A-
Writing	8	8011	2	A.3	3	1097	2.53		0.03	0.46	0.46	0.05	0.00	0.61		-0.35	-0.42	0.41	0.28	2.7471	0.0694	-7.1	0.7	-7.6	0.7	A+	A-
Writing	8	8011	2	B.6	3	1097	2.64		0.03	0.36	0.56	0.05	0.00	0.66		-0.34	-0.49	0.46	0.29	2.4554	0.0706	-3.4	0.9	-3.1	0.8	A+	A-
Writing	8	9247	3	A.2	3	1099	2.75		0.02	0.31	0.58	0.09	0.00	0.65		-0.30	-0.50	0.33	0.37	1.6295	0.0697	-8.7	0.7	-8.6	0.6	A+	A-
Writing	8	9247	3	B.6	3	1099	2.72		0.03	0.32	0.56	0.09	0.00	0.67		-0.31	-0.51	0.36	0.37	1.8802	0.0683	-4.8	0.8	-4.9	0.8	A+	A-
Writing	8	9011	4	A.3	4	1100	2.69		0.02	0.34	0.56	0.08	0.00	0.66		-0.31	-0.52	0.42	0.32	1.9561	0.0703	-9.2	0.7	-9.7	0.6	A+	A-
Writing	8	9011	4	B.6	4	1100	2.70		0.02	0.32	0.58	0.07	0.00	0.69		-0.32	-0.54	0.44	0.33	1.9689	0.0710	-6.3	0.7	-6.5	0.7	A+	A-

Appendix I: Item Statistics Open Ended

Item Information						Classical														Rasch		Infit		Outfit		DIF	
Cont	Grade	PubID	Form	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
Writing	8	4686	5	A.2	3	1097	2.79		0.01	0.26	0.65	0.08	0.00	0.64		-0.30	-0.51	0.36	0.32	1.4205	0.0737	-7.9	0.7	-7.7	0.6	B+	B-
Writing	8	4686	5	B.6	3	1097	2.75		0.02	0.28	0.63	0.07	0.00	0.68		-0.37	-0.51	0.42	0.32	1.8534	0.0723	-4.4	0.8	-4.1	0.8	B+	B-
Writing	8	2770	6	A.3	3	1095	2.75		0.01	0.33	0.56	0.10	0.00	0.67		-0.29	-0.54	0.36	0.37	1.5533	0.0701	-9.9	0.6	-9.9	0.5	B+	A-
Writing	8	2770	6	B.6	3	1095	2.76		0.02	0.31	0.57	0.10	0.00	0.69		-0.31	-0.55	0.36	0.38	1.5666	0.0703	-7.0	0.7	-6.8	0.7	C+	A-
Writing	11	4514	0	A.3	3	128771	2.82		0.04	0.23	0.60	0.13	0.00	0.70		-0.40	-0.46	0.28	0.40	1.6364	0.0065	-9.9	0.7	-9.9	0.5		
Writing	11	4514	0	B.6	3	128771	2.83		0.04	0.22	0.61	0.13	0.00	0.72		-0.41	-0.48	0.29	0.41	1.6099	0.0065	-9.9	0.8	-9.9	0.7		
Writing	11	6841	0	A.2	3	128771	2.85		0.03	0.19	0.66	0.12	0.00	0.69		-0.39	-0.47	0.29	0.38	1.5397	0.0068	-9.9	0.7	-9.9	0.6		
Writing	11	6841	0	B.6	3	128771	2.87		0.03	0.19	0.65	0.13	0.00	0.71		-0.40	-0.49	0.28	0.40	1.4528	0.0067	-9.9	0.8	-9.9	0.7		
Writing	11	6241	1	A.2	3	1100	2.86		0.02	0.20	0.68	0.10	0.00	0.66		-0.32	-0.52	0.32	0.34	1.3116	0.0748	-6.6	0.7	-7.2	0.6	A+	B-
Writing	11	6241	1	B.6	3	1100	2.87		0.03	0.20	0.65	0.12	0.00	0.69		-0.37	-0.51	0.31	0.36	1.3458	0.0718	-3.6	0.8	-3.9	0.8	A+	C-
Writing	11	5673	2	A.3	3	1094	2.82		0.03	0.24	0.62	0.12	0.00	0.66		-0.37	-0.45	0.29	0.37	1.6266	0.0699	-7.3	0.7	-7.5	0.6	A+	A-
Writing	11	5673	2	B.6	3	1094	2.84		0.03	0.22	0.61	0.13	0.00	0.70		-0.39	-0.48	0.28	0.40	1.5534	0.0690	-4.5	0.8	-4.2	0.8	A+	C-
Writing	11	5616	3	A.2	3	1092	2.85		0.03	0.20	0.67	0.10	0.00	0.66		-0.36	-0.47	0.31	0.33	1.5779	0.0725	-6.5	0.7	-6.6	0.6	A+	A+
Writing	11	5616	3	B.6	3	1092	2.87		0.03	0.20	0.65	0.12	0.00	0.67		-0.38	-0.47	0.27	0.37	1.4115	0.0712	-2.8	0.9	-2.7	0.8	A+	A-
Writing	11	4487	4	A.3	3	1092	2.83		0.03	0.21	0.66	0.10	0.00	0.66		-0.38	-0.45	0.32	0.34	1.6710	0.0721	-6.8	0.7	-7.3	0.6	A+	A-
Writing	11	4487	4	B.6	3	1092	2.84		0.03	0.22	0.63	0.12	0.00	0.67		-0.37	-0.48	0.30	0.36	1.5444	0.0703	-3.4	0.9	-2.8	0.8	A+	B-
Writing	11	8170	5	A.2	3	1096	2.70		0.05	0.28	0.60	0.07	0.00	0.63		-0.41	-0.38	0.37	0.29	2.2816	0.0688	-6.8	0.7	-6.2	0.7	A+	A-
Writing	11	8170	5	B.6	3	1096	2.76		0.05	0.25	0.61	0.10	0.00	0.67		-0.42	-0.42	0.34	0.34	2.0152	0.0681	-3.6	0.8	-3.0	0.8	A+	A-
Writing	11	8575	6	A.3	3	1094	2.80		0.04	0.22	0.65	0.09	0.00	0.67		-0.42	-0.42	0.33	0.34	1.8300	0.0706	-7.8	0.7	-7.9	0.6	A+	A-
Writing	11	8575	6	B.6	3	1094	2.82		0.04	0.22	0.63	0.12	0.00	0.71		-0.43	-0.46	0.31	0.39	1.7296	0.0689	-5.3	0.8	-4.8	0.7	A+	A-

Appendix J:

Linking Item Statistics

Column Heading	Definition
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

Appendix J: Linking Item Statistics

Mathematics Grade 3

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
557221	MC	0	2	0	2	0.89	0.89	0.1622	0.2455
549494	MC	0	3	0	3	0.88	0.86	0.4427	0.5676
557169	MC	0	4	0	3	0.87	0.87	0.3885	0.5115
550612	MC	0	5	0	5	0.89	0.89	0.2587	0.2469
550681	MC	0	9	0	9	0.85	0.85	0.7230	0.7127
557210	MC	0	11	0	12	0.67	0.68	1.9216	1.9982
550271	MC	0	12	0	12	0.88	0.88	0.4333	0.4113
550525	MC	0	13	0	13	0.93	0.93	-0.4048	-0.4350
550217	MC	0	18	0	18	0.95	0.95	-0.6537	-0.8181
549477	MC	0	19	0	19	0.83	0.83	0.9146	0.8666
557243	MC	0	20	0	19	0.85	0.84	0.5809	0.8067
557269	MC	0	21	0	21	0.80	0.81	1.0222	1.0727
550561	MC	0	22	0	22	0.92	0.92	-0.2323	-0.2031
550673	MC	0	23	0	23	0.88	0.87	0.4265	0.5108
550482	MC	0	52	0	53	0.93	0.92	-0.2532	-0.2309
550697	MC	0	53	0	55	0.89	0.88	0.2148	0.3428
557298	MC	0	57	0	57	0.77	0.75	1.2861	1.5108
550639	MC	0	58	0	59	0.93	0.94	-0.3127	-0.4975
550734	MC	0	99	0	100	0.97	0.96	-1.2138	-1.1203
557248	MC	0	100	0	102	0.86	0.86	0.6329	0.5939
550570	MC	0	101	0	103	0.72	0.73	1.6272	1.6714
557765	MC	0	102	0	103	0.91	0.91	0.0118	-0.0094
550674	MC	0	112	0	113	0.94	0.94	-0.5909	-0.5902
550728	MC	0	117	0	118	0.96	0.96	-1.1407	-0.9260
565064	MC	1	65	4	66	0.84	0.84	0.8422	0.7650
566602	MC	1	73	1	74	0.90	0.90	0.0949	0.0322
566618	MC	2	64	9	65	0.87	0.88	0.5145	0.4040
592500	MC	2	66	6	67	0.91	0.91	0.0024	0.0307
592517	MC	3	63	6	64	0.90	0.90	0.1348	0.1573
566633	MC	3	72	5	73	0.90	0.89	0.1755	0.2887
566596	MC	4	65	6	66	0.91	0.89	0.1084	0.2183
566619	MC	4	69	3	69	0.90	0.89	0.1806	0.2334
592505	MC	5	66	4	67	0.88	0.87	0.4263	0.4761
592812	MC	5	71	1	72	0.95	0.96	-0.9174	-1.0683
550311	OE	0	25	0	25	0.58	0.57	2.4099	2.4587
557369	OE	0	119	0	120	0.58	0.64	2.4657	2.1576
Mean						0.86	0.86	0.35	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		
542428	MC	0	3	0	4	0.73	0.74	0.1967	0.1768
542327	MC	0	6	0	5	0.79	0.77	-0.1731	-0.0347
542409	MC	0	7	0	6	0.76	0.76	-0.0093	0.0653
556938	MC	0	8	0	7	0.73	0.76	0.1154	0.0285
557006	MC	0	12	0	12	0.48	0.50	1.5063	1.4315
557050	MC	0	14	0	13	0.59	0.64	0.8960	0.7194
544190	MC	0	21	0	20	0.50	0.52	1.4152	1.3421
544164	MC	0	53	0	54	0.72	0.72	0.2357	0.2825
557009	MC	0	54	0	52	0.56	0.56	1.0566	1.1650
542394	MC	0	55	0	55	0.53	0.52	1.2574	1.3330
550970	MC	0	56	0	56	0.85	0.86	-0.6982	-0.7191
557118	MC	0	57	0	54	0.88	0.88	-1.0287	-0.9651
556968	MC	0	58	0	58	0.51	0.47	1.3935	1.5940
556978	MC	0	59	0	56	0.67	0.65	0.4524	0.7005
544274	MC	0	65	0	64	0.62	0.61	0.7886	0.9199
550912	MC	0	104	0	104	0.63	0.60	0.7340	0.9534
544198	MC	0	105	0	105	0.79	0.85	-0.1830	-0.6449
544088	MC	0	107	0	108	0.62	0.62	0.8085	0.8686
550837	MC	0	109	0	106	0.60	0.61	0.8570	0.8803
544158	MC	0	114	0	114	0.45	0.47	1.6691	1.6118
550937	MC	0	115	0	116	0.81	0.85	-0.3621	-0.5973
557085	MC	0	116	0	114	0.65	0.69	0.5931	0.4437
557043	MC	0	118	0	115	0.68	0.70	0.3755	0.3794
556977	MC	0	120	0	120	0.68	0.68	0.5061	0.5290
592524	MC	1	66	6	65	0.86	0.90	-0.7740	-1.1184
542418	MC	1	74	3	71	0.75	0.75	-0.0558	0.0633
566928	MC	2	73	2	72	0.85	0.81	-0.6435	-0.3278
593173	MC	2	74	7	73	0.73	0.71	0.2198	0.3324
566519	MC	3	67	7	66	0.86	0.86	-0.7682	-0.7244
566924	MC	3	72	5	71	0.60	0.60	0.9281	0.9750
592521	MC	4	67	2	66	0.69	0.71	0.4018	0.3790
592530	MC	4	69	8	68	0.86	0.86	-0.7715	-0.6871
592345	MC	5	72	4	71	0.59	0.65	0.9647	0.7225
592529	MC	5	76	7	75	0.60	0.67	0.9416	0.5674
548675	OE	0	26	0	26	0.58	0.56	1.2398	1.3847
557161	OE	0	121	0	121	0.61	0.63	0.8809	0.8454
Mean						0.68	0.69	0.42	0.41

Appendix J: Linking Item Statistics

Mathematics Grade 5

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
541850	MC	0	2	0	2	0.68	0.68	0.8461	0.8124
544453	MC	0	7	0	6	0.70	0.67	0.6902	0.8553
544654	MC	0	8	0	7	0.72	0.71	0.5664	0.6759
551106	MC	0	11	0	10	0.65	0.64	0.9743	1.0356
544535	MC	0	13	0	12	0.66	0.67	0.9311	0.8926
551142	MC	0	14	0	13	0.59	0.55	1.3159	1.5010
540065	MC	0	15	0	14	0.69	0.70	0.7627	0.7191
544425	MC	0	18	0	17	0.88	0.91	-0.7305	-0.9854
556821	MC	0	19	0	19	0.65	0.66	0.8929	0.9555
540138	MC	0	20	0	19	0.68	0.69	0.8118	0.7867
556768	MC	0	23	0	23	0.51	0.54	1.6243	1.5445
556780	MC	0	24	0	24	0.71	0.69	0.5124	0.7769
544395	MC	0	53	0	52	0.79	0.80	0.1134	0.0719
551064	MC	0	56	0	55	0.55	0.58	1.5475	1.3353
556798	MC	0	59	0	59	0.84	0.84	-0.3430	-0.2304
556836	MC	0	61	0	61	0.57	0.55	1.3230	1.5018
541903	MC	0	62	0	60	0.72	0.73	0.5573	0.5070
541836	MC	0	97	0	96	0.80	0.81	0.0140	-0.0262
544441	MC	0	102	0	101	0.43	0.50	2.1705	1.7705
556860	MC	0	105	0	105	0.67	0.68	0.7799	0.8033
541818	MC	0	106	0	105	0.82	0.82	-0.1363	-0.0799
544455	MC	0	113	0	112	0.80	0.81	0.0249	-0.0197
556792	MC	0	114	0	113	0.75	0.79	0.2586	0.1269
556874	MC	0	119	0	120	0.64	0.65	0.9388	0.9923
594391	MC	1	68	3	66	0.68	0.65	0.8023	0.9574
594981	MC	1	75	3	73	0.69	0.71	0.7235	0.6467
566873	MC	2	66	3	64	0.86	0.87	-0.5070	-0.5447
593103	MC	2	72	3	70	0.65	0.67	0.9459	0.9004
566762	MC	3	69	5	67	0.74	0.75	0.4854	0.4076
594463	MC	3	70	5	68	0.79	0.81	0.1565	0.0214
566784	MC	4	66	5	64	0.54	0.54	1.5738	1.5627
564863	MC	4	75	4	73	0.87	0.85	-0.5517	-0.3413
594348	MC	5	71	2	70	0.63	0.66	1.1006	0.9664
595076	MC	5	76	8	75	0.74	0.73	0.4885	0.5412
556898	OE	0	26	0	26	0.44	0.42	2.0627	2.2090
548710	OE	0	121	0	120	0.55	0.56	1.4657	1.4223
Mean						0.69	0.69	0.70	0.70

Appendix J: Linking Item Statistics

Mathematics Grade 6

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
545115	MC	0	3	0	4	0.63	0.67	0.7558	0.5544
545047	MC	0	7	0	7	0.61	0.64	0.8849	0.7244
542590	MC	0	8	0	8	0.60	0.61	0.9404	0.9217
545216	MC	0	10	0	10	0.79	0.79	-0.1960	-0.2186
556713	MC	0	12	0	13	0.63	0.69	0.6405	0.4552
551249	MC	0	13	0	13	0.66	0.65	0.6113	0.6890
545064	MC	0	18	0	18	0.75	0.76	0.0220	-0.0144
545075	MC	0	20	0	20	0.80	0.81	-0.2797	-0.3606
545098	MC	0	21	0	21	0.81	0.82	-0.4186	-0.4650
556614	MC	0	22	0	21	0.55	0.58	1.0997	1.0847
556650	MC	0	51	0	53	0.74	0.79	0.0120	-0.1994
545121	MC	0	52	0	54	0.68	0.68	0.4818	0.5008
556692	MC	0	55	0	56	0.82	0.84	-0.6056	-0.6186
545176	MC	0	57	0	58	0.68	0.62	0.4601	0.8427
545096	MC	0	59	0	60	0.74	0.73	0.1113	0.1728
556618	MC	0	95	0	96	0.48	0.47	1.4171	1.6371
542735	MC	0	96	0	95	0.80	0.80	-0.3210	-0.3012
545205	MC	0	97	0	98	0.80	0.81	-0.2895	-0.3739
545009	MC	0	98	0	99	0.82	0.84	-0.4858	-0.5870
556667	MC	0	104	0	106	0.83	0.87	-0.6212	-0.8574
556675	MC	0	105	0	109	0.87	0.88	-0.9839	-1.0572
551233	MC	0	106	0	109	0.80	0.79	-0.2986	-0.2007
556637	MC	0	107	0	110	0.75	0.76	-0.0331	0.0087
551307	MC	0	112	0	114	0.67	0.67	0.5458	0.5772
594406	MC	1	62	8	63	0.69	0.73	0.4480	0.1582
594451	MC	1	64	7	64	0.70	0.67	0.3677	0.5407
594385	MC	2	62	7	63	0.82	0.78	-0.4782	-0.1366
593161	MC	2	67	5	68	0.79	0.81	-0.2123	-0.3544
593113	MC	3	69	6	71	0.80	0.80	-0.3150	-0.2986
566824	MC	3	71	6	73	0.75	0.77	0.0463	-0.0637
566894	MC	4	66	6	68	0.78	0.79	-0.1725	-0.1942
595065	MC	4	68	8	70	0.82	0.79	-0.4132	-0.2104
593083	MC	5	62	6	62	0.76	0.75	-0.0351	0.0681
595050	MC	5	69	2	69	0.76	0.76	-0.0189	-0.0088
556745	OE	0	26	0	26	0.48	0.48	1.4422	1.4657
548751	OE	0	117	0	118	0.40	0.40	1.8946	1.9682
Mean						0.72	0.73	0.17	0.16

Appendix J: Linking Item Statistics

Mathematics Grade 7

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
543105	MC	0	3	0	4	0.42	0.40	1.8250	1.8859
543088	MC	0	6	0	5	0.84	0.86	-0.7773	-0.8470
556533	MC	0	8	0	8	0.71	0.72	0.0349	0.1642
551436	MC	0	13	0	13	0.70	0.74	0.2461	0.0610
544862	MC	0	14	0	14	0.79	0.80	-0.3136	-0.3729
551457	MC	0	15	0	15	0.68	0.70	0.3841	0.2561
556485	MC	0	16	0	15	0.81	0.83	-0.6013	-0.6391
556462	MC	0	17	0	16	0.82	0.85	-0.6533	-0.7972
551345	MC	0	18	0	18	0.75	0.76	-0.0716	-0.0917
556468	MC	0	19	0	19	0.48	0.48	1.3028	1.4773
551336	MC	0	20	0	19	0.70	0.69	0.2443	0.3242
544938	MC	0	23	0	23	0.75	0.76	-0.0789	-0.1256
544795	MC	0	49	0	48	0.86	0.87	-0.9162	-1.0370
556518	MC	0	51	0	51	0.60	0.63	0.6523	0.6770
544901	MC	0	53	0	51	0.90	0.88	-1.3325	-1.1169
544832	MC	0	55	0	55	0.58	0.57	0.9372	1.0300
556444	MC	0	60	0	59	0.70	0.74	0.0976	0.0241
542969	MC	0	97	0	96	0.56	0.58	1.0315	0.9623
544733	MC	0	105	0	104	0.61	0.59	0.7897	0.9089
542879	MC	0	106	0	105	0.83	0.85	-0.6580	-0.7913
542890	MC	0	109	0	108	0.64	0.66	0.5988	0.5354
556569	MC	0	111	0	112	0.63	0.63	0.5108	0.6703
556554	MC	0	114	0	113	0.74	0.76	-0.1246	-0.0690
544736	MC	0	116	0	115	0.73	0.72	0.0861	0.1756
593045	MC	1	65	8	64	0.68	0.68	0.3613	0.3829
594397	MC	1	67	4	66	0.77	0.76	-0.1631	-0.0914
593056	MC	2	62	4	61	0.81	0.81	-0.4778	-0.4837
564882	MC	2	72	5	71	0.61	0.63	0.7849	0.6901
594438	MC	3	63	8	62	0.66	0.70	0.5197	0.2896
593063	MC	3	67	7	66	0.57	0.55	1.0200	1.1300
594359	MC	4	64	4	63	0.50	0.48	1.3676	1.4845
566875	MC	4	67	1	66	0.58	0.64	0.9127	0.6231
595100	MC	5	64	7	63	0.69	0.69	0.3362	0.3623
593074	MC	5	66	2	65	0.76	0.74	-0.1346	0.0437
548799	OE	0	26	0	26	0.54	0.54	1.2393	1.2600
556580	OE	0	117	0	116	0.52	0.54	0.9976	0.8874
Mean						0.68	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		
541971	MC	0	4	0	4	0.69	0.70	0.4714	0.4012
542048	MC	0	7	0	6	0.66	0.67	0.5940	0.5465
556267	MC	0	8	0	8	0.80	0.84	-0.4202	-0.6248
551563	MC	0	13	0	13	0.79	0.82	-0.2516	-0.4049
545597	MC	0	23	0	23	0.86	0.85	-0.8377	-0.6909
556360	MC	0	24	0	24	0.65	0.68	0.5250	0.5026
545607	MC	0	50	0	49	0.88	0.87	-1.0379	-0.9329
545573	MC	0	51	0	50	0.77	0.78	-0.1066	-0.1165
556340	MC	0	54	0	98	0.66	0.68	0.4447	0.5275
545764	MC	0	55	0	54	0.77	0.76	-0.0512	0.0117
556365	MC	0	62	0	62	0.69	0.74	0.3064	0.1499
545646	MC	0	96	0	96	0.68	0.78	0.4735	-0.1128
556318	MC	0	97	0	54	0.69	0.72	0.2784	0.2851
556312	MC	0	98	0	97	0.77	0.74	-0.2373	0.1615
542059	MC	0	99	0	97	0.66	0.64	0.5854	0.7131
556277	MC	0	100	0	99	0.58	0.60	0.8819	0.9467
551541	MC	0	102	0	101	0.73	0.75	0.1919	0.0494
551610	MC	0	105	0	104	0.81	0.81	-0.4262	-0.3400
545715	MC	0	106	0	105	0.68	0.69	0.5274	0.4652
545672	MC	0	109	0	108	0.72	0.70	0.2663	0.3990
551599	MC	0	112	0	112	0.69	0.63	0.2830	0.7940
551601	MC	0	113	0	112	0.84	0.84	-0.6839	-0.5988
540347	MC	0	114	0	113	0.63	0.66	0.7705	0.6334
542084	MC	0	116	0	115	0.74	0.80	0.0886	-0.2907
594353	MC	1	65	1	64	0.73	0.74	0.1382	0.1008
595004	MC	1	71	1	70	0.81	0.82	-0.4287	-0.5066
594356	MC	2	64	7	64	0.71	0.73	0.3003	0.2289
593123	MC	2	67	2	67	0.77	0.85	-0.0706	-0.6606
566887	MC	3	68	9	67	0.68	0.69	0.4940	0.4862
566790	MC	3	70	4	69	0.71	0.65	0.3300	0.7225
566804	MC	4	72	6	71	0.72	0.70	0.2384	0.3740
593121	MC	4	73	8	72	0.71	0.73	0.3626	0.1727
595046	MC	5	66	6	65	0.73	0.72	0.2064	0.2986
594351	MC	5	68	4	67	0.71	0.69	0.3089	0.4880
556408	OE	0	25	0	25	0.42	0.41	1.9366	1.9441
548831	OE	0	26	0	26	0.45	0.44	1.6162	1.7237
Mean						0.71	0.72	0.22	0.22

Appendix J: Linking Item Statistics

Mathematics Grade 11

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
554528	MC	0	9	0	9	0.75	0.77	-0.7451	-0.7163
545292	MC	0	14	0	15	0.74	0.81	-0.5796	-1.0047
554571	MC	0	15	0	15	0.68	0.70	-0.2827	-0.2823
554490	MC	0	16	0	16	0.60	0.62	0.1357	0.1707
551701	MC	0	17	0	17	0.70	0.71	-0.3260	-0.3215
545449	MC	0	18	0	19	0.61	0.66	0.0679	-0.0600
542201	MC	0	23	0	24	0.73	0.70	-0.5003	-0.2506
554598	MC	0	24	0	24	0.85	0.87	-1.4705	-1.4873
545390	MC	0	52	0	52	0.78	0.80	-0.8243	-0.9606
545509	MC	0	55	0	55	0.81	0.84	-1.1033	-1.2931
545382	MC	0	56	0	56	0.72	0.73	-0.4594	-0.4532
554615	MC	0	59	0	60	0.63	0.61	-0.0325	0.2111
551729	MC	0	98	0	98	0.79	0.77	-0.9053	-0.7492
545334	MC	0	99	0	99	0.84	0.86	-1.3679	-1.3961
542200	MC	0	101	0	101	0.85	0.86	-1.4231	-1.4293
554559	MC	0	104	0	105	0.66	0.66	-0.1648	-0.0270
545270	MC	0	106	0	106	0.67	0.72	-0.1281	-0.4220
540519	MC	0	107	0	107	0.72	0.72	-0.4924	-0.4071
545326	MC	0	108	0	108	0.70	0.71	-0.3255	-0.3100
545351	MC	0	112	0	114	0.70	0.73	-0.3119	-0.4611
542141	MC	0	117	0	117	0.71	0.72	-0.4128	-0.3775
542135	MC	0	118	0	119	0.66	0.66	-0.1015	-0.0286
554553	MC	0	119	0	120	0.64	0.71	-0.0889	-0.3476
594396	MC	1	65	1	65	0.61	0.55	0.1573	0.5528
545486	MC	1	72	8	72	0.82	0.84	-1.2042	-1.2636
595018	MC	2	68	2	68	0.67	0.68	-0.1377	-0.1513
545501	MC	2	75	8	75	0.63	0.57	0.1229	0.4415
595091	MC	3	65	1	64	0.61	0.62	0.1705	0.1862
566809	MC	3	69	1	68	0.58	0.61	0.3227	0.2456
540547	MC	4	67	3	67	0.67	0.69	-0.1024	-0.1996
566868	MC	4	69	1	69	0.50	0.49	0.7502	0.8676
545494	MC	5	72	6	72	0.56	0.57	0.4934	0.4290
545343	MC	5	75	2	75	0.72	0.74	-0.4746	-0.5031
548869	OE	0	25	0	25	0.40	0.38	1.2569	1.3327
551773	OE	0	26	0	26	0.56	0.57	0.4748	0.4562
Mean						0.68	0.69	-0.29	-0.29

Appendix J: Linking Item Statistics

Reading Grade 3

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
554901	MC	0	43	0	44	0.52	0.53	1.0182	0.9791
554900	MC	0	44	0	45	0.59	0.52	0.6672	1.0140
554903	MC	0	45	0	46	0.63	0.63	0.4282	0.4180
554909	MC	0	46	0	47	0.74	0.75	-0.2364	-0.3081
554907	MC	0	47	0	48	0.57	0.58	0.7485	0.6872
554908	MC	0	48	0	49	0.61	0.60	0.5583	0.5718
557922	MC	0	49	0	50	0.44	0.43	1.4320	1.5092
554945	MC	0	130	0	129	0.94	0.94	-2.2888	-2.2746
554942	MC	0	131	0	130	0.61	0.60	0.5727	0.5710
554943	MC	0	132	0	131	0.72	0.73	-0.1148	-0.1425
554951	MC	0	133	0	132	0.85	0.83	-1.0357	-0.9063
554952	MC	0	134	0	133	0.69	0.69	0.0748	0.0655
554946	MC	0	135	0	135	0.68	0.68	0.1542	0.1278
554949	MC	0	136	0	136	0.79	0.78	-0.5806	-0.5047
554950	MC	0	137	0	137	0.66	0.69	0.2501	0.0952
593378	MC	1	76	7	80	0.59	0.58	0.6693	0.6872
593376	MC	1	77	7	78	0.92	0.91	-1.8737	-1.8208
593374	MC	1	78	7	81	0.57	0.58	0.7734	0.6972
593369	MC	1	79	7	82	0.71	0.70	-0.0173	0.0005
593377	MC	1	80	7	83	0.67	0.67	0.2088	0.2137
593370	MC	1	81	7	84	0.74	0.76	-0.2234	-0.3810
593373	MC	1	82	7	85	0.71	0.69	-0.0008	0.0486
593372	MC	1	83	7	86	0.87	0.89	-1.2421	-1.4662
593870	MC	4	76	9	77	0.92	0.93	-1.9063	-1.9770
594253	MC	4	77	9	78	0.65	0.64	0.3617	0.3582
593872	MC	4	78	9	79	0.76	0.77	-0.3612	-0.4588
593867	MC	4	79	9	81	0.82	0.81	-0.7971	-0.7010
593873	MC	4	80	9	82	0.80	0.79	-0.6150	-0.5691
593865	MC	4	81	9	83	0.55	0.54	0.9042	0.9308
593877	MC	4	82	9	85	0.71	0.71	-0.0285	-0.0180
594252	MC	4	83	9	86	0.57	0.55	0.8058	0.8478
562090	OE	0	50	0	51	0.48	0.47	1.2414	1.3432
Mean						0.69	0.69	-0.01	-0.01

Appendix J: Linking Item Statistics

Reading Grade 4

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
555065	MC	0	27	0	28	0.77	0.76	-0.3418	-0.2987
555069	MC	0	28	0	29	0.58	0.58	0.7481	0.7218
555064	MC	0	29	0	30	0.87	0.88	-1.2192	-1.2333
555066	MC	0	30	0	31	0.63	0.66	0.4566	0.2996
555070	MC	0	31	0	32	0.74	0.75	-0.1498	-0.1998
555061	MC	0	32	0	33	0.78	0.79	-0.4524	-0.4431
555071	MC	0	34	0	34	0.55	0.58	0.9035	0.7286
549127	MC	0	122	0	122	0.66	0.64	0.3244	0.4135
549137	MC	0	123	0	123	0.58	0.58	0.7284	0.7142
549136	MC	0	124	0	124	0.70	0.71	0.0837	0.0121
549145	MC	0	125	0	125	0.65	0.70	0.3412	0.0810
549139	MC	0	126	0	126	0.55	0.57	0.8690	0.7571
549143	MC	0	127	0	127	0.78	0.79	-0.4220	-0.4368
549138	MC	0	128	0	128	0.59	0.62	0.6590	0.5364
549144	MC	0	129	0	129	0.70	0.70	0.0968	0.0975
596211	MC	1	78	5	78	0.90	0.91	-1.5626	-1.5655
596210	MC	1	79	5	80	0.56	0.58	0.8353	0.7496
596209	MC	1	80	5	81	0.56	0.59	0.8212	0.6656
596212	MC	1	81	5	82	0.47	0.47	1.2796	1.2559
596218	MC	1	82	5	83	0.45	0.44	1.3839	1.4074
596217	MC	1	83	5	84	0.59	0.54	0.6861	0.9073
596220	MC	1	84	5	85	0.69	0.72	0.1628	-0.0382
596216	MC	1	85	5	86	0.65	0.65	0.3885	0.3601
564936	MC	4	78	1	79	0.79	0.78	-0.5999	-0.4065
564932	MC	4	79	1	80	0.83	0.84	-0.8674	-0.8683
564930	MC	4	80	1	81	0.76	0.77	-0.3936	-0.3021
564938	MC	4	81	1	83	0.72	0.73	-0.1253	-0.0947
564935	MC	4	82	1	84	0.83	0.83	-0.8760	-0.8017
564933	MC	4	83	1	85	0.83	0.84	-0.8536	-0.8766
564937	MC	4	84	1	86	0.65	0.65	0.3042	0.3814
564942	MC	4	85	1	87	0.57	0.53	0.7249	0.9577
560788	OE	0	35	0	35	0.65	0.65	0.3219	0.3438
549140	OE	0	130	0	130	0.57	0.57	0.4204	0.5330
Mean						0.67	0.68	0.14	0.13

Appendix J: Linking Item Statistics

Reading Grade 5

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
555324	MC	0	35	0	35	0.82	0.83	-0.6263	-0.6145
555325	MC	0	36	0	36	0.92	0.93	-1.7415	-1.8043
555322	MC	0	37	0	37	0.54	0.57	0.9851	0.9807
555321	MC	0	38	0	38	0.75	0.75	-0.1762	-0.0441
555317	MC	0	39	0	39	0.82	0.84	-0.6902	-0.7148
555327	MC	0	40	0	40	0.78	0.80	-0.3672	-0.3671
554800	MC	0	41	0	41	0.59	0.60	0.7274	0.8001
555320	MC	0	42	0	42	0.87	0.88	-1.1464	-1.1082
555394	MC	0	122	0	121	0.91	0.92	-1.5579	-1.5749
555392	MC	0	123	0	122	0.86	0.87	-0.9896	-0.9282
555390	MC	0	124	0	123	0.59	0.60	0.7267	0.8036
555395	MC	0	125	0	124	0.83	0.85	-0.7671	-0.7311
555397	MC	0	126	0	125	0.81	0.85	-0.5659	-0.7706
555398	MC	0	127	0	126	0.52	0.56	1.0807	1.0249
555388	MC	0	128	0	127	0.40	0.46	1.6894	1.4887
555389	MC	0	129	0	128	0.70	0.73	0.1723	0.1162
555396	MC	0	130	0	129	0.69	0.70	0.1989	0.2678
566059	MC	1	78	4	77	0.64	0.66	0.5097	0.5051
565953	MC	1	79	4	78	0.86	0.87	-1.0483	-0.9293
565951	MC	1	80	4	79	0.85	0.86	-0.9356	-0.8262
565957	MC	1	81	4	80	0.76	0.79	-0.2334	-0.2875
566007	MC	1	82	4	81	0.72	0.73	0.0307	0.1079
565942	MC	1	83	4	82	0.69	0.71	0.2183	0.1900
566008	MC	1	84	4	83	0.78	0.81	-0.3779	-0.4198
565956	MC	1	85	4	86	0.51	0.47	1.1377	1.4476
595868	MC	4	78	9	77	0.75	0.76	-0.1709	-0.1031
595865	MC	4	79	9	79	0.74	0.75	-0.0834	-0.0161
595867	MC	4	80	9	80	0.63	0.65	0.5652	0.5751
595858	MC	4	81	9	81	0.76	0.80	-0.2256	-0.3471
595866	MC	4	82	9	82	0.41	0.43	1.6450	1.6481
595862	MC	4	83	9	84	0.69	0.72	0.2395	0.1913
595861	MC	4	84	9	85	0.62	0.64	0.6275	0.6413
595859	MC	4	85	9	86	0.56	0.56	0.8901	1.0259
555330	OE	0	43	0	43	0.53	0.52	0.7827	0.7796
555399	OE	0	131	0	130	0.52	0.53	1.2603	1.2526
Mean						0.70	0.71	0.05	0.06

