TECHNICAL REPORT

for the
2012 Modified Pennsylvania
System of School Assessment

Provided by
Data Recognition Corporation

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, resulting in division of 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 *P*-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 *p*-value (see also *P*-value). The logit difficulty scale is inversely related to *p*-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, the mean 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).
N-count	Sometimes designated as *N* or *n*, 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}, $n = 6$.
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 one in which students make a choice from a supplied set of answer 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 *p*-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 toward 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
P-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. *P*-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. *P*-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 *p*-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 as 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)	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 Modified Assessments from 2008 to the Present

The Pennsylvania System of School Assessment with Modified Academic Achievement Standards (PSSA-M) is a statewide system designed to meet the *No Child Left Behind Act of 2001* (NCLB) requirement that all students be included in state assessment and accountability systems. The target population consists of those students who function above the one percent of students with the most severe cognitive impairments who are eligible to take the Pennsylvania Alternate System of Assessment (PASA), but whose disabilities inhibit their ability to respond to the standard PSSA, even with accommodations. The Pennsylvania Academic Assessment Anchor Content Standards, further delineated by the Eligible Content for Mathematics, Reading and Science, are the basis for test development. To facilitate students' ability to demonstrate their grade-level content knowledge and skills, revisions were made to assessment tasks, (e.g., items, passages, graphics/stimuli, scenarios) with the goal of minimizing or removing processing effects (e.g., cognitive, linguistic) or physical challenges related to students' disabilities without significant alteration of the assessed construct.

The introduction of an operational mathematics modified assessment in 2010 moved closer to reality with a major standalone field test at Grades 4−8 and 11 in May of 2009. Operational modified assessments for reading and science, implemented in spring 2011, underwent item development in 2009 and field testing in 2010.

To assist the reader in navigating through the year-to-year developmental activity of the PSSA-M, tables are presented along with explanatory text. Provided is an overview of 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).

ASSESSMENT ACTIVITIES OCCURRING IN THE 2008–09 SCHOOL YEAR

Table P–1 provides information about the field testing of modified assessments for mathematics during the 2008–09 school year. Following the spring operational assessment of the PSSA, a separate, standalone field test of items developed for Pennsylvania Assessment Anchors and Eligible Content in mathematics was conducted at Grades 4−8 and 11. Item development for these new assessments took place during 2008.

Major assessment activities included the following:

- Spring standalone field test for mathematics at Grades 4−8 and 11

Table P–1. Field Testing of Modified Assessments During the 2008–09 School Year

Subject	OP/FT	Grades	Assessment Schedule
Mathematics	FT (sa)	4−8, 11	April/May 2009

Note. FT (sa) refers to a standalone field test

ASSESSMENT ACTIVITIES OCCURRING IN THE 2009–10 SCHOOL YEAR

Table P–2 provides information about modified assessments during the 2009–10 school year. The mathematics modified assessments became operational for Grades 4–8 and 11 and were incorporated into the administration of the PSSA as a test version for eligible students with disabilities. There was an April testing window with a make-up period extending through the first week of May for all assessments. Field testing for mathematics was embedded as part of the operational assessments at each grade level. Consistent with the regular PSSA, a fall retest opportunity at Grade 12 was offered to students taking the mathematics modified assessment starting with the 2010 Fall Retest.

Standalone field tests in reading modified and science modified were conducted following the administration of the spring PSSA. Item development for these new assessments took place during 2009. Full implementation was scheduled to begin in 2011.

Major assessment activities included the following:

- Spring operational assessment in mathematics for Grades 4–8 and 11 with embedded field testing
- Spring standalone field test for reading at Grades 4–8 and 11 and for science at Grades 8 and 11

Table P–2. Operational Assessment and Field Testing During the 2009–10 School Year

Subject	OP/FT	Grades	Assessment Schedule
Mathematics	OP (eft)	4–8, 11	April/May 2010
Reading	FT (sa)	4–8, 11	May 2010
Science	FT (sa)	8, 11	May 2010

Note. OP (eft) refers to operational test with embedded field test
FT (sa) refers to standalone field test

ASSESSMENT ACTIVITIES OCCURRING IN THE 2010–11 SCHOOL YEAR

Table P–3 provides information about modified assessments during the 2010–11 school year. This was the second year for which the mathematics modified assessment was operational and the first year of implementation for the reading modified and science modified. Embedded field testing did not occur as part of the 2011 modified assessments.

A fall retest opportunity at Grade 12 was implemented for students taking the 2010 mathematics modified assessment. A retest opportunity was scheduled to become available in the fall of 2011 for students failing to reach the Proficient level on the reading and/or science modified assessments.

Major assessment activities included the following:

- Spring operational assessment in mathematics and reading modified for Grades 4–8 and 11, and in science modified at Grades 8 and 11
- A retest opportunity for Grade 12 students who as 11th graders in the spring of 2010 failed to attain at least the Proficient level in mathematics modified

Table P–3. Operational Assessment During the 2010–11 School Year

Subject	OP	Grades	Assessment Schedule
Mathematics	OP	4–8, 11	March 2011
Reading	OP	4–8, 11	March 2011
Science	OP	8, 11	May 2011
Retest for 2010 Mathematics	OP	12	October/November 2010

Assessment Activities Occurring in the 2011–12 School Year

Table P–4 provides information about modified assessments during the 2011–12 school year. Assessment began in mid-March for mathematics and reading and late April for science. The make-up period for mathematics and reading concluded in March; science was complete in early May. This was the third year of operational assessment for the mathematics modified and the second year of implementation for the reading and science modified. There was no embedded field testing as part of the operational modified assessments. The PSSA-M has been discontinued, so the fall retest opportunity at Grade 12 will not be available in the fall of 2012.

Major assessment activities include the following:

- Spring operational assessment in mathematics and reading modified for Grades 4–8 and 11, and in science modified at Grades 8 and 11
- A retest opportunity for Grade 12 students who as 11th graders in the spring of 2011 failed to attain at least the Proficient level in any of the subject areas

Table P–4. Operational Assessment and Field Testing During the 2011–12 School Year

Subject	OP	Grades	Assessment Schedule
Mathematics	OP	4–8, 11	March 2012
Reading	OP	4–8, 11	March 2012
Science	OP	8, 11	April/May 2012
Retest for 2011 Mathematics, Reading, Science	OP	12	October/November 2011

Assessment Activities Planned for the 2012–13 School Year

The modified assessments have been discontinued, so no activities are scheduled to take place for mathematics, reading, or science during the 2012–13 school year. This includes that a fall retest opportunity will not be available for students who as 11th graders in the spring of 2012 failed to attain at least the Proficient level in any of the subject areas.

Chapter One: Background of the Modified Pennsylvania System of School Assessment (PSSA-M)

This brief overview of a decade of change in Pennsylvania's assessment program summarizes the state and federal regulations that have continued to shape the design and development of the program. Among the changes are those involving content structure for reading, mathematics, and writing, the addition of science to the subject areas assessed, the expansion of grade levels assessed for reading and mathematics, the implementation of an alternate assessment for students with very severe disabilities, and the implementation of a modified assessment for a group of IEP students whose disabilities inhibit their ability to respond to a regular assessment.

STATE AND FEDERAL REGULATIONS AFFECTING THE PSSA

The Pennsylvania System of School Assessment (PSSA) program underwent major structural changes 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 Four Regulations on Academic Standards and Assessment*, detailed what students should know (knowledge) and be able to do (skills) at various grade levels. Subsequently, the State Board approved a set of criteria defining Advanced, Proficient, Basic, and Below Basic levels of performance. Reading and mathematics 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 at Grades 5, 8, and 11. In 2003, a reading and mathematics assessment at Grade 3 was added. Act 16 of Pennsylvania Senate Bill 652 in 2000 redefined the PSSA to include science. Combined with the State Board adoption of *Science and Technology Standards* on July 12, 2001, and the *Environment and Ecology Standards* on January 5, 2002, the groundwork was laid for a future science assessment. At the federal level, PL 107−110, the *No Child Left Behind Act of 2001* (NCLB) stipulated that states must develop reading and mathematics assessments in Grades 3−8 and at least once between Grades 10 and 12 and science assessments at least once in each of the grade bands: Grades 3–5, Grades 6–9, and Grades 10–12.

PURPOSES OF THE PSSA

Chapter Four regulations stipulated that the purposes of the PSSA are to:

- Provide students, parents, educators, and citizens with an understanding of student and school performance.
- Determine the degree to which programs enable students to attain proficiency of academic standards.
- Provide results to school districts, including charter schools and Career and Technical Centers (CTCs), for consideration in the development of strategic plans.
- Provide information to state policymakers, including the General Assembly, and the State Board, on how effective schools are in promoting and demonstrating student proficiency of the Academic Standards.
- Provide information to the general public on school performance.

- Provide results to school districts, including charter schools and CTCs, based on the aggregate performance of all students and for relevant subgroups, such as students with an IEP and for those without an IEP.

CHANGES IN 2005 AND BEYOND

Assessment in 2005 was marked by implementation of *Assessment Anchor Content Standards*, developed for reading and mathematics during the previous school year to clarify content structure, improve articulation between assessment and instruction, and improve test design and reporting. To meet the conditions of NCLB, assessment of reading and mathematics at Grades 4, 6, and 7 became operational in 2006, enabling Pennsylvania to more completely determine adequate yearly progress (AYP) at the state, district, and school level.

Although NCLB does not require states to conduct a writing assessment, Chapter Four does include one, aligned to the Academic Standards and reported in terms of performance levels, for all students at three grade levels. The 2006 PSSA operational writing assessment involved a shift from Grades 6, 9, and 11 to Grades 5, 8, and 11 to provide better alignment to the end of elementary school and middle school. Also incorporated were mode-specific scoring guides for essay responses and stimulus-based revising/editing multiple-choice items.

In accordance with the NCLB requirement to implement an operational science assessment in 2008, a major test development effort took place during 2006, followed by a large-scale, standalone field test in April/May of 2007. Full implementation of an operational science assessment at Grades 4, 8, and 11 first occurred in April–May 2008, aligned to the *Pennsylvania Science Assessment Anchor Content Standards* and Eligible Content.

More information regarding the 2011 PSSA may be found in the *2011 PSSA Technical Report.* This report can be accessed by going to www.education.state.pa.us. On the left, click on "Programs," then "Programs O–R," then "Pennsylvania System of School Assessment (PSSA)." In the "Most Requested Content…" section, select "PSSA Technical Reports."

STUDENTS WITH COMPLEX SUPPORT NEEDS: ALTERNATE ASSESSMENT

Although NCLB recommended that the same achievement standards be applied to all students, the U.S. Department of Education acknowledged that the same assessments are not universally appropriate. To better accommodate students with significant cognitive disabilities, intended for the lowest functioning 1% of the student population, the Department issued regulations permitting states to develop alternate achievement standards along with aligned assessments. In 2004 the *Pennsylvania Alternate System of Assessment* (PASA) was implemented to address the needs of these students. To be eligible for participation in the PASA, a student must meet each of the following criteria for reading, mathematics, and science, and a school-administered alternate assessment for writing: 1) enrolled in the assessed grade level for the subject area, 2) had a very severe cognitive disability, 3) required very intensive instruction, 4) required very extensive adaptation and support to perform or participate meaningfully, 5) required very substantial modification of the general education curriculum, and 6) participation in the general education curriculum differed very substantially in form and substance from that of other students. For more information, see the *2011–2012 PSSA Handbook for Assessment Coordinators (All Subjects)*, PDE, 2012, p.9), which may be accessed by going to www.education.state.pa.us. On the left side of the navigation bar, click on "Programs," then "Programs O–R," then "Pennsylvania System of School Assessment (PSSA)" and then "Test Administration."

STUDENTS WITH DISABILITIES NEEDING A MODIFIED APPROACH: MODIFIED ASSESSMENT

Following the issuance of regulations permitting states to develop alternate assessments for the students with the most severe cognitive disabilities, further research along with the experience of state assessment programs identified a need to address the difficulties encountered by a small group of IEP students in responding optimally to the regular assessment instruments. The U.S. Department of Education responded to this recognition by issuing additional regulations in April 2007 permitting states to develop assessments for the approximately 2% of students with disabilities based on modified achievement standards. Students targeted are those whose disabilities are not severe enough to warrant taking an alternate assessment and yet interfere significantly with their ability to respond optimally on the regular state assessment. This modified assessment must be aligned to a set of modified achievement standards designed to measure the same grade-level content as the state's general assessment. To be eligible to take a modified assessment, a student must meet a rigorous set of criteria, such as the IEP addressing educational goals reflecting grade-level content standards along with provisions for monitoring student progress.

Originally, PDE planned to develop modified assessments in reading for grades 3–8 and 11 and in science for grades 4, 8, and 11. However, the Pennsylvania PSSA-M Advisory Task Force met in January 2009 to discuss the criteria for the students for whom this test would be developed. The Task Force advised PDE to exclude third graders from the reading assessment and fourth graders from the science assessment, as the majority of these students could be properly assessed either with the general PSSA assessment at those grades or with the PASA (Pennsylvania Alternate System of Assessment).

To address the unique needs of these students, and to be in closer compliance with the NCLB intent that all students be included in state assessment and accountability systems, the *Pennsylvania System of School Assessment Modified* (PSSA-M) became operational in 2010 with a mathematics modified assessment at Grades 4−8 and 11. It was joined by operational modified assessments in reading at Grades 4−8 and 11 and science at Grades 8 and 11 in the spring of 2011.

More information regarding the development and composition of the 2010 PSSA-M Mathematics test may be found in Chapter Two of this report. Information may also be found in the Pennsylvania Department of Education publication, *2011–2012 PSSA Assessment Handbook,* (see *Part Six: PSSA–M*). This handbook can be accessed by going to www.education.state.pa.us. On the left, click on "Programs," then "Programs O−R," then "Pennsylvania System of School Assessment (PSSA)" and then "Resource Materials."

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) lacks academic progress. More detailed information on the PSSA-M eligibility criteria may be accessed by going to www.education.state.pa.us. On the left side of the navigation bar, click on "Programs," then "Programs S−Z," then "Special Education." From the "Special Education" page click on "Assessment" to access the relevant documents.

Chapter Two: Test Development Overview of the Modified PSSA

Overview of the Development Process

The Modified assessments were developed under the direction of the Pennsylvania Department of Education (PDE). The PSSA-M assessments were developed using the same rigorous and technically sound development steps as what is used to develop the general education assessment, Pennsylvania Student Assessment System (PSSA). These technically sound development steps involve Pennsylvania educators in all stages of the process. The Pennsylvania educators from school districts throughout the Commonwealth of Pennsylvania selected to participate in the development process were those with both content-area teaching expertise (e.g., mathematics, reading, and science) as well as those with expertise in teaching students with disabilities. The key development steps the PDE followed when developing the PSSA-M assessments included the following:

- Development of guidelines for revising and/or enhancing assessment questions
- Interviewing students and surveying teachers
- Revising and/or enhancing items to be more accessible to the given population of students
- Reviewing items by committees of Pennsylvania educators, including reviewing items for content alignment; rigor alignment; adherence to the principles of universal design; bias, fairness, and sensitivity; and adherence to technical quality or the standards for high-quality items
- Developing field test forms
- Field testing of the items to determine whether or not the items did, in fact, lend themselves to being more accessible to the given population
- Scoring of the open-ended or constructed-response items
- Reviewing of the items to determine which items should be placed in the pool of items to be considered acceptable for operational testing
- Reviewing the final operational forms prior to being administered to students
- Defining the expectation of mastery on the PSSA-M assessments or what it means for a student to be Proficient as determined by the standard-setting process
- Developing Modified Achievement Standards

Academic Standards, Assessment Anchor Content Standards, and Eligible Content

PSSA-M Mathematics, Reading, and Science

The PSSA-M assessment follows the guidelines of the PSSA Assessment Anchor Content Standards and Eligible Content, which 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 and PSSA-M. 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 and PSSA-M would be designed.

The Assessment Anchor's coding is read like an outline. The code includes the content, grade level, Reporting Category, Assessment Anchor, descriptor (Sub-Assessment Anchor), and Eligible Content. Thus, M4.A.1.1.1 would be: Math, Grade 4, Reporting Category A, Assessment Anchor 1, descriptor (Sub-Assessment Anchor) 1, 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., to conduct 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.

The Assessment Anchor Content Standards as defined by the Eligible Content are the same for the PSSA-M as they are for the general PSSA. However, in the PSSA-M, items measuring the Assessment Anchors as defined by the Eligible Content have been modified (revised and/or enhanced) when appropriate. Modifications, such as reduced text, easier vocabulary, simplified tasks, and the addition of hint boxes, allow for items to be more accessible to the given population of students while still in line with measuring the Assessment Anchors as defined by the Eligible Content. In so doing, the PSSA-M reflects the same emphasis and patterns as the general PSSA while utilizing a similar style and format. However, the PSSA-M does contain fewer items. These modifications, including fewer items and revisions and enhancements to items, are designed to allow students with disabilities a better assessment opportunity in which to demonstrate proficiency.

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

Mathematics Assessment Measures

In keeping with the alignment of the PSSA, the PSSA-M mathematics assessments at grades 4–8 and 11 have 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: Assessment Anchor Explanations for more information about how the Academic Standards are linked to the Reporting Categories, Assessment Anchors, and Eligible Content.

In keeping with the PSSA, the PSSA-M mathematics assessment also 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 are less efficient in the sense that they generally generate fewer scoreable points in the same amount of testing time. They do, however, provide tasks that are more realistic and better sample higher-level thinking skills. The design of the PSSA-M attempts to achieve a reasonable balance between the two item types. Furthermore, well-constructed scoring guides have made it possible to include open-ended tasks in large-scale assessments such as the PSSA-M. Trained scorers can apply the scoring guides to efficiently score large numbers of student papers in a highly reliable way.

MATHEMATICS MULTIPLE-CHOICE ITEMS

The majority of the mathematics items included on the PSSA-M, much like the PSSA, are multiple-choice (selected-response) items. This item type is especially efficient for measuring a broad range of content. In the PSSA and PSSA-M mathematics assessments, 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 computation errors. It is important to note that for the PSSA-M, dropping an answer option is not an allowable modification.

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

OPEN-ENDED TASKS FOR MATHEMATICS

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

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

For both the PSSA and the PSSA-M, open-ended mathematics items are scored on a 0–4 point scale with an item-specific scoring guideline. The item-specific scoring guideline outlines the requirements at 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: PSSA General Scoring Guidelines or the *PSSA-M Mathematics Item and Scoring Samplers* available on the PDE website.

The tables below provide a high-level overview of the operational mathematics PSSA-M test plan as compared to the general education mathematics PSSA. In addition, a comparison of the reporting categories for the mathematics PSSA-M and the general education mathematics PSSA is also provided. The PSSA-M content test blueprints show the same emphasis and patterns as the PSSA. The test content blueprints also show the extent to which the same or consistent categories of content appear in the PSSA-M and the PSSA. The PSSA-M, however, as noted in Table 2–1, has fewer items.

Table 2–1. Mathematics Operational Test Plan Summary: PSSA and PSSA-M

	Program	Grades	Number of MC Items per PSSA	Number of 4-point OE Items per PSSA	Total Number of Points (MC + OE) per PSSA
Mathematics	PSSA	4, 5, 6, 7, 8, and 11	60	3	72
	PSSA-M	4, 5, 6, 7, 8, and 11	30	2	38

Table 2–2. Mathematics Blueprint (percentage of total test points): PSSA and PSSA-M

Reporting Category	Program	Grade					
		4	5	6	7	8	11
Numbers and Operations	PSSA	43%–47%	41%–45%	28%–32%	20%–24%	18%–22%	12%–15%
	PSSA-M	43%–47%	41%–45%	28%–32%	20%–24%	18%–22%	12%–15%
Measurement	PSSA	12%–15%	12%–15%	12%–15%	12%–15%	12%–15%	12%–15%
	PSSA-M	12%–15%	12%–15%	12%–15%	12%–15%	12%–15%	12%–15%
Geometry	PSSA	12%–15%	12%–15%	15%–20%	15%–20%	15%–20%	12%–18%
	PSSA-M	12%–15%	12%–15%	15%–20%	15%–20%	15%–20%	12%–18%
Algebraic Concepts	PSSA	12%–15%	13%–17%	15%–20%	20%–27%	25%–30%	38%–42%
	PSSA-M	12%–15%	13%–17%	15%–20%	20%–27%	25%–30%	38%–42%
Data Analysis & Probability	PSSA	12%–15%	12%–15%	15%–20%	15%–20%	15%–20%	12%–18%
	PSSA-M	12%–15%	12%–15%	15%–20%	15%–20%	15%–20%	12%–18%

Reading Assessment Measures

In keeping with the alignment of the PSSA, the PSSA-M 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 Reading Academic Standards 1.1, 1.2, and 1.3. Like on the PSSA, Standards 1.6, 1.7, and 1.8 are not addressed on the PSSA-M 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: Assessment Anchor Explanations for more information about how the Academic Standards are linked to the Reporting Categories, Assessment Anchors, and Eligible Content.

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

READING MULTIPLE-CHOICE ITEMS

Multiple-choice (selected-response) items measure such concepts as 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 important 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. It is important to note that for the PSSA-M, dropping an answer option is not an allowable modification.

OPEN-ENDED TASKS FOR READING

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

The PSSA-M reading open-ended items, like the PSSA reading open-ended items, are scored on a 0–3 point scale with 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 guide 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: PSSA General Scoring Guidelines or the *PSSA-M Reading Item and Scoring Samplers* available on the PDE website.

The following tables provide a high-level overview of the operational reading PSSA-M test plan as compared to the general education reading PSSA. In addition, a comparison of the reporting categories for the reading PSSA-M and the general education reading PSSA is also provided. The PSSA-M content test blueprints show the same emphasis and patterns as the PSSA. The test content blueprints also show the extent to which the same or consistent categories of content appear in the PSSA-M and the PSSA. The PSSA-M, however, as noted in Table 2–3, has fewer items.

Table 2–3. Reading Operational Test Plan Summary: PSSA and PSSA-M

	Program	Grades	Number of MC Items per PSSA	Number of 3-point OE Items per PSSA	Total Number of Points (MC + OE) per PSSA
Reading	PSSA	4, 5, 6, 7, 8, and 11	40	4	52
	PSSA-M	4, 5, 6, 7, 8, and 11	30	2	36

Table 2–4. Reading Blueprint (percentage of total test points): PSSA and PSSA-M

Reporting Category	Program	Grade					
		4	5	6	7	8	11
Comprehension and Reading Skills	PSSA	60%–80%	60%–80%	50%–70%	50%–70%	40%–60%	40%–60%
	PSSA-M	60%–80%	60%–80%	50%–70%	50%–70%	40%–60%	40%–60%
Interpretation and Analysis of Fictional and Nonfictional Text	PSSA	20%–40%	20%–40%	30%–50%	30%–50%	40%–60%	40%–60%
	PSSA-M	20%–40%	20%–40%	30%–50%	30%–50%	40%–60%	40%–60%

Science Assessment Measures

The PSSA and the PSSA-M science assessments have four major reporting categories: The Nature of Science, Biological Sciences, Physical Sciences, 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 and the PSSA-M organize 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: Assessment Anchor Explanations 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 2012 PSSA-M 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-M are multiple-choice (selected-response) items. This item type is especially efficient for measuring a broad range of content. In the PSSA-M 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. It is important to note that for the PSSA-M, dropping an answer option is not an allowable modification.

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 science open-ended items (constructed-response tasks) require students to read a description of a scientific problem and to develop an appropriate solution. Open-ended items require about five minutes per task.

Open-ended tasks are especially useful for measuring students' skills in science. They offer the opportunity to present real-life situations that require students to solve problems using science abilities learned in the classroom. Students must read the task carefully, identify the necessary information, devise a method of solution, enter the solution directly in the answer document, and when required, offer an explanation. This provides insight into the 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 guide reflecting the task requirements. 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: PSSA General Scoring Guidelines or the *PSSA-M Science Item and Scoring Samplers* available on the PDE website.

The following tables provide a high-level overview of the operational science PSSA-M test plan as compared to the general education science PSSA. In addition, a comparison of the reporting categories for the science PSSA-M and the general education science PSSA is also provided. The PSSA-M content test blueprints show the same emphasis and patterns as the PSSA. The test content blueprints also show the extent to which the same or consistent categories of content appear in the PSSA-M and the PSSA. The PSSA-M, however, as noted in Table 2–5, has fewer items.

Table 2–5. Science Operational Test Plan Summary: PSSA and PSSA-M

	Program	Grades	Number of stand-alone MC Items per PSSA	Number of Scenario-based MC Items per PSSA	Number of 2-point OE Items per PSSA	Number of Scenario-based 4-point OE Items per PSSA	Total Number of Points (MC + OE) per PSSA
Science	PSSA	8	54	4	5	0	68
	PSSA-M	8	30	0	2	0	34
	PSSA	11	38	12	6	3	74
	PSSA-M	11	30	0	2	0	34

Table 2–6. Science Blueprint (percentage of total test points): PSSA and PSSA-M

Reporting Category	Program	Grade	
		8	11
Nature of Science	PSSA	~50%	~50%
	PSSA-M	~50%	~50%
Biological Sciences	PSSA	~17%	~17%
	PSSA-M	~17%	~17%
Physical Sciences	PSSA	~17%	~17%
	PSSA-M	~17%	~17%
Earth and Space Sciences	PSSA	~17%	~17%
	PSSA-M	~17%	~17%

Chapter Three: Item Development Process

The core portion of the 2012 PSSA-M mathematics operational administration is made up of items that were field tested in the 2009 PSSA-M standalone field test and used operationally for the first time in the 2010 PSSA-M mathematics operational administration. The items used as core-to-core linking items in the 2012 PSSA-M mathematics operational administration were selected from items that were developed for the 2009 PSSA-M standalone field test and used operationally on the 2011 PSSA-M mathematics operational administration. Therefore the activities that led to the 2012 PSSA-M operational mathematics administration began with the development of the draft test items that appeared in the 2009 PSSA-M standalone field test. The core portions of the 2012 PSSA-M reading and science operational administrations are made up of items that were field tested in the 2010 PSSA-M standalone field test. Therefore the activities that led to the 2012 PSSA-M operational reading and science administrations began with the development of draft test items that appeared in the 2010 PSSA-M standalone field test.

STEPS IN THE DEVELOPMENT PROCESS

A series of major activities took place in the development of the PSSA-M for mathematics. These key activities included the initial development of the guidelines for item revision and/or enhancement; cognitive interviews; item revision and/or enhancement of items; content review; bias, fairness, and sensitivity review; field test of items in spring 2009; item review with data; and final selection of items to compose the 2012 PSSA-M mathematics assessment for Grades 4–8 and 11. These activities are summarized in Table 3–1 below, and they are further described in the paragraphs that follow.

Table 3–1. PSSA-M Mathematics Development Timeline

Time Frame	Assessment	Activity
September 2008–January 2009	’09 FT for ’10 OP	Item modifications implemented in preparation for 2009 standalone field test
January 2009	’09 FT for ’10 OP	Item review and bias, fairness, and sensitivity review for candidate items for the 2009 standalone field test
February–March 2009	’09 FT for ’10 OP	Forms construction for the 2009 standalone field test
May 2009	Cognitive Interviews	Cognitive Interviews conducted in Pennsylvania schools
May 2009	’09 FT for ’10 OP	PSSA-M Mathematics Standalone Field Test
June–July 2009	’10 FT for ’11 OP	Item modifications (revisions and/or enhancements) implemented in preparation for 2010 embedded field test
July–August 2009	’10 FT for ’11 OP	Item review and bias, fairness, and sensitivity review for candidate items of the 2010 embedded field test
August 2009	’09 FT for ’10 OP	Statistical review of the 2009 field tested items

Table 3–1 (continued). PSSA-M Mathematics Development Timeline

Time Frame	Assessment	Activity
September 2009–January 2010	’10 OP & ’10 FT for ’11 OP	Forms construction for the 2010 operational assessment with embedded field test
April 2010	’10 OP & ’10 FT for ’11 OP	2010 operational assessment with embedded field test
August 2010	’10 FT for ’11 OP	Statistical review of the 2010 field tested items
August-September 2010	’10 OP & ’10 FT for ’11 OP	Forms construction for the 2011 operational assessment
March 2011	’11 OP	2011 operational assessment
August-September 2011	’12 OP	Forms construction for the 2012 operational assessment reusing the 2010 core items
March 2012	’12 OP	2012 operational assessment

A series of major activities took place in the development of the PSSA-M for reading. These key activities included the initial development of the guidelines for item revision and/or enhancement; cognitive interviews; item revision and/or enhancement of items; content review; bias, fairness, and sensitivity review; pilot testing of items in spring 2009; field testing of items in spring 2010; item review with data; and final selection of items to compose the 2012 PSSA-M reading assessments. These activities are summarized in Table 3–2 below, and they are further described in the paragraphs that follow.

Table 3–2. PSSA-M Reading Development Timeline

Time Frame	Assessment	Activity
Sept 2008–Jan 2009	’09 Pilot Test and ’10 FT	Item modifications implemented in preparation for 2009 Reading Pilot Test and 2010 Reading Standalone Field Tests
Jan 2009	’09 Pilot Test and ’10 FT	Item review and bias, fairness, and sensitivity review for candidate items for the 2009 Reading Pilot Test and 2010 Reading Standalone Field Tests
Jan–March 2009	’09 Pilot Test	Forms construction for the 2009 Reading Pilot Test
May 2009	Cognitive Interviews	Cognitive Interviews conducted in Pennsylvania schools
May 2009	’09 Pilot Test	PSSA-M Reading Pilot Test

Table 3–2 (continued). PSSA-M Reading Development Timeline

Time Frame	Assessment	Activity
May–July 2009	’10 FT for ’11 OP	Item modifications (revisions and/or enhancements) implemented in preparation for 2010 Reading Standalone Field Tests
July–Aug 2009	’10 FT for ’11 OP	Item review and bias, fairness, and sensitivity review for candidate items of the 2010 Reading Standalone Field Tests
Aug–Oct 2009	’10 FT for ’11 OP	Forms construction for the 2010 Reading Standalone Field Tests
April–May 2010	’10 FT for ’11 OP	PSSA-M Reading Standalone Field Tests
Aug 2010	’10 FT for ’11 OP	Statistical review of the 2010 field-tested items
Aug–Sept 2011	’10 FT for ’12 OP	Forms construction for the 2012 operational assessments for Reading
March 2012	’12 OP	2012 operational assessments for Reading

A series of major activities took place in the development of the PSSA-M for science. These key activities included the initial development of the guidelines for item revision and/or enhancement; cognitive interviews; item revision and/or enhancement of items; content review; bias, fairness, and sensitivity review; field test of items in spring 2010; item review with data; and final selection of items to compose the 2012 PSSA-M science assessments. These activities are summarized in Table 3–3 below, and they are further described in the paragraphs that follow.

Table 3–3. PSSA-M Science Development Timeline

Time Frame	Assessment	Activity
Sept 2008–Jan 2009	’10 FT	Item modifications implemented in preparation for 2010 Science Standalone Field Tests
Jan 2009	’10 FT	Item review and bias, fairness, and sensitivity review for candidate items for the 2010 Science Standalone Field Tests
May 2009	Cognitive Interviews	Cognitive Interviews conducted in Pennsylvania schools
May–July 2009	’10 FT for ’11 OP	Item modifications (revisions and/or enhancements) implemented in preparation for 2010 Science Standalone Field Tests
July–Aug 2009	’10 FT for ’11 OP	Item review and bias, fairness, and sensitivity review for candidate items of the 2010 Science Standalone Field Tests
Aug– Oct 2009	’10 FT for ’11 OP	Forms construction for the 2010 Science Standalone Field Tests
April–May 2010	’10 FT for ’11 OP	PSSA-M Science Standalone Field Tests

Table 3–3 (continued). PSSA-M Science Development Timeline

Time Frame	Assessment	Activity
Aug 2010	’10 FT for ’12 OP	Statistical review of the 2010 field-tested items
Aug–Sept 2011	’10 FT for ’12 OP	Forms construction for the 2012 operational assessments for Science
April–May 2012	’12 OP	2012 operational assessments for Science

Item Development Planning Meeting

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 2012 PSSA-M operational administration, the initial planning meetings for the item modifying process for the 2009 and 2010 field tests occurred throughout 2008. Item modifying began in fall 2008, with the item review meetings occurring in 2009. See Tables 3–1, 3–2, and 3–3 for additional details.

Review of the Items

In September 2008, a pool of mathematics items from grades 4–8 and 11 was reviewed. In September 2008 and again in May 2009, pools of PSSA reading items from grades 4–8 and 11 and PSSA science items for grades 8 and 11 were reviewed. The review of the items focused upon whether each item might lend itself well to revision and/or enhancement for possible field testing of PSSA-M items in spring 2009 or spring 2010. The pool of candidate items was comprised of PSSA items that had been field tested in earlier administrations.

Training

To begin the process, WestEd and DRC selected and trained mathematics, reading, and science staff to review PSSA items for possible revising and/or enhancement. Qualified content experts 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 and modifying multiple-choice and open-ended items. Prior to modifying items for the PSSA-M, 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

- Principles of Universal Design
- Item Quality Technical Style Guidelines
- Reference Information
- Sample Items

In addition, staff with a background in special education (e.g., those certified in special education and/or those with teaching experience in working with students with disabilities) and/or those with a background in developing assessments for the given population were also members of the team.

Training of content staff at WestEd and DRC began with the study and discussion of the information presented in the *Pennsylvania System of School Assessment-Modified (PSSA-M) Alternate Assessment Based on Modified Achievement Standards Item Revision and/or Enhancement Guidelines*. These guidelines were developed by WestEd with support from DRC. They were reviewed and approved by PDE prior to item revision and/or item enhancement. The guidelines served as the basis for all item revision and/or enhancement. A summary of the guidelines are given in the next section. The full guidelines are found in Appendix D of this document. It is important to note that these guidelines do adhere to the Principles of Universal Design (Center for Universal Design, 1997). NCEO has produced seven elements of Universal Design as they apply to assessments (Johnstone, Altman, & Thurlow, 2006).

These elements of the Principles of Universal Design served to guide PSSA-M item revision and/or enhancement and are clearly noted in the Guidelines for Item Revision and Enhancement, found in Appendix D. Further discussion related to universal design considerations can be found in Chapter Four: "Universal Design Procedures Applied in the PSSA-M Test Development Process."

Table 3–4 shows the number of mathematics multiple-choice (MC) and open-ended (OE) items revised and/or enhanced for field testing in spring 2009. In some cases, during the review of the items, the reviewers determined that an existing item did not lend itself to revision and/or enhancement. In Table 3–4, these are noted "As Is" with no modifications made to the item.

Table 3–4. Number of Mathematics Items (MC and OE) Revised and/or Enhanced for Field Testing in Spring 2009

Grade	MC Modified	MC As Is	Total MC	OE Modified	Total Items per Grade
4	78	3	81	11	92
5	66	9	75	10	85
6	52	8	60	7	67
7	52	8	60	8	68
8	54	8	62	7	69
11	52	10	62	7	69
Total	**354**	**46**	**400**	**50**	**450**

Additional items were developed for an embedded field test in spring 2010. These items were taken to an item review meeting in August of 2009. Table 3–5 shows the number of mathematics multiple-choice (MC) and open-ended (OE) items submitted to PDE for the item review meeting held in August of 2009.