Appendix J: Linking Item Statistics

Reading Grade 6

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
557394	MC	0	33	0	34	0.80	0.81	-0.6983	-0.6820
557388	MC	0	34	0	36	0.82	0.82	-0.8580	-0.7715
557392	MC	0	35	0	37	0.87	0.91	-1.2971	-1.6399
557393	MC	0	36	0	38	0.67	0.72	0.1489	-0.0461
557395	MC	0	37	0	39	0.67	0.68	0.1677	0.2036
557397	MC	0	38	0	41	0.67	0.68	0.1411	0.2021
557516	MC	0	133	0	132	0.73	0.75	-0.2230	-0.2370
557524	MC	0	134	0	133	0.68	0.69	0.1105	0.1452
557521	MC	0	135	0	135	0.50	0.45	1.0745	1.3696
557518	MC	0	136	0	136	0.74	0.74	-0.2818	-0.1971
557960	MC	0	137	0	137	0.68	0.71	0.0900	-0.0176
557519	MC	0	138	0	138	0.72	0.73	-0.1499	-0.0845
592912	MC	1	74	7	76	0.80	0.82	-0.6505	-0.7422
592914	MC	1	75	7	77	0.85	0.86	-1.1251	-1.1304
592915	MC	1	76	7	78	0.92	0.93	-1.8653	-1.9716
592911	MC	1	77	7	79	0.56	0.58	0.7300	0.7039
592909	MC	1	78	7	80	0.75	0.79	-0.3478	-0.5548
592907	MC	1	79	7	81	0.65	0.68	0.2424	0.1718
592906	MC	1	80	7	82	0.50	0.53	1.0672	0.9522
592926	MC	1	81	7	83	0.66	0.66	0.2249	0.2710
592918	MC	4	74	5	75	0.70	0.71	-0.0198	0.0272
592964	MC	4	75	5	77	0.72	0.74	-0.1337	-0.1401
592925	MC	4	76	5	78	0.74	0.76	-0.2930	-0.3155
592920	MC	4	77	5	79	0.80	0.81	-0.7076	-0.6647
592919	MC	4	78	5	80	0.69	0.71	0.0452	0.0225
592962	MC	4	79	5	81	0.57	0.63	0.6881	0.4946
592917	MC	4	80	5	82	0.80	0.83	-0.6785	-0.8113
592922	MC	4	81	5	84	0.47	0.46	1.1976	1.3162
557401	OE	0	39	0	42	0.65	0.67	0.2138	0.1468
557525	OE	0	139	0	139	0.55	0.55	0.6461	0.7226
Mean						0.70	0.71	-0.08	-0.11

Appendix J: Linking Item Statistics

Reading Grade 7

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
555424	MC	0	41	0	40	0.88	0.88	-1.2832	-1.1816
555417	MC	0	42	0	41	0.74	0.73	-0.1925	-0.1031
555416	MC	0	43	0	42	0.77	0.78	-0.3849	-0.4037
555419	MC	0	44	0	43	0.77	0.76	-0.3941	-0.2942
555415	MC	0	45	0	44	0.60	0.61	0.6024	0.5766
555426	MC	0	46	0	45	0.86	0.87	-1.0846	-1.1016
555423	MC	0	47	0	46	0.65	0.67	0.3277	0.2657
555551	MC	0	118	0	117	0.71	0.71	-0.0179	0.0353
555545	MC	0	119	0	118	0.45	0.45	1.3467	1.3570
555544	MC	0	120	0	120	0.79	0.78	-0.4939	-0.4246
555553	MC	0	121	0	121	0.61	0.60	0.5558	0.6253
555549	MC	0	122	0	122	0.87	0.86	-1.1937	-1.0312
555554	MC	0	123	0	123	0.80	0.80	-0.5726	-0.5410
555550	MC	0	124	0	124	0.71	0.73	-0.0133	-0.0625
594084	MC	1	74	7	74	0.85	0.86	-0.9835	-1.0658
594089	MC	1	75	7	75	0.68	0.69	0.1812	0.1617
594132	MC	1	76	7	76	0.76	0.77	-0.2972	-0.3218
594129	MC	1	77	7	77	0.55	0.54	0.8331	0.9064
594126	MC	1	78	7	78	0.86	0.87	-1.0469	-1.1582
594086	MC	1	79	7	79	0.79	0.80	-0.5392	-0.5165
594085	MC	1	80	7	80	0.77	0.78	-0.3737	-0.3930
594088	MC	1	81	7	82	0.65	0.72	0.3679	-0.0234
594110	MC	4	74	2	73	0.54	0.53	0.8789	0.9735
594131	MC	4	75	2	74	0.73	0.73	-0.0883	-0.0826
594107	MC	4	76	2	75	0.49	0.50	1.1525	1.0909
594133	MC	4	77	2	76	0.64	0.65	0.3677	0.3769
594106	MC	4	78	2	77	0.51	0.49	1.0498	1.1487
594104	MC	4	79	2	79	0.68	0.69	0.1688	0.1481
594112	MC	4	80	2	80	0.61	0.62	0.5308	0.5159
594135	MC	4	81	2	81	0.59	0.58	0.6355	0.7460
555427	OE	0	48	0	47	0.59	0.59	0.5377	0.4775
555556	OE	0	125	0	125	0.55	0.56	0.7695	0.7351
Mean						0.69	0.69	0.04	0.04

Appendix J: Linking Item Statistics

Reading Grade 8

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
555870	MC	0	43	0	41	0.84	0.84	-0.3779	-0.2714
555865	MC	0	44	0	42	0.85	0.86	-0.4890	-0.4980
555868	MC	0	45	0	43	0.60	0.60	1.1308	1.1770
555874	MC	0	46	0	45	0.64	0.62	0.9306	1.0881
555876	MC	0	47	0	46	0.70	0.70	0.5653	0.6323
555877	MC	0	48	0	47	0.55	0.60	1.3791	1.1860
555838	MC	0	119	0	118	0.80	0.81	-0.0266	-0.0617
555837	MC	0	120	0	119	0.82	0.82	-0.2018	-0.1591
555845	MC	0	121	0	120	0.59	0.59	1.1899	1.2362
555846	MC	0	122	0	121	0.69	0.70	0.6406	0.6761
555840	MC	0	123	0	123	0.84	0.85	-0.3642	-0.4267
555847	MC	0	124	0	124	0.82	0.84	-0.1704	-0.3039
594871	MC	1	75	2	74	0.50	0.49	1.6195	1.7364
594969	MC	1	76	2	76	0.78	0.79	0.0943	0.0881
594923	MC	1	77	2	77	0.77	0.78	0.1605	0.1528
594922	MC	1	78	2	78	0.73	0.73	0.4442	0.4471
594865	MC	1	79	2	79	0.56	0.62	1.3103	1.0577
594870	MC	1	80	2	80	0.63	0.65	0.9572	0.9317
594970	MC	1	81	2	81	0.82	0.82	-0.2034	-0.1282
594867	MC	1	82	2	83	0.56	0.60	1.3377	1.1769
594907	MC	4	75	5	74	0.64	0.65	0.9109	0.9241
594900	MC	4	76	5	75	0.57	0.59	1.2530	1.2686
594903	MC	4	77	5	77	0.82	0.84	-0.2365	-0.3054
594898	MC	4	78	5	78	0.53	0.55	1.4656	1.4710
594896	MC	4	79	5	79	0.84	0.85	-0.3215	-0.4242
594905	MC	4	80	5	80	0.82	0.82	-0.2293	-0.1710
594902	MC	4	81	5	81	0.63	0.65	0.9546	0.9637
594904	MC	4	82	5	83	0.64	0.68	0.9113	0.7788
555881	OE	0	49	0	48	0.54	0.57	1.3385	1.2291
555849	OE	0	125	0	125	0.63	0.67	0.5772	0.3271
Mean						0.69	0.71	0.55	0.53

Appendix J: Linking Item Statistics

Reading Grade 11

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
556105	MC	0	43	0	42	0.70	0.75	-0.0504	-0.2779
556106	MC	0	44	0	43	0.59	0.63	0.5408	0.3908
556096	MC	0	45	0	44	0.67	0.69	0.1084	0.0694
556100	MC	0	46	0	45	0.68	0.72	0.0426	-0.0715
556107	MC	0	47	0	46	0.59	0.62	0.5585	0.4730
556104	MC	0	48	0	48	0.79	0.82	-0.6514	-0.7510
556101	MC	0	49	0	49	0.79	0.80	-0.6618	-0.6014
556097	MC	0	50	0	50	0.81	0.83	-0.7661	-0.8286
556188	MC	0	121	0	121	0.60	0.59	0.4966	0.6013
556199	MC	0	122	0	122	0.74	0.76	-0.3129	-0.2987
556197	MC	0	123	0	123	0.84	0.84	-1.0552	-0.9536
556193	MC	0	124	0	124	0.47	0.48	1.1613	1.1644
556189	MC	0	125	0	125	0.58	0.58	0.6175	0.6919
556194	MC	0	126	0	127	0.60	0.61	0.4968	0.4983
556190	MC	0	127	0	128	0.76	0.78	-0.3874	-0.4524
556196	MC	0	128	0	129	0.61	0.61	0.4692	0.4944
595814	MC	1	77	7	77	0.73	0.76	-0.2493	-0.2997
595799	MC	1	78	7	78	0.61	0.61	0.4443	0.4952
595772	MC	1	79	7	79	0.58	0.59	0.5599	0.5921
595810	MC	1	80	7	80	0.73	0.75	-0.2548	-0.2553
595770	MC	1	81	7	81	0.89	0.90	-1.5116	-1.5753
595771	MC	1	82	7	82	0.70	0.70	-0.0416	0.0140
595773	MC	1	83	7	83	0.66	0.67	0.1853	0.1789
595800	MC	1	84	7	84	0.67	0.63	0.1095	0.4300
595812	MC	4	77	1	79	0.84	0.85	-1.0592	-1.0092
595816	MC	4	78	1	80	0.55	0.55	0.7279	0.8440
595813	MC	4	79	1	81	0.63	0.63	0.3478	0.4296
595777	MC	4	80	1	82	0.78	0.80	-0.5915	-0.5908
595786	MC	4	81	1	83	0.59	0.63	0.5215	0.4024
595781	MC	4	82	1	84	0.77	0.80	-0.4951	-0.5842
595783	MC	4	83	1	85	0.84	0.85	-1.0447	-0.9807
595815	MC	4	84	1	86	0.78	0.81	-0.5787	-0.7045
556109	OE	0	51	0	51	0.52	0.53	0.7278	0.7334
556200	OE	0	129	0	130	0.65	0.66	0.0872	0.1047
Mean						0.69	0.70	-0.04	-0.05

Appendix J: Linking Item Statistics

Science Grade 4

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
559994	MC	0	1	0	1	0.85	0.85	-0.8184	-0.8257
559862	MC	0	9	0	9	0.52	0.53	1.2049	1.1279
559773	MC	0	13	0	13	0.76	0.78	-0.1154	-0.2225
560084	MC	0	18	0	18	0.67	0.62	0.4378	0.6617
558279	MC	0	25	0	25	0.59	0.59	0.8638	0.8303
559982	MC	0	28	0	28	0.72	0.65	0.1000	0.5275
554091	MC	0	38	0	38	0.51	0.50	1.2784	1.3052
559998	MC	0	39	0	39	0.68	0.67	0.3731	0.4072
559989	MC	0	40	0	40	0.76	0.77	-0.1738	-0.1557
560038	MC	0	46	0	46	0.67	0.67	0.3844	0.4244
559705	MC	0	47	0	47	0.59	0.58	0.8383	0.9117
559901	MC	0	53	0	53	0.80	0.79	-0.4280	-0.3111
559992	MC	0	54	0	54	0.73	0.78	0.0384	-0.2481
554018	MC	0	61	0	60	0.82	0.81	-0.5871	-0.4523
558197	MC	0	64	0	63	0.56	0.58	1.0118	0.9028
559896	MC	0	65	0	64	0.70	0.69	0.2270	0.3297
565223	MC	1	31	9	31	0.41	0.47	1.7621	1.4006
566095	MC	1	68	12	68	0.72	0.73	0.1459	0.0371
566096	MC	2	70	6	70	0.74	0.72	0.0109	0.1618
565564	MC	2	71	5	71	0.57	0.58	0.9533	0.9012
564850	MC	3	31	6	31	0.50	0.55	1.2943	1.0434
564845	MC	3	70	4	69	0.71	0.72	0.1849	0.1105
565381	MC	4	34	11	34	0.82	0.83	-0.5769	-0.6172
564840	MC	4	69	11	69	0.52	0.55	1.2003	1.0521
565209	MC	5	30	1	31	0.75	0.75	-0.1658	-0.0357
565378	MC	5	33	7	34	0.86	0.86	-0.8873	-0.8879
565213	MC	6	30	10	30	0.53	0.41	1.1475	1.7046
564843	MC	6	32	5	32	0.79	0.80	-0.3747	-0.3636
565214	MC	7	68	5	68	0.80	0.80	-0.4556	-0.4038
564856	MC	7	70	12	70	0.51	0.51	1.2365	1.2632
565561	MC	8	30	5	30	0.55	0.56	1.0465	0.9988
565568	MC	8	32	1	32	0.79	0.80	-0.4243	-0.3953
566278	MC	9	33	6	33	0.83	0.84	-0.6124	-0.7215
565579	MC	9	67	2	67	0.77	0.79	-0.1833	-0.3305
564855	MC	10	33	8	33	0.61	0.63	0.7208	0.6509
565392	MC	10	68	3	68	0.78	0.74	-0.2873	-0.0136
565557	MC	11	33	1	33	0.85	0.85	-0.9024	-0.8349
564837	MC	11	67	3	67	0.51	0.54	1.2240	1.0705
565218	MC	12	30	3	30	0.66	0.70	0.4667	0.2412
565575	MC	12	68	11	68	0.84	0.86	-0.7369	-0.8456
560124	OE	0	35	0	35	0.71	0.74	0.2931	0.1772
560141	OE	0	36	0	36	0.84	0.82	-0.8986	-0.8643
Mean						0.69	0.69	0.23	0.23

Appendix J: Linking Item Statistics

Science Grade 8

ID	Type	Form	Prev		Prev		Prev		Prev	
			Seq	Form	Seq	P-Val	P-Val	Meas	Meas	
549822	MC	0	11	0	11	0.65	0.65	-0.2053	-0.1757	
549708	MC	0	12	0	12	0.62	0.63	-0.0486	-0.0606	
549823	MC	0	15	0	15	0.66	0.64	-0.2739	-0.1167	
558442	MC	0	16	0	16	0.65	0.67	-0.1845	-0.2635	
549738	MC	0	20	0	20	0.61	0.60	0.0440	0.1100	
559969	MC	0	22	0	22	0.66	0.68	-0.2810	-0.3167	
549752	MC	0	42	0	42	0.63	0.60	-0.0785	0.0974	
560011	MC	0	45	0	45	0.58	0.64	0.1532	-0.1174	
559916	MC	0	48	0	48	0.58	0.57	0.1637	0.2268	
560226	MC	0	50	0	50	0.70	0.72	-0.4978	-0.5803	
558334	MC	0	51	0	51	0.66	0.66	-0.2673	-0.2092	
559889	MC	0	55	0	55	0.53	0.53	0.4310	0.4323	
549813	MC	0	56	0	56	0.58	0.56	0.1668	0.3199	
549725	MC	0	57	0	57	0.61	0.65	-0.0094	-0.1455	
560225	MC	0	59	0	59	0.74	0.74	-0.7319	-0.6927	
559905	MC	0	65	0	65	0.64	0.64	-0.1469	-0.1078	
560087	MC	1	33	5	33	0.54	0.54	0.3808	0.3640	
549599	MC	1	70	6	32	0.63	0.62	-0.0819	-0.0528	
565679	MC	2	32	5	32	0.58	0.60	0.2073	0.0833	
565399	MC	2	71	3	33	0.41	0.43	1.0479	0.9520	
559974	MC	3	34	5	72	0.63	0.59	-0.0904	0.1588	
565410	MC	3	71	1	71	0.71	0.72	-0.5866	-0.5651	
559970	MC	4	35	10	35	0.56	0.60	0.2735	0.0987	
567025	MC	4	73	9	34	0.37	0.37	1.2378	1.2639	
565678	MC	5	35	6	35	0.80	0.82	-1.1483	-1.2223	
559964	MC	5	71	8	71	0.46	0.52	0.7748	0.5025	
565245	MC	6	70	8	32	0.55	0.56	0.3286	0.2764	
565083	MC	8	35	11	73	0.60	0.61	0.0633	0.0467	
567043	MC	8	71	4	71	0.54	0.56	0.3739	0.3200	
565250	MC	9	35	11	35	0.50	0.52	0.5540	0.5163	
565242	MC	9	71	7	71	0.48	0.49	0.6791	0.6692	
565398	MC	10	35	6	73	0.52	0.55	0.4747	0.3352	
565087	MC	10	71	2	71	0.68	0.67	-0.3697	-0.2946	
566644	MC	12	35	7	35	0.54	0.55	0.3613	0.3679	
593327	MC	12	71	7	33	0.72	0.70	-0.5655	-0.4073	
559570	OE	0	38	0	38	0.59	0.60	0.0711	0.0700	
559579	OE	0	74	0	74	0.41	0.38	1.0288	1.1614	
Mean						0.59	0.60	0.09	0.08	

Appendix J: Linking Item Statistics

Science Grade 11

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
549893	MC	0	1	0	1	0.67	0.68	-0.3757	-0.3778
554461	MC	0	5	0	5	0.67	0.69	-0.3834	-0.4596
560023	MC	0	8	0	8	0.85	0.85	-1.5717	-1.5296
554460	MC	0	9	0	9	0.62	0.64	-0.1236	-0.1975
554315	MC	0	13	0	13	0.70	0.71	-0.5203	-0.5595
559853	MC	0	27	0	27	0.68	0.71	-0.4284	-0.5422
559914	MC	0	31	0	31	0.72	0.69	-0.6755	-0.4371
549908	MC	0	32	0	32	0.58	0.56	0.0724	0.1984
559761	MC	0	35	0	35	0.54	0.59	0.3116	0.0664
549944	MC	0	36	0	36	0.61	0.61	-0.0573	-0.0378
558187	MC	0	37	0	37	0.42	0.42	0.8647	0.8987
554347	MC	0	50	0	50	0.38	0.40	1.0745	0.9715
549890	MC	0	56	0	56	0.57	0.56	0.1358	0.2127
559880	MC	0	57	0	57	0.54	0.55	0.2796	0.2701
558172	MC	0	58	0	58	0.54	0.52	0.3090	0.3800
559918	MC	0	59	0	59	0.61	0.63	-0.0292	-0.1168
565305	MC	1	72	8	72	0.58	0.60	0.0943	0.0152
565309	MC	2	49	3	49	0.40	0.45	0.9181	0.7577
566655	MC	2	71	4	71	0.53	0.58	0.3128	0.1304
567046	MC	3	47	4	47	0.54	0.53	0.2690	0.3388
565720	MC	3	69	5	69	0.44	0.46	0.7461	0.6858
565426	MC	4	48	2	48	0.39	0.39	0.9723	1.0145
566653	MC	4	71	1	71	0.64	0.62	-0.1960	-0.1086
594785	MC	5	49	4	49	0.68	0.70	-0.4361	-0.4920
549932	MC	5	69	2	69	0.48	0.47	0.6039	0.6386
560103	MC	6	48	8	71	0.53	0.50	0.3396	0.4800
565300	MC	6	72	7	72	0.38	0.40	1.0469	0.9684
565418	MC	7	47	8	47	0.82	0.83	-1.3006	-1.3133
560066	MC	7	71	5	71	0.36	0.34	1.1622	1.2897
593337	MC	8	48	7	71	0.32	0.32	1.3716	1.3932
565304	MC	8	69	6	69	0.80	0.82	-1.1493	-1.2611
560146	OE	0	38	0	38	0.54	0.50	0.3084	0.4862
560130	OE	0	40	0	40	0.36	0.29	1.1241	1.4516
Mean						0.56	0.56	0.15	0.16

Appendix J: Linking Item Statistics

Writing Grade 5

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
566560	MC	0	1	1	13	0.83	0.86	-0.3280	-0.5019
566561	MC	0	2	1	14	0.48	0.54	2.4367	2.3950
566562	MC	0	3	1	15	0.85	0.88	-0.5598	-0.8610
566563	MC	0	4	1	16	0.55	0.57	1.9859	2.1422
566398	MC	0	9	5	13	0.79	0.78	0.1513	0.3635
566399	MC	0	10	5	14	0.64	0.68	1.3186	1.2658
566400	MC	0	11	5	15	0.91	0.93	-1.4387	-1.8881
566401	MC	0	12	5	16	0.64	0.65	1.3189	1.4552
566578	MC	0	17	3	13	0.81	0.80	-0.1018	0.1558
566575	MC	0	18	3	14	0.64	0.64	1.3165	1.5960
566577	MC	0	19	3	15	0.58	0.57	1.7174	2.1196
566579	MC	0	20	3	16	0.76	0.75	0.3193	0.6405
567099	OE	0	21	1	23	0.67	0.66	1.7474	2.2337
567099	OE	0	21	1	23	0.67	0.66	1.7214	2.1808
559652	OE	0	23	2	23	0.67	0.64	1.9715	2.6811
559652	OE	0	23	2	23	0.66	0.64	2.0231	2.7019
Mean						0.70	0.70	0.97	1.17

Appendix J: Linking Item Statistics

Writing Grade 8

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
594193	MC	0	1	5	5	0.79	0.78	0.3414	0.4505
594194	MC	0	2	5	6	0.77	0.76	0.4986	0.7085
594195	MC	0	3	5	7	0.88	0.88	-0.7381	-0.6192
594197	MC	0	4	5	8	0.54	0.53	2.2697	2.5553
594472	MC	0	9	3	5	0.85	0.84	-0.2599	-0.1342
594474	MC	0	10	3	6	0.60	0.57	1.9213	2.2769
594473	MC	0	11	3	7	0.53	0.57	2.3720	2.3162
594476	MC	0	12	3	8	0.82	0.82	-0.0175	0.0965
593029	MC	0	17	6	13	0.71	0.64	1.0365	1.7588
593030	MC	0	18	6	14	0.82	0.79	0.0983	0.3593
593032	MC	0	19	6	15	0.91	0.90	-1.1121	-0.9551
593031	MC	0	20	6	16	0.61	0.59	1.8299	2.0951
594285	OE	0	21	5	23	0.68	0.67	1.9199	2.1810
594285	OE	0	21	5	23	0.67	0.67	2.0465	2.1101
559647	OE	0	23	4	23	0.70	0.65	1.6119	2.5426
559647	OE	0	23	4	23	0.70	0.66	1.6411	2.4939
Mean						0.72	0.71	0.97	1.26

Appendix J: Linking Item Statistics

Writing Grade 11

ID	Type	Form	Seq	Prev	Prev	Prev	Prev	Meas	Meas
				Form	Seq	P-Val	P-Val		
595426	MC	0	1	4	13	0.71	0.70	0.6309	1.1315
595424	MC	0	2	4	14	0.79	0.83	-0.1196	-0.2584
595425	MC	0	3	4	15	0.76	0.78	0.1365	0.3061
595427	MC	0	4	4	16	0.78	0.80	0.0062	0.1735
594826	MC	0	9	5	13	0.72	0.71	0.5569	0.9974
594825	MC	0	10	5	14	0.86	0.85	-0.8736	-0.5415
594828	MC	0	11	5	15	0.50	0.52	2.1834	2.6242
594827	MC	0	12	5	16	0.71	0.72	0.5695	0.9157
595410	MC	0	17	6	13	0.92	0.92	-1.9922	-1.6231
595409	MC	0	18	6	14	0.87	0.85	-1.0515	-0.4201
595411	MC	0	19	6	15	0.72	0.71	0.4744	1.0395
595413	MC	0	20	6	16	0.61	0.59	1.3693	2.0469
598835	OE	0	21	5	23	0.71	0.72	1.1443	1.4528
598835	OE	0	21	5	23	0.71	0.71	1.1261	1.5397
598837	OE	0	23	4	23	0.72	0.71	0.9322	1.6099
598837	OE	0	23	4	23	0.72	0.71	1.0207	1.6364
Mean						0.74	0.74	0.38	0.79

Appendix K:

Reliabilities

Column Heading	Definition
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

Appendix K: Reliabilities

Mathematics Grade 3

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	72	63	124749	59.4	10.81	0.92	3.0	MC/OE
	A	All	33	30	124749	27.3	5.45	0.86	2.0	MC/OE
	B	All	11	8	124749	8.3	2.05	0.53	1.4	MC/OE
	C	All	10	10	124749	8.9	1.54	0.65	0.9	MC
	D	All	9	6	124749	6.7	2.06	0.59	1.3	MC/OE
	E	All	9	9	124749	8.2	1.42	0.74	0.7	MC

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	Male	72	63	63930	59.6	10.87	0.92	3.0	MC/OE
		Female	72	63	60792	59.3	10.75	0.92	3.1	MC/OE
	A	Male	33	30	63930	27.5	5.42	0.87	2.0	MC/OE
		Female	33	30	60792	27.2	5.48	0.86	2.0	MC/OE
	B	Male	11	8	63930	8.3	2.05	0.53	1.4	MC/OE
		Female	11	8	60792	8.2	2.04	0.53	1.4	MC/OE
	C	Male	10	10	63930	8.8	1.56	0.66	0.9	MC
		Female	10	10	60792	8.9	1.51	0.64	0.9	MC
	D	Male	9	6	63930	6.7	2.06	0.59	1.3	MC/OE
		Female	9	6	60792	6.8	2.06	0.58	1.3	MC/OE
	E	Male	9	9	63930	8.2	1.45	0.75	0.7	MC
		Female	9	9	60792	8.2	1.40	0.73	0.7	MC

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	White	72	63	88261	61.2	9.31	0.90	2.9	MC/OE
		Af. Amer.	72	63	19204	53.1	13.19	0.93	3.4	MC/OE
		Hispanic	72	63	10652	55.0	12.55	0.93	3.3	MC/OE
		Asian	72	63	4236	63.8	8.18	0.90	2.6	MC/OE
		Am. Indian	72	63	189	58.5	11.39	0.93	3.1	MC/OE
		Multi	72	63	2167	57.9	11.10	0.92	3.2	MC/OE
	A	White	33	30	88261	28.2	4.75	0.84	1.9	MC/OE
		Af. Amer.	33	30	19204	24.3	6.61	0.88	2.3	MC/OE
		Hispanic	33	30	10652	25.2	6.32	0.88	2.2	MC/OE
		Asian	33	30	4236	29.4	4.06	0.82	1.7	MC/OE
		Am. Indian	33	30	189	27.0	5.72	0.88	2.0	MC/OE
		Multi	33	30	2167	26.7	5.59	0.86	2.1	MC/OE
	B	White	11	8	88261	8.5	1.87	0.47	1.4	MC/OE
		Af. Amer.	11	8	19204	7.2	2.29	0.58	1.5	MC/OE
		Hispanic	11	8	10652	7.6	2.18	0.55	1.5	MC/OE
		Asian	11	8	4236	9.0	1.80	0.45	1.3	MC/OE
		Am. Indian	11	8	189	8.1	1.96	0.47	1.4	MC/OE
		Multi	11	8	2167	7.9	2.13	0.54	1.4	MC/OE
	C	White	10	10	88261	9.1	1.35	0.60	0.8	MC
		Af. Amer.	10	10	19204	8.2	1.91	0.68	1.1	MC
		Hispanic	10	10	10652	8.4	1.82	0.68	1.0	MC
		Asian	10	10	4236	9.3	1.23	0.66	0.7	MC
		Am. Indian	10	10	189	8.8	1.64	0.68	0.9	MC
		Multi	10	10	2167	8.7	1.62	0.65	1.0	MC
	D	White	9	6	88261	7.0	1.93	0.56	1.3	MC/OE
		Af. Amer.	9	6	19204	5.9	2.31	0.61	1.4	MC/OE
		Hispanic	9	6	10652	6.2	2.27	0.61	1.4	MC/OE
		Asian	9	6	4236	7.6	1.59	0.51	1.1	MC/OE
		Am. Indian	9	6	189	6.4	2.09	0.61	1.3	MC/OE
Multi		9	6	2167	6.6	2.13	0.59	1.4	MC/OE	

Appendix K: Reliabilities

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
		White	9	9	88261	8.5	1.13	0.69	0.6	MC
		Af. Amer.	9	9	19204	7.5	1.97	0.77	0.9	MC
	E	Hispanic	9	9	10652	7.7	1.82	0.76	0.9	MC
		Asian	9	9	4236	8.5	1.05	0.69	0.6	MC
		Am. Indian	9	9	189	8.1	1.55	0.77	0.7	MC
		Multi	9	9	2167	8.1	1.51	0.73	0.8	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
ELL	Tot.	All	72	63	3768	50.2	13.52	0.93	3.5	MC/OE
	A	All	33	30	3768	22.9	6.78	0.88	2.4	MC/OE
	B	All	11	8	3768	7.0	2.23	0.56	1.5	MC/OE
	C	All	10	10	3768	7.8	2.12	0.70	1.2	MC
	D	All	9	6	3768	5.5	2.35	0.60	1.5	MC/OE
	E	All	9	9	3768	7.0	2.10	0.77	1.0	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
IEP	Tot.	All	72	63	18260	51.2	14.46	0.94	3.5	MC/OE
	A	All	33	30	18260	23.4	7.31	0.90	2.3	MC/OE
	B	All	11	8	18260	7.1	2.37	0.61	1.5	MC/OE
	C	All	10	10	18260	8.0	2.02	0.69	1.1	MC
	D	All	9	6	18260	5.5	2.49	0.64	1.5	MC/OE
	E	All	9	9	18260	7.3	2.12	0.80	1.0	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
Eco. Disadv.	Tot.	All	72	63	55041	55.7	12.22	0.93	3.3	MC/OE
	A	All	33	30	55041	25.6	6.18	0.88	2.2	MC/OE
	B	All	11	8	55041	7.6	2.17	0.56	1.4	MC/OE
	C	All	10	10	55041	8.5	1.76	0.66	1.0	MC
	D	All	9	6	55041	6.2	2.24	0.60	1.4	MC/OE
	E	All	9	9	55041	7.8	1.74	0.76	0.9	MC

Appendix K: Reliabilities

Mathematics Grade 4

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	72	63	125604	48.9	13.25	0.92	3.7	MC/OE
	A	All	32	29	125604	21.0	6.25	0.84	2.5	MC/OE
	B	All	9	9	125604	6.0	2.08	0.64	1.2	MC
	C	All	11	8	125604	7.3	2.35	0.60	1.5	MC/OE
	D	All	11	8	125604	7.5	2.71	0.67	1.6	MC/OE
	E	All	9	9	125604	7.1	1.97	0.71	1.1	MC

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	Male	72	63	64015	49.3	13.44	0.93	3.7	MC/OE
		Female	72	63	61552	48.5	13.03	0.92	3.7	MC/OE
	A	Male	32	29	64015	21.3	6.35	0.85	2.4	MC/OE
		Female	32	29	61552	20.8	6.14	0.84	2.5	MC/OE
	B	Male	9	9	64015	6.2	2.06	0.65	1.2	MC
		Female	9	9	61552	5.8	2.07	0.63	1.3	MC
	C	Male	11	8	64015	7.3	2.39	0.61	1.5	MC/OE
		Female	11	8	61552	7.3	2.31	0.59	1.5	MC/OE
	D	Male	11	8	64015	7.4	2.72	0.68	1.5	MC/OE
		Female	11	8	61552	7.5	2.70	0.66	1.6	MC/OE
	E	Male	9	9	64015	7.1	1.97	0.71	1.1	MC
		Female	9	9	61552	7.1	1.96	0.70	1.1	MC

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	White	72	63	89777	51.0	12.16	0.91	3.6	MC/OE
		Af. Amer.	72	63	19007	41.1	13.95	0.92	3.9	MC/OE
		Hispanic	72	63	10480	43.1	13.76	0.92	3.9	MC/OE
		Asian	72	63	4249	55.7	11.80	0.92	3.3	MC/OE
		Am. Indian	72	63	180	45.9	14.20	0.93	3.8	MC/OE
		Multi	72	63	1863	46.7	13.64	0.92	3.8	MC/OE
	A	White	32	29	89777	21.9	5.87	0.83	2.4	MC/OE
		Af. Amer.	32	29	19007	17.7	6.38	0.84	2.6	MC/OE
		Hispanic	32	29	10480	18.5	6.40	0.84	2.6	MC/OE
		Asian	32	29	4249	24.3	5.60	0.84	2.2	MC/OE
		Am. Indian	32	29	180	19.9	6.46	0.85	2.5	MC/OE
		Multi	32	29	1863	20.1	6.46	0.85	2.5	MC/OE
	B	White	9	9	89777	6.3	1.95	0.61	1.2	MC
		Af. Amer.	9	9	19007	4.8	2.09	0.59	1.3	MC
		Hispanic	9	9	10480	5.2	2.08	0.60	1.3	MC
		Asian	9	9	4249	6.7	1.94	0.64	1.2	MC
		Am. Indian	9	9	180	5.7	2.06	0.60	1.3	MC
		Multi	9	9	1863	5.7	2.11	0.63	1.3	MC
	C	White	11	8	89777	7.5	2.26	0.59	1.5	MC/OE
		Af. Amer.	11	8	19007	6.4	2.46	0.59	1.6	MC/OE
		Hispanic	11	8	10480	6.7	2.39	0.59	1.5	MC/OE
		Asian	11	8	4249	8.3	2.17	0.62	1.3	MC/OE
		Am. Indian	11	8	180	6.9	2.60	0.65	1.5	MC/OE
		Multi	11	8	1863	7.0	2.38	0.61	1.5	MC/OE
	D	White	11	8	89777	7.8	2.56	0.65	1.5	MC/OE
		Af. Amer.	11	8	19007	6.3	2.90	0.66	1.7	MC/OE
		Hispanic	11	8	10480	6.5	2.88	0.67	1.7	MC/OE
		Asian	11	8	4249	8.8	2.26	0.65	1.3	MC/OE
		Am. Indian	11	8	180	6.8	2.82	0.64	1.7	MC/OE
Multi		11	8	1863	7.1	2.81	0.67	1.6	MC/OE	

Appendix K: Reliabilities

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
		White	9	9	89777	7.4	1.71	0.65	1.0	MC
		Af. Amer.	9	9	19007	5.9	2.33	0.73	1.2	MC
	E	Hispanic	9	9	10480	6.3	2.22	0.72	1.2	MC
		Asian	9	9	4249	7.7	1.68	0.70	0.9	MC
		Am. Indian	9	9	180	6.7	2.20	0.74	1.1	MC
		Multi	9	9	1863	6.8	2.06	0.70	1.1	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
ELL	Tot.	All	72	63	3321	36.8	13.29	0.91	4.0	MC/OE
	A	All	32	29	3321	15.9	6.19	0.82	2.6	MC/OE
	B	All	9	9	3321	4.4	1.96	0.51	1.4	MC
	C	All	11	8	3321	5.8	2.40	0.57	1.6	MC/OE
	D	All	11	8	3321	5.4	2.82	0.63	1.7	MC/OE
	E	All	9	9	3321	5.3	2.35	0.71	1.3	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
IEP	Tot.	All	72	63	17816	40.1	14.61	0.93	4.0	MC/OE
	A	All	32	29	17816	17.3	6.74	0.85	2.6	MC/OE
	B	All	9	9	17816	5.0	2.18	0.63	1.3	MC
	C	All	11	8	17816	6.0	2.49	0.60	1.6	MC/OE
	D	All	11	8	17816	5.8	3.02	0.68	1.7	MC/OE
	E	All	9	9	17816	6.0	2.38	0.75	1.2	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
Eco. Disadv.	Tot.	All	72	63	53887	43.9	13.61	0.92	3.9	MC/OE
	A	All	32	29	53887	18.8	6.33	0.84	2.6	MC/OE
	B	All	9	9	53887	5.3	2.10	0.61	1.3	MC
	C	All	11	8	53887	6.7	2.39	0.59	1.5	MC/OE
	D	All	11	8	53887	6.6	2.85	0.66	1.7	MC/OE
	E	All	9	9	53887	6.4	2.19	0.72	1.2	MC

Appendix K: Reliabilities

Mathematics Grade 5

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	72	63	126578	47.5	13.17	0.93	3.5	MC/OE
	A	All	31	28	126578	21.4	6.19	0.86	2.3	MC/OE
	B	All	10	7	126578	5.1	2.42	0.63	1.5	MC/OE
	C	All	10	10	126578	6.6	2.20	0.64	1.3	MC
	D	All	11	8	126578	6.7	2.28	0.66	1.3	MC/OE
	E	All	10	10	126578	7.7	2.02	0.66	1.2	MC