Table 3–5. Mathematics Number of Items (MC and OE) Presented in August 2009 Item Review Meeting

Grade	August 2009 MC	August 2009 OE	Total Items
4	15	4	19
5	19	4	23
6	18	4	22
7	19	3	22
8	19	2	21
11	19	2	21
Total	**109**	**19**	**128**

Tables 3–6 and 3–7 show the number of reading multiple-choice (MC) items, open-ended (OE) items, and passages submitted to PDE for the item review meetings held in January and August of 2009.

Table 3–6. Reading Number of Items (MC and OE) Presented in January 2009 and August 2009 Item Review Meetings

Grade	January 2009 Modified MC	August 2009 Modified MC	August 2009 New MC	Total MC	January 2009 Modified OE	August 2009 Modified OE	August 2009 New OE	Total OE	Total Items
4	63	65	61	189	9	6	0	15	204
5	64	73	54	191	9	6	0	15	206
6	62	72	56	190	10	6	0	16	206
7	71	56	62	189	10	5	0	15	204
8	64	73	51	188	8	8	0	16	204
11	65	76	57	198	9	7	1	17	215
Total	**389**	**415**	**341**	**1145**	**55**	**38**	**1**	**94**	**1239**

Table 3–7. Reading Number of Passages Presented in January 2009 and August 2009 Item Review Meetings

Grade	January 2009 Passages	August 2009 Passages	Total Passages
4	9	6	15
5	9	6	15
6	9	6	15
7	10	5	15
8	8	7	15
11	8	7	15
Total	**53**	**37**	**90**

Table 3–8 shows the number of science multiple-choice (MC) and open-ended (OE) items submitted to PDE for the item review meetings held in January and August of 2009.

Table 3–8. Science Number of Items (MC and OE) Presented in January 2009 and August 2009 Item Review Meetings

Grade	January 2009 Modified MC	August 2009 Modified MC	Total MC	January 2009 Modified OE	August 2009 Modified OE	Total OE	Total Items
8	67	71	138	11	9	20	158
11	69	64	133	11	6	17	150
Total	**136**	**135**	**271**	**22**	**15**	**37**	**308**

SUMMARY OF REVISION AND/OR ENHANCEMENT GUIDELINES

Under the direction of the Pennsylvania Department of Education (PDE), the revisions and/or enhancements to PSSA items for mathematics, reading, and science were purposefully and necessarily made in order to address the eligible students' need for accessibility when taking the PSSA-M. The initial phases of PSSA-M item revisions and/or enhancements relied on expert judgment (e.g., PDE content-area experts and special educators; Pennsylvania educators, including both content-area educators and those special education educators with expertise in teaching the target population of students with disabilities). In addition, all revised and/or enhanced items were field tested in spring 2009 or spring 2010 for mathematics and in spring 2010 for reading and science. The additional data collected on item performance of each field test item further served to validate the design and the revisions and/or enhancements of the PSSA-M items. The data also offered PDE guidance in the selection of revised and/or enhanced items for the PSSA-M operational assessments. The types of revisions and/or enhancements to items are provided below.

Revisions

Students who will be eligible for the PSSA-M generally have difficulty processing information. As a result, revisions to items included the following:

- Simplifying the language in order to reduce the cognitive load or the amount of complex information without changing the construct, or what the item was intended to measure.
- Simplifying the language in order to remove any words that might be irrelevant.

Enhancements: Providing Supports

Enhancements to items involved embedding a type of support (e.g., adding graphics or artwork, providing definitions or context clues, providing scaffolds, and/or other permissible ways students might need to access and demonstrate understanding of the assessed content). Enhancement supports to items included the following:

- Providing helpful hints designed to support students' processing of information
- Providing additional graphics and/or artwork to support understanding
- Segmenting passages/prompts, when appropriate: When passages are segmented, items follow an order that parallels how information generally appears in the passage and/or prompt. (For example, for the reading PSSA-M, when appropriate, students will be provided the same passage/prompt as the general education PSSA at a given grade level, but the passage will be "segmented" or divided into meaningful parts. Those items that apply directly to each segment will appear directly after or adjacent to the referenced section of the text.)
- Providing scaffolds such as adding hints or thought boxes (visual cues) to provide a further definition of a word or words and terminology and/or to support the text or emphasize main ideas
- Providing supports for a number of steps and/or operations: For example, in a multi-step mathematics item, as appropriate, sub-questions or steps to break up or help students think through multi-step problems/item are provided.
- Adding additional directions to explain a process or activity
- Adding pre-reading information to clarify the purpose of a passage or prompt
- Embedding a formula (as appropriate for intention of the assessed standard)

Enhancements: Visual Display

Enhancements to items also involve the degree to which the item format can be altered (e.g., introducing bolding, underlining, and other text changes, as well as changes in font size) and still provide a reliable measure of the student's knowledge/skill. Enhancements involving item format included the following:

- Adding more space between letters and words if item validity was not affected
- Having fewer items per page, when appropriate
- Increasing the width of an item or line length (from two columns to one, single-column layout so that the text of the item spans the entire width of the page), when appropriate

- Restructuring the stem of an item into a “stacked” format (Facts or details related to the item were indented and placed into a stacked format as well.)
- Inserting bullets to organize complex information or inserting bullets to break complex text within an item stem into smaller parts

ITEM AUTHORING AND TRACKING

Initially, items are generated with software-prepared PSSA-M Item Cards and used for preliminary sorting and reviewing. Although very similar, the PSSA-M Item Card for Multiple-Choice Items differs from the PSSA-M Item Card for Open-Ended Items in that the former has a location at the bottom of the card for comments regarding the distractors. Blank examples of these two cards are shown in Appendix E: PSSA-M Item Review Cards. In both instances a column against the right margin provides for 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 (MC items), and calculator use (mathematics).

All items undergoing field-testing in 2009 or 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). Sample IDEAS Item Cards are presented in Appendix E: PSSA-M Item Review Cards.

INTERNAL REVIEWS AND PDE REVIEWS

To ensure that the items revised and/or enhanced were sufficient in number and adequately distributed across subcategories and levels of difficulty, content specialists, editors, and special education experts were informed of the required quantities of items needed for the external review by committees of Pennsylvania educators. Based upon the training received, content experts and special education experts began the process of revising and/or enhancing items. As items were revised and/or enhanced, they were entered into the item banking system along with important information (e.g., grade level, Assessment Anchor, Eligible Content, depth of knowledge, source item ID for modified items). Subsequently, as an integral part of the internal item revision and/or enhancement process, each item was reviewed by a team of content specialists, editors, and special education experts both at WestEd and DRC. Content specialists, editors, and special education experts evaluated each item to make sure that the construct had not changed and that it still measured the intended Eligible Content and/or Assessment Anchor Content Standard. They also assessed each item to make certain that the item revisions and/or enhancements were appropriate to the intended grade and that they provided and cued only one correct answer. 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 considerations, adherence to the PDE-approved item revision and enhancement guidelines, bias, source of challenge, grammar/punctuation, and PSSA-M style.

Following this internal process, revised and/or enhanced items were submitted to content specialists at the Pennsylvania Department of Education for review. PDE staff then consulted with

WestEd and DRC about any general issues (style, format, interpretation of Assessment Anchors and Eligible Content) and about the revisions and/or enhancements to specific items. Following PDE's review, the revised and/or enhanced items were prepared for the content review meetings and the bias, fairness, and sensitivity meetings conducted with Pennsylvania educators. Information concerning these external reviews by Pennsylvania educators is provided below.

Review by Committees of Pennsylvania Educators

Before the PSSA-M items were field tested, the items were reviewed by two separate committees at different stages. The first meeting was the Bias, Fairness, and Sensitivity Committee, and the second was the Item Content Meeting Committee. The first Bias, Fairness, and Sensitivity Meeting was held in Harrisburg, PA, on January 12–13 of 2009, and the first Item Content Meeting also held in Harrisburg, PA, took place on January 14–16 of 2009. A second set of meetings was held to review additional modified items. The second Bias, Fairness, and Sensitivity Meeting was held in Harrisburg, PA, on July 28–29 of 2009, and the second Item Content Meeting also held in Harrisburg, PA, took place on August 5–6 of 2009. Summaries, guidelines, and procedures for each meeting are presented below.

BIAS, FAIRNESS, AND SENSITIVITY REVIEW

Prior to 2009 or 2010 field testing, all revised and/or enhanced PSSA-M items were submitted to a Bias, Fairness, and Sensitivity Committee for review. The committee members consisted of a cross-representation of ethnic groups. Members of the committee also had expertise with special needs students and English Language Learners. All members had served on previous Pennsylvania Bias, Fairness, and Sensitivity Committees. The committee's primary responsibility was to evaluate items as to acceptability 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.

The expert, multi-ethnic committee composed of men and women was trained by DRC and WestEd staff to review items for bias, fairness, and sensitivity issues. Training materials included a PDE-approved manual developed by DRC (DRC, 2003–2009). The focus of the training was on security and confidentiality; fairness in testing ensuring balanced treatment; definition of bias; and types of bias including stereotyping, gender, regional or geographical, ethnic or cultural, socioeconomic or class, religious, ageism, persons with disabilities, experiential, and sensitivity.

PDE staff members also attended the review and served as reviewers of the process. All PSSA-M items were read by a cross-section of committee members. Each member noted bias, fairness, and/or sensitivity comments on tracking sheets and on the item, if needed, for clarification. Committee members individually categorized any concerns as related to ageism, disability, ethnicity/culture, gender, regional, religious, socioeconomic, or stereotyping. These categories then formed the framework through which recommendations for modification or rejection of items occurred during the subsequent committee consensus process. The committee then discussed each of the issues as a group and came to consensus as to which issues should represent the view of the committee. All consensus comments were then compiled, and the suggested actions on these items were recorded and submitted to PDE. This review followed security 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 at the DRC offices in Harrisburg, PA. Secure materials that did not need to be retained after the meeting were deposited in secure barrels, the contents of which were shredded.

ITEM CONTENT REVIEW

Prior to the 2009 or 2010 field testing, all revised and/or enhanced items were also submitted to content committees for review. The content committees consisted of Pennsylvania educators from school districts throughout the Commonwealth of Pennsylvania. The committee members were selected to have both content expertise as well as expertise in teaching students with disabilities and/or those students who may be administered the PSSA-M assessment. The primary responsibility of the content committees was to evaluate the revised and/or enhanced items with regard to the quality of the revision and/or enhancement, the content classification or whether or not the construct had changed, including grade-level appropriateness of the revision and/or enhancement, estimated difficulty, depth of knowledge, and source of challenge. With source of challenge (Webb, 2002; 2007), items were identified where the cognitive demand is focused on an unintended content, concept, or skill. In addition, source of challenge was considered if the reason that an answer could be given resulted from a cultural bias, an inappropriate reading level, or a flawed graphic in an item revision and/or enhancement, or if the item still required specialized, non-content related knowledge to answer. Source of challenge could result in the student answering—either correctly or incorrectly—without actually demonstrating the intended content or skill. Committee members were asked to note any items with a source of challenge and to suggest additional revisions and/or enhancements to remove the source of challenge. They also suggested additional and/or other revisions to items and/or other enhancements to the items. In some cases when the committee suggested that an item be deleted, the committee members reviewed a suggested replacement item provided by the facilitators. The committee also reviewed the items for adherence to the guidelines for item revision and/or enhancement and the Principles of Universal Design, including language demand and issues of bias, fairness, and sensitivity.

Committee members were approved by PDE, and PDE-approved invitations were sent to them by DRC. PDE also selected internal PDE staff members for attendance. The meeting commenced with a welcome by PDE and DRC. This was followed by a PowerPoint presentation by DRC and WestEd. The PowerPoint presentation introduced the goals of the meeting, security and confidentiality, overview of the PSSA-M, and PSSA-M strategies for revising and/or enhancing items, including what could not be considered. The life of a PSSA item, the life of a PSSA-M item, the item review process, content alignment, rigor-level alignment, technical design, universal design, roles and responsibilities, and an opportunity to ask questions were also included in the PowerPoint training. In addition, the training also included procedures and forms to be used for item content review. Unique to this item review training was the presentation of sample items which included presenting each parent item along with the modified “child” item. These parent items were shown so the committee could see how the item originated as a PSSA item. Parent items were also included for the revised and/or enhanced items during the item review.

After the training, committee members were divided into groups. WestEd content assessment specialists facilitated the reviews and were assisted by representatives from DRC and PDE. The members reviewed each item and 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. The consensus suggestions for acceptance, revision, or rejection were reviewed by PDE, and accepted suggestions or alternate decisions were implemented by DRC.

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 were deposited in secure barrels, the contents of which were shredded.

As the committee members reviewed the items and completed the Item Rating Sheets, they used the *PSSA-M Item Review Criteria Guidelines* produced by DRC and approved by PDE. These guidelines are found in Appendix F of this report. All committees had between 8 and 15 participants. Committees included a mixture of veteran item reviewers, new reviewers, and special education teachers. In general, all participants had been exposed to special needs students and they paid close attention to what the special education teacher had to say about the items. There were good discussions among the members of the committees, and overall, they liked the modifications that were made to the items.

All committee-recommended edits were reviewed by PDE. Approved edits were provided to DRC. All PDE approved edits were made. The revised and/or enhanced items were then made available for the Cognitive Interviews.

READING PILOT

As a result of feedback from both the TAC and the PSSA-M Advisory Task Force, PDE and DRC proposed a small pilot test in Reading, grades 5 and 8 only. The chart that follows shows the major deliverables and deadlines for the 2009 Reading pilot test pull lists.

Table 3–9. 2009 PSSA-M Reading Pilot Test Schedule

Date/Timeframe	Task
February 17, 2009	Reading pilot test pull list delivered to DRC from WestEd.
February 27	Pilot DFA template provided to WestEd.
March 5	DRC provided initial draft of reading pilots to WestEd.
March 10	WestEd provided initial reading pilot feedback to DRC.
March 13	DRC received pilot DFA from WestEd.
March 13	Reading pilot test forms provided to PDE/WestEd for review.
March 18	PDE and WestEd provided final approval to print PSSA-M pilot test.
March 23	PDE received pilot DFA for review.
March 23	Reading Pilot test approved for printer's proof production.
March 27	Reading Pilot test DFA approved by PDE.
April 8	Reading Pilot test admin materials approved for printer's proof production.

The specifications required three pilot test forms per grade. There were two passages, ten multiple-choice items, and one open-ended item per form. The following forms layout was used:

Table 3–10. 2009 PSSA-M Reading Pilot Forms Layout

Enhancement	Form 1	Form 2	Form 3
Passage Segmentation	Passage A: No segmentation Passage B: Segmentation (version 1)	Passage A: Segmentation (version 1) Passage B: No segmentation	Passage A: Segmentation (version 2) Passage B: Segmentation (version 2)
Passage Columns	Both passages: One column (usual margins)	Both passages: Two columns	Passage A: One column (wider margins) Passage B: Two columns
OE Items	Three points, scaffolded into parts a, b, c with single answer space	Three points, scaffolded with answer space following each part	Two points; scaffolded with answer space following each part
Glossing	At least one passage: Footnote style glossing	At least one passage: Bolded-word, glossing at bottom of page	At least one passage: Bolded-word, glossing in margin
Helpful Hints In Items	Both passages: Helpful hint above the item	Both passages: Helpful hint below the item	Passage A: Helpful hint as a first statement in the stem Passage B: Helpful hint in parentheses in the stem
Item Placement	Both passages: Two items per page	Passage A: All items on facing page with each passage segment; the “whole passage” (with explanation that it is the parts put together) placed before questions that cut across segments Passage B: Two items per page	Both passages: All items on facing page with each passage segment; direction telling students to use “all segments” to answer the questions placed before questions that cut across segments

The Reading pilot tests were administered from May 18, 2009, through May 22, 2009. The pilot tests were scored and the results were shared by DRC with PDE in October 2009.

COGNITIVE INTERVIEWS

As a part of the development process for the PSSA-M, Cognitive Interviews were also conducted. In order for the results of the Cognitive Interviews to help inform the item revision and/or enhancement process for the PSSA-M assessments, the interviews were conducted prior to the final development and field testing of the items. In addition to mathematics items, the Cognitive Interviews involved reading and science items. The following information summarizes the process used for the Cognitive Interviews. The introduction, study overview, and rationale for the PSSA-M cognitive interviews is based upon the report titled *Cognitive Interviews in Pennsylvania: Report on Data Collection for the Pennsylvania System of School Assessment Alternate Assessment with Modified Achievement Standards (PSSA-M) Study*. This report is available upon request from PDE. Additional details found in this report include the method used to conduct the interviews; target sample size; characteristics of the districts selected to participate; the process of school and student recruitment; informed consent; interview process; item booklets; teacher survey; findings; frequency of responses; findings by cluster, linguistic enhancements, test design enhancements, typographic feature enhancements; challenges with terminology and vocabulary, and findings by item enhancement type.

In order to provide help in identifying the need for an additional alternate assessment, PDE requested additional information from the Cognitive Interviews including information concerning accommodations used during instruction; effective tasks/task types that might help students with disabilities demonstrate their knowledge and ability; corroboration of enhancement strategies employed on PSSA-M; preparing students with disabilities for the PSSA-M; and application of PSSA-M results.

1. **Introduction**

   Data Recognition Corporation (DRC), in collaboration with WestEd, proposed to the Commonwealth of Pennsylvania a study intended to provide PDE with information the Department might want to consider when making decisions concerning the development of the PSSA-M. More specifically, DRC's subcontractor, WestEd, designed and conducted Cognitive Interviews with general education students and students with disabilities to examine the degree to which revision and/or enhancement strategies applied to PSSA-M items facilitated student access (their ability to understand and demonstrate their grade-level content understanding) to tested content. The Cognitive Interviews were conducted in Pennsylvania schools between May 11 and May 29, 2009. The sections below present an overview of the study, the Cognitive Interview methodology, and findings. Implications for future development of the PSSA-M also are presented.

2. **Study Overview**

   The study systematically evaluated the strategies used to develop items to be field tested and the degree to which these strategies facilitated students' abilities to demonstrate what they knew and could do. More specifically, this Cognitive Interview study intended to address the following question: What are the cognitive processes by which test items (or item types) are understood by students?

Data were collected from 252 students in grades 4, 5, 6, 7, 8, and 11 enrolled in Pennsylvania public schools in five districts across the Commonwealth, and from teachers in those schools who work primarily with PSSA-M-eligible students. This process is further described below.

3. Rationale for Cognitive Interviews

In the study, Cognitive Interviews were conducted to examine the effectiveness of the item enhancement strategies currently used during development of the PSSA-M reading and science field test items. Mathematics items were also included in the study. The results provided information concerning the degree to which current enhancement strategies—which consist primarily of changes to item structure or format—increase access to test items for students with disabilities (SWDs) and general education students.

Cognitive interviewing strategies were drawn from the family of process-tracing or verbal protocol models that can be used to confirm or verify hypotheses about access to tested content. They provided a forum for the researchers to test assumptions about the intent of an item or question. By microanalyzing the items (Solano-Flores & Trumbull, 2003), the researchers could simultaneously gather information about students' understandings of task expectations; their levels of mastery of the content; and the reasoning processes, problem solving strategies, and adaptive skills students use when answering test questions (Ericsson & Simon, 1980, 1993; Paulsen & Levine, 1999).

During each Cognitive Interview, researchers observe students individually as they respond to test questions. As students attempt to answer each item or solve each problem, they are encouraged to articulate, or say out loud their interpretation of the task required and the steps or processes needed to complete the task (*concurrent* data collection). Student comments, observations, insights, and responses about directions, item stem, response choices, and graphics or stimuli help the researchers check assumptions about whether a test item is functioning as intended; that is, that the assessment task actually taps the cognitive processes that are intended to be assessed (National Research Council, 2001).

The Cognitive Interview process used in Pennsylvania was conducted in three steps (adapted from Sato, Rabinowitz, Gallagher & Huang, in press). In the first step, the student was introduced to the interview process and allowed to practice thinking aloud. In the second step, data was collected concurrently as the student spoke out loud as he/she attempted to answer each test question. Via prompts, the researcher interacted with the student to elicit verbal responses that described his/her understanding of the test question and strategies for answering it. In the third step, the retrospective stage of data collection, students were asked specific questions about the test item (probes) immediately *after* answering it. At this point, most students could look back, recall, and discuss what they did to answer the question or solve the problem; in this way, they could verify or clarify their earlier comments. Once the student responded to all test items, the researcher asked each student a set of follow-up questions to clarify or verify comments collected earlier and/or to probe deeper into the student's thinking processes about that item.

This multi-step process helped reveal the types of prior/background knowledge and/or requisite skills that may have supported students' abilities to respond to the item and to assess the consequences of their decisions (Kopriva, 2001). Data collected through the Cognitive Interview contributed to information that helped to validate the interpretations of test performance outcomes by indicating the degree to which students' demonstrated understanding concurred with the construct intended to be measured by the item. From these interviews, specific, richly descriptive data were collected. This data was then used to help inform decision-making about the strategies currently used to revise and/or enhance items for the PSSA-M so that these enhancements would appropriately facilitate student access to the assessed content.

Summary of Cognitive Interviews

As stated above, the purpose of the Cognitive Interview study was to systematically evaluate the strategies used to develop (revise and/or enhance) items for the PSSA-M and the degree to which these strategies facilitated students' ability to demonstrate what they know and can do. The study addressed the following question: What are the cognitive processes by which test items (or item types) are understood by students?

Test items used in this study reflected a range of revision and enhancement strategies intended to facilitate the access to assessed content of students eligible for the PSSA-M. Results of the study suggested that a number of the revision and enhancement strategies, such as those related to linguistic enhancements or test design enhancements, helped students with their performance on the items included in this study.

TEST CONTENT BLUEPRINT FOR 2012 PSSA-M ASSESSMENTS

The PSSA-M, like the PSSA, is based on the Pennsylvania Academic Standards. The 2012 PSSA and PSSA-M reflect 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 would be designed. Relevant to item development are the refinement and clarification embodied in the Assessment Anchors.

Table 3–11. Mathematics Blueprint (Percentage of Total Test Points): PSSA and PSSA-M

Reporting Category	Program	Grade					
		4	5	6	7	8	11
Numbers and Operations	PSSA	43%–47%	41%–45%	28%-32%	20%–24%	18%-22%	12%–15%
	PSSA-M	43%–47%	41%–45%	28%-32%	20%–24%	18%-22%	12%–15%
Measurement	PSSA	12%–15%	12%–15%	12%–15%	12%–15%	12%–15%	12%–15%
	PSSA-M	12%–15%	12%–15%	12%–15%	12%–15%	12%–15%	12%–15%
Geometry	PSSA	12%–15%	12%–15%	15%–20%	15%–20%	15%–20%	12%–18%
	PSSA-M	12%–15%	12%–15%	15%–20%	15%–20%	15%–20%	12%–18%
Algebraic Concepts	PSSA	12%–15%	13%–17%	15%–20%	20%–27%	25%–30%	38%–42%
	PSSA-M	12%–15%	13%–17%	15%–20%	20%–27%	25%–30%	38%–42%
Data Analysis & Probability	PSSA	12%–15%	12%–15%	15%–20%	15%–20%	15%–20%	12%–18%
	PSSA-M	12%–15%	12%–15%	15%–20%	15%–20%	15%–20%	12%–18%

Table 3–12. Reading Blueprint (Percentage of Total Test Points): PSSA and PSSA-M

Reporting Category	Program	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 11
Comprehension and Reading Skills	PSSA	60%– 80%	60%–80%	50%–70%	50%–70%	40%–60%	40%–60%
	PSSA-M	60%–80%	60%–80%	50%–70%	50%–70%	40%–60%	40%–60%
Interpretation and Analysis of Fictional and Nonfictional Text	PSSA	20%–40%	20%–40%	30%–50%	30%–50%	40%–60%	40%–60%
	PSSA-M	20%–40%	20%–40%	30%–50%	30%–50%	40%–60%	40%–60%

Table 3–13. Science Blueprint (Percentage of Total Test Points): PSSA and PSSA-M

Reporting Category	Program	Grade 8	Grade 11
Nature of Science	PSSA	~50%	~50%
	PSSA-M	~50%	~50%
Biological Science	PSSA	~17%	~17%
	PSSA-M	~17%	~17%
Physical Science	PSSA	~17%	~17%
	PSSA-M	~17%	~17%
Earth and Space Science	PSSA	~17%	~17%
	PSSA-M	~17%	~17%

Operational Layout for 2012 PSSA-M

The PSSA-M mathematics assessments for Grades 4–8 and 11 are combined into one integrated test/answer booklet test booklet for each grade. (This differs from the PSSA mathematics assessments in Grades 4–8 and 11 which use separate test and answer booklets and combine the mathematics and reading assessments in the same set of materials.) The modified booklets contain scannable pages for multiple-choice (MC) responses, open-ended (OE) items with response spaces, and demographic data collection areas. All MC items are worth 1 point. OE items receive a maximum of 4 points (scale of 0–4).

The PSSA-M reading assessments for Grades 4–8 and 11 are combined into one integrated test/answer booklet test booklet for each grade. (This differs from the PSSA reading assessments in Grades 4–8 and 11 which use separate test and answer booklets and combine the mathematics and reading assessments in the same set of materials.) The modified booklets contain scannable pages for multiple-choice (MC) responses, open-ended (OE) items with response spaces, and demographic data collection areas. All MC items are worth 1 point. OE items receive a maximum of 3 points (scale of 0–3).

The PSSA-M science assessments for Grades 8 and 11 are combined into one integrated test/answer booklet test booklet for each grade. (This differs from the PSSA science assessment in Grade 8 which uses separate test and answer booklets.) The modified booklets contain scannable pages for multiple-choice (MC) responses, open-ended (OE) items with response spaces, and demographic data collection areas. All MC items are worth 1 point. OE items receive a maximum of 2 points (scale of 0–2).

For 2012, each test form contained common items taken by all students. The 2012 PSSA-M was comprised of 1 form per grade per content area. Tables 3–14 and 3–15 display information about the test form layout.

Table 3–14. 2012 PSSA-M Operational Test Plan Summary

Content Area	Year	Number of Common (Core) MC* Items per Form	Number of Common (Core) OE** Items per Form	Number of Forms per Grade
Mathematics	2012	30	2	1
Reading	2012	30	2	1
Science	2012	30	2	1

*MC = Multiple-Choice
**OE = Open-Ended

Table 3–15. 2012 PSSA-M Operational Test Layout

Content Area	Grades	Item Stage	Section 1	Section 2
Mathematics	4–8, 11	Core	15 MC	15 MC
Mathematics	4–8, 11	Core	1 OE	1 OE
Reading	4, 5, 7, 8, 11	Core	18 MC	12 MC
Reading	6	Core	19 MC	11 MC
Reading	4–8, 11	Core	1 OE	1 OE
Science	8, 11	Core	15 MC	15 MC
Science	8, 11	Core	1 OE	1 OE

An individual student's score is obtained by combining the points from the core MC and OE portions of the test as follows:

Table 3–16. 2012 PSSA-M Core Points

Student's Score	Grades	MC Items	OE Items	Total Points Possible
Mathematics	4–8, 11	30	2 items X 4-points=8 points	38
Reading	4–8, 11	30	2 items X 3 points=6 points	36
Science	8, 11	30	2 items X 2 points=4 points	34

For more information concerning the process used to convert the operational layout into forms (form construction), see Chapter Six.

Linking for 2011 and 2012 PSSA-M Mathematics Assessments

Linking provides a statistical bridge between assessment administrations. The 2012 administration was linked back to the 2011 administration through the use of linking items in the core (core-to-core link). In the PSSA-M, only multiple-choice items were used for linking purposes. Open-ended items were not repeated as linking items across cores. Approximately 20–50% of the multiple-choice items for each grade were repeated as linking items.

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

Test Sessions and Timing for 2012 PSSA-M Mathematics Assessments

The testing window for the 2012 operational assessment, including make-ups, extended from March 12 through March 30, 2012. The mathematics assessments consisted of two sections. Test administration recommendations called for each section to be scheduled as one assessment session, and schools were not permitted to combine both sections into a single session. Administration guidelines stipulated that the sections be administered in the sequence in which they are printed in the test booklets. The following tables outline the assessment schedule and estimated times for each section ("MC" refers to multiple-choice and "OE" refers to open-ended items). The estimated "Student Testing" times shown on the next page do not include time for administrative tasks that occur during the pre- and post-administration activities. These times are estimated separately. Times are approximate and are supplied to test administrators for scheduling purposes only.

Table 3–17. PSSA-M Mathematics—2012 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	5	6	7	8	11
1	65 to 80	15 to 20	50 to 60	15 MC 1 OE	15 MC 1 OE	15 MC 1 OE	15 MC 1 OE	15 MC 1 OE	15 MC 1 OE
2	65 to 80	15 to 20	50 to 60	15 MC 1 OE	15 MC 1 OE	15 MC 1 OE	15 MC 1 OE	15 MC 1 OE	15 MC 1 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.

Test Sessions and Timing for 2012 PSSA-M Reading Assessments

The testing window for the 2012 operational assessment, including make-ups, extended from March 12 through March 30, 2012. The reading assessments consisted of two sections. Test administration recommendations called for each section to be scheduled as one assessment session, and schools were not permitted to combine both sections into a single session. Administration guidelines stipulated that the sections be administered in the sequence in which they are printed in the test booklets. The following tables outline the assessment schedule and estimated times for each section (“MC” refers to multiple-choice and “OE” refers to open-ended items). The estimated “Student Testing” times shown on the next page do not include time for administrative tasks that occur during the pre- and post-administration activities. These times are estimated separately. Times are approximate and are supplied to test administrators for scheduling purposes only.

Table 3–18. PSSA-M Reading—2012 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	5	6	7	8	11
1	75 to 90	15 to 20	60 to 70	18 MC 1 OE	18 MC 1 OE	19 MC 1 OE	18 MC 1 OE	18 MC 1 OE	18 MC 1 OE
2	55 to 70	15 to 20	40 to 50	12 MC 1 OE	12 MC 1 OE	11 MC 1 OE	12 MC 1 OE	12 MC 1 OE	12 MC 1 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.

Test Sessions and Timing for 2012 PSSA-M Science Assessments

The testing window for the 2012 operational assessment, including make-ups, extended from April 23 through May 4, 2012. The science assessments consisted of two sections. Test administration recommendations called for each section to be scheduled as one assessment session, and schools were not permitted to combine both sections into a single session. Administration guidelines stipulated that the sections be administered in the sequence in which they are printed in the test booklets. The following tables outline the assessment schedule and estimated times for each section ("MC" refers to multiple-choice and "OE" refers to open-ended items). The estimated "Student Testing" times shown on the next page do not include time for administrative tasks that occur during the pre- and post-administration activities. These times are estimated separately. Times are approximate and are supplied to test administrators for scheduling purposes only.

Table 3–19. PSSA-M Science—2012 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	8	11
1	45 to 60	15 to 20	30 to 40	15 MC 1 OE	15 MC 1 OE
2	45 to 60	15 to 20	30 to 40	15 MC 1 OE	15 MC 1 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 2012 PSSA and PSSA-M Mathematics Assessments

The mathematics assessment results are 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 test points into these five categories and their percentages of the total number of test points are shown in the following table.

Table 3–20. Mathematics Reporting Categories and Point Distributions

Grade	Reporting Categories					Total Points
	A: Numbers and Operations	B: Measurement	C: Geometry	D: Algebraic Concepts	E: Data Analysis & Probability	
4	43%–47% 16–18 points	12%–15% 5–6 points	12%–15% 5–6 points	12%–15% 5–6 points	12%–15% 5–6 points	38
5	41%–45% 16–17 points	12%–15% 5–6 points	12%–15% 5–6 points	13%–17% 5–6 points	12%–15% 5–6 points	38
6	28%–32% 11–12 points	12%–15% 5–6 points	15%–20% 6–8 points	15%–20% 6–8 points	15%–20% 6–8 points	38
7	20%–24% 8–9 points	12%–15% 5–6 points	15%–20% 6–8 points	20%–27% 8–10 points	15%–20% 6–8 points	38
8	18%–22% 7–8 points	12%–15% 5–6 points	15%–20% 6–8 points	25%–30% 10–11 points	15%–20% 6–8 points	38
11	12%–15% 5–6 points	12%–15% 5–6 points	12%–18% 5–7 points	38%–42% 14–16 points	12%–18% 5–7 points	38

The mathematics 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.”

Reporting Categories and Points Distributions for 2012 PSSA and PSSA-M Reading Assessments

The Reading assessment results are 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 and their percentages of the total number of test points are shown on the following table.

Table 3–21. Reading Reporting Categories and Genre and Point Distributions

Grade	Reporting Categories				
	A: Comprehension and Reading Skills % Range	B: Interpretation and Analysis of Fictional and Nonfictional Text % Range	Total Points	% of Passages (Genre) Fiction	% Passages (Genre) Nonfiction
Grade 4	60%–80% 22–29 points	20%–40% 7–14 points	36	50%–70%	30%–50%
Grade 5	60%–80% 22–29 points	20%–40% 7–14 points	36	50%–70%	30%–50%
Grade 6	50%–70% 18–25 points	30%–50% 11–18 points	36	40%–60%	40%–60%
Grade 7	50%–70% 18–25 points	30%–50% 11–18 points	36	40%–60%	40%–60%
Grade 8	40%–60% 14–22 points	40%–60% 14–22 points	36	40%–60%	40%–60%
Grade 11	40%–60% 14–22 points	40%–60% 14–22 points	36	30%–50%	50%–70%

Like the mathematics reporting categories, reading 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."

Reporting Categories and Points Distributions for 2012 PSSA and PSSA-M Science Assessments

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

A. The Nature of Science

B. Biological Science

C. Physical Science

D. Earth and Space Science

The distribution of test points into these five categories and their percentages of the total number of test points are shown in the following table.

Table 3–22. Science Reporting Categories and Point Distributions

Grade	Reporting Categories				
	A: Nature of Science	B: Biological Sciences	C: Physical Sciences	D: Earth & Space Sciences	Total Points
Grade 8	~50% ~17 points	~17% ~5–6 points	~17% ~5–6 points	~17% ~5–6 points	34
Grade 11	~50% ~17 points	~17% ~5–6 points	~17% ~5–6 points	~17% ~5–6 points	34

The science 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,” “Descriptors (Sub-Assessment Anchors),” and “Eligible Content.”

Assessment Anchor Content Standards Subsumed within Reporting Categories for 2012 Modified Assessments

For mathematics, there are 16 Assessment Anchor Content Standards (Assessment Anchors) that occur at all grade levels (Grades 4–8 and 11), although they are not all assessed at each grade level. More specifically, the number targeted for assessment by grade level are 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.

For science, there are 12 Assessment Anchors that exist at each grade. Within The Nature of Science Reporting Category, three Assessment Anchors pertain to Reasoning and Analysis; Processes, Procedures, and Tools of Scientific Investigations; and Systems, Models, and Patterns. Within the Biological Sciences Reporting Category, three Assessment Anchors pertain to Structure and Function of Organisms, Continuity of Life, and Ecological Behavior and Systems. Within the Physical Sciences Reporting Category, three Assessment Anchors pertain to

Structure, Properties, and Interaction of Matter and Energy; Forms, Sources, Conversion, and Transfer of Energy; and Principles of Motion and Force. Within the Earth and Space Sciences Reporting Category, three Assessment Anchors pertain to Earth Features and Processes that Change Earth and Its Resources; Weather, Climate, and Atmospheric Processes; and Composition and Structure of the Universe.