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	Male	72	63	64504	47.9	13.31	0.93	3.5	MC/OE
		Female	72	63	62037	47.2	13.01	0.92	3.6	MC/OE
	A	Male	31	28	64504	21.6	6.18	0.86	2.3	MC/OE
		Female	31	28	62037	21.2	6.18	0.86	2.3	MC/OE
	B	Male	10	7	64504	5.1	2.42	0.63	1.5	MC/OE
		Female	10	7	62037	5.1	2.42	0.62	1.5	MC/OE
	C	Male	10	10	64504	6.7	2.24	0.66	1.3	MC
		Female	10	10	62037	6.5	2.16	0.62	1.3	MC
	D	Male	11	8	64504	6.8	2.31	0.68	1.3	MC/OE
		Female	11	8	62037	6.6	2.25	0.64	1.3	MC/OE
	E	Male	10	10	64504	7.7	2.05	0.67	1.2	MC
		Female	10	10	62037	7.8	1.98	0.65	1.2	MC

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	White	72	63	91376	49.6	12.24	0.92	3.5	MC/OE
		Af. Amer.	72	63	19003	39.5	13.05	0.92	3.7	MC/OE
		Hispanic	72	63	9978	41.3	13.54	0.93	3.7	MC/OE
		Asian	72	63	4172	54.7	11.91	0.93	3.2	MC/OE
		Am. Indian	72	63	193	44.5	13.18	0.92	3.7	MC/OE
		Multi	72	63	1814	45.5	13.15	0.93	3.6	MC/OE
	A	White	31	28	91376	22.3	5.74	0.85	2.2	MC/OE
		Af. Amer.	31	28	19003	17.9	6.39	0.85	2.5	MC/OE
		Hispanic	31	28	9978	18.6	6.51	0.86	2.4	MC/OE
		Asian	31	28	4172	24.7	5.32	0.85	2.1	MC/OE
		Am. Indian	31	28	193	19.9	6.30	0.86	2.4	MC/OE
		Multi	31	28	1814	20.5	6.32	0.86	2.4	MC/OE
	B	White	10	7	91376	5.5	2.36	0.62	1.5	MC/OE
		Af. Amer.	10	7	19003	3.8	2.13	0.55	1.4	MC/OE
		Hispanic	10	7	9978	4.2	2.27	0.59	1.4	MC/OE
		Asian	10	7	4172	6.3	2.34	0.63	1.4	MC/OE
		Am. Indian	10	7	193	4.6	2.54	0.65	1.5	MC/OE
		Multi	10	7	1814	4.8	2.35	0.62	1.4	MC/OE
	C	White	10	10	91376	6.9	2.11	0.62	1.3	MC
		Af. Amer.	10	10	19003	5.4	2.16	0.58	1.4	MC
		Hispanic	10	10	9978	5.8	2.26	0.62	1.4	MC
		Asian	10	10	4172	7.4	2.10	0.66	1.2	MC
		Am. Indian	10	10	193	6.2	2.23	0.63	1.4	MC
		Multi	10	10	1814	6.3	2.21	0.63	1.3	MC
	D	White	11	8	91376	6.9	2.20	0.65	1.3	MC/OE
		Af. Amer.	11	8	19003	5.7	2.24	0.62	1.4	MC/OE
		Hispanic	11	8	9978	5.9	2.28	0.64	1.4	MC/OE
		Asian	11	8	4172	7.9	2.16	0.66	1.3	MC/OE
		Am. Indian	11	8	193	6.2	2.31	0.64	1.4	MC/OE
Multi		11	8	1814	6.5	2.25	0.65	1.3	MC/OE	

Appendix K: Reliabilities

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
		White	10	10	91376	8.0	1.81	0.61	1.1	MC
		Af. Amer.	10	10	19003	6.7	2.30	0.67	1.3	MC
	E	Hispanic	10	10	9978	6.9	2.29	0.68	1.3	MC
		Asian	10	10	4172	8.4	1.78	0.67	1.0	MC
		Am. Indian	10	10	193	7.4	1.92	0.59	1.2	MC
		Multi	10	10	1814	7.5	2.07	0.65	1.2	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
ELL	Tot.	All	72	63	2824	34.0	12.70	0.91	3.8	MC/OE
	A	All	31	28	2824	15.5	6.31	0.84	2.6	MC/OE
	B	All	10	7	2824	3.3	2.07	0.55	1.4	MC/OE
	C	All	10	10	2824	4.7	2.10	0.53	1.4	MC
	D	All	11	8	2824	4.9	2.25	0.60	1.4	MC/OE
	E	All	10	10	2824	5.6	2.33	0.64	1.4	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
IEP	Tot.	All	72	63	17309	38.0	13.75	0.93	3.8	MC/OE
	A	All	31	28	17309	17.1	6.61	0.86	2.5	MC/OE
	B	All	10	7	17309	3.8	2.28	0.59	1.5	MC/OE
	C	All	10	10	17309	5.3	2.23	0.60	1.4	MC
	D	All	11	8	17309	5.4	2.37	0.65	1.4	MC/OE
	E	All	10	10	17309	6.4	2.35	0.68	1.3	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
Eco. Disadv.	Tot.	All	72	63	52626	42.3	13.12	0.92	3.7	MC/OE
	A	All	31	28	52626	19.1	6.31	0.85	2.4	MC/OE
	B	All	10	7	52626	4.3	2.28	0.59	1.5	MC/OE
	C	All	10	10	52626	5.9	2.21	0.61	1.4	MC
	D	All	11	8	52626	6.0	2.24	0.63	1.4	MC/OE
	E	All	10	10	52626	7.1	2.19	0.66	1.3	MC

Appendix K: Reliabilities

Mathematics Grade 6

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	72	63	126630	49.3	13.92	0.94	3.5	MC/OE
	A	All	22	19	126630	13.5	4.82	0.84	1.9	MC/OE
	B	All	11	8	126630	7.7	2.52	0.70	1.4	MC/OE
	C	All	13	13	126630	10.3	2.52	0.73	1.3	MC
	D	All	13	13	126630	9.8	2.86	0.77	1.4	MC
	E	All	13	10	126630	8.2	3.12	0.70	1.7	MC/OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	Male	72	63	64601	49.0	14.22	0.94	3.5	MC/OE
		Female	72	63	61989	49.7	13.59	0.93	3.5	MC/OE
	A	Male	22	19	64601	13.4	4.88	0.84	1.9	MC/OE
		Female	22	19	61989	13.5	4.75	0.83	2.0	MC/OE
	B	Male	11	8	64601	7.8	2.51	0.70	1.4	MC/OE
		Female	11	8	61989	7.6	2.53	0.70	1.4	MC/OE
	C	Male	13	13	64601	10.2	2.60	0.74	1.3	MC
		Female	13	13	61989	10.3	2.43	0.71	1.3	MC
	D	Male	13	13	64601	9.6	2.95	0.78	1.4	MC
		Female	13	13	61989	9.9	2.75	0.75	1.4	MC
	E	Male	13	10	64601	8.0	3.16	0.71	1.7	MC/OE
		Female	13	10	61989	8.4	3.06	0.69	1.7	MC/OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	White	72	63	91471	51.5	12.82	0.93	3.4	MC/OE
		Af. Amer.	72	63	19218	41.4	14.37	0.93	3.8	MC/OE
		Hispanic	72	63	10174	42.0	14.55	0.93	3.7	MC/OE
		Asian	72	63	3858	57.2	11.76	0.93	3.1	MC/OE
		Am. Indian	72	63	192	45.2	14.14	0.93	3.6	MC/OE
		Multi	72	63	1664	46.8	14.70	0.94	3.6	MC/OE
	A	White	22	19	91471	14.1	4.58	0.82	1.9	MC/OE
		Af. Amer.	22	19	19218	11.1	4.72	0.82	2.0	MC/OE
		Hispanic	22	19	10174	11.2	4.79	0.82	2.0	MC/OE
		Asian	22	19	3858	16.5	4.18	0.82	1.8	MC/OE
		Am. Indian	22	19	192	12.1	4.83	0.84	1.9	MC/OE
		Multi	22	19	1664	12.7	5.02	0.85	2.0	MC/OE
	B	White	11	8	91471	8.0	2.31	0.67	1.3	MC/OE
		Af. Amer.	11	8	19218	6.4	2.77	0.69	1.5	MC/OE
		Hispanic	11	8	10174	6.6	2.79	0.71	1.5	MC/OE
		Asian	11	8	3858	8.8	2.08	0.68	1.2	MC/OE
		Am. Indian	11	8	192	7.1	2.57	0.67	1.5	MC/OE
		Multi	11	8	1664	7.3	2.68	0.71	1.4	MC/OE
	C	White	13	13	91471	10.6	2.29	0.69	1.3	MC
		Af. Amer.	13	13	19218	9.0	2.81	0.72	1.5	MC
		Hispanic	13	13	10174	9.1	2.82	0.73	1.5	MC
		Asian	13	13	3858	11.3	2.08	0.72	1.1	MC
		Am. Indian	13	13	192	9.6	2.76	0.74	1.4	MC
		Multi	13	13	1664	9.9	2.67	0.74	1.4	MC
	D	White	13	13	91471	10.1	2.68	0.75	1.3	MC
		Af. Amer.	13	13	19218	8.5	3.04	0.75	1.5	MC
		Hispanic	13	13	10174	8.5	3.08	0.76	1.5	MC
Asian		13	13	3858	11.1	2.29	0.76	1.1	MC	
Am. Indian		13	13	192	9.2	2.79	0.72	1.5	MC	
Multi		13	13	1664	9.3	3.03	0.78	1.4	MC	

Appendix K: Reliabilities

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
		White	13	10	91471	8.6	2.94	0.67	1.7	MC/OE
		Af. Amer.	13	10	19218	6.5	3.11	0.71	1.7	MC/OE
		Hispanic	13	10	10174	6.6	3.12	0.70	1.7	MC/OE
		Asian	13	10	3858	9.6	2.85	0.67	1.6	MC/OE
		Am. Indian	13	10	192	7.2	3.19	0.72	1.7	MC/OE
		Multi	13	10	1664	7.6	3.23	0.72	1.7	MC/OE
ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	72	63	2554	33.6	13.47	0.92	3.9	MC/OE
	A	All	22	19	2554	9.1	4.45	0.79	2.0	MC/OE
	B	All	11	8	2554	5.1	2.80	0.66	1.6	MC/OE
	C	All	13	13	2554	7.5	2.78	0.67	1.6	MC
	D	All	13	13	2554	6.9	3.00	0.71	1.6	MC
	E	All	13	10	2554	5.0	2.76	0.63	1.7	MC/OE
IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	72	63	16803	36.7	14.69	0.93	3.8	MC/OE
	A	All	22	19	16803	9.5	4.78	0.82	2.0	MC/OE
	B	All	11	8	16803	5.8	2.80	0.68	1.6	MC/OE
	C	All	13	13	16803	8.2	2.94	0.72	1.5	MC
	D	All	13	13	16803	7.4	3.17	0.75	1.6	MC
	E	All	13	10	16803	5.7	3.13	0.71	1.7	MC/OE
Eco. Disadv.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	72	63	51862	43.6	14.29	0.93	3.7	MC/OE
	A	All	22	19	51862	11.6	4.78	0.82	2.0	MC/OE
	B	All	11	8	51862	6.8	2.70	0.70	1.5	MC/OE
	C	All	13	13	51862	9.4	2.73	0.72	1.4	MC
	D	All	13	13	51862	8.8	3.02	0.76	1.5	MC
	E	All	13	10	51862	7.0	3.13	0.71	1.7	MC/OE

Appendix K: Reliabilities

Mathematics Grade 7

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	72	63	126993	47.8	14.13	0.94	3.6	MC/OE
	A	All	17	17	126993	12.1	3.69	0.82	1.6	MC
	B	All	10	7	126993	5.1	2.47	0.70	1.4	MC/OE
	C	All	13	10	126993	9.3	2.72	0.72	1.4	MC/OE
	D	All	19	16	126993	12.2	4.06	0.75	2.0	MC/OE
	E	All	13	13	126993	9.1	2.97	0.76	1.5	MC

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	Male		72	63	64885	47.6	14.40	0.94	3.6	MC/OE
		Female		72	63	62065	48.0	13.85	0.93	3.6	MC/OE
	A	Male		17	17	64885	12.2	3.74	0.82	1.6	MC
		Female		17	17	62065	12.1	3.64	0.81	1.6	MC
	B	Male		10	7	64885	5.1	2.46	0.70	1.4	MC/OE
		Female		10	7	62065	5.0	2.49	0.70	1.4	MC/OE
	C	Male		13	10	64885	9.2	2.76	0.73	1.4	MC/OE
		Female		13	10	62065	9.4	2.67	0.70	1.5	MC/OE
	D	Male		19	16	64885	12.0	4.14	0.76	2.0	MC/OE
		Female		19	16	62065	12.3	3.97	0.74	2.0	MC/OE
	E	Male		13	13	64885	9.1	3.03	0.77	1.4	MC
		Female		13	13	62065	9.1	2.91	0.75	1.5	MC

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items	
	Tot.	White		72	63	92304	50.0	13.12	0.93	3.5	MC/OE
		Af. Amer.		72	63	18824	39.4	14.14	0.93	3.8	MC/OE
		Hispanic		72	63	10028	40.4	14.38	0.93	3.7	MC/OE
		Asian		72	63	3915	56.5	12.21	0.93	3.2	MC/OE
		Am. Indian		72	63	189	45.1	15.85	0.95	3.6	MC/OE
		Multi		72	63	1677	44.9	14.32	0.93	3.7	MC/OE
		A	White		17	17	92304	12.6	3.48	0.80	1.6
	Af. Amer.			17	17	18824	10.3	3.82	0.80	1.7	MC
	Hispanic			17	17	10028	10.5	3.82	0.80	1.7	MC
	Asian			17	17	3915	14.2	2.98	0.80	1.3	MC
	Am. Indian			17	17	189	11.5	4.20	0.86	1.6	MC
	Multi			17	17	1677	11.4	3.77	0.81	1.7	MC
	B		White		10	7	92304	5.4	2.38	0.68	1.3
		Af. Amer.		10	7	18824	3.7	2.21	0.63	1.4	MC/OE
		Hispanic		10	7	10028	3.9	2.33	0.66	1.4	MC/OE
		Asian		10	7	3915	6.6	2.39	0.69	1.3	MC/OE
		Am. Indian		10	7	189	4.7	2.58	0.71	1.4	MC/OE
		Multi		10	7	1677	4.6	2.38	0.68	1.4	MC/OE
		C	White		13	10	92304	9.7	2.50	0.68	1.4
	Af. Amer.			13	10	18824	7.9	2.97	0.73	1.5	MC/OE
	Hispanic			13	10	10028	8.2	2.96	0.74	1.5	MC/OE
	Asian			13	10	3915	10.7	2.27	0.67	1.3	MC/OE
	Am. Indian			13	10	189	8.9	3.07	0.76	1.5	MC/OE
	Multi			13	10	1677	8.9	2.81	0.72	1.5	MC/OE
	D		White		19	16	92304	12.7	3.85	0.74	2.0
		Af. Amer.		19	16	18824	10.1	4.04	0.73	2.1	MC/OE
		Hispanic		19	16	10028	10.3	4.03	0.73	2.1	MC/OE
		Asian		19	16	3915	14.6	3.59	0.75	1.8	MC/OE
		Am. Indian		19	16	189	11.3	4.30	0.77	2.1	MC/OE
Multi			19	16	1677	11.4	4.18	0.76	2.1	MC/OE	

Appendix K: Reliabilities

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
		White	13	13	92304	9.6	2.72	0.73	1.4	MC
		Af. Amer.	13	13	18824	7.4	3.13	0.75	1.6	MC
	E	Hispanic	13	13	10028	7.6	3.18	0.76	1.6	MC
		Asian	13	13	3915	10.4	2.50	0.73	1.3	MC
		Am. Indian	13	13	189	8.6	3.22	0.79	1.5	MC
		Multi	13	13	1677	8.6	3.05	0.76	1.5	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
ELL	Tot.	All	72	63	2501	32.0	13.31	0.92	3.8	MC/OE
	A	All	17	17	2501	8.5	3.74	0.77	1.8	MC
	B	All	10	7	2501	2.8	2.01	0.57	1.3	MC/OE
	C	All	13	10	2501	6.7	3.01	0.73	1.6	MC/OE
	D	All	19	16	2501	8.3	3.83	0.71	2.1	MC/OE
	E	All	13	13	2501	5.6	2.87	0.68	1.6	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
IEP	Tot.	All	72	63	16260	34.2	14.14	0.93	3.8	MC/OE
	A	All	17	17	16260	8.8	3.95	0.80	1.8	MC
	B	All	10	7	16260	3.3	2.15	0.61	1.3	MC/OE
	C	All	13	10	16260	7.0	3.01	0.74	1.5	MC/OE
	D	All	19	16	16260	8.7	3.95	0.72	2.1	MC/OE
	E	All	13	13	16260	6.5	3.12	0.73	1.6	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
Eco. Disadv.	Tot.	All	72	63	50774	41.7	14.17	0.93	3.7	MC/OE
	A	All	17	17	50774	10.7	3.81	0.80	1.7	MC
	B	All	10	7	50774	4.1	2.33	0.66	1.4	MC/OE
	C	All	13	10	50774	8.3	2.89	0.73	1.5	MC/OE
	D	All	19	16	50774	10.6	4.00	0.73	2.1	MC/OE
	E	All	13	13	50774	7.9	3.12	0.75	1.5	MC

Appendix K: Reliabilities

Mathematics Grade 8

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	72	63	126786	49.2	14.17	0.94	3.6	MC/OE
	A	All	15	12	126786	9.3	3.28	0.71	1.8	MC/OE
	B	All	11	11	126786	7.6	2.74	0.76	1.3	MC
	C	All	12	12	126786	8.8	2.68	0.74	1.4	MC
	D	All	20	17	126786	14.0	4.32	0.83	1.8	MC/OE
	E	All	14	11	126786	9.5	3.03	0.71	1.6	MC/OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	Male	72	63	64243	49.0	14.54	0.94	3.6	MC/OE
		Female	72	63	62491	49.4	13.77	0.93	3.6	MC/OE
	A	Male	15	12	64243	9.5	3.31	0.72	1.8	MC/OE
		Female	15	12	62491	9.2	3.25	0.70	1.8	MC/OE
	B	Male	11	11	64243	7.5	2.78	0.77	1.3	MC
		Female	11	11	62491	7.6	2.70	0.75	1.3	MC
	C	Male	12	12	64243	8.8	2.70	0.75	1.4	MC
		Female	12	12	62491	8.7	2.66	0.73	1.4	MC
	D	Male	20	17	64243	13.8	4.51	0.84	1.8	MC/OE
		Female	20	17	62491	14.2	4.10	0.81	1.8	MC/OE
	E	Male	14	11	64243	9.4	3.09	0.72	1.6	MC/OE
		Female	14	11	62491	9.6	2.97	0.69	1.6	MC/OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	White	72	63	92963	51.4	13.00	0.93	3.5	MC/OE
		Af. Amer.	72	63	18755	40.6	14.49	0.93	3.8	MC/OE
		Hispanic	72	63	9597	41.5	14.81	0.94	3.7	MC/OE
		Asian	72	63	3882	57.5	12.56	0.93	3.2	MC/OE
		Am. Indian	72	63	167	47.3	15.06	0.94	3.7	MC/OE
		Multi	72	63	1366	46.9	14.69	0.94	3.6	MC/OE
		A	White	15	12	92963	9.8	3.12	0.68	1.8
	Af. Amer.		15	12	18755	7.6	3.18	0.69	1.8	MC/OE
	Hispanic		15	12	9597	7.7	3.26	0.70	1.8	MC/OE
	Asian		15	12	3882	11.2	3.09	0.70	1.7	MC/OE
	Am. Indian		15	12	167	9.0	3.33	0.72	1.8	MC/OE
	Multi		15	12	1366	8.9	3.37	0.72	1.8	MC/OE
	B		White	11	11	92963	7.9	2.59	0.74	1.3
		Af. Amer.	11	11	18755	6.2	2.78	0.73	1.5	MC
		Hispanic	11	11	9597	6.4	2.84	0.74	1.4	MC
		Asian	11	11	3882	9.0	2.37	0.79	1.1	MC
		Am. Indian	11	11	167	7.2	2.89	0.78	1.4	MC
		Multi	11	11	1366	7.2	2.86	0.77	1.4	MC
		C	White	12	12	92963	9.2	2.47	0.71	1.3
	Af. Amer.		12	12	18755	7.2	2.88	0.72	1.5	MC
	Hispanic		12	12	9597	7.6	2.85	0.73	1.5	MC
	Asian		12	12	3882	10.1	2.26	0.75	1.1	MC
	Am. Indian		12	12	167	8.6	2.63	0.72	1.4	MC
	Multi		12	12	1366	8.3	2.83	0.75	1.4	MC
D	White		20	17	92963	14.6	4.03	0.81	1.8	MC/OE
	Af. Amer.	20	17	18755	11.8	4.54	0.83	1.9	MC/OE	
	Hispanic	20	17	9597	11.9	4.60	0.84	1.8	MC/OE	
	Asian	20	17	3882	16.3	3.59	0.80	1.6	MC/OE	
	Am. Indian	20	17	167	13.6	4.59	0.83	1.9	MC/OE	
	Multi	20	17	1366	13.5	4.47	0.83	1.8	MC/OE	

Appendix K: Reliabilities

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
		White	14	11	92963	10.0	2.76	0.66	1.6	MC/OE
		Af. Amer.	14	11	18755	7.7	3.20	0.71	1.7	MC/OE
		Hispanic	14	11	9597	7.9	3.29	0.73	1.7	MC/OE
		Asian	14	11	3882	10.9	2.81	0.70	1.5	MC/OE
		Am. Indian	14	11	167	8.9	3.38	0.76	1.7	MC/OE
		Multi	14	11	1366	9.0	3.10	0.71	1.7	MC/OE
ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	72	63	2366	33.8	14.28	0.93	3.8	MC/OE
	A	All	15	12	2366	6.3	3.11	0.68	1.8	MC/OE
	B	All	11	11	2366	5.2	2.68	0.70	1.5	MC
	C	All	12	12	2366	6.5	2.95	0.73	1.5	MC
	D	All	20	17	2366	9.9	4.62	0.83	1.9	MC/OE
E	All	14	11	2366	6.0	3.11	0.70	1.7	MC/OE	
IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	72	63	15968	35.4	14.46	0.93	3.8	MC/OE
	A	All	15	12	15968	6.6	3.16	0.69	1.8	MC/OE
	B	All	11	11	15968	5.4	2.70	0.70	1.5	MC
	C	All	12	12	15968	6.7	2.95	0.73	1.5	MC
	D	All	20	17	15968	10.0	4.62	0.83	1.9	MC/OE
E	All	14	11	15968	6.7	3.20	0.72	1.7	MC/OE	
Eco. Disadv.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	72	63	48728	43.0	14.47	0.93	3.7	MC/OE
	A	All	15	12	48728	8.1	3.23	0.70	1.8	MC/OE
	B	All	11	11	48728	6.6	2.79	0.74	1.4	MC
	C	All	12	12	48728	7.8	2.84	0.73	1.5	MC
	D	All	20	17	48728	12.4	4.51	0.83	1.8	MC/OE
E	All	14	11	48728	8.2	3.17	0.71	1.7	MC/OE	

Appendix K: Reliabilities

Mathematics Grade 11

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	72	63	127797	48.0	14.56	0.94	3.7	MC/OE
	A	All	11	8	127797	6.9	2.61	0.64	1.6	MC/OE
	B	All	11	11	127797	8.0	2.45	0.71	1.3	MC
	C	All	13	10	127797	7.7	3.06	0.75	1.5	MC/OE
	D	All	27	24	127797	18.0	6.17	0.86	2.3	MC/OE
	E	All	10	10	127797	7.4	2.06	0.64	1.2	MC

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	Male	72	63	64321	48.1	14.94	0.94	3.7	MC/OE
		Female	72	63	63357	47.9	14.13	0.93	3.7	MC/OE
	A	Male	11	8	64321	7.0	2.71	0.66	1.6	MC/OE
		Female	11	8	63357	6.8	2.50	0.62	1.5	MC/OE
	B	Male	11	11	64321	8.1	2.44	0.72	1.3	MC
		Female	11	11	63357	7.9	2.45	0.70	1.3	MC
	C	Male	13	10	64321	7.7	3.11	0.76	1.5	MC/OE
		Female	13	10	63357	7.8	3.01	0.74	1.5	MC/OE
	D	Male	27	24	64321	17.8	6.33	0.87	2.3	MC/OE
		Female	27	24	63357	18.2	6.00	0.85	2.3	MC/OE
	E	Male	10	10	64321	7.5	2.09	0.66	1.2	MC
		Female	10	10	63357	7.3	2.03	0.62	1.3	MC

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	White	72	63	96963	50.1	13.60	0.93	3.6	MC/OE
		Af. Amer.	72	63	17793	38.6	14.34	0.93	3.8	MC/OE
		Hispanic	72	63	7911	39.5	14.39	0.93	3.8	MC/OE
		Asian	72	63	3802	56.9	12.65	0.93	3.3	MC/OE
		Am. Indian	72	63	194	43.2	14.28	0.93	3.8	MC/OE
		Multi	72	63	1021	44.3	15.03	0.94	3.8	MC/OE
	A	White	11	8	96963	7.2	2.52	0.63	1.5	MC/OE
		Af. Amer.	11	8	17793	5.4	2.40	0.55	1.6	MC/OE
		Hispanic	11	8	7911	5.6	2.44	0.56	1.6	MC/OE
		Asian	11	8	3802	8.3	2.40	0.66	1.4	MC/OE
		Am. Indian	11	8	194	6.2	2.40	0.54	1.6	MC/OE
		Multi	11	8	1021	6.3	2.68	0.65	1.6	MC/OE
	B	White	11	11	96963	8.4	2.26	0.68	1.3	MC
		Af. Amer.	11	11	17793	6.5	2.59	0.68	1.5	MC
		Hispanic	11	11	7911	6.8	2.64	0.70	1.4	MC
		Asian	11	11	3802	9.1	2.08	0.71	1.1	MC
		Am. Indian	11	11	194	7.3	2.45	0.66	1.4	MC
		Multi	11	11	1021	7.6	2.62	0.73	1.4	MC
	C	White	13	10	96963	8.2	2.89	0.72	1.5	MC/OE
		Af. Amer.	13	10	17793	5.9	3.03	0.74	1.5	MC/OE
		Hispanic	13	10	7911	6.1	3.02	0.74	1.5	MC/OE
		Asian	13	10	3802	9.5	2.77	0.73	1.4	MC/OE
		Am. Indian	13	10	194	6.8	3.09	0.73	1.6	MC/OE
		Multi	13	10	1021	6.9	3.10	0.75	1.5	MC/OE
	D	White	27	24	96963	18.7	5.89	0.85	2.3	MC/OE
		Af. Amer.	27	24	17793	14.6	6.11	0.85	2.4	MC/OE
		Hispanic	27	24	7911	14.8	6.06	0.85	2.4	MC/OE
		Asian	27	24	3802	22.0	5.16	0.84	2.1	MC/OE
		Am. Indian	27	24	194	15.9	6.17	0.86	2.3	MC/OE
Multi		27	24	1021	16.5	6.35	0.86	2.4	MC/OE	

Appendix K: Reliabilities

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
		White	10	10	96963	7.7	1.89	0.59	1.2	MC
		Af. Amer.	10	10	17793	6.2	2.28	0.64	1.4	MC
	E	Hispanic	10	10	7911	6.3	2.25	0.63	1.4	MC
		Asian	10	10	3802	8.1	1.81	0.62	1.1	MC
		Am. Indian	10	10	194	7.0	2.23	0.67	1.3	MC
		Multi	10	10	1021	7.0	2.16	0.64	1.3	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
ELL	Tot.	All	72	63	1863	34.3	14.88	0.93	3.9	MC/OE
	A	All	11	8	1863	5.0	2.52	0.59	1.6	MC/OE
	B	All	11	11	1863	5.9	2.66	0.69	1.5	MC
	C	All	13	10	1863	5.2	3.20	0.76	1.6	MC/OE
	D	All	27	24	1863	13.3	6.22	0.85	2.4	MC/OE
	E	All	10	10	1863	5.0	2.26	0.59	1.4	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
IEP	Tot.	All	72	63	14290	32.5	13.72	0.92	3.9	MC/OE
	A	All	11	8	14290	4.6	2.35	0.52	1.6	MC/OE
	B	All	11	11	14290	5.8	2.64	0.68	1.5	MC
	C	All	13	10	14290	4.8	2.85	0.72	1.5	MC/OE
	D	All	27	24	14290	11.7	5.71	0.83	2.4	MC/OE
	E	All	10	10	14290	5.5	2.32	0.62	1.4	MC

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
Eco. Disadv.	Tot.	All	72	63	39876	41.4	14.50	0.93	3.8	MC/OE
	A	All	11	8	39876	5.8	2.49	0.58	1.6	MC/OE
	B	All	11	11	39876	7.1	2.60	0.70	1.4	MC
	C	All	13	10	39876	6.5	3.05	0.74	1.5	MC/OE
	D	All	27	24	39876	15.4	6.14	0.85	2.4	MC/OE
	E	All	10	10	39876	6.6	2.23	0.64	1.3	MC

Appendix K: Reliabilities

Reading Grade 3

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		46	42	124678	31.1	8.87	0.91	2.7
A	All		28	28	124678	19.3	5.80	0.87	2.1	MC
B	All		18	14	124678	11.8	3.48	0.78	1.6	MC/OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		Male	46	42	63880	30.2	9.13	0.91	2.7
Female			46	42	60772	32.1	8.49	0.90	2.6	MC/OE
A		Male	28	28	63880	18.8	5.95	0.87	2.1	MC
		Female	28	28	60772	19.7	5.59	0.86	2.1	MC
B		Male	18	14	63880	11.4	3.57	0.78	1.7	MC/OE
		Female	18	14	60772	12.3	3.31	0.76	1.6	MC/OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		White	46	42	88236	32.6	8.22	0.90	2.6
Af. Amer.			46	42	19187	26.2	9.03	0.90	2.9	MC/OE
Hispanic			46	42	10636	27.0	9.30	0.90	2.9	MC/OE
Asian			46	42	4230	33.9	8.21	0.90	2.6	MC/OE
Am. Indian			46	42	189	30.8	9.41	0.92	2.7	MC/OE
Multi			46	42	2161	29.6	9.04	0.91	2.8	MC/OE
A		White	28	28	88236	20.2	5.41	0.86	2.1	MC
		Af. Amer.	28	28	19187	16.1	5.84	0.84	2.3	MC
		Hispanic	28	28	10636	16.6	6.00	0.86	2.3	MC
		Asian	28	28	4230	20.8	5.38	0.86	2.0	MC
		Am. Indian	28	28	189	19.2	6.20	0.89	2.1	MC
		Multi	28	28	2161	18.3	5.90	0.86	2.2	MC
B		White	18	14	88236	12.4	3.23	0.75	1.6	MC/OE
		Af. Amer.	18	14	19187	10.1	3.64	0.77	1.8	MC/OE
		Hispanic	18	14	10636	10.3	3.74	0.78	1.7	MC/OE
		Asian	18	14	4230	13.0	3.24	0.76	1.6	MC/OE
		Am. Indian	18	14	189	11.5	3.62	0.78	1.7	MC/OE
		Multi	18	14	2161	11.3	3.56	0.78	1.7	MC/OE

ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		46	42	3753	22.0	8.51	0.87	3.0
A	All		28	28	3753	13.4	5.43	0.81	2.4	MC
B	All		18	14	3753	8.5	3.60	0.74	1.8	MC/OE

IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		46	42	18237	23.8	9.91	0.91	2.9
A	All		28	28	18237	14.7	6.39	0.87	2.3	MC
B	All		18	14	18237	9.1	3.95	0.80	1.8	MC/OE

Eco. Dis.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		46	42	54988	27.7	9.13	0.90	2.8
A	All		28	28	54988	17.1	5.94	0.86	2.3	MC
B	All		18	14	54988	10.6	3.64	0.78	1.7	MC/OE

Appendix K: Reliabilities

Reading Grade 4

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	124535	35.4	9.26	0.89	3.1
A	All		35	31	124535	24.0	6.66	0.86	2.5	MC/OE
B	All		17	13	124535	11.4	3.10	0.70	1.7	MC/OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		Male	52	44	63202	34.5	9.52	0.90	3.1
Female			52	44	61296	36.3	8.88	0.88	3.0	MC/OE
A		Male	35	31	63202	23.5	6.86	0.86	2.6	MC/OE
		Female	35	31	61296	24.6	6.41	0.85	2.5	MC/OE
B		Male	17	13	63202	11.0	3.17	0.71	1.7	MC/OE
		Female	17	13	61296	11.7	2.98	0.68	1.7	MC/OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		White	52	44	88938	36.9	8.39	0.87	3.0
Af. Amer.			52	44	18873	30.0	9.95	0.89	3.3	MC/OE
Hispanic			52	44	10408	31.1	10.05	0.90	3.2	MC/OE
Asian			52	44	4233	39.1	8.16	0.88	2.8	MC/OE
Am. Indian			52	44	179	33.7	10.25	0.91	3.1	MC/OE
Multi			52	44	1857	34.0	9.42	0.89	3.1	MC/OE
A		White	35	31	88938	25.1	6.07	0.83	2.5	MC/OE
		Af. Amer.	35	31	18873	20.2	7.12	0.86	2.7	MC/OE
		Hispanic	35	31	10408	20.9	7.18	0.86	2.7	MC/OE
		Asian	35	31	4233	26.6	5.95	0.85	2.3	MC/OE
		Am. Indian	35	31	179	22.9	7.12	0.87	2.6	MC/OE
		Multi	35	31	1857	23.1	6.75	0.85	2.6	MC/OE
B		White	17	13	88938	11.8	2.86	0.66	1.7	MC/OE
		Af. Amer.	17	13	18873	9.8	3.35	0.71	1.8	MC/OE
		Hispanic	17	13	10408	10.2	3.37	0.72	1.8	MC/OE
		Asian	17	13	4233	12.5	2.72	0.64	1.6	MC/OE
		Am. Indian	17	13	179	10.8	3.49	0.75	1.8	MC/OE
		Multi	17	13	1857	11.0	3.18	0.70	1.7	MC/OE

ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	3268	24.8	9.21	0.87	3.4
A	All		35	31	3268	16.5	6.60	0.82	2.8	MC/OE
B	All		17	13	3268	8.3	3.17	0.66	1.8	MC/OE

IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	16777	28.1	10.64	0.91	3.3
A	All		35	31	16777	19.1	7.57	0.87	2.7	MC/OE
B	All		17	13	16777	9.1	3.56	0.74	1.8	MC/OE

Eco. Dis.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	53309	31.7	9.71	0.89	3.2
A	All		35	31	53309	21.4	6.95	0.85	2.7	MC/OE
B	All		17	13	53309	10.3	3.27	0.71	1.8	MC/OE

Appendix K: Reliabilities

Reading Grade 5

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	125963	35.7	8.53	0.89	2.8
A	All		32	26	125963	21.5	5.20	0.82	2.2	MC/OE
B	All		20	18	125963	14.2	3.80	0.79	1.8	MC/OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		Male	52	44	63980	34.8	8.81	0.89	2.9
Female			52	44	61945	36.6	8.14	0.88	2.8	MC/OE
A		Male	32	26	63980	21.1	5.34	0.83	2.2	MC/OE
		Female	32	26	61945	21.9	5.02	0.80	2.2	MC/OE
B		Male	20	18	63980	13.7	3.94	0.79	1.8	MC/OE
		Female	20	18	61945	14.7	3.59	0.77	1.7	MC/OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		White	52	44	90885	37.1	7.68	0.87	2.8
Af. Amer.			52	44	18939	31.0	9.31	0.89	3.0	MC/OE
Hispanic			52	44	9943	31.1	9.63	0.90	3.0	MC/OE
Asian			52	44	4159	38.8	7.85	0.88	2.7	MC/OE
Am. Indian			52	44	192	35.4	7.94	0.87	2.9	MC/OE
Multi			52	44	1802	34.9	8.45	0.88	2.9	MC/OE
A		White	32	26	90885	22.3	4.72	0.79	2.2	MC/OE
		Af. Amer.	32	26	18939	18.6	5.57	0.82	2.4	MC/OE
		Hispanic	32	26	9943	18.7	5.75	0.83	2.4	MC/OE
		Asian	32	26	4159	23.3	4.90	0.81	2.1	MC/OE
		Am. Indian	32	26	192	21.6	4.75	0.78	2.2	MC/OE
		Multi	32	26	1802	21.0	5.14	0.81	2.3	MC/OE
B		White	20	18	90885	14.7	3.46	0.76	1.7	MC/OE
		Af. Amer.	20	18	18939	12.4	4.22	0.80	1.9	MC/OE
		Hispanic	20	18	9943	12.4	4.34	0.81	1.9	MC/OE
		Asian	20	18	4159	15.5	3.39	0.77	1.6	MC/OE
		Am. Indian	20	18	192	13.9	3.68	0.76	1.8	MC/OE
		Multi	20	18	1802	13.9	3.80	0.78	1.8	MC/OE

ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	2798	24.0	8.88	0.87	3.2
A	All		32	26	2798	14.6	5.31	0.78	2.5	MC/OE
B	All		20	18	2798	9.4	4.13	0.76	2.0	MC/OE

IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	16715	27.9	10.03	0.91	3.1
A	All		32	26	16715	17.1	6.02	0.84	2.4	MC/OE
B	All		20	18	16715	10.7	4.50	0.81	1.9	MC/OE

Eco. Dis.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	52347	32.3	9.07	0.89	3.0
A	All		32	26	52347	19.4	5.46	0.82	2.3	MC/OE
B	All		20	18	52347	12.8	4.11	0.79	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	126170	36.2	9.27	0.91	2.9	MC/OE
	A	All	32	28	126170	22.2	5.92	0.85	2.3	MC/OE
	B	All	20	16	126170	14.0	3.78	0.79	1.7	MC/OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	Male	52	44	64163	35.4	9.55	0.91	2.9	MC/OE
		Female	52	44	61967	37.1	8.89	0.90	2.8	MC/OE
	A	Male	32	28	64163	21.8	6.07	0.86	2.3	MC/OE
		Female	32	28	61967	22.5	5.73	0.85	2.2	MC/OE
	B	Male	20	16	64163	13.6	3.89	0.79	1.8	MC/OE
Female		20	16	61967	14.5	3.58	0.77	1.7	MC/OE	

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	White	52	44	91106	37.9	8.39	0.89	2.8	MC/OE
		Af. Amer.	52	44	19173	30.7	9.56	0.89	3.1	MC/OE
		Hispanic	52	44	10134	30.4	9.91	0.90	3.1	MC/OE
		Asian	52	44	3855	39.2	8.75	0.91	2.7	MC/OE
		Am. Indian	52	44	191	34.2	9.07	0.89	3.0	MC/OE
		Multi	52	44	1659	34.7	9.53	0.91	2.9	MC/OE
	A	White	32	28	91106	23.3	5.38	0.83	2.2	MC/OE
		Af. Amer.	32	28	19173	18.6	6.04	0.83	2.5	MC/OE
		Hispanic	32	28	10134	18.5	6.25	0.85	2.4	MC/OE
		Asian	32	28	3855	24.0	5.53	0.85	2.1	MC/OE
		Am. Indian	32	28	191	20.9	5.82	0.84	2.3	MC/OE
		Multi	32	28	1659	21.2	6.05	0.85	2.3	MC/OE
	B	White	20	16	91106	14.7	3.44	0.76	1.7	MC/OE
		Af. Amer.	20	16	19173	12.1	4.00	0.77	1.9	MC/OE
		Hispanic	20	16	10134	11.9	4.10	0.79	1.9	MC/OE
		Asian	20	16	3855	15.2	3.61	0.79	1.6	MC/OE
		Am. Indian	20	16	191	13.3	3.65	0.75	1.8	MC/OE
Multi		20	16	1659	13.5	3.91	0.79	1.8	MC/OE	

ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	52	44	2524	22.5	8.06	0.84	3.2	MC/OE
	A	All	32	28	2524	13.8	5.12	0.75	2.6	MC/OE
	B	All	20	16	2524	8.7	3.51	0.68	2.0	MC/OE

IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	52	44	16395	27.0	10.23	0.91	3.2	MC/OE
	A	All	32	28	16395	16.6	6.49	0.85	2.5	MC/OE
	B	All	20	16	16395	10.4	4.20	0.79	1.9	MC/OE

Eco. Dis.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	52	44	51636	32.1	9.59	0.90	3.0	MC/OE
	A	All	32	28	51636	19.6	6.09	0.84	2.4	MC/OE
	B	All	20	16	51636	12.5	3.95	0.78	1.9	MC/OE

Appendix K: Reliabilities

Reading Grade 7

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	126902	34.4	9.02	0.89	3.0
A	All		31	25	126902	20.9	5.64	0.84	2.2	MC/OE
B	All		21	19	126902	13.5	3.85	0.74	2.0	MC/OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		Male	52	44	64736	33.2	9.34	0.90	3.0
Female			52	44	62126	35.7	8.47	0.88	2.9	MC/OE
A		Male	31	25	64736	20.1	5.82	0.85	2.3	MC/OE
		Female	31	25	62126	21.8	5.32	0.83	2.2	MC/OE
B		Male	21	19	64736	13.0	3.97	0.75	2.0	MC/OE
		Female	21	19	62126	14.0	3.64	0.72	1.9	MC/OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		White	52	44	92230	35.9	8.35	0.88	2.9
Af. Amer.			52	44	18878	29.3	9.04	0.88	3.2	MC/OE
Hispanic			52	44	9975	29.2	9.45	0.89	3.1	MC/OE
Asian			52	44	3899	38.1	8.36	0.89	2.8	MC/OE
Am. Indian			52	44	189	32.6	9.47	0.89	3.1	MC/OE
Multi			52	44	1675	32.7	9.10	0.89	3.1	MC/OE
A		White	31	25	92230	21.8	5.20	0.82	2.2	MC/OE
		Af. Amer.	31	25	18878	17.8	5.74	0.83	2.4	MC/OE
		Hispanic	31	25	9975	17.7	6.03	0.84	2.4	MC/OE
		Asian	31	25	3899	23.2	5.25	0.84	2.1	MC/OE
		Am. Indian	31	25	189	19.9	5.80	0.83	2.4	MC/OE
		Multi	31	25	1675	19.8	5.71	0.84	2.3	MC/OE
B		White	21	19	92230	14.1	3.63	0.71	1.9	MC/OE
		Af. Amer.	21	19	18878	11.5	3.82	0.71	2.1	MC/OE
		Hispanic	21	19	9975	11.5	3.91	0.73	2.0	MC/OE
		Asian	21	19	3899	15.0	3.58	0.73	1.9	MC/OE
		Am. Indian	21	19	189	12.8	4.14	0.77	2.0	MC/OE
		Multi	21	19	1675	12.9	3.86	0.73	2.0	MC/OE

ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	2464	21.7	7.80	0.82	3.3
A	All		31	25	2464	13.0	5.07	0.76	2.5	MC/OE
B	All		21	19	2464	8.7	3.35	0.61	2.1	MC/OE

IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	16216	25.2	9.44	0.89	3.2
A	All		31	25	16216	15.2	5.96	0.83	2.4	MC/OE
B	All		21	19	16216	10.0	3.98	0.73	2.1	MC/OE

Eco. Dis.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	50724	30.3	9.16	0.88	3.1
A	All		31	25	50724	18.4	5.78	0.83	2.4	MC/OE
B	All		21	19	50724	11.9	3.87	0.72	2.0	MC/OE

Appendix K: Reliabilities

Reading Grade 8

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	127125	35.6	8.93	0.90	2.9
A	All		25	23	127125	18.1	4.43	0.81	1.9	MC/OE
B	All		27	21	127125	17.5	4.94	0.81	2.1	MC/OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		Male	52	44	64309	34.2	9.21	0.90	2.9
Female			52	44	62763	37.0	8.40	0.89	2.8	MC/OE
A		Male	25	23	64309	17.5	4.59	0.82	1.9	MC/OE
		Female	25	23	62763	18.7	4.16	0.80	1.9	MC/OE
B		Male	27	21	64309	16.7	5.05	0.82	2.2	MC/OE
		Female	27	21	62763	18.3	4.70	0.80	2.1	MC/OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		White	52	44	93222	37.1	8.17	0.88	2.8
Af. Amer.			52	44	18831	30.5	9.08	0.89	3.1	MC/OE
Hispanic			52	44	9604	30.0	9.58	0.90	3.1	MC/OE
Asian			52	44	3876	39.1	8.56	0.90	2.7	MC/OE
Am. Indian			52	44	166	34.4	9.49	0.90	3.0	MC/OE
Multi			52	44	1371	34.5	9.05	0.89	2.9	MC/OE
A		White	25	23	93222	18.9	4.00	0.78	1.9	MC/OE
		Af. Amer.	25	23	18831	15.7	4.71	0.80	2.1	MC/OE
		Hispanic	25	23	9604	15.4	5.02	0.83	2.1	MC/OE
		Asian	25	23	3876	19.5	4.27	0.82	1.8	MC/OE
		Am. Indian	25	23	166	17.5	4.43	0.80	2.0	MC/OE
		Multi	25	23	1371	17.7	4.48	0.81	2.0	MC/OE
B		White	27	21	93222	18.2	4.62	0.79	2.1	MC/OE
		Af. Amer.	27	21	18831	14.8	4.88	0.79	2.2	MC/OE
		Hispanic	27	21	9604	14.5	5.04	0.80	2.2	MC/OE
		Asian	27	21	3876	19.6	4.69	0.82	2.0	MC/OE
		Am. Indian	27	21	166	16.9	5.42	0.84	2.2	MC/OE
		Multi	27	21	1371	16.8	5.04	0.81	2.2	MC/OE

ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	2356	22.7	8.12	0.85	3.2
A	All		25	23	2356	11.5	4.52	0.75	2.2	MC/OE
B	All		27	21	2356	11.1	4.20	0.71	2.3	MC/OE

IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	16383	26.2	9.45	0.89	3.1
A	All		25	23	16383	13.6	4.99	0.81	2.2	MC/OE
B	All		27	21	16383	12.6	4.95	0.79	2.3	MC/OE

Eco. Dis.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	48873	31.4	9.16	0.89	3.0
A	All		25	23	48873	16.2	4.73	0.81	2.1	MC/OE
B	All		27	21	48873	15.2	4.92	0.79	2.2	MC/OE

Appendix K: Reliabilities

Reading Grade 11

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	127997	35.9	9.10	0.90	2.9
A	All		22	22	127997	15.6	4.11	0.79	1.9	MC
B	All		30	22	127997	20.2	5.48	0.84	2.2	MC/OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		Male	52	44	64324	34.9	9.47	0.90	2.9
Female			52	44	63552	36.9	8.57	0.89	2.9	MC/OE
A		Male	22	22	64324	15.5	4.25	0.80	1.9	MC
		Female	22	22	63552	15.8	3.94	0.77	1.9	MC
B		Male	30	22	64324	19.4	5.70	0.85	2.2	MC/OE
		Female	30	22	63552	21.1	5.12	0.82	2.1	MC/OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		White	52	44	97191	37.3	8.37	0.88	2.9
Af. Amer.			52	44	17785	30.2	9.46	0.89	3.1	MC/OE
Hispanic			52	44	7897	30.4	9.64	0.90	3.1	MC/OE
Asian			52	44	3795	38.3	8.98	0.91	2.8	MC/OE
Am. Indian			52	44	193	33.5	9.62	0.90	3.0	MC/OE
Multi			52	44	1023	34.6	9.16	0.89	3.0	MC/OE
A		White	22	22	97191	16.3	3.75	0.76	1.9	MC
		Af. Amer.	22	22	17785	13.0	4.27	0.77	2.1	MC
		Hispanic	22	22	7897	13.1	4.43	0.79	2.1	MC
		Asian	22	22	3795	16.3	4.07	0.80	1.8	MC
		Am. Indian	22	22	193	14.6	4.48	0.81	2.0	MC
		Multi	22	22	1023	15.1	4.16	0.78	1.9	MC
B		White	30	22	97191	21.0	5.13	0.82	2.2	MC/OE
		Af. Amer.	30	22	17785	17.2	5.71	0.83	2.3	MC/OE
		Hispanic	30	22	7897	17.3	5.73	0.84	2.3	MC/OE
		Asian	30	22	3795	22.0	5.34	0.85	2.1	MC/OE
		Am. Indian	30	22	193	18.9	5.67	0.84	2.3	MC/OE
		Multi	30	22	1023	19.6	5.51	0.84	2.2	MC/OE

ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	1853	22.4	8.07	0.84	3.2
A	All		22	22	1853	9.5	3.70	0.67	2.1	MC
B	All		30	22	1853	12.9	4.99	0.77	2.4	MC/OE

IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	14617	25.7	9.65	0.89	3.2
A	All		22	22	14617	11.5	4.45	0.77	2.1	MC
B	All		30	22	14617	14.1	5.75	0.83	2.4	MC/OE

Eco. Dis.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		52	44	39916	31.6	9.42	0.89	3.1
A	All		22	22	39916	13.8	4.33	0.78	2.0	MC
B	All		30	22	39916	17.9	5.62	0.83	2.3	MC/OE

Appendix K: Reliabilities

Science Grade 4

		Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
Overall	Tot.	All		68	63	128103	48.5	11.88	0.92	3.4	MC/OE
	A	All		33	31	128103	24.5	6.01	0.86	2.3	MC/OE
	B	All		14	13	128103	10.0	2.77	0.68	1.6	MC/OE
	C	All		10	9	128103	6.7	2.28	0.63	1.4	MC/OE
	D	All		11	10	128103	7.2	2.27	0.62	1.4	MC/OE
		Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
Gender	Tot.	Male		68	63	65475	48.8	12.16	0.92	3.4	MC/OE
		Female		68	63	62588	48.2	11.56	0.91	3.4	MC/OE
	A	Male		33	31	65475	24.5	6.19	0.87	2.3	MC/OE
		Female		33	31	62588	24.5	5.81	0.84	2.3	MC/OE
	B	Male		14	13	65475	10.1	2.79	0.69	1.5	MC/OE
		Female		14	13	62588	10.0	2.75	0.67	1.6	MC/OE
	C	Male		10	9	65475	6.9	2.27	0.64	1.4	MC/OE
		Female		10	9	62588	6.6	2.28	0.61	1.4	MC/OE
	D	Male		11	10	65475	7.3	2.30	0.64	1.4	MC/OE
		Female		11	10	62588	7.1	2.23	0.59	1.4	MC/OE
		Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
Ethnicity	Tot.	White		68	63	91171	51.2	10.25	0.90	3.3	MC/OE
		Af. Amer.		68	63	19489	39.4	12.46	0.91	3.7	MC/OE
		Hispanic		68	63	10927	41.2	12.44	0.91	3.7	MC/OE
		Asian		68	63	4371	51.5	11.15	0.92	3.2	MC/OE
		Am. Indian		68	63	187	46.3	12.81	0.93	3.5	MC/OE
		Multi		68	63	1907	45.6	12.09	0.91	3.5	MC/OE
	A	White		33	31	91171	25.8	5.15	0.82	2.2	MC/OE
		Af. Amer.		33	31	19489	20.1	6.59	0.85	2.6	MC/OE
		Hispanic		33	31	10927	21.1	6.49	0.85	2.5	MC/OE
		Asian		33	31	4371	26.2	5.49	0.85	2.1	MC/OE
		Am. Indian		33	31	187	23.2	6.67	0.88	2.3	MC/OE
		Multi		33	31	1907	23.2	6.17	0.85	2.4	MC/OE
	B	White		14	13	91171	10.6	2.46	0.62	1.5	MC/OE
		Af. Amer.		14	13	19489	8.3	2.98	0.67	1.7	MC/OE
		Hispanic		14	13	10927	8.6	3.00	0.68	1.7	MC/OE
		Asian		14	13	4371	10.5	2.67	0.68	1.5	MC/OE
		Am. Indian		14	13	187	9.6	2.93	0.70	1.6	MC/OE
		Multi		14	13	1907	9.4	2.88	0.68	1.6	MC/OE
	C	White		10	9	91171	7.1	2.09	0.58	1.4	MC/OE
		Af. Amer.		10	9	19489	5.4	2.31	0.58	1.5	MC/OE
		Hispanic		10	9	10927	5.5	2.32	0.59	1.5	MC/OE
		Asian		10	9	4371	7.2	2.20	0.63	1.3	MC/OE
		Am. Indian		10	9	187	6.5	2.43	0.67	1.4	MC/OE
		Multi		10	9	1907	6.3	2.30	0.61	1.4	MC/OE
D	White		11	10	91171	7.7	2.09	0.57	1.4	MC/OE	
	Af. Amer.		11	10	19489	5.8	2.23	0.56	1.5	MC/OE	
	Hispanic		11	10	10927	6.0	2.25	0.57	1.5	MC/OE	
	Asian		11	10	4371	7.7	2.17	0.61	1.4	MC/OE	
	Am. Indian		11	10	187	7.0	2.27	0.61	1.4	MC/OE	
	Multi		11	10	1907	6.7	2.29	0.61	1.4	MC/OE	

Appendix K: Reliabilities

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
ELL	Tot.	All	68	63	3864	34.4	11.57	0.89	3.8	MC/OE
	A	All	33	31	3864	17.7	6.25	0.82	2.7	MC/OE
	B	All	14	13	3864	7.1	2.92	0.63	1.8	MC/OE
	C	All	10	9	3864	4.5	2.15	0.51	1.5	MC/OE
	D	All	11	10	3864	5.1	2.07	0.48	1.5	MC/OE
IEP	Tot.	All	68	63	20140	41.0	13.20	0.92	3.7	MC/OE
	A	All	33	31	20140	20.6	6.90	0.87	2.5	MC/OE
	B	All	14	13	20140	8.6	3.05	0.70	1.7	MC/OE
	C	All	10	9	20140	5.6	2.39	0.62	1.5	MC/OE
	D	All	11	10	20140	6.1	2.37	0.62	1.5	MC/OE
Eco. Disadv.	Tot.	All	68	63	55479	43.3	12.41	0.91	3.6	MC/OE
	A	All	33	31	55479	22.0	6.44	0.85	2.5	MC/OE
	B	All	14	13	55479	9.0	2.93	0.68	1.7	MC/OE
	C	All	10	9	55479	5.9	2.33	0.60	1.5	MC/OE
	D	All	11	10	55479	6.4	2.28	0.59	1.5	MC/OE

Appendix K: Reliabilities

Science Grade 8

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	68	63	127075	42.1	13.62	0.93	3.6	MC/OE
	A	All	34	32	127075	21.0	7.13	0.87	2.5	MC/OE
	B	All	11	10	127075	6.6	2.61	0.69	1.5	MC/OE
	C	All	11	11	127075	7.0	2.56	0.69	1.4	MC
	D	All	12	10	127075	7.5	2.66	0.68	1.5	MC/OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	Male	68	63	64340	42.3	14.12	0.94	3.6	MC/OE
		Female	68	63	62666	41.9	13.06	0.92	3.6	MC/OE
	A	Male	34	32	64340	21.1	7.39	0.88	2.5	MC/OE
		Female	34	32	62666	21.0	6.84	0.86	2.6	MC/OE
	B	Male	11	10	64340	6.6	2.68	0.71	1.4	MC/OE
		Female	11	10	62666	6.5	2.55	0.67	1.5	MC/OE
	C	Male	11	11	64340	7.1	2.64	0.72	1.4	MC
		Female	11	11	62666	7.0	2.47	0.66	1.4	MC
	D	Male	12	10	64340	7.6	2.70	0.70	1.5	MC/OE
		Female	12	10	62666	7.4	2.62	0.65	1.5	MC/OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	White	68	63	93061	45.0	12.38	0.92	3.5	MC/OE
		Af. Amer.	68	63	18734	32.0	12.58	0.91	3.8	MC/OE
		Hispanic	68	63	9693	32.5	13.06	0.92	3.8	MC/OE
		Asian	68	63	3974	46.9	13.32	0.93	3.4	MC/OE
		Am. Indian	68	63	164	41.6	13.65	0.93	3.6	MC/OE
		Multi	68	63	1361	40.0	13.69	0.93	3.7	MC/OE
	A	White	34	32	93061	22.4	6.58	0.86	2.5	MC/OE
		Af. Amer.	34	32	18734	16.2	6.70	0.84	2.7	MC/OE
		Hispanic	34	32	9693	16.4	6.92	0.85	2.7	MC/OE
		Asian	34	32	3974	23.8	6.83	0.88	2.4	MC/OE
		Am. Indian	34	32	164	21.0	7.05	0.87	2.6	MC/OE
		Multi	34	32	1361	20.0	7.25	0.87	2.6	MC/OE
	B	White	11	10	93061	7.1	2.43	0.66	1.4	MC/OE
		Af. Amer.	11	10	18734	4.8	2.42	0.61	1.5	MC/OE
		Hispanic	11	10	9693	4.9	2.50	0.63	1.5	MC/OE
		Asian	11	10	3974	7.2	2.65	0.72	1.4	MC/OE
		Am. Indian	11	10	164	6.4	2.53	0.65	1.5	MC/OE
		Multi	11	10	1361	6.2	2.61	0.68	1.5	MC/OE
	C	White	11	11	93061	7.5	2.37	0.65	1.4	MC
		Af. Amer.	11	11	18734	5.4	2.47	0.62	1.5	MC
		Hispanic	11	11	9693	5.4	2.53	0.64	1.5	MC
		Asian	11	11	3974	7.8	2.50	0.71	1.3	MC
		Am. Indian	11	11	164	6.9	2.70	0.72	1.4	MC
		Multi	11	11	1361	6.7	2.54	0.67	1.5	MC
	D	White	12	10	93061	8.0	2.43	0.63	1.5	MC/OE
		Af. Amer.	12	10	18734	5.6	2.57	0.63	1.6	MC/OE
		Hispanic	12	10	9693	5.8	2.63	0.65	1.6	MC/OE
		Asian	12	10	3974	8.1	2.60	0.68	1.5	MC/OE
		Am. Indian	12	10	164	7.3	2.68	0.68	1.5	MC/OE
Multi		12	10	1361	7.1	2.66	0.67	1.5	MC/OE	

Appendix K: Reliabilities

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
ELL	Tot.	All	68	63	2698	24.5	9.49	0.84	3.8	MC/OE
	A	All	34	32	2698	12.5	5.29	0.74	2.7	MC/OE
	B	All	11	10	2698	3.6	1.99	0.43	1.5	MC/OE
	C	All	11	11	2698	4.1	2.08	0.46	1.5	MC
	D	All	12	10	2698	4.4	2.19	0.50	1.5	MC/OE
IEP	Tot.	All	68	63	16595	30.4	12.87	0.91	3.8	MC/OE
	A	All	34	32	16595	15.0	6.71	0.84	2.7	MC/OE
	B	All	11	10	16595	4.6	2.46	0.62	1.5	MC/OE
	C	All	11	11	16595	5.2	2.56	0.65	1.5	MC
	D	All	12	10	16595	5.6	2.66	0.66	1.5	MC/OE
Eco. Disadv.	Tot.	All	68	63	48848	35.2	13.23	0.92	3.8	MC/OE
	A	All	34	32	48848	17.6	6.96	0.85	2.7	MC/OE
	B	All	11	10	48848	5.4	2.54	0.65	1.5	MC/OE
	C	All	11	11	48848	5.9	2.56	0.66	1.5	MC
	D	All	12	10	48848	6.3	2.66	0.66	1.6	MC/OE

Appendix K: Reliabilities

Science Grade 11

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All	74	62	125307	39.7	13.94	0.92	3.8	MC/OE
	A	All	38	31	125307	21.9	7.14	0.86	2.7	MC/OE
	B	All	12	10	125307	5.8	2.88	0.72	1.5	MC/OE
	C	All	14	11	125307	6.5	3.23	0.71	1.7	MC/OE
	D	All	10	10	125307	5.5	2.33	0.61	1.5	MC

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	Male	74	62	63013	40.6	14.40	0.93	3.8	MC/OE
		Female	74	62	62175	38.9	13.39	0.92	3.9	MC/OE
	A	Male	38	31	63013	21.9	7.28	0.87	2.6	MC/OE
		Female	38	31	62175	21.9	6.99	0.85	2.7	MC/OE
	B	Male	12	10	63013	6.0	2.92	0.73	1.5	MC/OE
		Female	12	10	62175	5.6	2.82	0.71	1.5	MC/OE
	C	Male	14	11	63013	6.8	3.40	0.74	1.7	MC/OE
		Female	14	11	62175	6.3	3.03	0.67	1.7	MC/OE
	D	Male	10	10	63013	5.9	2.35	0.63	1.4	MC
		Female	10	10	62175	5.2	2.24	0.57	1.5	MC

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	White	74	62	96212	42.4	12.84	0.91	3.8	MC/OE
		Af. Amer.	74	62	16468	28.2	12.26	0.90	3.8	MC/OE
		Hispanic	74	62	7508	29.8	12.81	0.91	3.8	MC/OE
		Asian	74	62	3809	43.2	14.70	0.93	3.8	MC/OE
		Am. Indian	74	62	194	36.4	14.48	0.93	3.8	MC/OE
		Multi	74	62	985	36.2	13.79	0.92	3.8	MC/OE
	A	White	38	31	96212	23.3	6.45	0.83	2.7	MC/OE
		Af. Amer.	38	31	16468	15.9	6.76	0.84	2.7	MC/OE
		Hispanic	38	31	7508	16.8	6.98	0.85	2.7	MC/OE
		Asian	38	31	3809	23.3	7.38	0.87	2.7	MC/OE
		Am. Indian	38	31	194	19.8	7.51	0.87	2.7	MC/OE
		Multi	38	31	985	20.2	7.33	0.86	2.7	MC/OE
	B	White	12	10	96212	6.2	2.79	0.70	1.5	MC/OE
		Af. Amer.	12	10	16468	3.9	2.43	0.63	1.5	MC/OE
		Hispanic	12	10	7508	4.2	2.56	0.67	1.5	MC/OE
		Asian	12	10	3809	6.6	3.05	0.75	1.5	MC/OE
		Am. Indian	12	10	194	5.3	2.80	0.71	1.5	MC/OE
		Multi	12	10	985	5.2	2.77	0.71	1.5	MC/OE
	C	White	14	11	96212	7.1	3.11	0.69	1.7	MC/OE
		Af. Amer.	14	11	16468	4.3	2.67	0.62	1.6	MC/OE
		Hispanic	14	11	7508	4.6	2.78	0.64	1.7	MC/OE
		Asian	14	11	3809	7.6	3.44	0.75	1.7	MC/OE
		Am. Indian	14	11	194	6.0	3.25	0.73	1.7	MC/OE
		Multi	14	11	985	5.7	3.13	0.70	1.7	MC/OE
	D	White	10	10	96212	5.9	2.22	0.58	1.4	MC
		Af. Amer.	10	10	16468	4.0	2.17	0.55	1.5	MC
		Hispanic	10	10	7508	4.3	2.22	0.56	1.5	MC
		Asian	10	10	3809	5.7	2.37	0.63	1.4	MC
		Am. Indian	10	10	194	5.2	2.43	0.64	1.4	MC
Multi		10	10	985	5.1	2.30	0.60	1.5	MC	

Appendix K: Reliabilities

	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
ELL	Tot.	All	74	62	1992	21.8	9.33	0.85	3.7	MC/OE
	A	All	38	31	1992	12.0	5.33	0.76	2.6	MC/OE
	B	All	12	10	1992	3.0	1.96	0.46	1.4	MC/OE
	C	All	14	11	1992	3.5	2.30	0.53	1.6	MC/OE
	D	All	10	10	1992	3.3	1.78	0.35	1.4	MC
IEP	Tot.	All	74	62	14223	27.3	12.28	0.91	3.8	MC/OE
	A	All	38	31	14223	15.2	6.68	0.84	2.7	MC/OE
	B	All	12	10	14223	3.8	2.43	0.65	1.4	MC/OE
	C	All	14	11	14223	4.2	2.64	0.62	1.6	MC/OE
	D	All	10	10	14223	4.2	2.26	0.58	1.5	MC
Eco. Disadv.	Tot.	All	74	62	38111	32.6	13.28	0.92	3.8	MC/OE
	A	All	38	31	38111	18.3	7.11	0.85	2.7	MC/OE
	B	All	12	10	38111	4.6	2.66	0.68	1.5	MC/OE
	C	All	14	11	38111	5.1	2.91	0.66	1.7	MC/OE
	D	All	10	10	38111	4.7	2.30	0.59	1.5	MC

Appendix K: Reliabilities

Writing Grade 5

Overall	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	128833	65.8	14.57	0.81	6.4
A	All		80	2	128833	52.0	11.93	0.73	6.2	OE
B	All		20	14	128833	13.8	3.33	0.80	1.5	MC/OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		Male	100	16	65697	63.1	14.68	0.81	6.3
Female			100	16	63084	68.7	13.90	0.79	6.4	MC/OE
A		Male	80	2	65697	49.8	11.98	0.74	6.1	OE
		Female	80	2	63084	54.3	11.44	0.70	6.2	OE
B		Male	20	14	65697	13.3	3.41	0.80	1.5	MC/OE
		Female	20	14	63084	14.4	3.14	0.78	1.5	MC/OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		White	100	16	92997	68.0	13.85	0.79	6.4
Af. Amer.			100	16	19432	58.0	14.08	0.79	6.4	MC/OE
Hispanic			100	16	10144	59.1	14.49	0.81	6.4	MC/OE
Asian			100	16	4177	72.3	13.95	0.79	6.4	MC/OE
Am. Indian			100	16	201	63.3	14.08	0.77	6.8	MC/OE
Multi			100	16	1820	63.4	14.73	0.82	6.3	MC/OE
A		White	80	2	92997	53.6	11.47	0.71	6.2	OE
		Af. Amer.	80	2	19432	46.1	11.44	0.71	6.2	OE
		Hispanic	80	2	10144	47.0	11.75	0.72	6.2	OE
		Asian	80	2	4177	56.9	11.55	0.71	6.2	OE
		Am. Indian	80	2	201	50.0	11.64	0.68	6.6	OE
		Multi	80	2	1820	50.0	12.16	0.75	6.1	OE
B		White	20	14	92997	14.4	3.07	0.77	1.5	MC/OE
		Af. Amer.	20	14	19432	11.9	3.43	0.78	1.6	MC/OE
		Hispanic	20	14	10144	12.2	3.49	0.79	1.6	MC/OE
		Asian	20	14	4177	15.4	3.02	0.79	1.4	MC/OE
		Am. Indian	20	14	201	13.3	3.27	0.78	1.5	MC/OE
		Multi	20	14	1820	13.4	3.32	0.79	1.5	MC/OE

ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	2837	52.1	13.72	0.79	6.3
A	All		80	2	2837	41.9	11.23	0.70	6.1	OE
B	All		20	14	2837	10.1	3.27	0.73	1.7	MC/OE

IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	20108	53.8	15.08	0.82	6.4
A	All		80	2	20108	42.9	12.26	0.75	6.2	OE
B	All		20	14	20108	10.8	3.58	0.79	1.7	MC/OE

Eco. Dis.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	53980	59.9	14.15	0.80	6.4
A	All		80	2	53980	47.5	11.55	0.72	6.2	OE
B	All		20	14	53980	12.4	3.38	0.78	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	129619	67.1	14.22	0.81	6.2
A	All		80	2	129619	53.1	11.68	0.73	6.1	OE
B	All		20	14	129619	14.0	3.17	0.77	1.5	MC/OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		Male	100	16	65846	64.1	14.38	0.81	6.2
Female			100	16	63705	70.2	13.35	0.78	6.3	MC/OE
A		Male	80	2	65846	50.7	11.78	0.74	6.0	OE
		Female	80	2	63705	55.7	11.01	0.69	6.1	OE
B		Male	20	14	65846	13.4	3.28	0.78	1.5	MC/OE
		Female	20	14	63705	14.5	2.97	0.75	1.5	MC/OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		White	100	16	95098	69.1	13.45	0.79	6.2
Af. Amer.			100	16	19222	59.8	13.99	0.80	6.3	MC/OE
Hispanic			100	16	9778	59.8	14.32	0.81	6.2	MC/OE
Asian			100	16	3882	73.1	14.13	0.80	6.2	MC/OE
Am. Indian			100	16	165	64.3	14.94	0.82	6.3	MC/OE
Multi			100	16	1384	65.0	13.97	0.77	6.6	MC/OE
A		White	80	2	95098	54.7	11.17	0.71	6.1	OE
		Af. Amer.	80	2	19222	47.6	11.48	0.72	6.1	OE
		Hispanic	80	2	9778	47.6	11.67	0.73	6.0	OE
		Asian	80	2	3882	57.8	11.62	0.73	6.1	OE
		Am. Indian	80	2	165	50.8	12.35	0.75	6.1	OE
		Multi	80	2	1384	51.4	11.59	0.69	6.5	OE
B		White	20	14	95098	14.5	2.93	0.75	1.5	MC/OE
		Af. Amer.	20	14	19222	12.2	3.24	0.75	1.6	MC/OE
		Hispanic	20	14	9778	12.2	3.34	0.76	1.6	MC/OE
		Asian	20	14	3882	15.3	3.06	0.79	1.4	MC/OE
		Am. Indian	20	14	165	13.5	3.27	0.78	1.5	MC/OE
		Multi	20	14	1384	13.6	3.08	0.75	1.5	MC/OE

ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	2371	51.5	13.16	0.76	6.4
A	All		80	2	2371	41.6	10.89	0.68	6.2	OE
B	All		20	14	2371	9.9	3.05	0.68	1.7	MC/OE

IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	19538	54.0	13.76	0.79	6.3
A	All		80	2	19538	43.3	11.36	0.71	6.1	OE
B	All		20	14	19538	10.7	3.19	0.72	1.7	MC/OE

Eco. Dis.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	50243	61.1	13.97	0.79	6.3
A	All		80	2	50243	48.6	11.46	0.71	6.1	OE
B	All		20	14	50243	12.5	3.24	0.75	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	128775	71.4	14.76	0.82	6.3
A	All		80	2	128775	56.8	11.98	0.74	6.1	OE
B	All		20	14	128775	14.7	3.43	0.82	1.4	MC/OE

Gender	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		Male	100	16	64854	68.4	15.34	0.82	6.4
Female			100	16	63790	74.6	13.44	0.79	6.2	MC/OE
A		Male	80	2	64854	54.3	12.46	0.75	6.3	OE
		Female	80	2	63790	59.3	10.89	0.69	6.0	OE
B		Male	20	14	64854	14.1	3.55	0.82	1.5	MC/OE
		Female	20	14	63790	15.3	3.19	0.81	1.4	MC/OE

Ethnicity	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.		White	100	16	98575	73.2	13.96	0.80	6.2
Af. Amer.			100	16	17294	63.8	15.42	0.82	6.6	MC/OE
Hispanic			100	16	7795	64.5	15.42	0.81	6.7	MC/OE
Asian			100	16	3753	76.5	13.87	0.79	6.3	MC/OE
Am. Indian			100	16	198	67.6	16.44	0.82	6.9	MC/OE
Multi			100	16	1017	68.9	14.87	0.82	6.3	MC/OE
A		White	80	2	98575	58.0	11.43	0.72	6.1	OE
		Af. Amer.	80	2	17294	51.1	12.56	0.74	6.4	OE
		Hispanic	80	2	7795	51.8	12.49	0.73	6.5	OE
		Asian	80	2	3753	60.7	11.18	0.70	6.1	OE
		Am. Indian	80	2	198	53.7	13.48	0.75	6.7	OE
		Multi	80	2	1017	54.8	12.03	0.74	6.1	OE
B		White	20	14	98575	15.2	3.18	0.80	1.4	MC/OE
		Af. Amer.	20	14	17294	12.6	3.55	0.80	1.6	MC/OE
		Hispanic	20	14	7795	12.7	3.65	0.81	1.6	MC/OE
		Asian	20	14	3753	15.7	3.30	0.83	1.3	MC/OE
		Am. Indian	20	14	198	13.9	3.62	0.82	1.5	MC/OE
		Multi	20	14	1017	14.1	3.50	0.82	1.5	MC/OE