Mathematics, reading, and science scores are based on the core (common) sections. Also reported are the student's mathematics and reading performance levels. See Appendix C: 2012 Modified PSSA Tally Sheets for a summary by grade.

TEST DEVELOPMENT CONSIDERATIONS FOR THE PSSA-M

Alignment to the PSSA Assessment Anchors and Eligible Content, grade-level appropriateness (reading/interest level, etc.), depth of knowledge, cognitive level, item/task level of complexity, estimated difficulty level, relevancy of context, rationale for distractors, style, accuracy, and correct terminology were major considerations in the item development process. The *Standards for Educational and Psychological Testing* (AERA, APA, NCME, 1999) and the *Principles of Universal Design* (Thompson, Johnstone, & Thurlow, 2002) guided the development process. In addition, DRC's *Bias, Fairness, and Sensitivity Guidelines* were used for developing items. All items were reviewed for fairness by bias, fairness, 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) as well as 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

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

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

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

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

Universal Design

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-M. The following checklist was used as a guideline:

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

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

Depth of Knowledge

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, p.7–8) "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." The four levels of cognitive complexity (depth of knowledge) are as follows:

- Level 1: Recall
- Level 2: 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.

Test Item Readability

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

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

TEST DEVELOPMENT PROCESS

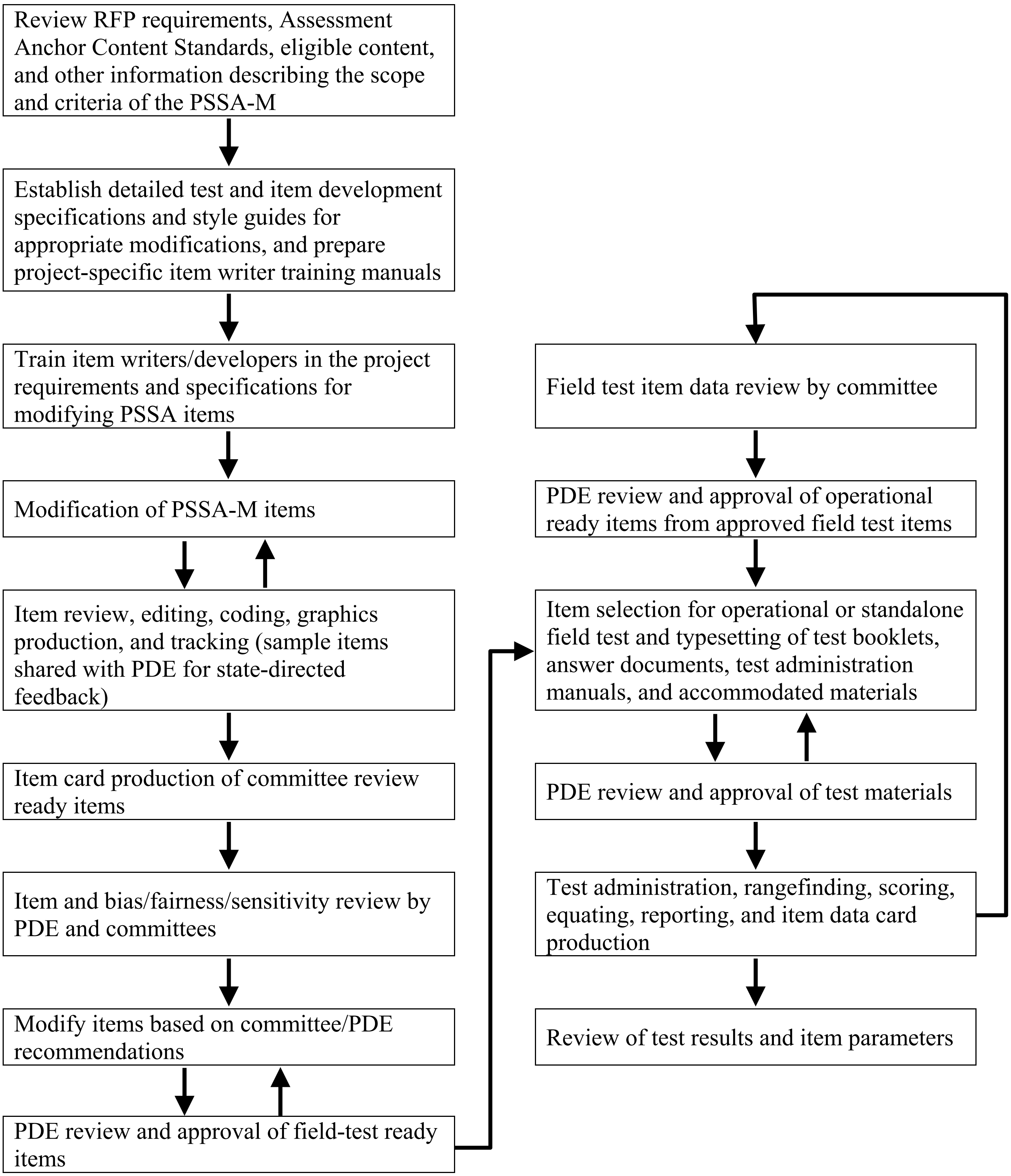
The item development process follows a logical timeline, which is outlined below in Figure 3–1. On the front-end of the schedule, tasks are generally completed with the goal of presenting field test candidate items to committees of Pennsylvania educators. On the back-end of the schedule, all tasks lead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

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

Steps in Development Cycle	Timeline to/from New Item Review		
Development planning	Fall	⇩	-12 to -4 months
Initial item modifying	Fall	⇩	-3 to -2 months
Internal reviews and PDE reviews	Fall/Winter	⇳	-3 to -1 months
Bias, Fairness, and Sensitivity Review	Winter	⇩	+/- 0 months
Newly Modified Item Content Review	**Winter**	⇨	**+/- 0 months**
Post-review resolution and clean-up	Winter	⇩	+/- 0 months
Build test forms	Spring	⇩	+0 to +1 months
Internal form reviews and PDE reviews	Spring	⇳	+1 to +2 months
Form printing, packaging, and shipping	Spring	⇩	+2 to +3 months
Test administration	Spring	⇩	+4 months
Material/data processing, rangefinding, and scoring	Spring/Summer	⇩	+4 to +7 months
Field Test Item Data Review	**Summer**	⇨	**+7 months**
Select operational items	Summer/Fall	⇩	+8 to +10 months

A process flowchart that illustrates the interrelationship among the steps in the process is shown in Figure 3–2. In addition, a detailed process table describing the item and test development processes also appears in Appendix D: Item and Test Development Process.

Figure 3–2. DRC Item and Test Development Process for PSSA-M



Chapter Four: Universal Design Procedures Applied in the Modified 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 2010 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)(l)]. Both Title 1 and IDEA regulations call for universally designed assessments that are accessible and valid for all students, including students with disabilities and English Language Learners. The benefits of universally designed assessments not only apply to these groups of students, but to all individuals with wide-ranging characteristics.

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

ELEMENTS OF UNIVERSALLY DESIGNED ASSESSMENTS

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

- **Inclusive Assessment Population**

  The PSSA-M is intended for students with disabilities functioning above the lowest 1% of the population, but not at a level that allows them to access the general Pennsylvania System of School Assessment (PSSA). The PSSA-M utilizes modified items designed to allow students with disabilities to demonstrate proficiency on the 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-M at the assessed grade levels. Universally designed assessments must remove all non-construct-oriented cognitive, sensory, emotional, and physical barriers.

- **Accessible, Non-biased Items**

  DRC conducted both internal and external reviews of items and test specifications to ensure that they did not create barriers because of lack of sensitivity to disability, culture, or other subgroups. Items and test specifications were developed by a team of individuals who understand the varied characteristics of items that might create difficulties for any group of students. Accessibility is incorporated as a primary dimension of test specifications, so that 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 universally designed assessment requires that the test is compatible with accommodations and a variety of widely-used adaptive equipment and assistive technology. (See the section on Assessment Accommodations later in Chapter Four.)

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

  Assessment instructions should be easy to understand, regardless of a student's experience, knowledge, language skills, or current concentration level. Knowledge questions that are posed within 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 that text is maximally readable and comprehensible. These features go beyond what is measured by readability formulas. Readability and comprehensibility are affected by many characteristics, 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 newly modified PSSA-M 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 results 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, 2004–2010) was utilized, with PDE approval, which included dimensions of style consistent with universal design.

GUIDELINES FOR UNIVERSALLY DESIGNED ITEMS

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

1. **Items measure what they are intended to measure.** Item writing training included assuring 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 13-point size. 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 difficulties. 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 assessed.
    - Technical terms and abbreviations were used only if 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-M 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. Spanish versions for the PSSA-M mathematics and the PSSA-M science were available for use by English Language Learners who would benefit from this accommodation.
7. **The test has an overall appearance that is clean and organized.** Images, pictures, and text that may not be necessary (e.g., sidebars, overlays, callout boxes, visual crowding, shading) and that could be potentially distracting to students were avoided. Also avoided were purely decorative features that did not serve a purpose. Information was organized in a manner consistent with an academic English framework with a left-right, top-bottom flow.

ITEM DEVELOPMENT

DRC and WestEd work closely with the Pennsylvania Department of Education (PDE) to help ensure that PSSA-M tests comply with nationally recognized Principles of Universal Design. We support the implementation of accommodations on large-scale statewide assessments for students with disabilities. 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 *Test 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, we 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-M tests are bias free for all students.

- With the goal of ensuring that the PSSA-M 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-M:
    - Mathematics: complicated tessellations, a chart or graph that extends 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-M tests to maximize accessibility for all students by using text that is in a 13-point size and a font style that is easily readable. DRC limits shading, spacing, graphics, charts, and the number of items per page so that there is sufficient white space on each page. Whenever possible, we ensure that graphics, pictures, diagrams, charts, and tables are positioned on the page with the associated test items. We use 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-M test booklets to ensure that they lie flat for two-page viewing and ease of reading and handling.

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

- High contrast and clarity is used to convey detailed information.
- Typically, shading is avoided; when necessary for content purposes, 10 percent screens are used as the standard.
- Overlaid print on diagrams, charts, and graphs is avoided.
- Charts, graphs, diagrams, and tables are clearly labeled with titles and with short descriptions where applicable.
- Only relevant information is included in diagrams, pictures, and graphics.
- Symbols used in keys and legends are meaningful and provide reasonable representations of the topic 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 PDE examines accommodations policies and current research to ensure that valid, acceptable accommodations are available for students. An accommodations manual for the PSSA and PSSA-M entitled *PSSA & PSSA-M Accommodations Guidelines for Students with IEPs and Students with 504 Plans* (PDE, January 2011) was developed for use with the 2011 PSSA and PSSA-M.

The manual can be accessed by going to www.education.state.pa.us. On the left, click on “Programs,” then “Programs O–R,” then select “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 PSSA-M mathematics and PSSA-M science. The Spanish-translation versions are discussed in Chapter Six.

Chapter Five: Field Test Leading to the 2012 Core

STANDALONE FIELD-TEST ITEMS

All core items appearing on the 2012 reading and science assessments came from the Spring 2010 standalone field test. The purpose of administering field-test items is to obtain statistics for them so they can be reviewed before becoming operational. Based on the statistical review, many of the field-test items tested in the 2010 PSSA-M standalone field test were selected for use as common core items in the 2012 PSSA-M.

Table 5–1. 2010 Spring PSSA-M Reading Field Test

Grade	No. of Passages per FT Form	No. of FT MC per FT Form	No. of FT OE per FT Form	Total No. of Forms	Total No. of Passages	Total No. of FT MC Items per Passage	Total No. of FT OE Items per Passage	Total No. of FT MC Items	Total No. of FT OE Items
4	5	30	3	6	15	12	1	180	15
5	5	30	3	6	15	12	1	180	15
6	5	30	3	6	15	12	1	180	15
7	5	30	3	6	15	12	1	180	15
8	5	30	3	6	15	12	1	180	15
11	5	30	3	6	15	12	1	180	15

Table 5–2. 2010 Spring PSSA-M Science Field Test

Grades	No. of FT MC per Form	No. of FT OE per Op. Form	Total No. of Forms	Total No. of FT MC	Total No. of FT OE	Total No. of Field Test Items
8	24	3	5	120	15	135
11	24	3	5	120	15	135

Core items appearing on the 2012 mathematics assessment came from the Spring 2010 mathematics embedded field test and also from the 2009 standalone field test. More information on the 2010 field test designs can be found in specific portions of Chapter Three. Additional information about the 2009 standalone mathematics field test can be found in the *Technical Report for the 2010 Modified Pennsylvania System of School Assessment*.

STATISTICAL ANALYSIS OF ITEM DATA

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

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

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

- Gender DIF code of B-, B+, C- or C+
- Any ethnic DIF code of B- or C-

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

REVIEW OF ITEMS WITH DATA

In the preceding section on Statistical Analysis of Item Data, it was stated that test development content-area specialists used certain statistics from item and DIF analyses of the 2010 field test to identify items for further review. Specific flagging criteria for this purpose were specified in the previous section. Due to the PSSA-M program for reading and science being in its initial stages, however, it was determined that all PSSA-M reading and science items necessary for the building of two equivalent core forms, both multiple-choice and open-ended, be brought to the data review for approval. Additionally, all mathematics items, both multiple-choice and open-ended, used in the 2010 embedded mathematics field test were brought to the data review, regardless of statistical performance.

The review of the items with data was conducted by over 50 Pennsylvania educators (teachers and PDE staff) broken out into content and grade-level committees. The review took place on August 9–10, 2010. In this session, 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, and instructional issues) and a decision regarding acceptance. DRC and WestEd 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. Further discussion on how this information was used is covered in Chapter Six.

Table 5–3. 2010 Mathematics Data Review Committee Results

	Grade	No. of Items in 2010 Field Test	Field Test Items Examined at 2010 Data Review Committee		Field Test Items Rejected by 2010 Data Review Committee		Items Classified as "Rejected" from 2010 Field Test (all sources)*	
			No. of	% of FT	No. of	% of FT	No. of	% of FT
Mathematics	4	27	27	100%	1	3.7%	1	3.7%
	5	27	27	100%	2	7.4%	2	7.4%
	6	27	27	100%	3	11.1%	3	11.1%
	7	27	27	100%	3	11.1%	3	11.1%
	8	27	27	100%	2	7.4%	2	7.4%
	11	27	27	100%	4	14.8%	4	14.8%
Total		**162**	**162**	**100%**	**15**	**9.3%**	**15**	**9.3%**

*Data Review Committee, PDE, and DRC

Table 5–4. 2010 Reading Data Review Committee Results

Reading	Grade	No. of Items in 2010 Field Test	Field Test Items Examined at 2010 Data Review Committee		Field Test Items Rejected by 2010 Data Review Committee		Items Classified as "Rejected" from 2010 Field Test (all sources)*	
			No. of	% of FT	No. of	% of FT	No. of	% of FT
	4	195	51	26.2%	0	0.0%	0	0.0%
	5	195	55	28.2%	0	0.0%	0	0.0%
	6	195	54	27.7%	1	0.5%	1	0.5%
	7	195	52	26.7%	0	0.0%	0	0.0%
	8	195	59	30.3%	0	0.0%	0	0.0%
	11	195	52	26.7%	0	0.0%	0	0.0%
Total		**1,170**	**323**	**27.6%**	**1**	**0.001%**	**1**	**0.001%**

*Data Review Committee, PDE, and DRC

Table 5–5. 2010 Science Data Review Committee Results

Science	Grade	No. of Items in 2010 Field Test	Field Test Items Examined at 2010 Data Review Committee		Field Test Items Rejected by 2010 Data Review Committee		Items Classified as "Rejected" from 2010 Field Test (all sources)*	
			No. of	% of FT	No. of	% of FT	No. of	% of FT
	8	135	51	37.8%	0	0.0%	0	0.0%
	11	135	53	39.3%	0	0.0%	0	0.0%
Total		**270**	**104**	**38.5%**	**0**	**0.0%**	**0**	**0.0%**

*Data Review Committee, PDE, and DRC

Chapter Six: Operational Forms Construction for 2012

Final Selection of Items and 2012 PSSA-M Forms Construction

When the final selection of items for the operational 2012 test was ready to begin, the candidate items that emerged from the spring 2010 field test had undergone multiple reviews, including:

- Reviews by DRC and WestEd content-area test development specialists and curriculum specialists
- Formal bias, fairness, and sensitivity review by the Bias, Fairness, and Sensitivity Committee consisting of an expert, multi-ethnic group of men and women with members also 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 end product of the above process was an "item status" designation for each field tested item. All items having an item status code of "Acceptable/Active" were candidates to be selected for the 2012 PSSA-M. To have an item status code of "Acceptable/Active" meant that the item met the following criteria:

- Appropriately aligned with its designated Assessment Anchor Content Standard (Assessment Anchor) and sub-classifications
- Acceptable in terms of bias/fairness/sensitivity issues, including differential item functioning (for gender and ethnicity)
- Free of psychometric flaws, 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, Excel files were created for each content area at each grade. These files contained all relevant content codes and statistical characteristics. IDEAS also created a 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.

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) positions according to test blueprint requirements and psychometric guidelines. Changes to items were not encouraged since alterations could affect how an item performs on subsequent testing.

For the common items, this meant that the combination of MC and OE items would yield the appropriate range of points while tapping an appropriate variety of the Assessment Anchors and related Eligible Content within each Reporting Category. Items selected in the first round were examined with regard to how well they functioned 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 bi-serial 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.