ELL	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	1741	54.7	14.62	0.78	6.9
A	All		80	2	1741	44.9	12.16	0.70	6.7	OE
B	All		20	14	1741	9.8	3.27	0.73	1.7	MC/OE

IEP	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	17456	56.2	15.76	0.81	6.8
A	All		80	2	17456	45.3	13.11	0.75	6.6	OE
B	All		20	14	17456	10.9	3.45	0.76	1.7	MC/OE

Eco. Dis.	Strand	Group	Pts.	Len.	N	Mean	SD	r	SEM	Items
	Tot.	All		100	16	40012	65.4	15.21	0.82	6.5
A	All		80	2	40012	52.3	12.37	0.74	6.3	OE
B	All		20	14	40012	13.1	3.56	0.81	1.6	MC/OE

Appendix L:
Cut Scores and Scale Transformations

Column Heading	Definition
LOSS	Lowest Obtainable Scaled Score

Appendix L: Cut Scores and Scale Transformations

	Grade	Scaling	LOSS	Scaled Score Cuts			Logit Cuts		
				Basic	Prof.	Adv.	Basic	Prof.	Adv.
Mathematics	3	128.81X + 964.24	750	1044	1180	1370	0.6192	1.6750	3.1501
	4	200.00X + 1183.52	700	1156	1246	1445	-0.1376	0.3124	1.3074
	5	189.80X + 1134.10	700	1158	1312	1483	0.1259	0.9373	1.8383
	6	200.00X + 1201.54	700	1174	1298	1476	-0.1377	0.4823	1.3723
	7	200.00X + 1225.28	700	1183	1298	1472	-0.2114	0.3636	1.2336
	8	177.53X + 1182.30	700	1171	1284	1446	-0.0637	0.5729	1.4854
	11	206.42X + 1203.10	700	1167	1304	1509	-0.1749	0.4888	1.4819
Reading	3	123.80X + 1207.70	1000	1168	1235	1442	-0.3207	0.2205	1.8926
	4	200.00X + 1156.30	700	1112	1255	1469	-0.2215	0.4935	1.5635
	5	198.80X + 1094.60	700	1137	1275	1497	0.2133	0.9074	2.0241
	6	200.00X + 1168.96	700	1121	1278	1456	-0.2398	0.5452	1.4352
	7	200.00X + 1194.40	700	1131	1279	1470	-0.3170	0.4230	1.3780
	8	234.82X + 1113.70	700	1146	1280	1473	0.1376	0.7082	1.5301
	11	245.45X + 1115.20	700	1112	1257	1492	-0.0130	0.5777	1.5351
Science	4	176.75X + 1225.65	1050	1150	1275	1483	-0.4280	0.2792	1.4560
	8	191.54X + 1196.64	925	1150	1275	1464	-0.2435	0.4091	1.3958
	11	101.81X + 1194.69	1050	1150	1275	1347	-0.4390	0.7888	1.4960
Writing	5	100.00X + 1071.44	700	745	1236	1909	-3.2644	1.6456	8.3756
	8	100.00X + 1123.84	700	914	1236	1748	-2.0984	1.1216	6.2416
	11	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	2011			2005	2006	2007	2008	2009	2010	2011	
Mathematics Grade 3	Raw Score	Mean	-	-	54.98	55.00	60.02	60.32	59.45	Raw Score	Mean	-	45.08	43.61	44.28	47.22	49.11	48.92
		SD	-	-	9.66	9.91	10.63	9.97	10.81		SD	-	12.66	12.41	13.25	14.51	12.95	13.25
		Max	-	-	66	66	72	72	72		Max	-	66	66	66	72	72	72
	Scaled Score	Mean	-	-	1314.5	1332.9	1333.0	1341.0	1345.7	Scaled Score	Mean	-	1403.0	1416.7	1445.3	1456.6	1469.6	1476.9
		SD	-	-	176.6	184.7	176.0	164.7	176.6		SD	-	220.6	221.0	243.0	234.0	222.4	221.6
		Max	-	-	1765	1827	1814	1816	1832		Max	-	2282	2348	2370	2405	2446	2467
	Raw Cuts	Bel. Basic/Basic	-	-	37	36	38	38	37	Raw Cuts	Bel. Basic/Basic	-	29	28	27	26	28	27
		Basic/Prof.	-	-	50	49	53	52	51		Basic/Prof.	-	36	34	33	33	35	34
		Prof./Adv.	-	-	61	60	65	65	64		Prof./Adv.	-	50	47	47	49	50	50
	Theta Cuts	Bel. Basic/Basic	-	-	0.6369	0.6397	0.6171	0.6277	0.6410	Theta Cuts	Bel. Basic/Basic	-	-0.1359	-0.1029	-0.0871	-0.1178	-0.1150	-0.0872
		Basic/Prof.	-	-	1.7479	1.7081	1.7404	1.7186	1.7186		Basic/Prof.	-	0.3124	0.3496	0.3348	0.3321	0.3378	0.3446
		Prof./Adv.	-	-	3.3362	3.2408	3.1592	3.2516	3.2193		Prof./Adv.	-	1.3089	1.3315	1.3437	1.3204	1.3175	1.3544
	Impact %	Bel. Basic	-	-	6.1	6.0	5.2	4.2	5.1	Impact %	Bel. Basic	-	12.6	12.7	12.3	9.4	7.0	7.1
		Basic	-	-	15.4	13.5	13.1	11.3	11.4		Basic	-	10.1	9.3	8.2	8.8	8.1	7.6
		Proficient	-	-	44.2	38.0	38.1	41.1	37.3		Proficient	-	33.7	31.1	29.6	30.6	30.9	31.0
Advanced		-	-	34.3	42.5	43.6	43.4	46.2	Advanced		-	43.5	46.9	50.0	51.2	54.0	54.2	
Prof. + Adv.		-	-	78.5	80.5	81.7	84.5	83.5	Prof. + Adv.		-	77.3	78.0	79.5	81.8	84.8	85.2	
Demographic	N Count	-	-	125533	126552	127268	126676	124749	Demographic	N Count	-	127959	126154	126414	127601	126333	125604	
	% City	-	-	11.4	11.2	10.9	10.8	10.6		% City	-	11.6	11.3	11.0	10.9	10.6	10.2	
	% White	-	-	73.1	72.8	72.5	71.5	70.8		% White	-	74.5	73.6	73.0	72.5	72.2	71.5	
	% Black	-	-	15.8	15.8	15.5	15.5	15.4		% Black	-	15.4	15.7	15.7	15.6	15.3	15.1	
	% Hispanic	-	-	7.2	7.5	7.6	8.1	8.5		% Hispanic	-	6.4	6.9	7.5	7.6	7.7	8.3	

		2005	2006	2007	2008	2009	2010	2011			2005	2006	2007	2008	2009	2010	2011	
Mathematics Grade 5	Raw Score	Mean	47.21	44.71	43.81	43.39	46.20	48.59	47.54	Raw Score	Mean	-	42.44	44.66	42.96	47.90	49.42	49.33
		SD	12.31	12.99	12.45	14.08	14.57	13.60	13.17		SD	-	13.07	11.81	13.85	14.36	13.68	13.92
		Max	66	66	66	66	72	72	72		Max	-	66	66	66	72	72	72
	Scaled Score	Mean	1419.3	1424.0	1427.6	1453.1	1451.9	1477.1	1474.1	Scaled Score	Mean	-	1400.2	1421.1	1457.4	1469.9	1493.4	1499.2
		SD	223.8	238.1	226.7	234.2	226.2	236.3	222.2		SD	-	227.7	233.6	253.5	240.2	245.0	248.0
		Max	2272	2292	2476	2329	2409	2432	2470		Max	-	2345	2369	2453	2415	2447	2476
	Raw Cuts	Bel. Basic/Basic	31	29	28	23	25	28	27	Raw Cuts	Bel. Basic/Basic	-	28	31	26	28	29	29
		Basic/Prof.	43	40	38	35	37	40	38		Basic/Prof.	-	37	39	35	38	39	38
		Prof./Adv.	54	51	49	48	51	52	51		Prof./Adv.	-	49	50	47	51	51	51
	Theta Cuts	Bel. Basic/Basic	-	0.1924	0.1886	0.1398	0.1286	0.1494	0.1911	Theta Cuts	Bel. Basic/Basic	-	-0.1366	-0.1292	-0.0912	-0.1288	-0.1237	-0.0971
		Basic/Prof.	-	0.9868	0.9326	0.9407	0.9367	0.9992	0.9477		Basic/Prof.	-	0.4823	0.5116	0.5200	0.5206	0.5324	0.4855
		Prof./Adv.	-	1.8626	1.8384	1.8360	1.8797	1.9071	1.9015		Prof./Adv.	-	1.3721	1.4429	1.4008	1.4040	1.3791	1.4047
	Impact %	Bel. Basic	11.9	13.4	12.1	10.4	9.6	8.8	7.7	Impact %	Bel. Basic	-	15.8	14.4	14.1	11.1	9.4	10.1
		Basic	19.1	19.8	17.0	16.4	16.9	16.8	16.0		Basic	-	16.2	15.9	13.6	13.2	12.6	11.0
		Proficient	30.9	28.0	29.5	27.5	29.2	26.8	30.1		Proficient	-	30.2	30.0	25.5	26.2	24.7	25.0
Advanced		38.1	38.9	41.5	45.7	44.3	47.6	46.2	Advanced		-	37.8	39.6	46.8	49.5	53.3	53.8	
Prof. + Adv.		69.0	66.9	71.0	73.2	73.5	74.4	76.3	Prof. + Adv.		-	68.0	69.6	72.3	75.7	78.0	78.9	
Demographic	N Count	134322	131702	129781	127324	127544	126419	126578	Demographic	N Count	-	136186	133610	130851	128421	126288	126630	
	% City	12.3	11.6	11.0	10.8	10.6	10.6	9.7		% City	-	11.4	10.8	10.3	10.2	10.2	9.7	
	% White	74.4	74.7	74.2	73.4	72.9	72.3	72.2		% White	-	74.5	74.5	74.2	73.3	72.8	72.2	
	% Black	16.3	15.6	15.4	15.6	15.5	15.5	15.0		% Black	-	16.1	15.6	15.3	15.4	15.2	15.2	
	% Hispanic	6.0	6.3	6.7	7.2	7.5	7.8	7.9		% Hispanic	-	6.2	6.5	6.9	7.3	7.6	8.0	

Appendix M: PSSA Historical Statistics

			2005	2006	2007	2008	2009	2010	2011				2005	2006	2007	2008	2009	2010	2011
Mathematics Grade 7	Raw Score	Mean	-	39.77	40.54	41.58	45.62	47.88	47.81	Raw Score	Mean	43.97	42.33	42.62	44.17	47.17	49.33	49.21	
		SD	-	13.38	13.23	13.41	14.57	14.61	14.13		SD	13.69	13.71	13.70	13.54	14.84	14.53	14.17	
		Max	-	66	66	66	72	72	72		Max	66	66	66	66	72	72	72	
	Scaled Score	Mean	-	1393.3	1419.2	1442.7	1464.2	1500.0	1503.8	Scaled Score	Mean	1369.2	1368.7	1393.5	1406.3	1419.8	1450.7	1448.7	
		SD	-	221.7	248.5	236.7	233.4	254.7	249.7		SD	222.2	222.5	222.3	221.0	220.3	236.9	225.4	
		Max	-	2343	2487	2407	2450	2475	2545		Max	2240	2225	2259	2270	2286	2314	2310	
	Raw Cuts	Bel. Basic/Basic	-	26	27	26	26	28	28	Raw Cuts	Bel. Basic/Basic	31	29	28	29	28	30	30	
		Basic/Prof.	-	34	35	34	35	36	36		Basic/Prof.	41	39	37	38	39	40	39	
		Prof./Adv.	-	46	46	46	49	49	49		Prof./Adv.	52	50	49	50	52	52	52	
	Theta Cuts	Bel. Basic/Basic	-	-0.2123	-0.2114	-0.1486	-0.2145	-0.1565	-0.1500	Theta Cuts	Bel. Basic/Basic	-	-0.0514	-0.0174	-0.0046	-0.0649	-0.0609	-0.0168	
		Basic/Prof.	-	0.3636	0.4076	0.4271	0.3755	0.3673	0.3885		Basic/Prof.	-	0.6355	0.6341	0.6221	0.6285	0.6122	0.5777	
		Prof./Adv.	-	1.2351	1.3170	1.2916	1.2920	1.2552	1.2924		Prof./Adv.	-	1.4907	1.5493	1.5535	1.4991	1.5042	1.5154	
	Impact %	Bel. Basic	-	17.3	17.8	14.9	11.6	11.7	10.8	Impact %	Bel. Basic	19.3	18.9	16.9	16.0	12.8	12.0	11.4	
		Basic	-	16.3	15.0	14.5	13.1	10.3	10.6		Basic	17.8	18.9	15.2	13.7	16.0	12.8	11.7	
		Proficient	-	29.3	26.2	26.8	27.8	23.6	24.9		Proficient	26.5	26.1	27.6	27.7	26.6	24.1	26.7	
		Advanced	-	37.2	41.0	43.8	47.5	54.3	53.7		Advanced	36.4	36.1	40.3	42.6	44.7	51.1	50.2	
		Prof. + Adv.	-	66.4	67.2	70.6	75.3	78.0	78.6		Prof. + Adv.	62.9	62.2	67.9	70.3	71.2	75.1	76.9	
		N Count	-	141300	138838	135807	132803	127685	126993		N Count	145999	143749	141451	138582	135909	129983	126786	
Demographic	% City	-	10.9	10.7	10.0	9.7	9.6	9.2	Demographic	% City	11.1	11.0	10.6	10.3	9.8	9.5	9.1		
	% White	-	75.1	74.3	74.4	74.1	73.3	72.7		% White	76.8	75.9	75.0	74.5	74.4	74.1	73.3		
	% Black	-	15.8	15.9	15.4	15.1	15.1	14.8		% Black	15.0	15.4	15.7	15.6	15.0	14.7	14.8		
	% Hispanic	-	6.0	6.4	6.7	7.0	7.4	7.9		% Hispanic	5.3	5.6	6.2	6.5	6.9	7.0	7.6		

			2005	2006	2007	2008	2009	2010	2011
Mathematics Grade 11	Raw Score	Mean	39.89	43.39	40.95	42.00	45.97	47.62	47.99
		SD	15.17	14.24	14.25	14.33	15.50	15.23	14.56
		Max	66	66	66	66	72	72	72
	Scaled Score	Mean	1338.1	1342.5	1332.8	1343.8	1345.4	1372.2	1379.0
		SD	288.3	292.5	253.3	267.3	259.9	276.0	264.0
		Max	2440	2398	2349	2342	2347	2377	2425
	Raw Cuts	Bel. Basic/Basic	31	36	31	33	35	37	36
		Basic/Prof.	41	45	41	42	46	46	46
		Prof./Adv.	53	55	54	54	59	58	59
	Theta Cuts	Bel. Basic/Basic	-	-0.1182	-0.1546	-0.1113	-0.1731	-0.1149	-0.1601
		Basic/Prof.	-	0.5620	0.5150	0.5254	0.5272	0.4987	0.4983
		Prof./Adv.	-	1.5382	1.5344	1.5474	1.5417	1.4788	1.5722
	Impact %	Bel. Basic	30.5	30.4	26.6	26.6	24.9	24.8	21.6
		Basic	18.7	17.7	19.8	17.6	19.5	15.6	18.0
		Proficient	24.6	23.9	29.5	30.0	29.9	27.6	31.5
		Advanced	26.3	28.1	24.2	25.9	25.7	32.0	28.8
		Prof. + Adv.	50.8	51.9	53.7	55.9	55.7	59.6	60.4
		N Count	129962	132666	135632	135137	133952	129910	127797
Demographic	% City	9.3	8.5	8.2	7.8	8.4	8.2	8.2	
	% White	80.5	80.5	79.5	79.1	77.8	76.6	75.9	
	% Black	12.1	12.2	12.6	12.7	13.5	13.7	13.9	
	% Hispanic	3.8	4.0	4.5	5.0	5.3	5.8	6.2	

Appendix M: PSSA Historical Statistics

		2005	2006	2007	2008	2009	2010	2011			2005	2006	2007	2008	2009	2010	2011	
Reading Grade 3	Raw Score	Mean	-	-	30.18	30.64	30.82	30.64	31.11	Raw Score	Mean	-	33.10	31.74	33.93	34.07	34.97	35.41
		SD	-	-	9.43	8.87	8.80	9.09	8.87		SD	-	9.92	9.63	9.82	10.15	9.98	9.26
		Max	-	-	46	46	46	46	46		Max	-	52	52	52	52	52	52
	Scaled Score	Mean	-	-	1330.8	1334.8	1342.1	1350.2	1346.5	Scaled Score	Mean	-	1339.3	1349.2	1366.6	1375.5	1379.6	1379.5
		SD	-	-	149.7	139.4	145.8	158.6	155.9		SD	-	217.9	218.7	225.1	223.0	222.9	205.8
		Max	-	-	1891	1896	1928	1966	1942		Max	-	2303	2411	2318	2299	2294	2286
	Raw Cuts	Bel. Basic/Basic	-	-	19	19	20	19	20	Raw Cuts	Bel. Basic/Basic	-	22	21	22	21	22	23
		Basic/Prof.	-	-	25	25	25	25	25		Basic/Prof.	-	30	28	30	29	30	31
		Prof./Adv.	-	-	39	39	38	38	38		Prof./Adv.	-	40	38	40	40	41	41
	Theta Cuts	Bel. Basic/Basic	-	-	-0.3137	-0.3235	-0.2423	-0.3251	-0.3173	Theta Cuts	Bel. Basic/Basic	-	-0.2218	-0.1667	-0.2014	-0.2069	-0.2073	-0.1389
		Basic/Prof.	-	-	0.2857	0.2836	0.2779	0.3125	0.2220		Basic/Prof.	-	0.4935	0.5021	0.5469	0.5023	0.5057	0.5607
		Prof./Adv.	-	-	2.0417	2.0544	1.9360	2.0230	1.9466		Prof./Adv.	-	1.5629	1.5675	1.6028	1.5925	1.6441	1.6033
	Impact %	Bel. Basic	-	-	14.8	12.4	13.5	12.9	13.1	Impact %	Bel. Basic	-	15.3	14.9	13.6	12.8	12.8	11.3
		Basic	-	-	12.4	10.7	9.5	11.9	9.6		Basic	-	16.6	15.0	16.3	14.6	14.3	15.3
		Proficient	-	-	50.8	57.1	50.8	47.9	48.9		Proficient	-	37.1	38.1	35.8	36.2	36.3	37.9
		Advanced	-	-	22.0	19.7	26.2	27.3	28.3		Advanced	-	31.0	32.0	34.3	36.4	36.6	35.4
		Prof. + Adv.	-	-	72.8	76.9	77.0	75.2	77.2		Prof. + Adv.	-	68.1	70.1	70.1	72.6	72.9	73.4
	Demographic	N Count	-	-	125344	126395	127154	126588	124678	Demographic	N Count	-	127680	125981	126280	127519	128452	124535
		% City	-	-	11.4	11.2	10.9	10.8	10.6		% City	-	11.5	11.3	11.0	10.9	10.5	10.2
		% White	-	-	73.2	72.8	72.5	71.6	70.8		% White	-	74.5	73.7	73.0	72.5	72.2	71.4
% Black		-	-	15.8	15.8	15.5	15.5	15.4	% Black		-	15.4	15.7	15.7	15.6	15.3	15.2	
% Hispanic		-	-	7.2	7.5	7.6	8.1	8.5	% Hispanic		-	6.4	6.9	7.4	7.6	7.7	8.4	

		2005	2006	2007	2008	2009	2010	2011			2005	2006	2007	2008	2009	2010	2011	
Reading Grade 5	Raw Score	Mean	35.87	35.13	33.83	34.57	35.11	35.65	35.72	Raw Score	Mean	-	32.96	33.11	34.54	35.44	35.71	36.22
		SD	9.52	9.81	9.68	9.80	9.19	8.79	8.53		SD	-	9.26	9.87	9.60	9.67	9.72	9.27
		Max	52	52	52	52	52	52	52		Max	-	52	52	52	52	52	52
	Scaled Score	Mean	1334.8	1311.5	1318.0	1329.7	1332.1	1328.9	1354.3	Scaled Score	Mean	-	1335.6	1342.7	1357.6	1373.1	1378.4	1396.4
		SD	235.1	232.9	221.9	222.0	219.8	217.6	214.5		SD	-	210.4	223.9	221.5	222.4	233.7	234.0
		Max	2300	2234	2261	2262	2322	2357	2344		Max	-	2339	2306	2290	2285	2293	2332
	Raw Cuts	Bel. Basic/Basic	28	28	26	26	27	28	27	Raw Cuts	Bel. Basic/Basic	-	23	23	24	24	25	25
		Basic/Prof.	35	35	33	34	34	35	34		Basic/Prof.	-	31	31	32	33	33	33
		Prof./Adv.	44	44	43	43	43	43	43		Prof./Adv.	-	39	40	41	41	41	41
	Theta Cuts	Bel. Basic/Basic	-	0.2263	0.2564	0.2378	0.2289	0.2219	0.2425	Theta Cuts	Bel. Basic/Basic	-	-0.2409	-0.1960	-0.1898	-0.1980	-0.1583	-0.1615
		Basic/Prof.	-	0.9268	0.9094	0.9934	0.9321	0.9505	0.9668		Basic/Prof.	-	0.5452	0.5488	0.5587	0.6215	0.5928	0.6003
		Prof./Adv.	-	2.0985	2.0854	2.0706	2.1020	2.0584	2.1815		Prof./Adv.	-	1.4345	1.5094	1.5553	1.5044	1.5051	1.5402
	Impact %	Bel. Basic	19.1	21.1	20.4	18.9	17.9	17.2	14.6	Impact %	Bel. Basic	-	15.6	17.0	15.3	14.0	14.8	13.1
		Basic	16.7	18.3	19.7	19.6	17.5	18.7	18.2		Basic	-	18.5	19.6	17.7	18.4	16.4	17.0
		Proficient	41.3	39.8	39.2	38.1	41.8	41.2	44.9		Proficient	-	33.5	32.7	34.9	30.5	30.7	30.5
		Advanced	22.9	20.8	20.8	23.5	22.7	22.9	22.4		Advanced	-	32.4	30.8	32.0	37.1	38.1	39.4
		Prof. + Adv.	64.2	60.6	59.9	61.5	64.5	64.1	67.2		Prof. + Adv.	-	65.9	63.5	66.9	67.6	68.7	69.9
	Demographic	N Count	134142	131488	129593	127211	127430	128933	125963	Demographic	N Count	-	135914	133399	130706	128284	128921	126170
		% City	12.2	11.6	11.0	10.8	10.6	10.5	9.7		% City	-	11.4	10.8	10.3	10.2	10.1	9.7
		% White	74.4	74.7	74.3	73.5	72.9	72.2	72.2		% White	-	74.5	74.6	74.3	73.3	72.7	72.2
% Black		16.3	15.6	15.5	15.6	15.5	15.6	15.0	% Black		-	16.0	15.6	15.3	15.4	15.3	15.2	
% Hispanic		5.9	6.3	6.7	7.2	7.5	7.8	7.9	% Hispanic		-	6.2	6.5	6.9	7.3	7.6	8.0	

Appendix M: PSSA Historical Statistics

		2005	2006	2007	2008	2009	2010	2011			2005	2006	2007	2008	2009	2010	2011	
Reading Grade 7	Raw Score	Mean	-	33.13	33.19	34.12	34.52	34.83	34.42	Raw Score	Mean	39.12	34.98	33.08	33.57	34.77	34.61	35.60
		SD	-	9.75	10.18	10.05	9.91	9.48	9.02		SD	9.07	9.78	8.98	10.13	9.55	8.89	8.93
		Max	-	52	52	52	52	52	52		Max	52	52	52	52	52	52	52
	Scaled Score	Mean	-	1363.5	1372.4	1394.2	1413.1	1413.9	1418.3	Scaled Score	Mean	1359.5	1424.8	1441.3	1479.9	1499.5	1491.3	1513.0
		SD	-	220.1	229.7	234.8	231.0	219.2	210.7		SD	274.3	284.7	249.2	272.8	263.7	245.3	260.4
		Max	-	2351	2361	2366	2388	2373	2387		Max	2349	2559	2646	2628	2621	2635	2639
	Raw Cuts	Bel. Basic/Basic	-	22	22	22	21	22	21	Raw Cuts	Bel. Basic/Basic	33	25	22	20	21	21	22
		Basic/Prof.	-	30	30	30	30	30	29		Basic/Prof.	39	31	28	26	27	27	28
		Prof./Adv.	-	39	39	40	39	39	38		Prof./Adv.	45	39	36	35	36	36	36
	Theta Cuts	Bel. Basic/Basic	-	-0.3167	-0.2713	-0.2808	-0.3012	-0.2353	-0.2950	Theta Cuts	Bel. Basic/Basic	-	0.1584	0.1727	0.1507	0.1775	0.1659	0.1977
		Basic/Prof.	-	0.4230	0.4511	0.4361	0.4955	0.4820	0.4572		Basic/Prof.	-	0.7466	0.7668	0.7042	0.7360	0.7294	0.7688
		Prof./Adv.	-	1.3773	1.3771	1.4939	1.4066	1.4015	1.3935		Prof./Adv.	-	1.6424	1.6248	1.5700	1.6317	1.6340	1.5882
	Impact %	Bel. Basic	-	14.6	16.0	13.8	11.2	11.2	9.2	Impact %	Bel. Basic	19.7	16.2	12.3	12.1	10.6	8.7	8.9
		Basic	-	17.3	17.3	16.2	17.4	15.3	14.8		Basic	16.3	13.2	12.7	9.6	8.9	9.4	9.3
		Proficient	-	33.2	30.3	34.0	30.0	31.6	32.7		Proficient	30.6	27.1	29.3	24.2	25.2	28.6	24.1
		Advanced	-	34.9	36.5	36.0	41.4	41.9	43.3		Advanced	33.5	43.5	45.7	54.1	55.3	53.3	57.7
Prof. + Adv.		-	68.0	66.8	70.0	71.4	73.5	76.0	Prof. + Adv.		64.0	70.6	75.0	78.2	80.5	81.9	81.7	
N Count		-	141012	138610	135669	132641	130376	126902	N Count		145752	143401	141193	138377	135739	132906	127125	
Demographic	% City	-	10.9	10.6	10.0	9.7	9.6	9.2	Demographic	% City	11.1	11.0	10.6	10.2	9.8	9.4	9.0	
	% White	-	75.2	74.4	74.5	74.2	73.3	72.7		% White	76.8	76.0	75.0	74.5	74.5	74.1	73.3	
	% Black	-	15.7	15.9	15.4	15.1	15.2	14.9		% Black	15.0	15.4	15.7	15.6	15.0	14.8	14.8	
	% Hispanic	-	6.0	6.4	6.7	7.0	7.4	7.9		% Hispanic	5.3	5.6	6.2	6.5	6.9	7.1	7.6	

		2005	2006	2007	2008	2009	2010	2011	
Reading Grade 11	Raw Score	Mean	38.75	34.76	34.02	34.81	35.04	35.25	35.88
		SD	9.51	9.13	9.55	9.28	9.39	9.38	9.10
		Max	52	52	52	52	52	52	52
	Scaled Score	Mean	1362.9	1366.4	1346.2	1360.2	1368.5	1363.2	1381.6
		SD	316.5	278.5	266.9	276.2	280.8	280.4	273.4
		Max	2446	2631	2529	2546	2524	2520	2511
	Raw Cuts	Bel. Basic/Basic	33	27	26	27	27	27	27
		Basic/Prof.	38	33	32	33	33	33	33
		Prof./Adv.	45	41	41	41	41	41	41
	Theta Cuts	Bel. Basic/Basic	-	0.0646	0.0416	0.0582	0.0675	0.0156	0.0437
		Basic/Prof.	-	0.6639	0.6034	0.6497	0.6540	0.6097	0.6194
		Prof./Adv.	-	1.6804	1.6229	1.6056	1.5958	1.5606	1.5392
	Impact %	Bel. Basic	22.0	18.5	19.3	19.0	18.8	18.0	15.9
		Basic	12.9	16.3	15.3	16.2	15.9	14.8	14.9
		Proficient	31.4	33.9	36.5	32.9	32.1	33.2	33.0
		Advanced	33.6	31.2	28.9	31.8	33.1	34.0	36.1
Prof. + Adv.		65.0	65.2	65.4	64.7	65.3	67.2	69.2	
N Count		129693	132434	135364	135015	133753	133291	127997	
Demographic	% City	9.3	8.5	8.2	7.8	8.4	8.2	8.2	
	% White	80.6	80.5	79.6	79.2	77.8	76.4	75.9	
	% Black	12.1	12.2	12.5	12.7	13.4	13.9	13.9	
	% Hispanic	3.8	4.0	4.5	4.9	5.2	5.9	6.2	

Appendix M: PSSA Historical Statistics

		2005	2006	2007	2008	2009	2010	2011			2005	2006	2007	2008	2009	2010	2011		
Science Grade 4	Raw Score	Mean	-	-	-	45.80	47.25	48.64	48.47	Raw Score	Mean	-	-	-	38.25	41.00	42.61	42.10	
		SD	-	-	-	11.04	11.53	12.22	11.88		SD	-	-	-	-	11.71	13.02	13.74	13.62
		Max	-	-	-	66	66	68	68		Max	-	-	-	-	66	66	68	68
	Scaled Score	Mean	-	-	-	1429.4	1449.2	1456.8	1452.4	Scaled Score	Mean	-	-	-	1284.4	1302.9	1309.0	1312.5	
		SD	-	-	-	174.1	176.0	200.4	181.9		SD	-	-	-	-	174.1	197.6	210.1	203.2
		Max	-	-	-	2256	2271	2254	2234		Max	-	-	-	-	2297	2303	2258	2283
	Raw Cuts	Bel. Basic/Basic	-	-	-	26	25	28	26	Raw Cuts	Bel. Basic/Basic	-	-	-	29	31	33	31	
		Basic/Prof.	-	-	-	36	36	38	37		Basic/Prof.	-	-	-	-	39	41	42	41
		Prof./Adv.	-	-	-	51	52	53	53		Prof./Adv.	-	-	-	-	51	53	55	54
	Theta Cuts	Bel. Basic/Basic	-	-	-	-0.4243	-0.4261	-0.3909	-0.3994	Theta Cuts	Bel. Basic/Basic	-	-	-	-0.2333	-0.2118	-0.1829	-0.2267	
		Basic/Prof.	-	-	-	0.2798	0.3223	0.3093	0.3180		Basic/Prof.	-	-	-	-	0.4587	0.4620	0.4202	0.4102
		Prof./Adv.	-	-	-	1.4659	1.5133	1.4914	1.4788		Prof./Adv.	-	-	-	-	1.4173	1.4098	1.4771	1.4148
	Impact %	Bel. Basic	-	-	-	5.9	4.9	7.7	5.6	Impact %	Bel. Basic	-	-	-	23.1	24.0	25.5	22.9	
		Basic	-	-	-	12.7	11.7	10.8	11.5		Basic	-	-	-	-	24.3	21.1	17.3	18.9
		Proficient	-	-	-	41.2	41.0	35.5	38.0		Proficient	-	-	-	-	36.4	32.5	33.7	34.0
		Advanced	-	-	-	40.3	42.4	45.9	44.9		Advanced	-	-	-	-	16.3	22.3	23.5	24.3
		Prof. + Adv.	-	-	-	81.5	83.4	81.5	83.0		Prof. + Adv.	-	-	-	-	52.7	54.8	57.2	58.3
	Demographic	N Count	-	-	-	126426	127537	128565	128103	Demographic	N Count	-	-	-	137790	134969	132452	127075	
% City		-	-	-	10.9	10.7	10.5	10.2	% City		-	-	-	-	10.1	9.7	9.3	9.0	
% White		-	-	-	72.9	72.5	72.0	71.2	% White		-	-	-	-	74.6	74.5	74.1	73.2	
% Black		-	-	-	15.5	15.5	15.3	15.2	% Black		-	-	-	-	15.3	14.9	14.6	14.7	
% Hispanic		-	-	-	7.6	7.7	7.9	8.5	% Hispanic		-	-	-	-	6.6	7.0	7.1	7.6	

		2005	2006	2007	2008	2009	2010	2011	
Science Grade 11	Raw Score	Mean	-	-	-	36.11	39.02	39.48	39.72
		SD	-	-	-	12.46	13.16	13.02	13.94
		Max	-	-	-	72	72	74	74
	Scaled Score	Mean	-	-	-	1236.3	1244.0	1242.6	1244.8
		SD	-	-	-	89.0	101.5	96.7	96.5
		Max	-	-	-	1825	1859	1862	1822
	Raw Cuts	Bel. Basic/Basic	-	-	-	24	27	27	26
		Basic/Prof.	-	-	-	42	44	45	45
		Prof./Adv.	-	-	-	53	53	54	56
	Theta Cuts	Bel. Basic/Basic	-	-	-	-0.3955	-0.3898	-0.4062	-0.3853
		Basic/Prof.	-	-	-	0.7921	0.8144	0.8288	0.7891
		Prof./Adv.	-	-	-	1.5577	1.4967	1.5053	1.5633
	Impact %	Bel. Basic	-	-	-	18.1	19.8	19.0	18.8
		Basic	-	-	-	46.2	40.5	41.2	40.4
		Proficient	-	-	-	25.2	22.5	25.0	26.7
		Advanced	-	-	-	10.5	17.2	14.8	14.1
		Prof. + Adv.	-	-	-	35.6	39.7	39.8	40.8
	Demographic	N Count	-	-	-	131157	130262	129926	125307
% City		-	-	-	6.8	7.3	7.0	7.4	
% White		-	-	-	80.2	78.8	77.5	76.8	
% Black		-	-	-	11.6	12.4	13.0	13.1	
% Hispanic		-	-	-	4.8	5.1	5.7	6.0	

Appendix M: PSSA Historical Statistics

		2005	2006	2007	2008	2009	2010	2011			2005	2006	2007	2008	2009	2010	2011	
Writing Grade 5	Raw Score	Mean	-	68.63	65.07	66.56	66.03	65.44	65.83	Raw Score	Mean	-	71.71	67.24	68.05	67.82	68.36	67.11
		SD	-	12.97	13.03	13.93	14.35	14.55	14.57		SD	-	14.09	13.91	13.32	13.83	14.90	14.22
		Max	-	100	100	100	100	100	100		Max	-	100	100	100	100	100	100
	Scaled Score	Mean	-	1300.2	1274.5	1319.6	1303.2	1322.1	1351.3	Scaled Score	Mean	-	1340.5	1375.1	1322.5	1363.1	1400.9	1415.5
		SD	-	248.9	215.4	304.4	246.0	265.5	277.7		SD	-	266.0	258.4	210.5	265.5	271.9	272.1
		Max	-	2188	2145	2615	2162	2249	2294		Max	-	2119	2265	2098	2288	2245	2329
	Raw Cuts	Bel. Basic/Basic	-	35	35	34	31	30	31	Raw Cuts	Bel. Basic/Basic	-	45	40	43	43	38	38
		Basic/Prof.	-	68	64	65	64	63	61		Basic/Prof.	-	69	60	63	62	60	58
		Prof./Adv.	-	96	98	89	97	94	92		Prof./Adv.	-	92	85	94	85	86	82
	Theta Cuts	Bel. Basic/Basic	-			-3.2096	-3.2167	-3.2280	-3.1071	Theta Cuts	Bel. Basic/Basic	-			-1.9218	-2.0619	-2.0663	-2.0134
		Basic/Prof.	-			1.6555	1.7538	1.7554	1.7133		Basic/Prof.	-			1.1614	1.1847	1.1789	1.2283
		Prof./Adv.	-			8.6187	8.4299	8.4710	8.4777		Prof./Adv.	-			6.4254	6.3760	6.4115	6.3574
	Impact %	Bel. Basic	-	0.8	1.1	1.2	1.0	1.8	1.9	Impact %	Bel. Basic	-	3.4	2.8	2.9	4.2	3.2	2.8
		Basic	-	45.0	41.6	41.6	40.9	36.5	31.0		Basic	-	30.6	25.5	28.0	24.6	21.6	24.1
		Proficient	-	52.0	56.0	52.7	55.5	59.8	64.9		Proficient	-	60.5	60.9	66.8	60.7	61.7	62.1
		Advanced	-	2.1	1.3	4.6	2.6	2.0	2.2		Advanced	-	5.6	10.9	2.3	10.5	13.5	11.0
		Prof. + Adv.	-	54.1	57.3	57.3	58.1	61.7	67.1		Prof. + Adv.	-	66.0	71.7	69.1	71.2	75.1	73.1
		N Count	-	129802	128637	125547	126625	128201	128833		N Count	-	141365	139263	136417	134976	131780	129619
Demographic	% City	-	11.2	10.7	10.5	10.4	10.4	9.6	Demographic	% City	-	10.4	10.1	9.8	9.6	9.3	8.9	
	% White	-	75.2	74.6	73.9	73.1	72.4	72.2		% White	-	76.7	75.6	75.0	74.7	74.3	73.4	
	% Black	-	15.2	15.2	15.5	15.3	15.4	15.1		% Black	-	14.9	15.3	15.2	14.9	14.6	14.8	
	% Hispanic	-	6.2	6.6	7.0	7.5	7.7	7.9		% Hispanic	-	5.5	6.0	6.4	6.8	7.0	7.5	

		2005	2006	2007	2008	2009	2010	2011	
Writing Grade 11	Raw Score	Mean	-	71.90	70.23	69.71	72.30	69.60	71.44
		SD	-	13.22	11.48	13.27	14.48	14.35	14.76
		Max	-	100	100	100	100	100	100
	Scaled Score	Mean	-	1515.7	1442.9	1470.6	1480.4	1483.7	1536.8
		SD	-	274.8	216.7	262.8	283.7	282.3	298.6
		Max	-	2356	2283	2377	2257	2382	2364
	Raw Cuts	Bel. Basic/Basic	-	36	38	36	39	35	34
		Basic/Prof.	-	57	59	56	60	57	55
		Prof./Adv.	-	83	87	84	88	82	83
	Theta Cuts	Bel. Basic/Basic	-			-2.8217	-2.8091	-2.7956	-2.7861
		Basic/Prof.	-			-0.0891	-0.0515	-0.0159	-0.0562
		Prof./Adv.	-			5.6192	5.6480	5.6311	5.7382
	Impact %	Bel. Basic	-	1.2	0.8	1.2	2.3	2.2	1.7
		Basic	-	13.1	11.3	13.0	14.9	17.1	13.6
		Proficient	-	69.8	80.2	72.2	67.9	67.7	66.0
		Advanced	-	15.8	7.7	13.6	14.8	13.0	18.7
		Prof. + Adv.	-	85.7	87.8	85.8	82.8	80.7	84.7
		N Count	-	130572	133368	132349	132866	130352	128775
Demographic	% City	-	7.9	7.4	7.0	7.9	7.3	7.5	
	% White	-	81.4	80.3	80.1	78.2	77.3	76.5	
	% Black	-	11.6	12.0	11.9	13.1	13.2	13.4	
	% Hispanic	-	3.8	4.3	4.8	5.1	5.7	6.1	

Appendix N:

Raw-to-Scaled Score Conversion Tables

Column Heading	Definition
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

Appendix N: Raw-to-Scaled Score Conversion Tables

Mathematics Grade 3

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.3285	1.8325	750	236	0	0.0	0	0.0	0
1	-4.1073	1.0123	750	130	0	0.0	0	0.0	0
2	-3.3893	0.7245	750	93	0	0.0	0	0.0	0
3	-2.9588	0.5988	750	77	0	0.0	0	0.0	0
4	-2.6458	0.5248	750	68	1	0.0	1	0.0	1
5	-2.3971	0.4751	750	61	0	0.0	1	0.0	1
6	-2.1889	0.4389	750	57	2	0.0	3	0.0	1
7	-2.0087	0.4112	750	53	2	0.0	5	0.0	1
8	-1.8488	0.3892	750	50	8	0.0	13	0.0	1
9	-1.7044	0.3713	750	48	11	0.0	24	0.0	1
10	-1.5721	0.3565	762	46	19	0.0	43	0.0	1
11	-1.4496	0.3440	778	44	25	0.0	68	0.1	1
12	-1.3350	0.3332	792	43	38	0.0	106	0.1	1
13	-1.2271	0.3240	806	42	57	0.0	163	0.1	1
14	-1.1247	0.3160	819	41	66	0.1	229	0.2	1
15	-1.0271	0.3089	832	40	79	0.1	308	0.2	1
16	-0.9336	0.3028	844	39	91	0.1	399	0.3	1
17	-0.8436	0.2973	856	38	131	0.1	530	0.4	1
18	-0.7567	0.2925	867	38	146	0.1	676	0.5	1
19	-0.6724	0.2882	878	37	137	0.1	813	0.7	1
20	-0.5905	0.2844	888	37	172	0.1	985	0.8	1
21	-0.5105	0.2811	898	36	189	0.2	1174	0.9	1
22	-0.4324	0.2781	909	36	211	0.2	1385	1.1	1
23	-0.3558	0.2755	918	35	207	0.2	1592	1.3	1
24	-0.2806	0.2732	928	35	225	0.2	1817	1.5	1
25	-0.2065	0.2712	938	35	245	0.2	2062	1.7	2
26	-0.1334	0.2695	947	35	266	0.2	2328	1.9	2
27	-0.0612	0.2680	956	35	280	0.2	2608	2.1	2
28	0.0102	0.2668	966	34	299	0.2	2907	2.3	2
29	0.0812	0.2658	975	34	323	0.3	3230	2.6	2
30	0.1516	0.2650	984	34	360	0.3	3590	2.9	3
31	0.2217	0.2645	993	34	413	0.3	4003	3.2	3
32	0.2915	0.2642	1002	34	432	0.3	4435	3.6	3
33	0.3613	0.2640	1011	34	455	0.4	4890	3.9	4
34	0.4310	0.2641	1020	34	485	0.4	5375	4.3	4
35	0.5008	0.2643	1029	34	514	0.4	5889	4.7	5
36	0.5707	0.2648	1038	34	515	0.4	6404	5.1	5
37	0.6410	0.2654	1047	34	575	0.5	6979	5.6	5
38	0.7117	0.2662	1056	34	631	0.5	7610	6.1	6
39	0.7828	0.2672	1065	34	670	0.5	8280	6.6	6
40	0.8545	0.2685	1074	35	748	0.6	9028	7.2	7
41	0.9270	0.2699	1084	35	764	0.6	9792	7.8	8
42	1.0002	0.2715	1093	35	867	0.7	10659	8.5	8
43	1.0744	0.2733	1103	35	944	0.8	11603	9.3	9
44	1.1496	0.2754	1112	35	1028	0.8	12631	10.1	10
45	1.2261	0.2777	1122	36	1111	0.9	13742	11.0	11
46	1.3039	0.2802	1132	36	1154	0.9	14896	11.9	11
47	1.3832	0.2830	1142	36	1254	1.0	16150	12.9	12
48	1.4642	0.2860	1153	37	1415	1.1	17565	14.1	14
49	1.5469	0.2893	1163	37	1473	1.2	19038	15.3	15
50	1.6317	0.2930	1174	38	1586	1.3	20624	16.5	16
51	1.7186	0.2969	1186	38	1973	1.6	22597	18.1	17
52	1.8081	0.3012	1197	39	2025	1.6	24622	19.7	19

Appendix N: Raw-to-Scaled Score Conversion Tables

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
53	1.9002	0.3059	1209	39	2211	1.8	26833	21.5	21
54	1.9953	0.3109	1221	40	2474	2.0	29307	23.5	23
55	2.0937	0.3165	1234	41	2734	2.2	32041	25.7	25
56	2.1957	0.3225	1247	42	2969	2.4	35010	28.1	27
57	2.3018	0.3291	1261	42	3361	2.7	38371	30.8	29
58	2.4126	0.3364	1275	43	3675	2.9	42046	33.7	32
59	2.5284	0.3445	1290	44	4119	3.3	46165	37.0	35
60	2.6502	0.3536	1306	46	4534	3.6	50699	40.6	39
61	2.7787	0.3638	1322	47	5010	4.0	55709	44.7	43
62	2.9154	0.3756	1340	48	5401	4.3	61110	49.0	47
63	3.0614	0.3893	1359	50	6043	4.8	67153	53.8	51
64	3.2193	0.4056	1379	52	6596	5.3	73749	59.1	56
65	3.3918	0.4257	1401	55	7088	5.7	80837	64.8	62
66	3.5834	0.4509	1426	58	7702	6.2	88539	71.0	68
67	3.8013	0.4841	1454	62	8024	6.4	96563	77.4	74
68	4.0573	0.5304	1487	68	8038	6.4	104601	83.8	81
69	4.3744	0.6007	1528	77	7534	6.0	112135	89.9	87
70	4.8051	0.7231	1583	93	6214	5.0	118349	94.9	92
71	5.5185	1.0088	1675	130	4426	3.5	122775	98.4	97
72	6.7338	1.8297	1832	236	1974	1.6	124749	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	-5.2557	1.8325	700	367	0	0.0	0	0.0	0
1	-4.0344	1.0123	700	202	0	0.0	0	0.0	0
2	-3.3166	0.7243	700	145	0	0.0	0	0.0	0
3	-2.8867	0.5982	700	120	1	0.0	1	0.0	1
4	-2.5746	0.5239	700	105	2	0.0	3	0.0	1
5	-2.3270	0.4737	718	95	0	0.0	3	0.0	1
6	-2.1203	0.4371	759	87	3	0.0	6	0.0	1
7	-1.9419	0.4089	795	82	9	0.0	15	0.0	1
8	-1.7839	0.3864	827	77	19	0.0	34	0.0	1
9	-1.6418	0.3681	855	74	36	0.0	70	0.1	1
10	-1.5121	0.3527	881	71	55	0.0	125	0.1	1
11	-1.3924	0.3396	905	68	76	0.1	201	0.2	1
12	-1.2809	0.3284	927	66	136	0.1	337	0.3	1
13	-1.1763	0.3186	948	64	183	0.1	520	0.4	1
14	-1.0776	0.3099	968	62	236	0.2	756	0.6	1
15	-0.9840	0.3023	987	60	297	0.2	1053	0.8	1
16	-0.8946	0.2955	1005	59	401	0.3	1454	1.2	1
17	-0.8092	0.2895	1022	58	428	0.3	1882	1.5	1
18	-0.7269	0.2840	1038	57	534	0.4	2416	1.9	2
19	-0.6477	0.2791	1054	56	593	0.5	3009	2.4	2
20	-0.5710	0.2746	1069	55	646	0.5	3655	2.9	3
21	-0.4967	0.2706	1084	54	682	0.5	4337	3.5	3
22	-0.4245	0.2670	1099	53	785	0.6	5122	4.1	4
23	-0.3541	0.2637	1113	53	846	0.7	5968	4.8	4
24	-0.2853	0.2608	1126	52	945	0.8	6913	5.5	5
25	-0.2180	0.2581	1140	52	951	0.8	7864	6.3	6
26	-0.1521	0.2557	1153	51	1075	0.9	8939	7.1	7
27	-0.0872	0.2535	1166	51	1133	0.9	10072	8.0	8
28	-0.0235	0.2516	1179	50	1183	0.9	11255	9.0	8
29	0.0394	0.2500	1191	50	1313	1.0	12568	10.0	9
30	0.1016	0.2486	1204	50	1284	1.0	13852	11.0	11
31	0.1631	0.2474	1216	49	1486	1.2	15338	12.2	12
32	0.2240	0.2464	1228	49	1578	1.3	16916	13.5	13
33	0.2845	0.2456	1240	49	1623	1.3	18539	14.8	14
34	0.3446	0.2450	1252	49	1668	1.3	20207	16.1	15
35	0.4046	0.2447	1264	49	1859	1.5	22066	17.6	17
36	0.4644	0.2445	1276	49	1959	1.6	24025	19.1	18
37	0.5242	0.2446	1288	49	1979	1.6	26004	20.7	20
38	0.5841	0.2449	1300	49	2055	1.6	28059	22.3	22
39	0.6442	0.2454	1312	49	2172	1.7	30231	24.1	23
40	0.7046	0.2462	1324	49	2281	1.8	32512	25.9	25
41	0.7654	0.2472	1337	49	2367	1.9	34879	27.8	27
42	0.8269	0.2484	1349	50	2508	2.0	37387	29.8	29
43	0.8889	0.2499	1361	50	2510	2.0	39897	31.8	31
44	0.9518	0.2516	1374	50	2720	2.2	42617	33.9	33
45	1.0156	0.2536	1387	51	2821	2.2	45438	36.2	35
46	1.0805	0.2559	1400	51	2874	2.3	48312	38.5	37
47	1.1467	0.2585	1413	52	2986	2.4	51298	40.8	40
48	1.2142	0.2615	1426	52	3012	2.4	54310	43.2	42
49	1.2834	0.2647	1440	53	3167	2.5	57477	45.8	44
50	1.3544	0.2683	1454	54	3391	2.7	60868	48.5	47
51	1.4275	0.2723	1469	54	3381	2.7	64249	51.2	50
52	1.5029	0.2768	1484	55	3522	2.8	67771	54.0	53

Appendix N: Raw-to-Scaled Score Conversion Tables

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
53	1.5808	0.2817	1500	56	3645	2.9	71416	56.9	55
54	1.6617	0.2872	1516	57	3687	2.9	75103	59.8	58
55	1.7459	0.2932	1533	59	3867	3.1	78970	62.9	61
56	1.8338	0.3000	1550	60	3789	3.0	82759	65.9	64
57	1.9261	0.3075	1569	62	3824	3.0	86583	68.9	67
58	2.0232	0.3159	1588	63	3843	3.1	90426	72.0	70
59	2.1259	0.3254	1609	65	3873	3.1	94299	75.1	74
60	2.2352	0.3361	1631	67	3858	3.1	98157	78.1	77
61	2.3523	0.3484	1654	70	3675	2.9	101832	81.1	80
62	2.4786	0.3626	1679	73	3529	2.8	105361	83.9	82
63	2.6160	0.3793	1707	76	3631	2.9	108992	86.8	85
64	2.7673	0.3991	1737	80	3379	2.7	112371	89.5	88
65	2.9359	0.4231	1771	85	3193	2.5	115564	92.0	91
66	3.1273	0.4529	1809	91	2753	2.2	118317	94.2	93
67	3.3496	0.4914	1853	98	2404	1.9	120721	96.1	95
68	3.6160	0.5434	1907	109	1899	1.5	122620	97.6	97
69	3.9514	0.6194	1974	124	1465	1.2	124085	98.8	98
70	4.4104	0.7463	2066	149	924	0.7	125009	99.5	99
71	5.1646	1.0323	2216	206	476	0.4	125485	99.9	99
72	6.4171	1.8457	2467	369	119	0.1	125604	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	-5.0450	1.8319	700	348	0	0.0	0	0.0	0
1	-3.8251	1.0114	700	192	0	0.0	0	0.0	0
2	-3.1090	0.7232	700	137	0	0.0	0	0.0	0
3	-2.6804	0.5971	700	113	0	0.0	0	0.0	0
4	-2.3694	0.5230	700	99	0	0.0	0	0.0	0
5	-2.1225	0.4731	731	90	0	0.0	0	0.0	0
6	-1.9162	0.4368	770	83	1	0.0	1	0.0	1
7	-1.7377	0.4091	804	78	5	0.0	6	0.0	1
8	-1.5795	0.3871	834	73	4	0.0	10	0.0	1
9	-1.4366	0.3693	861	70	18	0.0	28	0.0	1
10	-1.3058	0.3545	886	67	31	0.0	59	0.0	1
11	-1.1846	0.3421	909	65	61	0.0	120	0.1	1
12	-1.0713	0.3315	931	63	84	0.1	204	0.2	1
13	-0.9645	0.3223	951	61	154	0.1	358	0.3	1
14	-0.8632	0.3144	970	60	207	0.2	565	0.4	1
15	-0.7665	0.3075	989	58	299	0.2	864	0.7	1
16	-0.6739	0.3014	1006	57	368	0.3	1232	1.0	1
17	-0.5847	0.2960	1023	56	461	0.4	1693	1.3	1
18	-0.4985	0.2913	1039	55	569	0.4	2262	1.8	2
19	-0.4149	0.2871	1055	54	628	0.5	2890	2.3	2
20	-0.3336	0.2833	1071	54	719	0.6	3609	2.9	3
21	-0.2543	0.2800	1086	53	807	0.6	4416	3.5	3
22	-0.1767	0.2770	1101	53	843	0.7	5259	4.2	4
23	-0.1008	0.2743	1115	52	971	0.8	6230	4.9	5
24	-0.0262	0.2720	1129	52	1069	0.8	7299	5.8	5
25	0.0473	0.2699	1143	51	1181	0.9	8480	6.7	6
26	0.1196	0.2681	1157	51	1268	1.0	9748	7.7	7
27	0.1911	0.2665	1170	51	1353	1.1	11101	8.8	8
28	0.2617	0.2651	1184	50	1448	1.1	12549	9.9	9
29	0.3317	0.2640	1197	50	1533	1.2	14082	11.1	11
30	0.4011	0.2630	1210	50	1588	1.3	15670	12.4	12
31	0.4700	0.2622	1223	50	1700	1.3	17370	13.7	13
32	0.5386	0.2616	1236	50	1884	1.5	19254	15.2	14
33	0.6069	0.2612	1249	50	1922	1.5	21176	16.7	16
34	0.6751	0.2609	1262	50	2116	1.7	23292	18.4	18
35	0.7432	0.2609	1275	50	2055	1.6	25347	20.0	19
36	0.8113	0.2609	1288	50	2279	1.8	27626	21.8	21
37	0.8794	0.2612	1301	50	2329	1.8	29955	23.7	23
38	0.9477	0.2616	1314	50	2528	2.0	32483	25.7	25
39	1.0164	0.2623	1327	50	2454	1.9	34937	27.6	27
40	1.0853	0.2631	1340	50	2602	2.1	37539	29.7	29
41	1.1548	0.2640	1353	50	2697	2.1	40236	31.8	31
42	1.2248	0.2652	1367	50	2756	2.2	42992	34.0	33
43	1.2955	0.2666	1380	51	2943	2.3	45935	36.3	35
44	1.3670	0.2682	1394	51	2940	2.3	48875	38.6	37
45	1.4394	0.2700	1407	51	3068	2.4	51943	41.0	40
46	1.5129	0.2721	1421	52	3054	2.4	54997	43.4	42
47	1.5875	0.2744	1435	52	3165	2.5	58162	45.9	45
48	1.6635	0.2770	1450	53	3268	2.6	61430	48.5	47
49	1.7410	0.2799	1465	53	3200	2.5	64630	51.1	50
50	1.8203	0.2832	1480	54	3412	2.7	68042	53.8	52
51	1.9015	0.2868	1495	54	3355	2.7	71397	56.4	55
52	1.9849	0.2908	1511	55	3527	2.8	74924	59.2	58

Appendix N: Raw-to-Scaled Score Conversion Tables

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
53	2.0708	0.2953	1527	56	3404	2.7	78328	61.9	61
54	2.1594	0.3004	1544	57	3435	2.7	81763	64.6	63
55	2.2513	0.3060	1561	58	3623	2.9	85386	67.5	66
56	2.3469	0.3123	1580	59	3620	2.9	89006	70.3	69
57	2.4465	0.3194	1598	61	3592	2.8	92598	73.2	72
58	2.5510	0.3274	1618	62	3544	2.8	96142	76.0	75
59	2.6612	0.3365	1639	64	3427	2.7	99569	78.7	77
60	2.7778	0.3469	1661	66	3500	2.8	103069	81.4	80
61	2.9023	0.3589	1685	68	3404	2.7	106473	84.1	83
62	3.0360	0.3728	1710	71	3275	2.6	109748	86.7	85
63	3.1810	0.3892	1738	74	3135	2.5	112883	89.2	88
64	3.3400	0.4087	1768	78	2878	2.3	115761	91.5	90
65	3.5166	0.4324	1802	82	2648	2.1	118409	93.5	93
66	3.7161	0.4618	1839	88	2351	1.9	120760	95.4	94
67	3.9465	0.4996	1883	95	1970	1.6	122730	97.0	96
68	4.2209	0.5506	1935	105	1663	1.3	124393	98.3	98
69	4.5638	0.6250	2000	119	1129	0.9	125522	99.2	99
70	5.0288	0.7496	2089	142	681	0.5	126203	99.7	99
71	5.7864	1.0330	2232	196	304	0.2	126507	99.9	99
72	7.0384	1.8450	2470	350	71	0.1	126578	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	-5.4154	1.8322	700	366	0	0.0	0	0.0	0
1	-4.1949	1.0118	700	202	0	0.0	0	0.0	0
2	-3.4781	0.7237	700	145	0	0.0	0	0.0	0
3	-3.0489	0.5976	700	120	1	0.0	1	0.0	1
4	-2.7375	0.5233	700	105	0	0.0	1	0.0	1
5	-2.4904	0.4732	703	95	1	0.0	2	0.0	1
6	-2.2841	0.4366	745	87	2	0.0	4	0.0	1
7	-2.1060	0.4086	780	82	3	0.0	7	0.0	1
8	-1.9483	0.3863	812	77	18	0.0	25	0.0	1
9	-1.8062	0.3680	840	74	46	0.0	71	0.1	1
10	-1.6765	0.3528	866	71	85	0.1	156	0.1	1
11	-1.5566	0.3399	890	68	113	0.1	269	0.2	1
12	-1.4449	0.3289	913	66	172	0.1	441	0.3	1
13	-1.3399	0.3193	934	64	232	0.2	673	0.5	1
14	-1.2407	0.3109	953	62	341	0.3	1014	0.8	1
15	-1.1464	0.3035	972	61	406	0.3	1420	1.1	1
16	-1.0562	0.2970	990	59	472	0.4	1892	1.5	1
17	-0.9698	0.2912	1008	58	561	0.4	2453	1.9	2
18	-0.8866	0.2860	1024	57	624	0.5	3077	2.4	2
19	-0.8061	0.2814	1040	56	701	0.6	3778	3.0	3
20	-0.7281	0.2773	1056	55	779	0.6	4557	3.6	3
21	-0.6523	0.2736	1071	55	877	0.7	5434	4.3	4
22	-0.5783	0.2703	1086	54	882	0.7	6316	5.0	5
23	-0.5060	0.2674	1100	53	972	0.8	7288	5.8	5
24	-0.4352	0.2649	1115	53	955	0.8	8243	6.5	6
25	-0.3657	0.2626	1128	53	1061	0.8	9304	7.3	7
26	-0.2972	0.2606	1142	52	1136	0.9	10440	8.2	8
27	-0.2298	0.2590	1156	52	1188	0.9	11628	9.2	9
28	-0.1631	0.2575	1169	52	1182	0.9	12810	10.1	10
29	-0.0971	0.2563	1182	51	1309	1.0	14119	11.1	11
30	-0.0316	0.2554	1195	51	1323	1.0	15442	12.2	12
31	0.0334	0.2546	1208	51	1436	1.1	16878	13.3	13
32	0.0981	0.2541	1221	51	1531	1.2	18409	14.5	14
33	0.1626	0.2538	1234	51	1537	1.2	19946	15.8	15
34	0.2270	0.2537	1247	51	1591	1.3	21537	17.0	16
35	0.2914	0.2538	1260	51	1640	1.3	23177	18.3	18
36	0.3558	0.2541	1273	51	1783	1.4	24960	19.7	19
37	0.4205	0.2546	1286	51	1820	1.4	26780	21.1	20
38	0.4855	0.2552	1299	51	1944	1.5	28724	22.7	22
39	0.5508	0.2561	1312	51	2006	1.6	30730	24.3	23
40	0.6167	0.2571	1325	51	2140	1.7	32870	26.0	25
41	0.6831	0.2584	1338	52	2197	1.7	35067	27.7	27
42	0.7502	0.2598	1352	52	2142	1.7	37209	29.4	29
43	0.8181	0.2614	1365	52	2318	1.8	39527	31.2	30
44	0.8869	0.2632	1379	53	2401	1.9	41928	33.1	32
45	0.9567	0.2653	1393	53	2659	2.1	44587	35.2	34
46	1.0277	0.2675	1407	54	2588	2.0	47175	37.3	36
47	1.0999	0.2700	1422	54	2581	2.0	49756	39.3	38
48	1.1736	0.2728	1436	55	2813	2.2	52569	41.5	40
49	1.2488	0.2758	1451	55	2851	2.3	55420	43.8	43
50	1.3258	0.2791	1467	56	3026	2.4	58446	46.2	45
51	1.4047	0.2828	1482	57	3131	2.5	61577	48.6	47
52	1.4858	0.2868	1499	57	3124	2.5	64701	51.1	50

Appendix N: Raw-to-Scaled Score Conversion Tables

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
53	1.5693	0.2913	1515	58	3330	2.6	68031	53.7	52
54	1.6556	0.2962	1533	59	3577	2.8	71608	56.5	55
55	1.7449	0.3017	1551	60	3645	2.9	75253	59.4	58
56	1.8377	0.3078	1569	62	3623	2.9	78876	62.3	61
57	1.9346	0.3147	1588	63	3794	3.0	82670	65.3	64
58	2.0360	0.3225	1609	65	3944	3.1	86614	68.4	67
59	2.1429	0.3314	1630	66	3930	3.1	90544	71.5	70
60	2.2561	0.3416	1653	68	3922	3.1	94466	74.6	73
61	2.3768	0.3534	1677	71	4064	3.2	98530	77.8	76
62	2.5064	0.3671	1703	73	4108	3.2	102638	81.1	79
63	2.6470	0.3832	1731	77	3979	3.1	106617	84.2	83
64	2.8011	0.4023	1762	80	3822	3.0	110439	87.2	86
65	2.9720	0.4253	1796	85	3642	2.9	114081	90.1	89
66	3.1648	0.4537	1835	91	3388	2.7	117469	92.8	91
67	3.3867	0.4899	1879	98	2916	2.3	120385	95.1	94
68	3.6499	0.5387	1932	108	2432	1.9	122817	97.0	96
69	3.9774	0.6103	1997	122	1764	1.4	124581	98.4	98
70	4.4207	0.7322	2086	146	1210	1.0	125791	99.3	99
71	5.1473	1.0150	2231	203	637	0.5	126428	99.8	99
72	6.3701	1.8321	2476	366	202	0.2	126630	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	-5.5362	1.8342	700	367	0	0.0	0	0.0	0
1	-4.3107	1.0151	700	203	0	0.0	0	0.0	0
2	-3.5873	0.7281	700	146	0	0.0	0	0.0	0
3	-3.1518	0.6027	700	121	0	0.0	0	0.0	0
4	-2.8343	0.5289	700	106	0	0.0	0	0.0	0
5	-2.5816	0.4791	709	96	3	0.0	3	0.0	1
6	-2.3697	0.4429	751	89	2	0.0	5	0.0	1
7	-2.1861	0.4151	788	83	5	0.0	10	0.0	1
8	-2.0232	0.3930	821	79	29	0.0	39	0.0	1
9	-1.8760	0.3749	850	75	45	0.0	84	0.1	1
10	-1.7411	0.3599	877	72	81	0.1	165	0.1	1
11	-1.6163	0.3471	902	69	117	0.1	282	0.2	1
12	-1.4996	0.3362	925	67	193	0.2	475	0.4	1
13	-1.3898	0.3267	947	65	271	0.2	746	0.6	1
14	-1.2857	0.3184	968	64	385	0.3	1131	0.9	1
15	-1.1867	0.3111	988	62	475	0.4	1606	1.3	1
16	-1.0920	0.3047	1007	61	566	0.4	2172	1.7	1
17	-1.0009	0.2989	1025	60	671	0.5	2843	2.2	2
18	-0.9131	0.2938	1043	59	741	0.6	3584	2.8	3
19	-0.8282	0.2891	1060	58	853	0.7	4437	3.5	3
20	-0.7458	0.2850	1076	57	925	0.7	5362	4.2	4
21	-0.6657	0.2812	1092	56	1030	0.8	6392	5.0	5
22	-0.5875	0.2779	1108	56	1006	0.8	7398	5.8	5
23	-0.5112	0.2748	1123	55	1159	0.9	8557	6.7	6
24	-0.4364	0.2721	1138	54	1211	1.0	9768	7.7	7
25	-0.3630	0.2696	1153	54	1223	1.0	10991	8.7	8
26	-0.2910	0.2674	1167	53	1306	1.0	12297	9.7	9
27	-0.2200	0.2654	1181	53	1425	1.1	13722	10.8	10
28	-0.1500	0.2637	1195	53	1466	1.2	15188	12.0	11
29	-0.0809	0.2622	1209	52	1516	1.2	16704	13.2	13
30	-0.0125	0.2609	1223	52	1608	1.3	18312	14.4	14
31	0.0553	0.2598	1236	52	1642	1.3	19954	15.7	15
32	0.1225	0.2589	1250	52	1645	1.3	21599	17.0	16
33	0.1894	0.2582	1263	52	1730	1.4	23329	18.4	18
34	0.2560	0.2577	1276	52	1885	1.5	25214	19.9	19
35	0.3223	0.2574	1290	51	1951	1.5	27165	21.4	21
36	0.3885	0.2573	1303	51	1964	1.5	29129	22.9	22
37	0.4547	0.2574	1316	51	2038	1.6	31167	24.5	24
38	0.5211	0.2578	1330	52	2117	1.7	33284	26.2	25
39	0.5877	0.2583	1343	52	2202	1.7	35486	27.9	27
40	0.6546	0.2591	1356	52	2317	1.8	37803	29.8	29
41	0.7219	0.2600	1370	52	2325	1.8	40128	31.6	31
42	0.7898	0.2612	1383	52	2410	1.9	42538	33.5	33
43	0.8585	0.2627	1397	53	2550	2.0	45088	35.5	35
44	0.9279	0.2644	1411	53	2552	2.0	47640	37.5	37
45	0.9983	0.2663	1425	53	2710	2.1	50350	39.6	39
46	1.0697	0.2685	1439	54	2739	2.2	53089	41.8	41
47	1.1425	0.2710	1454	54	2811	2.2	55900	44.0	43
48	1.2167	0.2737	1469	55	2885	2.3	58785	46.3	45
49	1.2924	0.2768	1484	55	2986	2.4	61771	48.6	47
50	1.3700	0.2802	1499	56	3046	2.4	64817	51.0	50
51	1.4496	0.2840	1515	57	3127	2.5	67944	53.5	52
52	1.5314	0.2882	1532	58	3221	2.5	71165	56.0	55

Appendix N: Raw-to-Scaled Score Conversion Tables

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
53	1.6158	0.2928	1548	59	3252	2.6	74417	58.6	57
54	1.7030	0.2979	1566	60	3309	2.6	77726	61.2	60
55	1.7934	0.3036	1584	61	3456	2.7	81182	63.9	63
56	1.8875	0.3099	1603	62	3547	2.8	84729	66.7	65
57	1.9857	0.3170	1622	63	3605	2.8	88334	69.6	68
58	2.0887	0.3249	1643	65	3563	2.8	91897	72.4	71
59	2.1971	0.3339	1665	67	3678	2.9	95575	75.3	74
60	2.3120	0.3441	1688	69	3674	2.9	99249	78.2	77
61	2.4344	0.3559	1712	71	3565	2.8	102814	81.0	80
62	2.5659	0.3696	1738	74	3657	2.9	106471	83.8	82
63	2.7084	0.3858	1767	77	3559	2.8	110030	86.6	85
64	2.8647	0.4053	1798	81	3360	2.6	113390	89.3	88
65	3.0384	0.4290	1833	86	3261	2.6	116651	91.9	91
66	3.2351	0.4589	1872	92	2826	2.2	119477	94.1	93
67	3.4631	0.4977	1918	100	2602	2.0	122079	96.1	95
68	3.7365	0.5506	1973	110	1973	1.6	124052	97.7	97
69	4.0810	0.6280	2041	126	1460	1.1	125512	98.8	98
70	4.5531	0.7568	2136	151	906	0.7	126418	99.5	99
71	5.3270	1.0439	2291	209	454	0.4	126872	99.9	99
72	6.5992	1.8543	2545	371	121	0.1	126993	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	-5.4047	1.8317	700	325	0	0.0	0	0.0	0
1	-4.1856	1.0108	700	179	0	0.0	0	0.0	0
2	-3.4705	0.7225	700	128	0	0.0	0	0.0	0
3	-3.0430	0.5963	700	106	0	0.0	0	0.0	0
4	-2.7330	0.5220	700	93	1	0.0	1	0.0	1
5	-2.4872	0.4719	741	84	1	0.0	2	0.0	1
6	-2.2820	0.4355	777	77	3	0.0	5	0.0	1
7	-2.1048	0.4076	809	72	10	0.0	15	0.0	1
8	-1.9479	0.3854	836	68	21	0.0	36	0.0	1
9	-1.8065	0.3673	862	65	37	0.0	73	0.1	1
10	-1.6772	0.3523	885	63	83	0.1	156	0.1	1
11	-1.5576	0.3396	906	60	135	0.1	291	0.2	1
12	-1.4460	0.3287	926	58	220	0.2	511	0.4	1
13	-1.3411	0.3193	944	57	282	0.2	793	0.6	1
14	-1.2418	0.3112	962	55	374	0.3	1167	0.9	1
15	-1.1472	0.3040	979	54	473	0.4	1640	1.3	1
16	-1.0567	0.2977	995	53	566	0.4	2206	1.7	2
17	-0.9698	0.2921	1010	52	651	0.5	2857	2.3	2
18	-0.8859	0.2872	1025	51	699	0.6	3556	2.8	3
19	-0.8047	0.2828	1039	50	748	0.6	4304	3.4	3
20	-0.7258	0.2789	1053	50	834	0.7	5138	4.1	4
21	-0.6491	0.2754	1067	49	799	0.6	5937	4.7	4
22	-0.5741	0.2723	1080	48	830	0.7	6767	5.3	5
23	-0.5006	0.2696	1093	48	956	0.8	7723	6.1	6
24	-0.4286	0.2672	1106	47	968	0.8	8691	6.9	6
25	-0.3579	0.2650	1119	47	1058	0.8	9749	7.7	7
26	-0.2881	0.2632	1131	47	1109	0.9	10858	8.6	8
27	-0.2193	0.2616	1143	46	1073	0.8	11931	9.4	9
28	-0.1512	0.2602	1155	46	1225	1.0	13156	10.4	10
29	-0.0838	0.2591	1167	46	1266	1.0	14422	11.4	11
30	-0.0168	0.2582	1179	46	1268	1.0	15690	12.4	12
31	0.0496	0.2575	1191	46	1466	1.2	17156	13.5	13
32	0.1157	0.2569	1203	46	1512	1.2	18668	14.7	14
33	0.1817	0.2566	1215	46	1567	1.2	20235	16.0	15
34	0.2475	0.2565	1226	46	1595	1.3	21830	17.2	17
35	0.3133	0.2565	1238	46	1626	1.3	23456	18.5	18
36	0.3790	0.2567	1250	46	1863	1.5	25319	20.0	19
37	0.4450	0.2570	1261	46	1927	1.5	27246	21.5	21
38	0.5112	0.2576	1273	46	2003	1.6	29249	23.1	22
39	0.5777	0.2583	1285	46	2114	1.7	31363	24.7	24
40	0.6447	0.2592	1297	46	2096	1.7	33459	26.4	26
41	0.7121	0.2602	1309	46	2287	1.8	35746	28.2	27
42	0.7802	0.2614	1321	46	2320	1.8	38066	30.0	29
43	0.8489	0.2628	1333	47	2430	1.9	40496	31.9	31
44	0.9183	0.2644	1345	47	2508	2.0	43004	33.9	33
45	0.9886	0.2661	1358	47	2601	2.1	45605	36.0	35
46	1.0600	0.2681	1370	48	2689	2.1	48294	38.1	37
47	1.1324	0.2702	1383	48	2761	2.2	51055	40.3	39
48	1.2060	0.2725	1396	48	2970	2.3	54025	42.6	41
49	1.2810	0.2751	1410	49	2939	2.3	56964	44.9	44
50	1.3574	0.2779	1423	49	3085	2.4	60049	47.4	46
51	1.4355	0.2810	1437	50	3075	2.4	63124	49.8	49
52	1.5154	0.2844	1451	50	3161	2.5	66285	52.3	51