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

LINKING THE 2011 OPERATIONAL TEST TO THE 2012 OPERATIONAL TEST

The 2011 Operational PSSA-M Mathematics, Reading, and Science tests were linked with the 2012 Operational PSSA-M Mathematics test using core-to-core linking items (items that are repeated from operational form to the next).

In the selection 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 administration.

SPECIAL FORMS USED IN THE 2012 PSSA-M

Braille and Large Print

Students with visual impairments were able to respond to test materials that were available in either Braille or large print. At each grade level assessed, one form was selected for the creation of a Braille and a large-print edition. School district personnel ordered Braille or large-print assessment materials directly from the Pennsylvania Training and Technical Assistance Network (PaTTAN) in Harrisburg. 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 answer document had to have the same form designation as the form used for Braille or large print.

Spanish Translation of the Mathematics and Science Assessments

School personnel had the option of having Spanish-speaking students who had been enrolled in schools in the United States for less than three years respond to a Spanish version of the PSSA-M for mathematics and/or science only. The original translation of the items and the *Directions for Administration Manuals* was initiated by Second Language Testing, Incorporated and completed by DRC. After discussions with PDE and Second Language Testing, Incorporated, the mathematics booklets for Grades 4–8 and 11 and the science booklets for Grades 8 and 11 were designed with 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 and/or science assessments could write their answers in English, Spanish, or a combination of both English and Spanish, with the highest possible score from those combinations recorded for the student.

Spanish-translated versions of the PSSA-M mathematics assessment were used by a total of 23 students at Grades 4, 6, 7, 8, and 11 in 2012. Spanish-translated versions of the 2012 PSSA-M science assessment were used by a total of 11 students at Grades 8 and 11.

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

Chapter Seven: Test Administration Procedures

TEST SESSIONS, TEST SECTIONS, AND TEST TIMING

The PSSA-M Mathematics test utilizes a single consumable booklet. When a single scannable answer booklet is used, the contents of the answer booklet and the test booklet are combined into one integrated booklet. This organization allows the students who are taking the modified tests to maintain the flow and directions of the test without having to manage two separate booklets.

The PSSA-M tests consist of two untimed sections. Testing-time recommendations are given, but the estimated times are meant to provide general guidelines for scheduling purposes rather than absolute testing times.

Table 7–1. PSSA-M Mathematics Test Section Information

Grade	No. of Sections per Test	No. of MC items Section 1	No. of OE items Section 1	No. of MC items Section 2	No. of OE items Section 2	Primary Testing Window	Make-up Testing Window
4	2	15	1	15	1	March 12–23	March 26–30
5	2	15	1	15	1	March 12–23	March 26–30
6	2	15	1	15	1	March 12–23	March 26–30
7	2	15	1	15	1	March 12–23	March 26–30
8	2	15	1	15	1	March 12–23	March 26–30
11	2	15	1	15	1	March 12–23	March 26–30

Table 7–2. PSSA-M Mathematics Duration and Testing Load by Grade

Assessment	Grade	Total No. of MC Items per Form per Admin	Total No. of OE Items per Form per Admin	Total Estimated Administration Time per Form (in Minutes)
Mathematics	**4**	30	2	130 to 160
	5	30	2	130 to 160
	6	30	2	130 to 160
	7	30	2	130 to 160
	8	30	2	130 to 160
	11	30	2	130 to 160

Table 7–3. PSSA-M Reading Test Section Information

Grade	No. of Sections per Test	No. of MC items Section 1	No. of OE items Section 1	No. of MC items Section 2	No. of OE items Section 2	Primary Testing Window	Make-up Testing Window
4	2	18	1	12	1	March 12–23	March 26–30
5	2	18	1	12	1	March 12–23	March 26–30
6	2	19	1	11	1	March 12–23	March 26–30
7	2	18	1	12	1	March 12–23	March 26–30
8	2	19	1	11	1	March 12–23	March 26–30
11	2	18	1	12	1	March 12–23	March 26–30

Table 7–4. PSSA-M Reading Duration and Testing Load by Grade

Assessment	Grade	Total No. of MC Items per Form per Admin	Total No. of OE Items per Form per Admin	Total Estimated Administration Time per Form (in Minutes)
Reading	**4**	30	2	130 to 160
	5	30	2	130 to 160
	6	30	2	130 to 160
	7	30	2	130 to 160
	8	30	2	130 to 160
	11	30	2	130 to 160

Table 7–5. PSSA-M Science Test Section Information

Grade	No. of Sections per Test	No. of MC items Section 1	No. of OE items Section 1	No. of MC items Section 2	No. of OE items Section 2	Primary Testing Window	Make-up Testing Window
8	2	15	1	15	1	April 23–27	April 30–May 4
11	2	15	1	15	1	April 23–27	April 30–May 4

Table 7–6. PSSA-M Science Duration and Testing Load by Grade

Assessment	Grade	Total No. of MC Items per Form per Admin	Total No. of OE Items per Form per Admin	Total Estimated Administration Time per Form (in Minutes)
Science	**8**	30	2	90 to 120
	11	30	2	90 to 120

Test administrators are instructed that each section in a form should be scheduled as one assessment session. In addition, they are also told to not combine multiple sections into a single session. Test administrators are also instructed to administer the sections in the sequence in which they were printed in the booklets. In all cases, individual assessment sections must be completed within one school day.

Test administrators are advised to use a testing location that is separate from the administration of the general PSSA assessment. For 2012, students who participated in the PSSA-M mathematics assessment may have participated in the general PSSA reading assessment. These students were allowed to complete both sections of the PSSA-M mathematics before completing the three general PSSA reading sections. Alternating the PSSA-M math sections with the PSSA reading sections was also an option for the test administrators, as long as the subject sections were administered in sequence of the booklet. Likewise, students who participated in the PSSA-M reading assessment may have participated in the general PSSA mathematics assessment. Test administrators would have the option of completing both sections of the PSSA-M reading before completing the three general PSSA mathematics sections or alternating the PSSA-M reading sections with the PSSA mathematics sections, as long as the subject sections were administered in sequence of the booklet.

Since not all students will finish the assessment sections at the same time, test administrators are advised to use the flexibility of the time limits to the students' advantage. For example, test administrators manage the testing time so that students do not feel rushed while they are taking any assessment section, and no student is penalized because he or she works slowly. It is equally stressed to test administrators that a student should not be given an opportunity to waste time. Students are told to close their booklets when they have finished the section of the assessment in which they had been working. Students who finish early are allowed to sit quietly or read for pleasure until all students have 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 work slowly may require extended time. Special assessment situations are arranged for these students. When all students in a testing session have indicated that they have finished an assessment section, test administrators end the section.

Scheduled extended time can be provided by a test administrator, and students may request extended time if they indicate that they have not completed the task. Such requests are granted if the test administrator finds the request to be educationally valid. Test administrators are advised that not permitting ample time for students to complete the assessment may impact the students' and schools' performance.

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

For PSSA-M Mathematics at grades 7, 8, and 11, test administrators are asked to print out and distribute a copy of the individual grade's formula sheets. The formula sheets are posted at www.education.state.pa.us. [First click on "Programs" in the left navigation bar, select "Programs O–R," select "Pennsylvania System of School Assessment (PSSA)," and finally click on "Resource Materials." The formula sheets are listed under "Mathematics Resources."]

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

TESTING WINDOW

The testing windows for the 2012 PSSA-M operational assessments were as follows:

Mathematics and Reading:

- Primary testing window – March 12 through 23, 2012
- Make-up testing window – March 26 through 30, 2012

Science:

- Primary testing window – April 23 through 27, 2012
- Make-up testing window – April 30 through May 4, 2012

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 2012 PSSA-M operational assessment:

- Shipment one contained the *Handbook for Assessment Coordinators* and the *Directions for Administration Manual*s for each grade tested at a school participating in the mathematics, reading, and science assessments. Shipment one was delivered by February 13, 2012.
- 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, and science assessments. Shipment two was delivered by February 27, 2012.

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 the box being sealed for shipment 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 108,306 modified assessment booklets and 32,061 modified *Directions for Administration Manual*s for 3,994 testing sites. DRC used United Parcel Service (UPS) and Advanced Shipping Technologies (AST) to deliver the secure materials to the testing sites.

MATERIALS RETURNED

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

- Primary return window—March 14 through March 23, 2012
- Make-up return window—March 26 through March 30, 2012

TEST SECURITY MEASURES

Test security is essential to obtaining reliable and valid scores for accountability purposes. Test Security Certifications were required to be signed by each building Principal, School Assessment Coordinator, District Assessment Coordinator, Test Administrator, and Proctor prior to the assessment being administered. All signed Certifications were returned to the Chief School Administrator who must retain the Certifications for three years. The purpose of the Certifications 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 Certifications 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 Manual*s 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, and Keystone (paper pencil) 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 2012 PSSA-M. Additional information regarding assessment accommodations can be found in Chapter Four of this report. 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."

Chapter Eight: Processing and Scoring

RECEIPT OF MATERIALS

Receipt of PSSA-M test materials began on March 19, 2012, and concluded with all make-up tests on May 4, 2012. 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 answer booklet) 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 a 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 booklets) were processed through booklet check-in, the materials became available to the DRC Document Processing Center 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 documents that were linked to the box barcode were assigned to the batch number and tracked through all processing steps. As documents 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 the DRC Document Processing Center 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 item 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 answer documents.

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 omits in predetermined fields. Marks that did not meet the predefined editing standards were routed to editors for resolution.

Experienced DRC Document Processing Center 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.

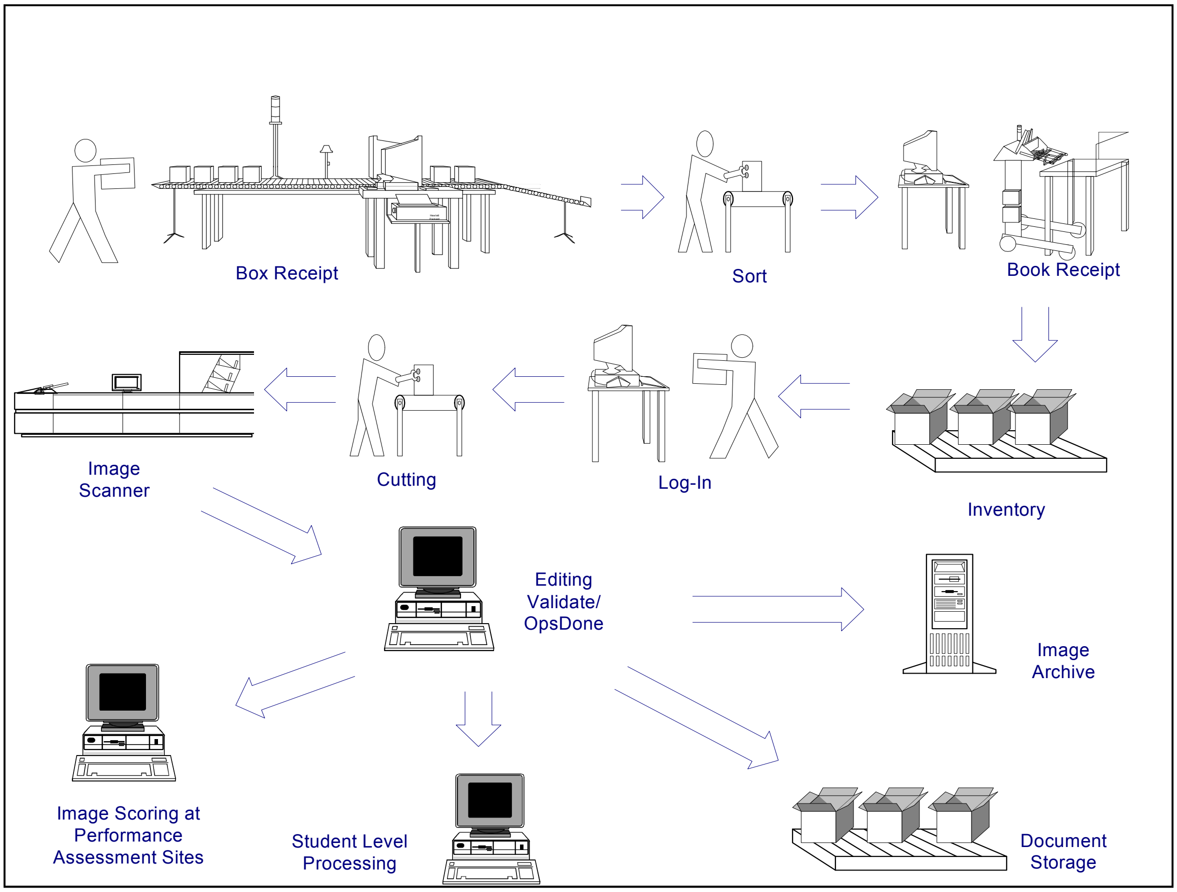
Table 8–1 shows the number of modified booklets received through booklet check-in and the number of modified booklets that contained student responses that were scanned and scored.

Table 8–1. Counts of 2012 PSSA-M Materials Received – Grades 4–8 and 11

Material Description	Booklets Received	Used Booklets Scanned	Total Booklets Shipped
Grade 4 Modified Math	7,114	2,766	7,116
Grade 4 Modified Reading	7,890	3,788	7,892
Grade 5 Modified Math	7,972	3,802	7,973
Grade 5 Modified Reading	8,726	4,750	8,728
Grade 6 Modified Math	7,658	4,142	7,660
Grade 6 Modified Reading	8,109	4,644	8,110
Grade 7 Modified Math	7,597	4,404	7,600
Grade 7 Modified Reading	7,920	4,704	7,920
Grade 8 Modified Math	7,891	4,575	7,896
Grade 8 Modified Reading	7,779	4,446	7,782
Grade 8 Modified Science	6,796	3,691	6,812
Grade 11 Modified Math	7,882	4,761	7,885
Grade 11 Modified Reading	7,602	4,419	7,603
Grade 11 Modified Science	7,303	4,004	7,329

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 constructed 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 scaled scores were calculated.

Student answers were scored against the finalized 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

The reading and science items that were part of the 2012 PSSA-M were field tested in 2010. The mathematics items that were part of the 2012 PSSA-M were field tested in either 2009 or 2010. Rangefinding took place after each field-test administration. What follows is a description of DRC's rangefinding process for the 2012 PSSA-M items (though those items underwent rangefinding in previous years).

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

Reading and science responses were pulled from the 2010 modified field tests. Mathematics responses were pulled from the 2009 and 2010 modified field tests. Once examples of responses representing all the 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 Modified Reading Rangefinding Meeting was held July 7 and 8, 2010, at the Hilton, Harrisburg. Modified Math Rangefinding Meetings were held on July 7, 2010, at the Hilton, Harrisburg, and from June 30 through July 2, 2009, at the Holiday Inn, New Cumberland. The Modified Science Rangefinding Meeting was held July 7 and 8, 2010, at the Hilton, 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 2012 PSSA (including the modified assessment). To complete the rater staffing for this project, DRC placed advertisements in local newspapers and utilized a variety of websites. Open houses were held and applications for rater positions were screened by DRC's recruiting staff. Next, 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, or science. 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 and PSSA-M.

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, or science 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 purged and was released from the project.

TRAINING

As part of preparation for the 2012 modified mathematics, reading, and science 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 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 included in all subjects. 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-M 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 for every 8–10 raters ensured a sufficient monitoring rate for each team member.

The 2012 assessment included the opportunity for students to respond in Spanish to modified math and science items. The scoring director responsible for this component of the assessment is a Spanish speaker who has a strong mathematics and science background and who has worked closely with the PSSA for three 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 responses 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. There were no student response alerts during the scoring of the 2012 modified assessment.

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-M and across consecutive administrations. In scoring the 2012 PSSA-M, 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 modified subject selected 40 validity papers for each core open-ended (OE) 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 retraining, usually in the form of an annotated handout or a short set of papers without printed scores that was given to raters as a recalibration test.

Validity was employed on all core modified reading, math, and science OE items. 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 normally 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 modified open-ended items responses:

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 of responses 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 what percentage of 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). 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 procedure 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 modified mathematics items in the 2012 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 were used to calculate the exact and adjacent agreement rates.

Table 8–2. Inter-rater Agreement for 2012 PSSA Modified Mathematics Grades 4–8 and 11 Open-Ended Response Items and Validity

Grade	Common Item	% Exact Agreement	% Adjacent Agreement	% Exact + Adjacent Agreement	% Exact Validity Agreement
4	1	97	3	100	87
	2	98	2	100	93
5	1	93	7	100	85
	2	96	3	99	97
6	1	93	7	100	95
	2	94	6	100	94
7	1	94	6	100	95
	2	96	4	100	89
8	1	90	10	100	94
	2	94	6	100	94
11	1	97	3	100	94
	2	95	5	100	94

Note. 0–4 possible score points

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

Table 8–3. Percentages Awarded for Each Possible Score Point 2012 PSSA Modified Mathematics Grades 4–8 and 11

Grade	Common Item	%0	%1	%2	%3	%4	%B/NS*
4	1	46	31	8	7	8	1
	2	42	30	18	5	4	1
5	1	68	20	7	3	1	1
	2	39	27	10	10	14	1
6	1	48	41	7	2	1	0
	2	19	57	19	4	1	1
7	1	29	34	14	15	7	1
	2	77	4	4	7	5	1
8	1	32	41	20	4	2	1
	2	38	39	13	8	1	1
11	1	52	34	6	1	3	4
	2	43	46	3	3	0	4

*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 modified reading items in the 2012 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 were used to calculate the exact and adjacent agreement rates.