Appendix N: Raw-to-Scaled Score Conversion Tables

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
53	1.5974	0.2882	1466	51	3236	2.6	69521	54.8	54
54	1.6816	0.2923	1481	52	3394	2.7	72915	57.5	56
55	1.7684	0.2970	1496	53	3424	2.7	76339	60.2	59
56	1.8581	0.3023	1512	54	3405	2.7	79744	62.9	62
57	1.9513	0.3083	1529	55	3535	2.8	83279	65.7	64
58	2.0484	0.3151	1546	56	3498	2.8	86777	68.4	67
59	2.1502	0.3230	1564	57	3605	2.8	90382	71.3	70
60	2.2574	0.3323	1583	59	3569	2.8	93951	74.1	73
61	2.3713	0.3431	1603	61	3756	3.0	97707	77.1	76
62	2.4934	0.3559	1625	63	3740	2.9	101447	80.0	79
63	2.6255	0.3714	1648	66	3784	3.0	105231	83.0	82
64	2.7702	0.3901	1674	69	3678	2.9	108909	85.9	84
65	2.9313	0.4133	1703	73	3586	2.8	112495	88.7	87
66	3.1140	0.4427	1735	79	3410	2.7	115905	91.4	90
67	3.3267	0.4811	1773	85	3130	2.5	119035	93.9	93
68	3.5829	0.5337	1818	95	2703	2.1	121738	96.0	95
69	3.9078	0.6110	1876	108	2251	1.8	123989	97.8	97
70	4.3569	0.7402	1956	131	1584	1.2	125573	99.0	98
71	5.1036	1.0295	2088	183	877	0.7	126450	99.7	99
72	6.3534	1.8452	2310	328	336	0.3	126786	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	-5.8526	1.8312	700	378	0	0.0	0	0.0	0
1	-4.6346	1.0100	700	208	1	0.0	1	0.0	1
2	-3.9213	0.7213	700	149	0	0.0	1	0.0	1
3	-3.4956	0.5947	700	123	0	0.0	1	0.0	1
4	-3.1874	0.5201	700	107	0	0.0	1	0.0	1
5	-2.9437	0.4698	700	97	0	0.0	1	0.0	1
6	-2.7406	0.4331	700	89	3	0.0	4	0.0	1
7	-2.5655	0.4049	700	84	3	0.0	7	0.0	1
8	-2.4108	0.3824	705	79	12	0.0	19	0.0	1
9	-2.2716	0.3641	734	75	41	0.0	60	0.0	1
10	-2.1446	0.3489	760	72	75	0.1	135	0.1	1
11	-2.0276	0.3359	785	69	118	0.1	253	0.2	1
12	-1.9185	0.3249	807	67	186	0.1	439	0.3	1
13	-1.8161	0.3153	828	65	288	0.2	727	0.6	1
14	-1.7194	0.3069	848	63	402	0.3	1129	0.9	1
15	-1.6274	0.2996	867	62	517	0.4	1646	1.3	1
16	-1.5397	0.2931	885	61	674	0.5	2320	1.8	2
17	-1.4555	0.2874	903	59	796	0.6	3116	2.4	2
18	-1.3744	0.2823	919	58	875	0.7	3991	3.1	3
19	-1.2960	0.2777	936	57	913	0.7	4904	3.8	3
20	-1.2200	0.2737	951	56	1023	0.8	5927	4.6	4
21	-1.1461	0.2701	967	56	1131	0.9	7058	5.5	5
22	-1.0740	0.2670	981	55	1092	0.9	8150	6.4	6
23	-1.0034	0.2642	996	55	1193	0.9	9343	7.3	7
24	-0.9343	0.2617	1010	54	1231	1.0	10574	8.3	8
25	-0.8664	0.2595	1024	54	1241	1.0	11815	9.2	9
26	-0.7996	0.2577	1038	53	1305	1.0	13120	10.3	10
27	-0.7336	0.2560	1052	53	1325	1.0	14445	11.3	11
28	-0.6684	0.2547	1065	53	1468	1.1	15913	12.5	12
29	-0.6039	0.2536	1078	52	1453	1.1	17366	13.6	13
30	-0.5398	0.2527	1092	52	1603	1.3	18969	14.8	14
31	-0.4761	0.2520	1105	52	1597	1.2	20566	16.1	15
32	-0.4127	0.2516	1118	52	1712	1.3	22278	17.4	17
33	-0.3495	0.2513	1131	52	1702	1.3	23980	18.8	18
34	-0.2864	0.2512	1144	52	1774	1.4	25754	20.2	19
35	-0.2233	0.2513	1157	52	1878	1.5	27632	21.6	21
36	-0.1601	0.2516	1170	52	1905	1.5	29537	23.1	22
37	-0.0966	0.2521	1183	52	2068	1.6	31605	24.7	24
38	-0.0329	0.2528	1196	52	2053	1.6	33658	26.3	26
39	0.0312	0.2536	1210	52	2157	1.7	35815	28.0	27
40	0.0957	0.2546	1223	53	2285	1.8	38100	29.8	29
41	0.1609	0.2558	1236	53	2375	1.9	40475	31.7	31
42	0.2267	0.2572	1250	53	2456	1.9	42931	33.6	33
43	0.2932	0.2587	1264	53	2460	1.9	45391	35.5	35
44	0.3606	0.2605	1278	54	2641	2.1	48032	37.6	37
45	0.4290	0.2624	1292	54	2631	2.1	50663	39.6	39
46	0.4983	0.2645	1306	55	2825	2.2	53488	41.9	41
47	0.5689	0.2669	1321	55	2817	2.2	56305	44.1	43
48	0.6408	0.2694	1335	56	2942	2.3	59247	46.4	45
49	0.7141	0.2722	1351	56	2967	2.3	62214	48.7	48
50	0.7890	0.2752	1366	57	2958	2.3	65172	51.0	50
51	0.8656	0.2785	1382	57	3034	2.4	68206	53.4	52
52	0.9442	0.2821	1398	58	3161	2.5	71367	55.8	55

Appendix N: Raw-to-Scaled Score Conversion Tables

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
53	1.0249	0.2861	1415	59	3169	2.5	74536	58.3	57
54	1.1080	0.2905	1432	60	3189	2.5	77725	60.8	60
55	1.1938	0.2953	1450	61	3252	2.5	80977	63.4	62
56	1.2825	0.3008	1468	62	3261	2.6	84238	65.9	65
57	1.3749	0.3069	1487	63	3381	2.6	87619	68.6	67
58	1.4712	0.3139	1507	65	3322	2.6	90941	71.2	70
59	1.5722	0.3220	1528	66	3344	2.6	94285	73.8	72
60	1.6789	0.3314	1550	68	3355	2.6	97640	76.4	75
61	1.7923	0.3425	1573	71	3336	2.6	100976	79.0	78
62	1.9141	0.3557	1598	73	3363	2.6	104339	81.6	80
63	2.0462	0.3717	1625	77	3233	2.5	107572	84.2	83
64	2.1915	0.3912	1655	81	3257	2.5	110829	86.7	85
65	2.3539	0.4155	1689	86	3257	2.5	114086	89.3	88
66	2.5392	0.4466	1727	92	3063	2.4	117149	91.7	90
67	2.7566	0.4875	1772	101	2924	2.3	120073	94.0	93
68	3.0209	0.5436	1827	112	2622	2.1	122695	96.0	95
69	3.3600	0.6259	1897	129	2180	1.7	124875	97.7	97
70	3.8338	0.7617	1994	157	1639	1.3	126514	99.0	98
71	4.6234	1.0560	2157	218	929	0.7	127443	99.7	99
72	5.9191	1.8657	2425	385	354	0.3	127797	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	-5.5148	1.8391	1000	228	0	0.0	0	0.0	0
1	-4.2766	1.0242	1000	127	0	0.0	0	0.0	0
2	-3.5348	0.7406	1000	92	0	0.0	0	0.0	0
3	-3.0809	0.6177	1000	76	5	0.0	5	0.0	1
4	-2.7452	0.5459	1000	68	19	0.0	24	0.0	1
5	-2.4741	0.4980	1000	62	50	0.0	74	0.1	1
6	-2.2438	0.4633	1000	57	136	0.1	210	0.2	1
7	-2.0416	0.4370	1000	54	248	0.2	458	0.4	1
8	-1.8598	0.4163	1000	52	424	0.3	882	0.7	1
9	-1.6936	0.3997	1000	49	578	0.5	1460	1.2	1
10	-1.5394	0.3860	1017	48	857	0.7	2317	1.9	2
11	-1.3948	0.3747	1035	46	1074	0.9	3391	2.7	2
12	-1.2580	0.3653	1052	45	1232	1.0	4623	3.7	3
13	-1.1275	0.3574	1068	44	1351	1.1	5974	4.8	4
14	-1.0022	0.3507	1084	43	1470	1.2	7444	6.0	5
15	-0.8812	0.3451	1099	43	1577	1.3	9021	7.2	7
16	-0.7638	0.3405	1113	42	1676	1.3	10697	8.6	8
17	-0.6492	0.3367	1127	42	1842	1.5	12539	10.1	9
18	-0.5369	0.3336	1141	41	1835	1.5	14374	11.5	11
19	-0.4264	0.3313	1155	41	1999	1.6	16373	13.1	12
20	-0.3173	0.3295	1168	41	2119	1.7	18492	14.8	14
21	-0.2091	0.3284	1182	41	2224	1.8	20716	16.6	16
22	-0.1015	0.3279	1195	41	2333	1.9	23049	18.5	18
23	0.0060	0.3279	1208	41	2532	2.0	25581	20.5	20
24	0.1137	0.3285	1222	41	2823	2.3	28404	22.8	22
25	0.2220	0.3297	1235	41	2983	2.4	31387	25.2	24
26	0.3313	0.3315	1249	41	3229	2.6	34616	27.8	26
27	0.4419	0.3339	1262	41	3528	2.8	38144	30.6	29
28	0.5545	0.3371	1276	42	3704	3.0	41848	33.6	32
29	0.6694	0.3409	1291	42	4016	3.2	45864	36.8	35
30	0.7871	0.3456	1305	43	4332	3.5	50196	40.3	39
31	0.9084	0.3512	1320	43	4753	3.8	54949	44.1	42
32	1.0340	0.3578	1336	44	5062	4.1	60011	48.1	46
33	1.1648	0.3657	1352	45	5401	4.3	65412	52.5	50
34	1.3019	0.3750	1369	46	5624	4.5	71036	57.0	55
35	1.4466	0.3861	1387	48	5963	4.8	76999	61.8	59
36	1.6007	0.3993	1406	49	6054	4.9	83053	66.6	64
37	1.7663	0.4152	1426	51	6293	5.0	89346	71.7	69
38	1.9466	0.4346	1449	54	6310	5.1	95656	76.7	74
39	2.1457	0.4585	1473	57	6356	5.1	102012	81.8	79
40	2.3695	0.4887	1501	61	6155	4.9	108167	86.8	84
41	2.6271	0.5279	1533	65	5567	4.5	113734	91.2	89
42	2.9331	0.5808	1571	72	4546	3.6	118280	94.9	93
43	3.3135	0.6571	1618	81	3327	2.7	121607	97.5	96
44	3.8240	0.7823	1681	97	2029	1.6	123636	99.2	98
45	4.6362	1.0611	1782	131	871	0.7	124507	99.9	99
46	5.9315	1.8622	1942	231	171	0.1	124678	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	-5.3603	1.8361	700	367	0	0.0	0	0.0	0
1	-4.1297	1.0188	700	204	0	0.0	0	0.0	0
2	-3.3987	0.7333	700	147	1	0.0	1	0.0	1
3	-2.9557	0.6089	700	122	4	0.0	5	0.0	1
4	-2.6306	0.5360	700	107	8	0.0	13	0.0	1
5	-2.3702	0.4870	700	97	23	0.0	36	0.0	1
6	-2.1507	0.4515	726	90	55	0.0	91	0.1	1
7	-1.9594	0.4242	764	85	116	0.1	207	0.2	1
8	-1.7888	0.4027	799	81	178	0.1	385	0.3	1
9	-1.6338	0.3851	830	77	272	0.2	657	0.5	1
10	-1.4912	0.3706	858	74	360	0.3	1017	0.8	1
11	-1.3584	0.3584	885	72	499	0.4	1516	1.2	1
12	-1.2337	0.3480	910	70	603	0.5	2119	1.7	1
13	-1.1158	0.3391	933	68	760	0.6	2879	2.3	2
14	-1.0034	0.3314	956	66	938	0.8	3817	3.1	3
15	-0.8959	0.3247	977	65	952	0.8	4769	3.8	3
16	-0.7923	0.3190	998	64	1045	0.8	5814	4.7	4
17	-0.6923	0.3140	1018	63	1131	0.9	6945	5.6	5
18	-0.5950	0.3097	1037	62	1223	1.0	8168	6.6	6
19	-0.5003	0.3060	1056	61	1350	1.1	9518	7.6	7
20	-0.4076	0.3029	1075	61	1474	1.2	10992	8.8	8
21	-0.3167	0.3003	1093	60	1478	1.2	12470	10.0	9
22	-0.2272	0.2982	1111	60	1623	1.3	14093	11.3	11
23	-0.1389	0.2965	1129	59	1720	1.4	15813	12.7	12
24	-0.0513	0.2953	1146	59	1980	1.6	17793	14.3	13
25	0.0357	0.2946	1163	59	2067	1.7	19860	15.9	15
26	0.1224	0.2943	1181	59	2242	1.8	22102	17.7	17
27	0.2090	0.2945	1198	59	2556	2.1	24658	19.8	19
28	0.2959	0.2951	1215	59	2634	2.1	27292	21.9	21
29	0.3833	0.2962	1233	59	2848	2.3	30140	24.2	23
30	0.4714	0.2977	1251	60	2998	2.4	33138	26.6	25
31	0.5607	0.2998	1268	60	3341	2.7	36479	29.3	28
32	0.6513	0.3024	1287	60	3714	3.0	40193	32.3	31
33	0.7437	0.3055	1305	61	3929	3.2	44122	35.4	34
34	0.8382	0.3093	1324	62	4244	3.4	48366	38.8	37
35	0.9352	0.3137	1343	63	4526	3.6	52892	42.5	41
36	1.0352	0.3189	1363	64	5043	4.0	57935	46.5	44
37	1.1388	0.3249	1384	65	5099	4.1	63034	50.6	49
38	1.2465	0.3318	1406	66	5515	4.4	68549	55.0	53
39	1.3592	0.3398	1428	68	5889	4.7	74438	59.8	57
40	1.4778	0.3491	1452	70	5954	4.8	80392	64.6	62
41	1.6033	0.3598	1477	72	6376	5.1	86768	69.7	67
42	1.7373	0.3725	1504	75	6185	5.0	92953	74.6	72
43	1.8815	0.3874	1533	77	6286	5.0	99239	79.7	77
44	2.0385	0.4054	1564	81	5985	4.8	105224	84.5	82
45	2.2116	0.4275	1599	86	5506	4.4	110730	88.9	87
46	2.4059	0.4552	1637	91	4642	3.7	115372	92.6	91
47	2.6291	0.4912	1682	98	3707	3.0	119079	95.6	94
48	2.8941	0.5407	1735	108	2608	2.1	121687	97.7	97
49	3.2247	0.6139	1801	123	1653	1.3	123340	99.0	98
50	3.6743	0.7382	1891	148	862	0.7	124202	99.7	99
51	4.4133	1.0231	2039	205	286	0.2	124488	100.0	99
52	5.6505	1.8388	2286	368	47	0.0	124535	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	-5.5887	1.8383	700	365	0	0.0	0	0.0	0
1	-4.3525	1.0227	700	203	0	0.0	0	0.0	0
2	-3.6135	0.7388	700	147	1	0.0	1	0.0	1
3	-3.1622	0.6157	700	122	2	0.0	3	0.0	1
4	-2.8288	0.5438	700	108	8	0.0	11	0.0	1
5	-2.5598	0.4958	700	99	17	0.0	28	0.0	1
6	-2.3317	0.4610	700	92	58	0.0	86	0.1	1
7	-2.1316	0.4345	700	86	98	0.1	184	0.1	1
8	-1.9520	0.4137	707	82	160	0.1	344	0.3	1
9	-1.7880	0.3968	739	79	251	0.2	595	0.5	1
10	-1.6362	0.3829	769	76	309	0.2	904	0.7	1
11	-1.4942	0.3712	798	74	433	0.3	1337	1.1	1
12	-1.3601	0.3613	824	72	488	0.4	1825	1.4	1
13	-1.2327	0.3529	850	70	619	0.5	2444	1.9	2
14	-1.1107	0.3457	874	69	740	0.6	3184	2.5	2
15	-0.9933	0.3395	897	67	782	0.6	3966	3.1	3
16	-0.8799	0.3342	920	66	780	0.6	4746	3.8	3
17	-0.7698	0.3297	942	66	834	0.7	5580	4.4	4
18	-0.6624	0.3258	963	65	956	0.8	6536	5.2	5
19	-0.5573	0.3226	984	64	1054	0.8	7590	6.0	6
20	-0.4541	0.3199	1004	64	1117	0.9	8707	6.9	6
21	-0.3525	0.3178	1025	63	1193	0.9	9900	7.9	7
22	-0.2521	0.3161	1044	63	1343	1.1	11243	8.9	8
23	-0.1525	0.3149	1064	63	1536	1.2	12779	10.1	10
24	-0.0536	0.3142	1084	62	1646	1.3	14425	11.5	11
25	0.0450	0.3139	1104	62	1893	1.5	16318	13.0	12
26	0.1436	0.3141	1123	62	2037	1.6	18355	14.6	14
27	0.2425	0.3147	1143	63	2334	1.9	20689	16.4	15
28	0.3418	0.3158	1163	63	2513	2.0	23202	18.4	17
29	0.4420	0.3173	1182	63	2705	2.1	25907	20.6	19
30	0.5433	0.3193	1203	63	3235	2.6	29142	23.1	22
31	0.6461	0.3219	1223	64	3670	2.9	32812	26.0	25
32	0.7506	0.3250	1244	65	3933	3.1	36745	29.2	28
33	0.8574	0.3286	1265	65	4554	3.6	41299	32.8	31
34	0.9668	0.3329	1287	66	4939	3.9	46238	36.7	35
35	1.0792	0.3379	1309	67	5344	4.2	51582	41.0	39
36	1.1953	0.3437	1332	68	5823	4.6	57405	45.6	43
37	1.3157	0.3503	1356	70	6198	4.9	63603	50.5	48
38	1.4411	0.3580	1381	71	6527	5.2	70130	55.7	53
39	1.5723	0.3668	1407	73	6916	5.5	77046	61.2	58
40	1.7105	0.3769	1435	75	6924	5.5	83970	66.7	64
41	1.8569	0.3887	1464	77	6888	5.5	90858	72.1	69
42	2.0132	0.4024	1495	80	6940	5.5	97798	77.6	75
43	2.1815	0.4185	1528	83	6438	5.1	104236	82.8	80
44	2.3645	0.4377	1565	87	5730	4.5	109966	87.3	85
45	2.5660	0.4609	1605	92	5000	4.0	114966	91.3	89
46	2.7915	0.4897	1650	97	4177	3.3	119143	94.6	93
47	3.0489	0.5266	1701	105	2924	2.3	122067	96.9	96
48	3.3516	0.5762	1761	115	1937	1.5	124004	98.4	98
49	3.7239	0.6486	1835	129	1150	0.9	125154	99.4	99
50	4.2195	0.7700	1933	153	552	0.4	125706	99.8	99
51	5.0084	1.0481	2090	208	215	0.2	125921	100.0	99
52	6.2825	1.8534	2344	368	42	0.0	125963	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	-5.6865	1.8421	700	368	1	0.0	1	0.0	1
1	-4.4419	1.0276	700	206	2	0.0	3	0.0	1
2	-3.6952	0.7425	700	149	5	0.0	8	0.0	1
3	-3.2402	0.6174	700	123	0	0.0	8	0.0	1
4	-2.9062	0.5433	700	109	7	0.0	15	0.0	1
5	-2.6388	0.4932	700	99	16	0.0	31	0.0	1
6	-2.4139	0.4567	700	91	44	0.0	75	0.1	1
7	-2.2183	0.4288	725	86	75	0.1	150	0.1	1
8	-2.0441	0.4067	760	81	107	0.1	257	0.2	1
9	-1.8861	0.3888	792	78	204	0.2	461	0.4	1
10	-1.7407	0.3741	821	75	296	0.2	757	0.6	1
11	-1.6055	0.3618	848	72	392	0.3	1149	0.9	1
12	-1.4784	0.3514	873	70	518	0.4	1667	1.3	1
13	-1.3581	0.3427	897	69	645	0.5	2312	1.8	2
14	-1.2432	0.3352	920	67	761	0.6	3073	2.4	2
15	-1.1330	0.3289	942	66	923	0.7	3996	3.2	3
16	-1.0266	0.3235	964	65	935	0.7	4931	3.9	4
17	-0.9235	0.3189	984	64	1046	0.8	5977	4.7	4
18	-0.8230	0.3151	1004	63	1246	1.0	7223	5.7	5
19	-0.7248	0.3119	1024	62	1273	1.0	8496	6.7	6
20	-0.6283	0.3093	1043	62	1329	1.1	9825	7.8	7
21	-0.5333	0.3072	1062	61	1515	1.2	11340	9.0	8
22	-0.4394	0.3057	1081	61	1532	1.2	12872	10.2	10
23	-0.3463	0.3046	1100	61	1720	1.4	14592	11.6	11
24	-0.2538	0.3040	1118	61	1888	1.5	16480	13.1	12
25	-0.1615	0.3038	1137	61	2011	1.6	18491	14.7	14
26	-0.0692	0.3040	1155	61	2131	1.7	20622	16.3	16
27	0.0234	0.3047	1174	61	2368	1.9	22990	18.2	17
28	0.1165	0.3058	1192	61	2498	2.0	25488	20.2	19
29	0.2105	0.3073	1211	61	2746	2.2	28234	22.4	21
30	0.3055	0.3093	1230	62	2992	2.4	31226	24.7	24
31	0.4019	0.3118	1249	62	3252	2.6	34478	27.3	26
32	0.5001	0.3149	1269	63	3507	2.8	37985	30.1	29
33	0.6003	0.3185	1289	64	3672	2.9	41657	33.0	32
34	0.7030	0.3227	1310	65	4104	3.3	45761	36.3	35
35	0.8087	0.3275	1331	66	4308	3.4	50069	39.7	38
36	0.9178	0.3332	1353	67	4591	3.6	54660	43.3	42
37	1.0309	0.3397	1375	68	5106	4.0	59766	47.4	45
38	1.1488	0.3472	1399	69	5332	4.2	65098	51.6	49
39	1.2723	0.3558	1423	71	5547	4.4	70645	56.0	54
40	1.4023	0.3657	1449	73	5797	4.6	76442	60.6	58
41	1.5402	0.3772	1477	75	6076	4.8	82518	65.4	63
42	1.6875	0.3906	1506	78	6243	4.9	88761	70.4	68
43	1.8462	0.4065	1538	81	6509	5.2	95270	75.5	73
44	2.0189	0.4253	1573	85	6236	4.9	101506	80.5	78
45	2.2094	0.4482	1611	90	5960	4.7	107466	85.2	83
46	2.4229	0.4767	1654	95	5403	4.3	112869	89.5	87
47	2.6671	0.5132	1702	103	4670	3.7	117539	93.2	91
48	2.9552	0.5627	1760	113	3603	2.9	121142	96.0	95
49	3.3111	0.6351	1831	127	2517	2.0	123659	98.0	97
50	3.7883	0.7573	1927	151	1553	1.2	125212	99.2	99
51	4.5567	1.0377	2080	208	762	0.6	125974	99.8	99
52	5.8151	1.8472	2332	369	196	0.2	126170	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	-5.3863	1.8356	700	367	0	0.0	0	0.0	0
1	-4.1571	1.0179	700	204	0	0.0	0	0.0	0
2	-3.4276	0.7325	700	147	1	0.0	1	0.0	1
3	-2.9855	0.6084	700	122	2	0.0	3	0.0	1
4	-2.6608	0.5359	700	107	8	0.0	11	0.0	1
5	-2.4003	0.4874	714	97	24	0.0	35	0.0	1
6	-2.1803	0.4523	758	90	65	0.1	100	0.1	1
7	-1.9880	0.4257	797	85	106	0.1	206	0.2	1
8	-1.8159	0.4047	831	81	166	0.1	372	0.3	1
9	-1.6591	0.3877	863	78	253	0.2	625	0.5	1
10	-1.5143	0.3738	892	75	381	0.3	1006	0.8	1
11	-1.3790	0.3622	919	72	529	0.4	1535	1.2	1
12	-1.2514	0.3524	944	70	636	0.5	2171	1.7	1
13	-1.1303	0.3440	968	69	748	0.6	2919	2.3	2
14	-1.0144	0.3369	992	67	942	0.7	3861	3.0	3
15	-0.9030	0.3308	1014	66	994	0.8	4855	3.8	3
16	-0.7954	0.3256	1035	65	1143	0.9	5998	4.7	4
17	-0.6909	0.3211	1056	64	1209	1.0	7207	5.7	5
18	-0.5889	0.3174	1077	63	1403	1.1	8610	6.8	6
19	-0.4893	0.3142	1097	63	1479	1.2	10089	8.0	7
20	-0.3914	0.3116	1116	62	1611	1.3	11700	9.2	9
21	-0.2950	0.3095	1135	62	1672	1.3	13372	10.5	10
22	-0.1998	0.3078	1154	62	1832	1.4	15204	12.0	11
23	-0.1054	0.3066	1173	61	2045	1.6	17249	13.6	13
24	-0.0117	0.3059	1192	61	2236	1.8	19485	15.4	14
25	0.0817	0.3055	1211	61	2344	1.8	21829	17.2	16
26	0.1751	0.3056	1229	61	2694	2.1	24523	19.3	18
27	0.2686	0.3061	1248	61	2867	2.3	27390	21.6	20
28	0.3626	0.3070	1267	61	3111	2.5	30501	24.0	23
29	0.4572	0.3084	1286	62	3379	2.7	33880	26.7	25
30	0.5528	0.3101	1305	62	3691	2.9	37571	29.6	28
31	0.6497	0.3124	1324	62	3908	3.1	41479	32.7	31
32	0.7481	0.3151	1344	63	4350	3.4	45829	36.1	34
33	0.8485	0.3184	1364	64	4620	3.6	50449	39.8	38
34	0.9510	0.3223	1385	64	4934	3.9	55383	43.6	42
35	1.0563	0.3268	1406	65	5286	4.2	60669	47.8	46
36	1.1648	0.3320	1427	66	5495	4.3	66164	52.1	50
37	1.2769	0.3380	1450	68	5812	4.6	71976	56.7	54
38	1.3935	0.3450	1473	69	6014	4.7	77990	61.5	59
39	1.5153	0.3530	1497	71	6282	5.0	84272	66.4	64
40	1.6432	0.3624	1523	72	6177	4.9	90449	71.3	69
41	1.7783	0.3732	1550	75	5993	4.7	96442	76.0	74
42	1.9223	0.3859	1579	77	5846	4.6	102288	80.6	78
43	2.0769	0.4009	1610	80	5420	4.3	107708	84.9	83
44	2.2447	0.4190	1643	84	4913	3.9	112621	88.7	87
45	2.4294	0.4411	1680	88	4219	3.3	116840	92.1	90
46	2.6359	0.4687	1722	94	3499	2.8	120339	94.8	93
47	2.8720	0.5045	1769	101	2622	2.1	122961	96.9	96
48	3.1506	0.5535	1825	111	1839	1.4	124800	98.3	98
49	3.4955	0.6258	1894	125	1160	0.9	125960	99.3	99
50	3.9603	0.7486	1986	150	621	0.5	126581	99.7	99
51	4.7149	1.0308	2137	206	269	0.2	126850	100.0	99
52	5.9632	1.8432	2387	369	52	0.0	126902	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	-5.0576	1.8388	700	432	0	0.0	0	0.0	0
1	-3.8207	1.0230	700	240	0	0.0	0	0.0	0
2	-3.0817	0.7382	700	173	0	0.0	0	0.0	0
3	-2.6319	0.6141	700	144	4	0.0	4	0.0	1
4	-2.3009	0.5412	700	127	9	0.0	13	0.0	1
5	-2.0351	0.4923	700	116	20	0.0	33	0.0	1
6	-1.8107	0.4567	700	107	44	0.0	77	0.1	1
7	-1.6148	0.4296	735	101	75	0.1	152	0.1	1
8	-1.4396	0.4081	776	96	145	0.1	297	0.2	1
9	-1.2803	0.3908	813	92	228	0.2	525	0.4	1
10	-1.1332	0.3766	848	88	275	0.2	800	0.6	1
11	-0.9960	0.3647	880	86	399	0.3	1199	0.9	1
12	-0.8667	0.3546	910	83	551	0.4	1750	1.4	1
13	-0.7440	0.3461	939	81	600	0.5	2350	1.8	2
14	-0.6268	0.3389	967	80	818	0.6	3168	2.5	2
15	-0.5140	0.3327	993	78	793	0.6	3961	3.1	3
16	-0.4051	0.3275	1019	77	983	0.8	4944	3.9	4
17	-0.2994	0.3230	1043	76	1086	0.9	6030	4.7	4
18	-0.1963	0.3192	1068	75	1188	0.9	7218	5.7	5
19	-0.0955	0.3161	1091	74	1213	1.0	8431	6.6	6
20	0.0036	0.3135	1115	74	1385	1.1	9816	7.7	7
21	0.1012	0.3114	1137	73	1534	1.2	11350	8.9	8
22	0.1977	0.3099	1160	73	1550	1.2	12900	10.1	10
23	0.2933	0.3088	1183	73	1741	1.4	14641	11.5	11
24	0.3885	0.3081	1205	72	1768	1.4	16409	12.9	12
25	0.4833	0.3079	1227	72	2081	1.6	18490	14.5	14
26	0.5781	0.3081	1249	72	2188	1.7	20678	16.3	15
27	0.6732	0.3087	1272	72	2532	2.0	23210	18.3	17
28	0.7688	0.3097	1294	73	2709	2.1	25919	20.4	19
29	0.8651	0.3112	1317	73	2951	2.3	28870	22.7	22
30	0.9626	0.3131	1340	74	3277	2.6	32147	25.3	24
31	1.0613	0.3155	1363	74	3639	2.9	35786	28.2	27
32	1.1618	0.3185	1387	75	3973	3.1	39759	31.3	30
33	1.2643	0.3220	1411	76	4322	3.4	44081	34.7	33
34	1.3692	0.3260	1435	77	4645	3.7	48726	38.3	37
35	1.4770	0.3308	1461	78	5102	4.0	53828	42.3	40
36	1.5882	0.3363	1487	79	5349	4.2	59177	46.6	44
37	1.7034	0.3426	1514	80	5724	4.5	64901	51.1	49
38	1.8233	0.3499	1542	82	6035	4.7	70936	55.8	53
39	1.9485	0.3583	1571	84	6114	4.8	77050	60.6	58
40	2.0803	0.3680	1602	86	6470	5.1	83520	65.7	63
41	2.2198	0.3793	1635	89	6497	5.1	90017	70.8	68
42	2.3686	0.3924	1670	92	6442	5.1	96459	75.9	73
43	2.5286	0.4079	1707	96	6119	4.8	102578	80.7	78
44	2.7024	0.4265	1748	100	5694	4.5	108272	85.2	83
45	2.8937	0.4490	1793	105	5016	3.9	113288	89.1	87
46	3.1077	0.4771	1843	112	4346	3.4	117634	92.5	91
47	3.3522	0.5132	1901	121	3438	2.7	121072	95.2	94
48	3.6400	0.5623	1968	132	2687	2.1	123759	97.4	96
49	3.9953	0.6344	2052	149	1724	1.4	125483	98.7	98
50	4.4714	0.7564	2164	178	1074	0.8	126557	99.6	99
51	5.2383	1.0370	2344	244	460	0.4	127017	99.9	99
52	6.4956	1.8468	2639	434	108	0.1	127125	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	-5.6121	1.8376	700	451	1	0.0	1	0.0	1
1	-4.3782	1.0209	700	251	0	0.0	1	0.0	1
2	-3.6435	0.7354	700	181	1	0.0	2	0.0	1
3	-3.1978	0.6108	700	150	6	0.0	8	0.0	1
4	-2.8708	0.5376	700	132	17	0.0	25	0.0	1
5	-2.6089	0.4884	700	120	35	0.0	60	0.0	1
6	-2.3881	0.4527	700	111	69	0.1	129	0.1	1
7	-2.1958	0.4255	700	104	88	0.1	217	0.2	1
8	-2.0240	0.4041	700	99	184	0.1	401	0.3	1
9	-1.8678	0.3868	700	95	252	0.2	653	0.5	1
10	-1.7238	0.3726	700	91	346	0.3	999	0.8	1
11	-1.5895	0.3607	725	89	440	0.3	1439	1.1	1
12	-1.4631	0.3508	756	86	533	0.4	1972	1.5	1
13	-1.3431	0.3424	786	84	681	0.5	2653	2.1	2
14	-1.2283	0.3352	814	82	724	0.6	3377	2.6	2
15	-1.1180	0.3291	841	81	736	0.6	4113	3.2	3
16	-1.0115	0.3239	867	80	900	0.7	5013	3.9	4
17	-0.9080	0.3195	892	78	1032	0.8	6045	4.7	4
18	-0.8071	0.3158	917	78	1064	0.8	7109	5.6	5
19	-0.7084	0.3127	941	77	1186	0.9	8295	6.5	6
20	-0.6114	0.3102	965	76	1278	1.0	9573	7.5	7
21	-0.5158	0.3082	989	76	1326	1.0	10899	8.5	8
22	-0.4214	0.3066	1012	75	1638	1.3	12537	9.8	9
23	-0.3278	0.3055	1035	75	1667	1.3	14204	11.1	10
24	-0.2347	0.3048	1058	75	1928	1.5	16132	12.6	12
25	-0.1419	0.3045	1080	75	2007	1.6	18139	14.2	13
26	-0.0492	0.3046	1103	75	2270	1.8	20409	15.9	15
27	0.0437	0.3051	1126	75	2487	1.9	22896	17.9	17
28	0.1370	0.3060	1149	75	2819	2.2	25715	20.1	19
29	0.2310	0.3073	1172	75	3058	2.4	28773	22.5	21
30	0.3260	0.3091	1195	76	3288	2.6	32061	25.0	24
31	0.4221	0.3112	1219	76	3599	2.8	35660	27.9	26
32	0.5198	0.3139	1243	77	3809	3.0	39469	30.8	29
33	0.6194	0.3171	1267	78	4215	3.3	43684	34.1	32
34	0.7211	0.3209	1292	79	4531	3.5	48215	37.7	36
35	0.8254	0.3253	1318	80	4942	3.9	53157	41.5	40
36	0.9329	0.3304	1344	81	5171	4.0	58328	45.6	44
37	1.0439	0.3362	1371	83	5410	4.2	63738	49.8	48
38	1.1592	0.3430	1400	84	5700	4.5	69438	54.2	52
39	1.2795	0.3509	1429	86	6185	4.8	75623	59.1	57
40	1.4058	0.3600	1460	88	6105	4.8	81728	63.9	61
41	1.5392	0.3706	1493	91	6333	4.9	88061	68.8	66
42	1.6811	0.3831	1528	94	6236	4.9	94297	73.7	71
43	1.8334	0.3979	1565	98	6051	4.7	100348	78.4	76
44	1.9988	0.4158	1606	102	5752	4.5	106100	82.9	81
45	2.1805	0.4376	1650	107	5298	4.1	111398	87.0	85
46	2.3838	0.4651	1700	114	4563	3.6	115961	90.6	89
47	2.6162	0.5008	1757	123	4042	3.2	120003	93.8	92
48	2.8908	0.5497	1825	135	3349	2.6	123352	96.4	95
49	3.2314	0.6221	1908	153	2266	1.8	125618	98.1	97
50	3.6914	0.7453	2021	183	1457	1.1	127075	99.3	99
51	4.4410	1.0283	2205	252	713	0.6	127788	99.8	99
52	5.6857	1.8418	2511	452	209	0.2	127997	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	-5.5810	1.8340	1050	324	0	0.0	0	0.0	0
1	-4.3561	1.0147	1050	179	0	0.0	0	0.0	0
2	-3.6336	0.7274	1050	129	0	0.0	0	0.0	0
3	-3.1993	0.6017	1050	106	0	0.0	0	0.0	0
4	-2.8831	0.5275	1050	93	0	0.0	0	0.0	0
5	-2.6318	0.4775	1050	84	1	0.0	1	0.0	1
6	-2.4217	0.4409	1050	78	2	0.0	3	0.0	1
7	-2.2400	0.4127	1050	73	3	0.0	6	0.0	1
8	-2.0791	0.3903	1050	69	3	0.0	9	0.0	1
9	-1.9340	0.3719	1050	66	21	0.0	30	0.0	1
10	-1.8015	0.3565	1050	63	33	0.0	63	0.0	1
11	-1.6791	0.3435	1050	61	62	0.0	125	0.1	1
12	-1.5651	0.3322	1050	59	84	0.1	209	0.2	1
13	-1.4579	0.3225	1050	57	125	0.1	334	0.3	1
14	-1.3568	0.3139	1050	55	195	0.2	529	0.4	1
15	-1.2606	0.3064	1050	54	262	0.2	791	0.6	1
16	-1.1689	0.2997	1050	53	348	0.3	1139	0.9	1
17	-1.0809	0.2937	1050	52	390	0.3	1529	1.2	1
18	-0.9962	0.2884	1050	51	452	0.4	1981	1.5	1
19	-0.9144	0.2836	1064	50	531	0.4	2512	2.0	2
20	-0.8352	0.2793	1078	49	613	0.5	3125	2.4	2
21	-0.7583	0.2755	1092	49	676	0.5	3801	3.0	3
22	-0.6833	0.2720	1105	48	814	0.6	4615	3.6	3
23	-0.6102	0.2690	1118	48	812	0.6	5427	4.2	4
24	-0.5386	0.2662	1130	47	873	0.7	6300	4.9	5
25	-0.4684	0.2638	1143	47	827	0.6	7127	5.6	5
26	-0.3994	0.2616	1155	46	948	0.7	8075	6.3	6
27	-0.3314	0.2597	1167	46	1028	0.8	9103	7.1	7
28	-0.2644	0.2581	1179	46	1087	0.8	10190	8.0	8
29	-0.1982	0.2567	1191	45	1161	0.9	11351	8.9	8
30	-0.1325	0.2556	1202	45	1246	1.0	12597	9.8	9
31	-0.0675	0.2546	1214	45	1300	1.0	13897	10.8	10
32	-0.0028	0.2539	1225	45	1420	1.1	15317	12.0	11
33	0.0616	0.2534	1237	45	1493	1.2	16810	13.1	13
34	0.1257	0.2532	1248	45	1549	1.2	18359	14.3	14
35	0.1897	0.2531	1259	45	1644	1.3	20003	15.6	15
36	0.2538	0.2532	1271	45	1836	1.4	21839	17.0	16
37	0.3180	0.2536	1282	45	1889	1.5	23728	18.5	18
38	0.3825	0.2542	1293	45	2007	1.6	25735	20.1	19
39	0.4473	0.2550	1305	45	2091	1.6	27826	21.7	21
40	0.5126	0.2560	1316	45	2310	1.8	30136	23.5	23
41	0.5785	0.2573	1328	45	2339	1.8	32475	25.4	24
42	0.6451	0.2589	1340	46	2561	2.0	35036	27.3	26
43	0.7126	0.2607	1352	46	2696	2.1	37732	29.5	28
44	0.7811	0.2628	1364	46	2927	2.3	40659	31.7	31
45	0.8508	0.2653	1376	47	3132	2.4	43791	34.2	33
46	0.9218	0.2680	1389	47	3320	2.6	47111	36.8	35
47	0.9945	0.2711	1401	48	3367	2.6	50478	39.4	38
48	1.0690	0.2747	1415	49	3667	2.9	54145	42.3	41
49	1.1455	0.2786	1428	49	3688	2.9	57833	45.1	44
50	1.2243	0.2831	1442	50	4032	3.1	61865	48.3	47
51	1.3059	0.2882	1456	51	4262	3.3	66127	51.6	50
52	1.3906	0.2938	1471	52	4452	3.5	70579	55.1	53