Table 8–4. Inter-rater Agreement for 2012 PSSA Modified Reading Grades 4–8 and 11 Open-Ended Response Items and Validity

Grade	Common Item	% Exact Agreement	% Adjacent Agreement	% Exact + Adjacent Agreement	% Exact Validity Agreement
4	1	74	26	100	72
	2	81	19	100	68
5	1	89	11	100	85
	2	77	23	100	73
6	1	78	22	100	84
	2	79	21	100	77
7	1	80	19	99	70
	2	77	22	99	70
8	1	79	21	100	82
	2	82	18	100	62
11	1	75	25	100	65
	2	81	19	100	83

Note. 0–3 possible score points

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

Table 8–5. Percentages Awarded for Each Possible Score Point 2012 PSSA Modified Reading Grades 4–8 and 11

Grade	Common Item	%0	%1	%2	%3	%B/NS*
4	1	16	35	36	10	1
	2	26	29	20	24	2
5	1	20	26	28	25	2
	2	6	41	38	11	1
6	1	18	47	28	6	2
	2	13	33	36	15	2
7	1	16	31	31	20	2
	2	20	50	22	6	2
8	1	14	30	40	15	2
	2	6	26	40	24	2
11	1	9	41	29	17	4
	2	6	36	35	18	4

*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 modified science items in the 2012 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 were used to calculate the exact and adjacent agreement rates.

Table 8–6. Inter-rater Agreement for 2012 PSSA Modified Science Grades 8 and 11 Open-Ended Response Items and Validity

Grade	Common Item	% Exact Agreement	% Adjacent Agreement	% Exact + Adjacent Agreement	% Exact Validity Agreement
8	1	88	12	100	96
	2	85	15	100	95
11	1	81	19	100	82
	2	88	12	100	90

Note. 0–2 possible score points

Table 8–7 shows the distribution of scores for the modified science items. All modified science items are scored with a 0–2 score point range.

Table 8–7. Percentages Awarded for Each Possible Score Point 2012 PSSA Modified Science Grades 8 and 11

Grade	Common Item	%0	%1	%2	%B/NS*
8	1	29	45	24	2
	2	25	54	19	2
11	1	16	41	32	11
	2	61	25	5	8

*B=blank and NS=non-scoreable

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. Statistical analysis is conducted at several points for the PSSA-M: 1) an early analysis for quality control purposes and 2) analyses for the technical report and item banking. Detailed information regarding the attributes of students used for Adequate Yearly Progress (AYP) reporting is provided in Chapter Ten.

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:

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

PSSA-M ATTEMPT CRITERIA

For all data sources, only students who meet the attempt criteria are included. The attempt criteria required students to complete a minimum of four items (multiple-choice or open-ended items) in each subject area section of the test booklets. Counts were based on operational items only.

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 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-M. 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 2012 this data included all public school students who 1) had their MC items scanned and scored by May 20 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).

FINAL DATA

This file included all students who met state reporting criteria and post-AYP appeals (including attempt criteria) by August 29 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 data banked for this administration and the majority of the results included in this technical report were derived using the final data file.

FINAL *N*-COUNTS FOR ALL DATA SOURCES

The *n*-counts for all data sources are provided in Table 9–1.

Table 9–1. Data Source *N*-Counts

		Key Validation	Final
Mathematics	4	2647	2708
	5	3632	3726
	6	3950	4061
	7	4161	4283
	8	4302	4444
	11	4466	4606
Reading	4	3646	3711
	5	4574	4672
	6	4438	4543
	7	4453	4570
	8	4177	4308
	11	4125	4255
Sci.	8	3452	3554
	11	3632	3742

Chapter Ten: Summary Demographic, Program, and Accommodation Data for the 2012 PSSA-Modified

ASSESSED STUDENTS

As stated in earlier chapters, the target population for the PSSA-M consists of public school students with an IEP and history of low academic achievement whose disabilities inhibit their capacity to respond to the standard PSSA, even with accommodations. However, they function above the one percent of students with the most severe cognitive impairments who qualify for the Pennsylvania Alternate System of Assessment (PASA).

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, and 3) demonstrates persistent academic difficulties with 4) 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, select "Programs," "Programs S–Z," and then "Special Education." From the "Special Education" page select "Assessment" to access the relevant documents regarding eligibility.

Results in this chapter are presented in sets of tables for the three PSSA-M subject areas (mathematics, reading, and science). Accompanying each numbered table is a letter (M, R, or S) to designate the subject area. Table set 10–1M, 10–1R, and 10–1S 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 2012 PSSA-M. This number pertains to the total number of records on file and is typically less than the "Used 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-M score in the subject area, followed by the number and percentage not receiving a score. The final line gives the number of students contributing to state summary statistics, which is especially relevant for all tables following 10–2 (M, R, and S). (See the section of this chapter entitled "Composition of Sample Used in Subsequent Tables" for an additional explanation.)

Table 10–1M. Students Assessed on the 2012 PSSA-M: Mathematics

	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct
Number of non-blank answer documents processed	2,765	3,799	4,144	4,405	4,575	4,759
Students with a mathematics score	2,756 99.7	3,783 99.6	4,133 99.7	4,372 99.3	4,543 99.3	4,693 98.6
Number processed but not assessed (without a total score)	9 0.3	16 0.4	11 0.3	33 0.7	32 0.7	66 1.4
Students with a mathematics score used in state summaries	2,708	3,726	4,061	4,283	4,444	4,606

Table 10–1R. Students Assessed on the 2012 PSSA-M: Reading

	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct
Number of non-blank answer documents processed	3,783	4,745	4,642	4,698	4,440	4,410
Students with a reading score	3,768 99.6	4,733 99.7	4,613 99.4	4,656 99.1	4,404 99.2	4,341 98.4
Number processed but not assessed (without a total score)	15 0.4	12 0.3	29 0.6	42 0.9	36 0.8	69 1.6
Students with a reading score used in state summaries	3,711	4,672	4,543	4,570	4,308	4,255

Table 10–1S. Students Assessed on the 2012 PSSA-M: Science

	Gr. 8		Gr. 11	
	N	Pct	N	Pct
Number of non-blank answer documents processed	3,684		3,992	
Students with a science score	3,638	98.8	3,804	95.3
Number processed but not assessed (without a total score)	46	1.2	188	4.7
Students with a science score used in state summaries	3,554		3,742	

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

- Extended absence from school that continued beyond the assessment window
- Being absent without make-up for at least one section of a subject area test
- Failure of a student to meet the attempt criteria on one or more sections of a subject area test with no exclusion code marked by school personnel. For mathematics, reading, and science the attempt criteria required a minimum of four items to be completed in each test section
- 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, 10–2R, and 10–2S.

Table 10–2M. Counts of Students without Scores on the 2012 PSSA-M: Mathematics

Reason for Non-Assessment	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct
Extended Absence from School	1 / 11.1	2 / 12.5	2 / 18.2	5 / 15.2	5 / 15.6	15 / 22.7
Absent Without Make-up	0 / 0.0	1 / 6.3	2 / 18.2	2 / 6.1	2 / 6.3	9 / 13.6
Non-Attempt	5 / 55.6	9 / 56.3	4 / 36.4	13 / 39.4	13 / 40.6	16 / 24.2
Medical Emergency	1 / 11.1	2 / 12.5	2 / 18.2	8 / 24.2	6 / 18.8	11 / 16.7
Other Reasons	2 / 22.2	2 / 12.5	1 / 9.1	5 / 15.2	6 / 18.8	15 / 22.7
Total Not Assessed	9	16	11	33	32	66

Table 10–2R. Counts of Students without Scores on the 2012 PSSA-M: Reading

Reason for Non-Assessment	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct
Extended Absence from School	2 / 13.3	3 / 25.0	3 / 10.3	4 / 9.5	4 / 11.1	12 / 17.4
Absent Without Make-up	0 / 0.0	0 / 0.0	5 / 17.2	2 / 4.8	3 / 8.3	12 / 17.4
Non-Attempt	11 / 73.3	4 / 33.3	16 / 55.2	25 / 59.5	18 / 50.0	22 / 31.9
Medical emergency	0 / 0.0	3 / 25.0	3 / 10.3	8 / 19.0	4 / 11.1	9 / 13.0
Other Reasons	2 / 13.3	2 / 16.7	2 / 6.9	3 / 7.1	7 / 19.4	14 / 20.3
Total Not Assessed	15	12	29	42	36	69

Table 10–2S. Counts of Students without Scores on the 2012 PSSA-M: Science

Reason for Non-Assessment	Gr. 8		Gr. 11	
	N	Pct	N	Pct
Extended Absence from School	12	26.1	43	22.9
Absent Without Make-up	3	6.5	38	20.2
Non-Attempt	10	21.7	56	29.8
Medical Emergency	10	21.7	14	7.4
Other Reasons	11	23.9	37	19.7
Total Not Assessed	46		188	

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 27, 2012. Students not included in the present state summary data were those who 1) were enrolled in a Pennsylvania school after October 1, 2011; 2) were coded as ELL and enrolled after April 15, 2011; 3) were a foreign exchange student; 4) were home schooled; 5) were enrolled in a non-public school; or 6) do not have a subject area test score.

Demographic data for students taking the PSSA-M is presented separately for each subject area in Tables 10–3M, 10–3R, and 10–3S. 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-M is administered.

DEMOGRAPHIC CHARACTERISTICS

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

Beginning in 2011, PSSA-M was based on post-appeals files rather than on the pre-appeals file as in 2010, making it more comparable with the PSSA. A comparison between selected demographic characteristics of PSSA-M and PSSA data was thereby improved. The assessment of 2012 is the first year in which a two-year comparison was available for reading and science. Comparisons involving gender and ethnicity revealed more male and minority (Black/African American, Latino/Hispanic) students responded to the PSSA-M than those receiving the standard PSSA, regardless of subject area. A detailed account of these comparisons may be found in Appendix O of this report.

Table 10–3M. Demographic Characteristics of Students Taking the 2012 PSSA-M: Mathematics

Demographic or Educational Characteristic	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct
Gender						
Female	1,081 39.9	1,484 39.8	1,667 41.0	1,719 40.1	1,693 38.1	1,851 40.2
Male	1,625 60.0	2,240 60.1	2,391 58.9	2,562 59.8	2,746 61.8	2,750 59.7
Race/Ethnicity						
American Indian or Alaskan Native	5 0.2	6 0.2	11 0.3	8 0.2	10 0.2	8 0.2
Asian or Pacific Islander	30 1.1	33 0.9	48 1.2	49 1.1	41 0.9	51 1.1
Black/African American non-Hispanic	645 23.8	890 23.9	962 23.7	896 20.9	934 21.0	1,031 22.4
Latino/Hispanic	298 11.0	397 10.7	419 10.3	448 10.5	434 9.8	397 8.6
White non-Hispanic	1,655 61.1	2,317 62.2	2,549 62.8	2,808 65.6	2,944 66.2	3,074 66.7
Multi-Racial/Ethnic	71 2.6	80 2.1	68 1.7	68 1.6	76 1.7	37 0.8
Educational Category and Other Demographic Groups						
IEP (not gifted)	2,708 100.0	3,726 100.0	4,061 100.0	4,283 100.0	4,444 100.0	4,606 100.0
Student exited IEP in last 2 years	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
Title I	1,124 41.5	1,402 37.6	1,219 30.0	984 23.0	933 21.0	936 20.3
Title III Served	127 4.7	162 4.3	146 3.6	159 3.7	134 3.0	90 2.0
Title III Not Served	12 0.4	16 0.4	17 0.4	19 0.4	10 0.2	11 0.2
Migrant Student	1 0.0	2 0.1	2 0.0	2 0.0	1 0.0	1 0.0
ELL (enrolled after 4-15-11)	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
ELL (enrolled before 4-15-11)	140 5.2	180 4.8	163 4.0	178 4.2	144 3.2	102 2.2

Table 10–3M (continued). Demographic Characteristics of Students Taking the 2012 PSSA-M: Mathematics

Demographic or Educational Characteristic	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	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	5 0.2	17 0.5	18 0.4	8 0.2	9 0.2	5 0.1
Exited ESL/bilingual program and in second year of monitoring	7 0.3	7 0.2	9 0.2	9 0.2	10 0.2	9 0.2
Former ELL no longer monitored	8 0.3	11 0.3	36 0.9	41 1.0	48 1.1	67 1.5
Economically Disadvantaged	1,747 64.5	2,421 65.0	2,542 62.6	2,595 60.6	2,610 58.7	2,397 52.0
Enrollment						
Current Enrollment in school of residence after 10-1-11	84 3.1	94 2.5	116 2.9	110 2.6	113 2.5	124 2.7
Current Enrollment in district of residence after 10-1-11	32 1.2	47 1.3	55 1.4	60 1.4	70 1.6	69 1.5
Current Enrollment as PA resident after 10-1-11	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
Enrolled in school of residence after 10-1-10 but on/before 10-1-11	675 24.9	822 22.1	1,064 26.2	937 21.9	794 17.9	823 17.9
Enrolled in district of residence after 10-1-10 but on/before 10-1-11	235 8.7	319 8.6	361 8.9	408 9.5	396 8.9	345 7.5
Education in Non-Traditional Settings						
Court/agency placed	4 0.1	7 0.2	7 0.2	19 0.4	25 0.6	54 1.2
Students with mathematics scores used in state summaries	2,708	3,726	4,061	4,283	4,444	4,606

Table 10–3R. Demographic Characteristics of Students Taking the 2012 PSSA-M: Reading

Demographic or Educational Characteristic	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct
Gender						
Female	1,328 35.8	1,645 35.2	1,714 37.7	1,728 37.8	1,529 35.5	1,577 37.1
Male	2,379 64.1	3,024 64.7	2,827 62.2	2,840 62.1	2,777 64.5	2,674 62.8
Race/Ethnicity						
American Indian or Alaskan Native	7 0.2	6 0.1	15 0.3	8 0.2	9 0.2	6 0.1
Asian or Pacific Islander	43 1.2	54 1.2	54 1.2	47 1.0	48 1.1	50 1.2
Black/African American non-Hispanic	773 20.8	993 21.3	993 21.9	900 19.7	881 20.5	989 23.2
Latino/Hispanic	372 10.0	471 10.1	436 9.6	495 10.8	429 10.0	385 9.0
White non-Hispanic	2,427 65.4	3,069 65.7	2,970 65.4	3,051 66.8	2,867 66.6	2,782 65.4
Multi-Racial/Ethnic	85 2.3	75 1.6	73 1.6	63 1.4	71 1.6	38 0.9
Educational Category and Other Demographic Groups						
IEP (not gifted)	3,711 100.0	4,672 100.0	4,543 100.0	4,570 100.0	4,308 100.0	4,255 100.0
Student exited IEP in last 2 years	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
Title I	1,441 38.8	1,666 35.7	1,329 29.3	1,023 22.4	931 21.6	873 20.5
Title III Served	174 4.7	188 4.0	162 3.6	184 4.0	149 3.5	87 2.0
Title III Not Served	10 0.3	19 0.4	16 0.4	22 0.5	13 0.3	12 0.3
Migrant Student	1 0.0	2 0.0	3 0.1	2 0.0	0 0.0	1 0.0
ELL (enrolled after 4-15-11)	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
ELL (enrolled before 4-15-11)	184 5.0	209 4.5	179 3.9	206 4.5	163 3.8	102 2.4
Exited ESL/bilingual program and in first year of monitoring	10 0.3	22 0.5	21 0.5	13 0.3	12 0.3	7 0.2

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

Demographic or Educational Characteristic	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	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	9 0.2	9 0.2	14 0.3	12 0.3	9 0.2	13 0.3
Former ELL no longer monitored	8 0.2	18 0.4	36 0.8	46 1.0	49 1.1	68 1.6
Economically Disadvantaged	2,266 61.1	2,900 62.1	2,783 61.3	2,734 59.8	2,528 58.7	2,314 54.4
Enrollment						
Current Enrollment in school of residence after 10-1-11	102 2.7	94 2.0	113 2.5	121 2.6	112 2.6	118 2.8
Current Enrollment in district of residence after 10-1-11	42 1.1	48 1.0	50 1.1	70 1.5	71 1.6	64 1.5
Current Enrollment as PA resident after 10-1-11	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
Enrolled in school of residence after 10-1-10 but on/before 10-1-11	819 22.1	951 20.4	1,129 24.9	993 21.7	766 17.8	806 18.9
Enrolled in district of residence after 10-1-10 but on/before 10-1-11	284 7.7	376 8.0	369 8.1	432 9.5	364 8.4	341 8.0
Education in Non-Traditional Settings						
Court/agency placed	3 0.1	6 0.1	5 0.1	17 0.4	20 0.5	56 1.3
Students with reading scores used in state summaries	3,711	4,672	4,543	4,570	4,308	4,255

Table 10–3S. Demographic Characteristics of Students Taking the 2012 PSSA-M: Science

Demographic or Educational Characteristic	Gr. 8		Gr. 11	
	N	Pct	N	Pct
Gender				
Female	1,310	36.9	1,412	37.7
Male	2,243	63.1	2,327	62.2
Race/Ethnicity				
American Indian or Alaskan Native	7	0.2	6	0.2
Asian or Pacific Islander	33	0.9	39	1.0
Black/African American non-Hispanic	697	19.6	847	22.6
Latino/Hispanic	356	10.0	331	8.8
White non-Hispanic	2,400	67.5	2,478	66.2
Multi-Racial/Ethnic	61	1.7	37	1.0
Educational Category and Other Demographic Groups				
IEP (not gifted)	3,554	100.0	3,742	100.0
Student exited IEP in last 2 years	0	0.0	0	0.0
Title I	643	18.1	770	20.6
Title III - Served	135	3.8	70	1.9
Title III - Not Served	8	0.2	13	0.3
Migrant Student	0	0.0	1	0.0
ELL (enrolled after 4-15-11)	7	0.2	3	0.1
ELL (enrolled before 4-15-11)	136	3.8	82	2.2
Exited ESL/bilingual program and in first year of monitoring	8	0.2	5	0.1
Exited ESL/bilingual program and in second year of monitoring	10	0.3	9	0.2
Former ELL no longer monitored	38	1.1	59	1.6
Economically Disadvantaged	2,074	58.4	1,999	53.4
Enrollment				
Current Enrollment in school of residence after 10-1-11	81	2.3	91	2.4
Current Enrollment in district of residence after 10-1-11	53	1.5	47	1.3

Table 10–3S (continued). Demographic Characteristics of Students Taking the 2012 PSSA-M: Science

Demographic or Educational Characteristic	Gr. 8		Gr. 11	
	N	Pct	N	Pct
Enrollment (continued)				
Current Enrollment as PA resident after 10-1-11	0	0.0	0	0.0
Enrolled in school of residence after 10-1-10 but on/before 10-1-11	575	16.2	660	17.6
Enrolled in district of residence after 10-1-10 but on/before 10-1-11	304	8.6	285	7.6
Education in Non-Traditional Settings				
Court/agency placed	20	0.6	41	1.1
Students with science scores used in state summaries	3,554		3,742	

TEST ACCOMMODATIONS PROVIDED

School personnel supplied information regarding accommodations that a student may have received while taking the PSSA-M. Accommodations, classified in terms of presentation, response, setting, and timing, enable students to better manage disabilities that hinder their ability to learn and respond to assessments. An accommodations manual 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 2012 PSSA and PSSA-M. The manual can be accessed at www.education.state.pa.us. On the left side, 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 by subject area for each accommodation category in Tables 10–4M through 10–7S. Table values are based on all scored students who contributed to state summary statistics. Note that a glossary of accommodation terms as applied to the PSSA is provided in Table 10–10.