Appendix N: Raw-to-Scaled Score Conversion Tables

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
53	1.4788	0.3003	1487	53	4630	3.6	75209	58.7	57
54	1.5711	0.3075	1503	54	4769	3.7	79978	62.4	61
55	1.6681	0.3158	1520	56	4868	3.8	84846	66.2	64
56	1.7709	0.3254	1539	58	5041	3.9	89887	70.2	68
57	1.8803	0.3364	1558	59	5086	4.0	94973	74.1	72
58	1.9977	0.3492	1579	62	5019	3.9	99992	78.1	76
59	2.1249	0.3645	1601	64	4888	3.8	104880	81.9	80
60	2.2643	0.3827	1626	68	4767	3.7	109647	85.6	84
61	2.4192	0.4051	1653	72	4459	3.5	114106	89.1	87
62	2.5945	0.4332	1684	77	4014	3.1	118120	92.2	91
63	2.7977	0.4699	1720	83	3353	2.6	121473	94.8	94
64	3.0416	0.5202	1763	92	2734	2.1	124207	97.0	96
65	3.3497	0.5948	1818	105	1987	1.6	126194	98.5	98
66	3.7755	0.7213	1893	127	1219	1.0	127413	99.5	99
67	4.4888	1.0100	2019	179	539	0.4	127952	99.9	99
68	5.7067	1.8311	2234	324	151	0.1	128103	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	-5.5963	1.8310	925	351	1	0.0	1	0.0	1
1	-4.3788	1.0097	925	193	0	0.0	1	0.0	1
2	-3.6662	0.7208	925	138	0	0.0	1	0.0	1
3	-3.2411	0.5943	925	114	0	0.0	1	0.0	1
4	-2.9335	0.5196	925	100	2	0.0	3	0.0	1
5	-2.6902	0.4693	925	90	3	0.0	6	0.0	1
6	-2.4875	0.4326	925	83	8	0.0	14	0.0	1
7	-2.3128	0.4044	925	77	21	0.0	35	0.0	1
8	-2.1584	0.3820	925	73	43	0.0	78	0.1	1
9	-2.0196	0.3638	925	70	86	0.1	164	0.1	1
10	-1.8928	0.3485	925	67	151	0.1	315	0.2	1
11	-1.7759	0.3357	925	64	275	0.2	590	0.5	1
12	-1.6670	0.3246	925	62	428	0.3	1018	0.8	1
13	-1.5647	0.3151	925	60	591	0.5	1609	1.3	1
14	-1.4681	0.3068	925	59	789	0.6	2398	1.9	2
15	-1.3763	0.2994	933	57	980	0.8	3378	2.7	2
16	-1.2886	0.2930	950	56	1156	0.9	4534	3.6	3
17	-1.2045	0.2873	966	55	1387	1.1	5921	4.7	4
18	-1.1234	0.2822	981	54	1498	1.2	7419	5.8	5
19	-1.0451	0.2777	996	53	1571	1.2	8990	7.1	6
20	-0.9691	0.2736	1011	52	1598	1.3	10588	8.3	8
21	-0.8952	0.2700	1025	52	1767	1.4	12355	9.7	9
22	-0.8232	0.2668	1039	51	1687	1.3	14042	11.1	10
23	-0.7528	0.2640	1052	51	1770	1.4	15812	12.4	12
24	-0.6838	0.2615	1066	50	1786	1.4	17598	13.8	13
25	-0.6160	0.2593	1079	50	1810	1.4	19408	15.3	15
26	-0.5492	0.2574	1091	49	1811	1.4	21219	16.7	16
27	-0.4835	0.2557	1104	49	1906	1.5	23125	18.2	17
28	-0.4184	0.2543	1116	49	1927	1.5	25052	19.7	19
29	-0.3540	0.2532	1129	48	1946	1.5	26998	21.2	20
30	-0.2901	0.2523	1141	48	2058	1.6	29056	22.9	22
31	-0.2267	0.2516	1153	48	2122	1.7	31178	24.5	24
32	-0.1635	0.2511	1165	48	2223	1.7	33401	26.3	25
33	-0.1005	0.2509	1177	48	2218	1.7	35619	28.0	27
34	-0.0376	0.2509	1189	48	2234	1.8	37853	29.8	29
35	0.0254	0.2510	1202	48	2325	1.8	40178	31.6	31
36	0.0885	0.2514	1214	48	2347	1.8	42525	33.5	33
37	0.1518	0.2521	1226	48	2487	2.0	45012	35.4	34
38	0.2156	0.2529	1238	48	2603	2.0	47615	37.5	36
39	0.2798	0.2540	1250	49	2671	2.1	50286	39.6	39
40	0.3446	0.2553	1263	49	2740	2.2	53026	41.7	41
41	0.4102	0.2569	1275	49	2832	2.2	55858	44.0	43
42	0.4767	0.2587	1288	50	2900	2.3	58758	46.2	45
43	0.5442	0.2608	1301	50	3011	2.4	61769	48.6	47
44	0.6128	0.2632	1314	50	3049	2.4	64818	51.0	50
45	0.6828	0.2660	1327	51	3225	2.5	68043	53.5	52
46	0.7543	0.2690	1341	52	3404	2.7	71447	56.2	55
47	0.8277	0.2725	1355	52	3292	2.6	74739	58.8	58
48	0.9029	0.2763	1370	53	3456	2.7	78195	61.5	60
49	0.9805	0.2807	1384	54	3502	2.8	81697	64.3	63
50	1.0606	0.2855	1400	55	3613	2.8	85310	67.1	66
51	1.1436	0.2909	1416	56	3614	2.8	88924	70.0	69
52	1.2300	0.2970	1432	57	3671	2.9	92595	72.9	71

Appendix N: Raw-to-Scaled Score Conversion Tables

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
53	1.3202	0.3038	1450	58	3660	2.9	96255	75.7	74
54	1.4148	0.3116	1468	60	3620	2.8	99875	78.6	77
55	1.5146	0.3204	1487	61	3620	2.8	103495	81.4	80
56	1.6204	0.3304	1507	63	3396	2.7	106891	84.1	83
57	1.7334	0.3420	1529	66	3277	2.6	110168	86.7	85
58	1.8548	0.3555	1552	68	3143	2.5	113311	89.2	88
59	1.9868	0.3713	1577	71	2970	2.3	116281	91.5	90
60	2.1316	0.3903	1605	75	2687	2.1	118968	93.6	93
61	2.2929	0.4135	1636	79	2259	1.8	121227	95.4	95
62	2.4756	0.4425	1671	85	1994	1.6	123221	97.0	96
63	2.6878	0.4801	1711	92	1491	1.2	124712	98.1	98
64	2.9423	0.5314	1760	102	1083	0.9	125795	99.0	99
65	3.2635	0.6067	1822	116	721	0.6	126516	99.6	99
66	3.7053	0.7335	1906	140	365	0.3	126881	99.8	99
67	4.4386	1.0210	2047	196	163	0.1	127044	100.0	99
68	5.6735	1.8383	2283	352	31	0.0	127075	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	-5.4748	1.8323	1050	187	1	0.0	1	0.0	1
1	-4.2541	1.0118	1050	103	0	0.0	1	0.0	1
2	-3.5372	0.7236	1050	74	0	0.0	1	0.0	1
3	-3.1082	0.5974	1050	61	0	0.0	1	0.0	1
4	-2.7969	0.5230	1050	53	2	0.0	3	0.0	1
5	-2.5503	0.4727	1050	48	11	0.0	14	0.0	1
6	-2.3445	0.4360	1050	44	45	0.0	59	0.0	1
7	-2.1670	0.4078	1050	42	64	0.1	123	0.1	1
8	-2.0099	0.3853	1050	39	140	0.1	263	0.2	1
9	-1.8687	0.3669	1050	37	258	0.2	521	0.4	1
10	-1.7398	0.3515	1050	36	388	0.3	909	0.7	1
11	-1.6209	0.3385	1050	34	565	0.5	1474	1.2	1
12	-1.5102	0.3272	1050	33	726	0.6	2200	1.8	1
13	-1.4064	0.3174	1052	32	1014	0.8	3214	2.6	2
14	-1.3083	0.3089	1061	31	1129	0.9	4343	3.5	3
15	-1.2153	0.3013	1071	31	1316	1.1	5659	4.5	4
16	-1.1265	0.2946	1080	30	1498	1.2	7157	5.7	5
17	-1.0415	0.2887	1089	29	1606	1.3	8763	7.0	6
18	-0.9597	0.2833	1097	29	1671	1.3	10434	8.3	8
19	-0.8808	0.2785	1105	28	1715	1.4	12149	9.7	9
20	-0.8044	0.2742	1113	28	1874	1.5	14023	11.2	10
21	-0.7303	0.2704	1120	28	1796	1.4	15819	12.6	12
22	-0.6582	0.2669	1128	27	1816	1.4	17635	14.1	13
23	-0.5878	0.2638	1135	27	1954	1.6	19589	15.6	15
24	-0.5190	0.2610	1142	27	1981	1.6	21570	17.2	16
25	-0.4515	0.2585	1149	26	2025	1.6	23595	18.8	18
26	-0.3853	0.2562	1155	26	2207	1.8	25802	20.6	20
27	-0.3202	0.2543	1162	26	2157	1.7	27959	22.3	21
28	-0.2559	0.2525	1169	26	2187	1.7	30146	24.1	23
29	-0.1925	0.2510	1175	26	2287	1.8	32433	25.9	25
30	-0.1299	0.2497	1181	25	2317	1.8	34750	27.7	27
31	-0.0678	0.2486	1188	25	2365	1.9	37115	29.6	29
32	-0.0062	0.2477	1194	25	2483	2.0	39598	31.6	31
33	0.0549	0.2470	1200	25	2567	2.0	42165	33.6	33
34	0.1158	0.2464	1206	25	2631	2.1	44796	35.7	35
35	0.1764	0.2461	1213	25	2615	2.1	47411	37.8	37
36	0.2369	0.2459	1219	25	2681	2.1	50092	40.0	39
37	0.2973	0.2458	1225	25	2865	2.3	52957	42.3	41
38	0.3578	0.2460	1231	25	2886	2.3	55843	44.6	43
39	0.4184	0.2463	1237	25	2965	2.4	58808	46.9	46
40	0.4792	0.2468	1243	25	2936	2.3	61744	49.3	48
41	0.5402	0.2474	1250	25	3089	2.5	64833	51.7	51
42	0.6017	0.2483	1256	25	3032	2.4	67865	54.2	53
43	0.6635	0.2493	1262	25	3094	2.5	70959	56.6	55
44	0.7260	0.2505	1269	26	3260	2.6	74219	59.2	58
45	0.7891	0.2519	1275	26	3241	2.6	77460	61.8	61
46	0.8529	0.2535	1282	26	3239	2.6	80699	64.4	63
47	0.9176	0.2553	1288	26	3160	2.5	83859	66.9	66
48	0.9833	0.2573	1295	26	3143	2.5	87002	69.4	68
49	1.0501	0.2596	1302	26	3062	2.4	90064	71.9	71
50	1.1181	0.2622	1309	27	3087	2.5	93151	74.3	73
51	1.1876	0.2650	1316	27	3130	2.5	96281	76.8	76
52	1.2587	0.2682	1323	27	2986	2.4	99267	79.2	78

Appendix N: Raw-to-Scaled Score Conversion Tables

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
53	1.3315	0.2717	1330	28	2905	2.3	102172	81.5	80
54	1.4064	0.2756	1338	28	2824	2.3	104996	83.8	83
55	1.4835	0.2800	1346	29	2635	2.1	107631	85.9	85
56	1.5633	0.2848	1354	29	2536	2.0	110167	87.9	87
57	1.6459	0.2902	1362	30	2260	1.8	112427	89.7	89
58	1.7319	0.2963	1371	30	2123	1.7	114550	91.4	91
59	1.8216	0.3031	1380	31	2009	1.6	116559	93.0	92
60	1.9159	0.3108	1390	32	1843	1.5	118402	94.5	94
61	2.0151	0.3195	1400	33	1515	1.2	119917	95.7	95
62	2.1204	0.3296	1411	34	1341	1.1	121258	96.8	96
63	2.2327	0.3411	1422	35	1117	0.9	122375	97.7	97
64	2.3536	0.3545	1434	36	889	0.7	123264	98.4	98
65	2.4848	0.3704	1448	38	686	0.5	123950	98.9	99
66	2.6289	0.3893	1462	40	518	0.4	124468	99.3	99
67	2.7894	0.4125	1479	42	367	0.3	124835	99.6	99
68	2.9713	0.4415	1497	45	207	0.2	125042	99.8	99
69	3.1824	0.4790	1519	49	156	0.1	125198	99.9	99
70	3.4358	0.5302	1544	54	66	0.1	125264	100.0	99
71	3.7556	0.6054	1577	62	30	0.0	125294	100.0	99
72	4.1956	0.7321	1622	75	11	0.0	125305	100.0	99
73	4.9266	1.0196	1696	104	2	0.0	125307	100.0	99
74	6.1592	1.8374	1822	187	0	0.0	125307	100.0	100

Appendix N: Raw-to-Scaled Score Conversion Tables

Writing Grade 5

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
22	-6.9579	1.8374	700	184	31	0.0	31	0.0	1
23	-5.7237	1.0217	700	102	137	0.1	168	0.1	1
24	-4.9858	0.7387	700	74	363	0.3	531	0.4	1
25	-4.5337	0.6172	700	62	456	0.4	987	0.8	1
26	-4.1974	0.5474	700	55	492	0.4	1479	1.1	1
27	-3.9236	0.5019	700	50	373	0.3	1852	1.4	1
28	-3.6881	0.4701	703	47	278	0.2	2130	1.7	2
29	-3.4783	0.4470	724	45	169	0.1	2299	1.8	2
30	-3.2864	0.4300	743	43	120	0.1	2419	1.9	2
31	-3.1071	0.4173	761	42	66	0.1	2485	1.9	2
32	-2.9371	0.4081	778	41	44	0.0	2529	2.0	2
33	-2.7733	0.4015	794	40	74	0.1	2603	2.0	2
34	-2.6140	0.3973	810	40	170	0.1	2773	2.2	2
35	-2.4572	0.3949	826	39	372	0.3	3145	2.4	2
36	-2.3016	0.3943	841	39	603	0.5	3748	2.9	3
37	-2.1458	0.3952	857	40	713	0.6	4461	3.5	3
38	-1.9888	0.3975	873	40	765	0.6	5226	4.1	4
39	-1.8295	0.4009	888	40	706	0.5	5932	4.6	4
40	-1.6672	0.4052	905	41	643	0.5	6575	5.1	5
41	-1.5010	0.4101	921	41	472	0.4	7047	5.5	5
42	-1.3307	0.4153	938	42	359	0.3	7406	5.7	6
43	-1.1560	0.4204	956	42	239	0.2	7645	5.9	6
44	-0.9775	0.4246	974	42	203	0.2	7848	6.1	6
45	-0.7957	0.4277	992	43	322	0.2	8170	6.3	6
46	-0.6122	0.4289	1010	43	666	0.5	8836	6.9	7
47	-0.4284	0.4281	1029	43	1287	1.0	10123	7.9	7
48	-0.2462	0.4253	1047	43	2144	1.7	12267	9.5	9
49	-0.0671	0.4208	1065	42	2902	2.3	15169	11.8	11
50	0.1076	0.4149	1082	41	3745	2.9	18914	14.7	13
51	0.2770	0.4082	1099	41	4147	3.2	23061	17.9	16
52	0.4407	0.4011	1116	40	4450	3.5	27511	21.4	20
53	0.5988	0.3940	1131	39	4255	3.3	31766	24.7	23
54	0.7513	0.3873	1147	39	3584	2.8	35350	27.4	26
55	0.8989	0.3811	1161	38	2401	1.9	37751	29.3	28
56	1.0420	0.3756	1176	38	1282	1.0	39033	30.3	30
57	1.1812	0.3709	1190	37	476	0.4	39509	30.7	30
58	1.3174	0.3671	1203	37	487	0.4	39996	31.0	31
59	1.4509	0.3641	1217	36	885	0.7	40881	31.7	31
60	1.5827	0.3620	1230	36	1500	1.2	42381	32.9	32
61	1.7133	0.3609	1243	36	2339	1.8	44720	34.7	34
62	1.8435	0.3608	1256	36	3343	2.6	48063	37.3	36
63	1.9740	0.3618	1269	36	4360	3.4	52423	40.7	39
64	2.1055	0.3638	1282	36	5093	4.0	57516	44.6	43
65	2.2390	0.3671	1295	37	5112	4.0	62628	48.6	47
66	2.3753	0.3717	1309	37	4000	3.1	66628	51.7	50
67	2.5157	0.3778	1323	38	2529	2.0	69157	53.7	53
68	2.6614	0.3857	1338	39	643	0.5	69800	54.2	54
69	2.8138	0.3957	1353	40	221	0.2	70021	54.4	54
70	2.9751	0.4081	1369	41	463	0.4	70484	54.7	55
71	3.1479	0.4237	1386	42	906	0.7	71390	55.4	55
72	3.3354	0.4430	1405	44	1912	1.5	73302	56.9	56
73	3.5422	0.4672	1426	47	3263	2.5	76565	59.4	58
74	3.7743	0.4973	1449	50	5426	4.2	81991	63.6	62

Appendix N: Raw-to-Scaled Score Conversion Tables

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
75	4.0398	0.5340	1475	53	7805	6.1	89796	69.7	67
76	4.3476	0.5759	1506	58	9634	7.5	99430	77.2	73
77	4.7033	0.6150	1542	62	9580	7.4	109010	84.6	81
78	5.0966	0.6341	1581	63	6231	4.8	115241	89.4	87
79	5.4935	0.6209	1621	62	403	0.3	115644	89.8	90
80	5.8590	0.5863	1657	59	13	0.0	115657	89.8	90
81	6.1805	0.5479	1689	55	22	0.0	115679	89.8	90
82	6.4622	0.5144	1718	51	61	0.0	115740	89.8	90
83	6.7127	0.4876	1743	49	149	0.1	115889	90.0	90
84	6.9401	0.4670	1765	47	314	0.2	116203	90.2	90
85	7.1507	0.4516	1787	45	721	0.6	116924	90.8	90
86	7.3494	0.4406	1806	44	1296	1.0	118220	91.8	91
87	7.5401	0.4333	1825	43	2205	1.7	120425	93.5	93
88	7.7259	0.4294	1844	43	2899	2.3	123324	95.7	95
89	7.9098	0.4287	1862	43	2501	1.9	125825	97.7	97
90	8.0944	0.4312	1881	43	152	0.1	125977	97.8	98
91	8.2826	0.4371	1900	44	0	0.0	125977	97.8	98
92	8.4777	0.4470	1919	45	0	0.0	125977	97.8	98
93	8.6836	0.4616	1940	46	4	0.0	125981	97.8	98
94	8.9060	0.4826	1962	48	8	0.0	125989	97.8	98
95	9.1528	0.5126	1987	51	28	0.0	126017	97.8	98
96	9.4370	0.5564	2015	56	82	0.1	126099	97.9	98
97	9.7828	0.6245	2050	62	222	0.2	126321	98.1	98
98	10.2436	0.7443	2096	74	478	0.4	126799	98.4	98
99	10.9897	1.0255	2170	103	901	0.7	127700	99.1	99
100	12.2292	1.8394	2294	184	1133	0.9	128833	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	-7.0548	1.8384	700	184	13	0.0	13	0.0	1
23	-5.8180	1.0235	700	102	91	0.1	104	0.1	1
24	-5.0762	0.7413	700	74	238	0.2	342	0.3	1
25	-4.6203	0.6204	700	62	334	0.3	676	0.5	1
26	-4.2800	0.5511	700	55	379	0.3	1055	0.8	1
27	-4.0020	0.5061	724	51	308	0.2	1363	1.1	1
28	-3.7623	0.4747	748	47	230	0.2	1593	1.2	1
29	-3.5481	0.4520	769	45	144	0.1	1737	1.3	1
30	-3.3517	0.4353	789	44	101	0.1	1838	1.4	1
31	-3.1678	0.4230	807	42	60	0.0	1898	1.5	1
32	-2.9928	0.4140	825	41	34	0.0	1932	1.5	1
33	-2.8241	0.4078	841	41	46	0.0	1978	1.5	2
34	-2.6597	0.4037	858	40	157	0.1	2135	1.6	2
35	-2.4977	0.4016	874	40	286	0.2	2421	1.9	2
36	-2.3367	0.4010	890	40	495	0.4	2916	2.2	2
37	-2.1756	0.4019	906	40	666	0.5	3582	2.8	3
38	-2.0134	0.4039	923	40	642	0.5	4224	3.3	3
39	-1.8491	0.4068	939	41	654	0.5	4878	3.8	4
40	-1.6821	0.4104	956	41	551	0.4	5429	4.2	4
41	-1.5121	0.4143	973	41	439	0.3	5868	4.5	4
42	-1.3389	0.4180	990	42	330	0.3	6198	4.8	5
43	-1.1629	0.4211	1008	42	217	0.2	6415	4.9	5
44	-0.9846	0.4232	1025	42	173	0.1	6588	5.1	5
45	-0.8052	0.4239	1043	42	256	0.2	6844	5.3	5
46	-0.6257	0.4229	1061	42	569	0.4	7413	5.7	5
47	-0.4479	0.4203	1079	42	1179	0.9	8592	6.6	6
48	-0.2728	0.4163	1097	42	1935	1.5	10527	8.1	7
49	-0.1016	0.4111	1114	41	2815	2.2	13342	10.3	9
50	0.0649	0.4050	1130	41	3396	2.6	16738	12.9	12
51	0.2264	0.3986	1146	40	3944	3.0	20682	16.0	14
52	0.3827	0.3921	1162	39	4324	3.3	25006	19.3	18
53	0.5340	0.3858	1177	39	3986	3.1	28992	22.4	21
54	0.6805	0.3798	1192	38	2971	2.3	31963	24.7	24
55	0.8226	0.3744	1206	37	1819	1.4	33782	26.1	25
56	0.9609	0.3696	1220	37	751	0.6	34533	26.6	26
57	1.0960	0.3655	1233	37	339	0.3	34872	26.9	27
58	1.2283	0.3622	1247	36	406	0.3	35278	27.2	27
59	1.3585	0.3597	1260	36	828	0.6	36106	27.9	28
60	1.4873	0.3581	1273	36	1489	1.1	37595	29.0	28
61	1.6152	0.3573	1285	36	2347	1.8	39942	30.8	30
62	1.7429	0.3575	1298	36	3510	2.7	43452	33.5	32
63	1.8711	0.3587	1311	36	4582	3.5	48034	37.1	35
64	2.0005	0.3610	1324	36	5221	4.0	53255	41.1	39
65	2.1320	0.3645	1337	36	4730	3.6	57985	44.7	43
66	2.2666	0.3693	1351	37	3384	2.6	61369	47.3	46
67	2.4052	0.3756	1364	38	1637	1.3	63006	48.6	48
68	2.5492	0.3837	1379	38	350	0.3	63356	48.9	49
69	2.7003	0.3939	1394	39	181	0.1	63537	49.0	49
70	2.8603	0.4066	1410	41	452	0.3	63989	49.4	49
71	3.0319	0.4224	1427	42	984	0.8	64973	50.1	50
72	3.2184	0.4421	1446	44	2189	1.7	67162	51.8	51
73	3.4245	0.4667	1466	47	3974	3.1	71136	54.9	53
74	3.6564	0.4974	1489	50	6691	5.2	77827	60.0	57

Appendix N: Raw-to-Scaled Score Conversion Tables

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
75	3.9223	0.5349	1516	53	9605	7.4	87432	67.5	64
76	4.2319	0.5781	1547	58	11491	8.9	98923	76.3	72
77	4.5911	0.6186	1583	62	10374	8.0	109297	84.3	80
78	4.9892	0.6380	1623	64	5722	4.4	115019	88.7	87
79	5.3903	0.6233	1663	62	282	0.2	115301	89.0	89
80	5.7575	0.5865	1700	59	11	0.0	115312	89.0	89
81	6.0781	0.5463	1732	55	19	0.0	115331	89.0	89
82	6.3574	0.5117	1760	51	49	0.0	115380	89.0	89
83	6.6048	0.4841	1784	48	151	0.1	115531	89.1	89
84	6.8286	0.4629	1807	46	410	0.3	115941	89.4	89
85	7.0353	0.4471	1827	45	816	0.6	116757	90.1	90
86	7.2299	0.4358	1847	44	1581	1.2	118338	91.3	91
87	7.4164	0.4283	1865	43	2511	1.9	120849	93.2	92
88	7.5979	0.4243	1884	42	3114	2.4	123963	95.6	94
89	7.7774	0.4236	1902	42	2252	1.7	126215	97.4	97
90	7.9576	0.4261	1920	43	132	0.1	126347	97.5	97
91	8.1415	0.4320	1938	43	1	0.0	126348	97.5	97
92	8.3321	0.4420	1957	44	2	0.0	126350	97.5	97
93	8.5337	0.4569	1977	46	4	0.0	126354	97.5	97
94	8.7517	0.4781	1999	48	15	0.0	126369	97.5	97
95	8.9941	0.5083	2023	51	44	0.0	126413	97.5	98
96	9.2741	0.5525	2051	55	131	0.1	126544	97.6	98
97	9.6155	0.6211	2085	62	332	0.3	126876	97.9	98
98	10.0720	0.7415	2131	74	654	0.5	127530	98.4	98
99	10.8138	1.0234	2205	102	1047	0.8	128577	99.2	99
100	12.0506	1.8384	2329	184	1042	0.8	129619	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	-7.0630	1.8366	700	184	21	0.0	21	0.0	1
23	-5.8307	1.0203	700	102	101	0.1	122	0.1	1
24	-5.0959	0.7365	735	74	271	0.2	393	0.3	1
25	-4.6472	0.6143	780	61	368	0.3	761	0.6	1
26	-4.3147	0.5438	813	54	382	0.3	1143	0.9	1
27	-4.0450	0.4974	840	50	378	0.3	1521	1.2	1
28	-3.8142	0.4648	863	46	249	0.2	1770	1.4	1
29	-3.6098	0.4407	883	44	168	0.1	1938	1.5	1
30	-3.4239	0.4224	902	42	91	0.1	2029	1.6	2
31	-3.2515	0.4084	919	41	61	0.0	2090	1.6	2
32	-3.0893	0.3975	935	40	37	0.0	2127	1.7	2
33	-2.9348	0.3891	951	39	45	0.0	2172	1.7	2
34	-2.7861	0.3826	966	38	128	0.1	2300	1.8	2
35	-2.6416	0.3776	980	38	322	0.3	2622	2.0	2
36	-2.5005	0.3739	994	37	470	0.4	3092	2.4	2
37	-2.3617	0.3712	1008	37	619	0.5	3711	2.9	3
38	-2.2246	0.3693	1022	37	656	0.5	4367	3.4	3
39	-2.0888	0.3679	1035	37	541	0.4	4908	3.8	4
40	-1.9538	0.3669	1049	37	508	0.4	5416	4.2	4
41	-1.8195	0.3661	1062	37	369	0.3	5785	4.5	4
42	-1.6858	0.3653	1076	37	277	0.2	6062	4.7	5
43	-1.5526	0.3645	1089	36	200	0.2	6262	4.9	5
44	-1.4201	0.3634	1102	36	184	0.1	6446	5.0	5
45	-1.2886	0.3620	1115	36	232	0.2	6678	5.2	5
46	-1.1582	0.3603	1128	36	486	0.4	7164	5.6	5
47	-1.0291	0.3583	1141	36	861	0.7	8025	6.2	6
48	-0.9015	0.3560	1154	36	1437	1.1	9462	7.3	7
49	-0.7757	0.3535	1167	35	1717	1.3	11179	8.7	8
50	-0.6516	0.3509	1179	35	1962	1.5	13141	10.2	9
51	-0.5294	0.3484	1191	35	2043	1.6	15184	11.8	11
52	-0.4088	0.3460	1203	35	1797	1.4	16981	13.2	12
53	-0.2899	0.3437	1215	34	1493	1.2	18474	14.3	14
54	-0.1725	0.3418	1227	34	1178	0.9	19652	15.3	15
55	-0.0562	0.3402	1239	34	856	0.7	20508	15.9	16
56	0.0591	0.3390	1250	34	547	0.4	21055	16.4	16
57	0.1737	0.3383	1262	34	423	0.3	21478	16.7	17
58	0.2881	0.3382	1273	34	621	0.5	22099	17.2	17
59	0.4026	0.3386	1285	34	1042	0.8	23141	18.0	18
60	0.5176	0.3397	1296	34	1648	1.3	24789	19.2	19
61	0.6336	0.3415	1308	34	2170	1.7	26959	20.9	20
62	0.7510	0.3441	1319	34	2659	2.1	29618	23.0	22
63	0.8706	0.3476	1331	35	3020	2.3	32638	25.3	24
64	0.9929	0.3520	1344	35	3106	2.4	35744	27.8	27
65	1.1187	0.3576	1356	36	2818	2.2	38562	29.9	29
66	1.2489	0.3643	1369	36	2370	1.8	40932	31.8	31
67	1.3846	0.3726	1383	37	1546	1.2	42478	33.0	32
68	1.5271	0.3826	1397	38	670	0.5	43148	33.5	33
69	1.6780	0.3947	1412	39	404	0.3	43552	33.8	34
70	1.8395	0.4094	1428	41	813	0.6	44365	34.5	34
71	2.0142	0.4272	1446	43	1639	1.3	46004	35.7	35
72	2.2058	0.4489	1465	45	2909	2.3	48913	38.0	37
73	2.4192	0.4758	1486	48	4729	3.7	53642	41.7	40
74	2.6612	0.5089	1510	51	6820	5.3	60462	47.0	44

Appendix N: Raw-to-Scaled Score Conversion Tables

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
75	2.9406	0.5493	1538	55	9041	7.0	69503	54.0	50
76	3.2681	0.5955	1571	60	11105	8.6	80608	62.6	58
77	3.6500	0.6383	1609	64	12377	9.6	92985	72.2	67
78	4.0732	0.6567	1652	66	10503	8.2	103488	80.4	76
79	4.4954	0.6370	1694	64	944	0.7	104432	81.1	81
80	4.8759	0.5950	1732	60	60	0.0	104492	81.1	81
81	5.2043	0.5515	1765	55	42	0.0	104534	81.2	81
82	5.4881	0.5150	1793	52	117	0.1	104651	81.3	81
83	5.7382	0.4864	1818	49	252	0.2	104903	81.5	81
84	5.9638	0.4646	1841	46	493	0.4	105396	81.8	82
85	6.1719	0.4485	1861	45	979	0.8	106375	82.6	82
86	6.3676	0.4369	1881	44	1595	1.2	107970	83.8	83
87	6.5549	0.4293	1900	43	3018	2.3	110988	86.2	85
88	6.7372	0.4252	1918	43	4601	3.6	115589	89.8	88
89	6.9174	0.4243	1936	42	6001	4.7	121590	94.4	92
90	7.0983	0.4268	1954	43	496	0.4	122086	94.8	95
91	7.2827	0.4327	1973	43	1	0.0	122087	94.8	95
92	7.4740	0.4427	1992	44	3	0.0	122090	94.8	95
93	7.6761	0.4575	2012	46	13	0.0	122103	94.8	95
94	7.8947	0.4786	2034	48	30	0.0	122133	94.8	95
95	8.1376	0.5088	2058	51	70	0.1	122203	94.9	95
96	8.4180	0.5529	2086	55	159	0.1	122362	95.0	95
97	8.7599	0.6215	2120	62	377	0.3	122739	95.3	95
98	9.2170	0.7418	2166	74	790	0.6	123529	95.9	96
99	9.9593	1.0237	2240	102	1874	1.5	125403	97.4	97
100	11.1964	1.8384	2364	184	3372	2.6	128775	100.0	99