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 2012 PSSA-M varied by subject as follows: mathematics and science, 13, and reading, 9. As depicted in Tables 10–4M, 10–4R, and 10–4S, the actual frequencies were quite low, generally representing less than five-tenths of one percent of assessed students statewide. The most notable exceptions were test directions read aloud (each subject), and test items/questions read aloud (mathematics and science only).

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 in the 2012 PSSA-M varied by subject as follows: mathematics and science, 12, and reading, 9. Tables 10–5M, 10–5R, and 10–5S summarize the frequency with which these accommodations were utilized, most of which are quite low, typically representing less than five-tenths of one percent of assessed students statewide.

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 in 2012. As depicted in Tables 10–6M, 10–6R, and 10–6S, small group testing and testing in a separate setting were the most commonly used accommodations for each subject, and in fact were the most heavily used of all accommodations provided to students.

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 three categories of timing accommodations in 2012. As depicted in Tables 10–7M, 10–7R, and 10–7S, the most common accommodations were extended time and frequent breaks.

Table 10–4M. Incidence of Presentation Accommodations Received on the 2012 PSSA-M: Mathematics

Type of Presentation Accommodation	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct
Braille Format	2 0.1	1 0.0	0 0.0	1 0.0	0 0.0	5 0.1
Large Print Format	20 0.7	16 0.4	17 0.4	17 0.4	17 0.4	32 0.7
Electronic Screen Reader	1 0.0	0 0.0	0 0.0	1 0.0	0 0.0	0 0.0
Test directions read aloud (provided by live reader)	1,089 40.2	1,366 36.7	1,203 29.6	982 22.9	1,026 23.1	515 11.2
Test directions signed, interpreted for ELL student, or recorded	23 0.8	27 0.7	18 0.4	35 0.8	37 0.8	25 0.5
Test items/questions read aloud (provided by live reader) or signed	1,616 59.7	2,083 55.9	1,744 42.9	1,173 27.4	1,059 23.8	365 7.9
Test items/questions interpreted for ELL student	16 0.6	19 0.5	13 0.3	14 0.3	14 0.3	18 0.4
Amplification device	15 0.6	8 0.2	5 0.1	9 0.2	1 0.0	1 0.0
Magnification device	3 0.1	1 0.0	1 0.0	0 0.0	2 0.0	5 0.1
Reading windows, reading guides	48 1.8	63 1.7	59 1.5	4 0.1	10 0.2	0 0.0
Other (per *Accommodations Guidelines*)	68 2.5	35 0.9	52 1.3	59 1.4	62 1.4	28 0.6
Spanish version for mathematics	2 0.1	2 0.1	5 0.1	3 0.1	6 0.1	5 0.1

Table 10–4R. Incidence of Presentation Accommodations Received on the 2012 PSSA-M: Reading

Type of Presentation Accommodation	Gr. 4 N / Pct	Gr. 5 N / Pct	Gr. 6 N / Pct	Gr. 7 N / Pct	Gr. 8 N / Pct	Gr. 11 N / Pct
Braille Format	1 0.0	3 0.1	0 0.0	1 0.0	2 0.0	3 0.1
Large Print Format	19 0.5	16 0.3	22 0.5	21 0.5	21 0.5	31 0.7
Electronic Screen Reader	0 0.0	0 0.0	0 0.0	2 0.0	0 0.0	1 0.0
Test directions read aloud (provided by live reader)	1,443 38.9	1,693 36.2	1,238 27.3	1,008 22.1	938 21.8	451 10.6
Test directions signed, interpreted for ELL student, or recorded	29 0.8	24 0.5	17 0.4	34 0.7	28 0.7	25 0.6
Amplification device	19 0.5	25 0.5	6 0.1	6 0.1	0 0.0	3 0.1
Magnification device	2 0.1	2 0.0	1 0.0	0 0.0	2 0.0	4 0.1
Reading windows, reading guides	253 6.8	244 5.2	150 3.3	29 0.6	19 0.4	3 0.1
Other (per *Accommodations Guidelines*)	78 2.1	58 1.2	62 1.4	75 1.6	64 1.5	40 0.9

Table 10–4S. Incidence of Presentation Accommodations Received on the 2012 PSSA-M: Science

Type of Presentation Accommodation	Gr. 8		Gr. 11	
	N	Pct	N	Pct
Braille Format	1	0.0	3	0.1
Large Print Format	21	0.6	15	0.4
Electronic Screen Reader	0	0.0	0	0.0
Test directions read aloud (provided by live reader)	652	18.3	320	8.6
Test directions signed, interpreted for ELL student, or recorded	23	0.6	17	0.5
Test items/questions read aloud (provided by live reader) or signed	733	20.6	280	7.5
Test items/questions interpreted for ELL student	8	0.2	8	0.2
Amplification device	1	0.0	5	0.1
Magnification device	1	0.0	2	0.1
Reading windows, reading guides	3	0.1	0	0.0
Other (per *Accommodations Guidelines*)	30	0.8	24	0.6
Spanish version for science	5	0.1	6	0.2

Table 10–5M. Incidence of Response Accommodations Received on the 2012 PSSA-M: Mathematics

Type of Response Accommodation	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N /Pct	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct
Test administrator marked multiple-choice responses at student's direction	34 1.3	46 1.2	41 1.0	26 0.6	24 0.5	12 0.3
Test administrator scribed open-ended responses at student's direction	100 3.7	120 3.2	71 1.7	23 0.5	47 1.1	13 0.3
Test administrator transcribed student responses	38 1.4	42 1.1	36 0.9	30 0.7	22 0.5	30 0.7
Qualified interpreter for ELL	1 0.0	1 0.0	1 0.0	0 0.0	1 0.0	1 0.0
Keyboard, word processor, or computer	0 0.0	2 0.1	2 0.0	2 0.0	4 0.1	4 0.1
Brailler/Notetaker	1 0.0	0 0.0	0 0.0	0 0.0	1 0.0	4 0.1
Augmentative communication device	0 0.0	0 0.0	0 0.0	1 0.0	0 0.0	0 0.0
Audio recording of student responses	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
Electronic Screen Reader	0 0.0	0 0.0	0 0.0	1 0.0	1 0.0	0 0.0
Manipulative	69 2.5	23 0.6	20 0.5	0 0.0	1 0.0	1 0.0
Translation dictionary for ELL student	0 0.0	1 0.0	0 0.0	2 0.0	2 0.0	0 0.0
Other (approved by PDE)	15 0.6	11 0.3	28 0.7	23 0.5	29 0.7	5 0.1

Table 10–5R. Incidence of Response Accommodations Received on the 2012 PSSA-M: Reading

Type of Response Accommodation	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct
Test administrator marked multiple-choice responses at student's direction	37 1.0	50 1.1	43 0.9	31 0.7	22 0.5	9 0.2
Test administrator scribed open-ended responses at student's direction	263 7.1	244 5.2	122 2.7	70 1.5	62 1.4	13 0.3
Test administrator transcribed student responses	80 2.2	87 1.9	61 1.3	59 1.3	45 1.0	32 0.8
Keyboard, word processor, or computer	6 0.2	15 0.3	10 0.2	16 0.4	20 0.5	17 0.4
Brailler/Notetaker	0 0.0	2 0.0	0 0.0	1 0.0	0 0.0	1 0.0
Augmentative communication device	0 0.0	0 0.0	0 0.0	1 0.0	0 0.0	0 0.0
Audio recording of student responses	0 0.0	0 0.0	1 0.0	0 0.0	0 0.0	0 0.0
Electronic Screen Reader	0 0.0	0 0.0	0 0.0	2 0.0	0 0.0	4 0.1
Other (approved by PDE)	17 0.5	19 0.4	26 0.6	25 0.5	28 0.7	5 0.1

Table 10–5S. Incidence of Response Accommodations Received on the 2012 PSSA-M: Science

Type of Response Accommodation	Gr. 8		Gr. 11	
	N	Pct	N	Pct
Test administrator marked multiple-choice responses at student's direction	21	0.6	5	0.1
Test administrator scribed open-ended responses at student's direction	29	0.9	11	0.3
Test administrator transcribed student responses	29	0.9	15	0.4
Qualified interpreter for ELL student	0	0.0	0	0.0
Keyboard, word processor, or computer	9	0.3	11	0.3
Brailler/Notetaker	1	0.0	0	0.0
Augmentative communication device	0	0.0	0	0.0
Audio recording of student responses	0	0.0	0	0.0
Electronic Screen Reader	0	0.0	6	0.2
Manipulative	1	0.0	0	0.0
Translation dictionary for ELL students	1	0.1	0	0.0
Other (approved by PDE)	34	1.0	22	0.0

Table 10–6M. Incidence of Setting Accommodations Received on the 2012 PSSA-M: Mathematics

Type of Setting Accommodation	Gr. 4 N / Pct	Gr. 5 N / Pct	Gr. 6 N / Pct	Gr. 7 N / Pct	Gr. 8 N / Pct	Gr. 11 N / Pct
Hospital/Home Testing	4 0.1	4 0.1	2 0.0	12 0.3	11 0.2	13 0.3
Separate Setting	1,771 65.4	2,324 62.4	1,986 48.9	1,764 41.2	1,832 41.2	1,392 30.2
Small Group Testing	2,047 75.6	2,831 76.0	2,918 71.9	2,719 63.5	2,720 61.2	2,364 51.3
Other (PDE Approved)	17 0.6	12 0.3	24 0.6	14 0.3	23 0.5	10 0.2

Table 10–6R. Incidence of Setting Accommodations Received on the 2012 PSSA-M: Reading

Type of Setting Accommodation	Gr. 4 N / Pct	Gr. 5 N / Pct	Gr. 6 N / Pct	Gr. 7 N / Pct	Gr. 8 N / Pct	Gr. 11 N / Pct
Hospital/Home Testing	8 0.2	4 0.1	2 0.0	10 0.2	13 0.3	12 0.3
Separate Setting	2,484 66.9	2,961 63.4	2,194 48.3	1,908 41.8	1,800 41.8	1,287 30.2
Small Group Testing	2,834 76.4	3,550 76.0	3,265 71.9	2,895 63.3	2,666 61.9	2,206 51.8
Other (PDE Approved)	14 0.4	22 0.5	24 0.5	13 0.3	23 0.5	13 0.3

Table 10–6S. Incidence of Setting Accommodations Received on the 2012 PSSA-M: Science

Type of Setting Accommodation	Gr. 8		Gr. 11	
	N	Pct	N	Pct
Hospital/Home Testing	7	0.2	8	0.2
Separate Setting	1,268	35.7	927	24.8
Small Group Testing	1,883	53.0	1,640	43.8
Other (PDE Approved)	10	0.3	5	0.1

Table 10–7M. Incidence of Timing Accommodations Received on the 2012 PSSA-M: Mathematics

Type of Timing Accommodation	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct
Extended Time	521 19.2	671 18.0	587 14.5	504 11.8	493 11.1	654 14.2
Frequent Breaks	539 19.9	605 16.2	501 12.3	408 9.5	340 7.7	200 4.3
Changed Test Schedule	110 4.1	146 3.9	111 2.7	100 2.3	89 2.0	80 1.7

Table 10–7R. Incidence of Timing Accommodations Received on the 2012 PSSA-M: Reading

Type of Timing Accommodation	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct
Extended Time	757 20.4	857 18.3	656 14.4	618 13.5	545 12.7	630 14.8
Frequent Breaks	726 19.6	773 16.5	567 12.5	404 8.8	340 7.9	200 4.7
Changed Test Schedule	124 3.3	162 3.5	139 3.1	100 2.2	115 2.7	78 1.8

Table 10–7S. Incidence of Timing Accommodations Received on the 2012 PSSA-M: Science

Type of Timing Accommodation	Gr. 8		Gr. 11	
	N	Pct	N	Pct
Extended Time	276	7.8	278	7.4
Frequent Breaks	177	5.0	96	2.6
Changed Test Schedule	19	0.5	18	0.5

ACCOMMODATION RATE

The number of possible accommodations available to a student ranged from 32 for mathematics and science to 25 for reading. The incidence of students receiving one or more of the available accommodations by subject area is provided in Tables 10–8M, 10–8R, and 10–8S. The category of Non-Accommodated refers to students who did not receive any accommodations during the testing.

The general pattern of findings for mathematics and reading reveals a consistently high percentage of students receiving an accommodation, which diminished across grade levels. Science also displayed a high incidence of students receiving an accommodation at grades 8 and 11, although slightly lower than for the other two subject areas.

Table 10–8M. Accommodation Rate on the 2012 PSSA-M: Mathematics

Student Subgroup	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct
Non-Accommodated	411 15.2	570 15.3	811 20.0	1,103 25.8	1,250 28.1	1,891 41.1
Accommodated	2,297 84.8	3,156 84.7	3,250 80.0	3,180 74.2	3,194 71.9	2,715 58.9
	2,708	3,726	4,061	4,283	4,444	4,606

Table 10–8R. Accommodation Rate on the 2012 PSSA-M: Reading

Student Subgroup	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct	N / Pct
Non-Accommodated	538 14.5	730 15.6	971 21.4	1,171 25.6	1,184 27.5	1,721 40.4
Accommodated	3,173 85.5	3,942 84.4	3,572 78.6	3,399 74.4	3,124 72.5	2,534 59.6
	3,711	4,672	4,543	4,570	4,308	4,255

Table 10–8S. Accommodation Rate on the 2012 PSSA-M: Science

Student Subgroup	Gr. 8		Gr. 11	
	N	Pct	N	Pct
Non-Accommodated	1,305	36.7	1,868	49.9
Accommodated	2,249	63.3	1,874	50.1
	3,554		3,742	

THE INCIDENCE OF ACCOMMODATIONS AND ELL STATUS

By definition, students qualifying to take the PSSA-M assessment have an IEP along with a history of very low achievement. These students often receive various accommodations to assist them in accessing and responding optimally in assessment situations. As observed in Tables 10–4M through 10–7S, the most frequently occurring accommodations for assessed students were the following:

- Test directions read aloud
- Test items/questions read aloud or signed (mathematics and science only)
- Tested in separate setting
- Small group testing
- Extended time
- Frequent breaks

Because the accommodations with the largest frequencies can potentially supply the most stable data when broken out for subgroup analysis, these were selected for display in Tables 10–9M, 10–9R, and 10–9S. For purposes of this analysis, an English Language Learner (ELL) was a student classified as ELL and enrolled in a U.S. school on or before April 15, 2011. All other assessed students, including those who exited an ESL/bilingual program and in the first or second year of monitoring, were regarded as non-ELL. Students coded as ELL and enrolled in a U.S. school after April 15, 2011, are excluded from state summary statistics as stated earlier in this chapter.

Because the combination of accommodations listed in the tables and grades assessed differs somewhat by subject area, it is useful to reference the number of instances of accommodations for which the results in the tables apply. For example, mathematics with six accommodations displayed and six assessed grade levels results in 36 possible instances. There are 30 instances for reading and 12 for science. The total number of instances across the three subjects is 78.

To evaluate the two groups with respect to frequency rate, a choice was made to use a difference of 5 or more percentage points as a criterion. In many instances the percentage difference was of little practical significance (from zero to only several percentage points). The largest difference between the two groups was observed for small group testing, which reached as high as 20 percent for grade 8 mathematics and grade 7 reading.

Of the 78 possible comparisons overall, the non-ELL students received a larger percentage of accommodations (by a margin of at least five percent) in 32 instances, ELL students in three instances, and in the 43 remaining instances the difference between Non-ELL and ELL was less than 5 percent.

The tendency for accommodations to occur more frequently for a particular group of students is summarized below for each of the accommodations evaluated in this analysis.

- Directions read aloud occurred more frequently for the Non-ELL group in five of 14 instances: mathematics (Grades 6, 8), reading (Grades 6–8), science (none).
- Test items/questions read aloud or signed, an accommodation available only for mathematics and science, occurred more frequently for the non-ELL group in four of eight instances: mathematics (Grades 5–7) and science (Grade 8). A higher frequency for ELL students occurred in only one of the eight instances: mathematics (Grade 4).
- Students tested in a separate setting occurred more frequently for the non-ELL group than for the ELL group in six of 14 instances: mathematics and reading (Grades 6–7) and science (Grades 8, 11). A higher frequency for ELL students only occurred in two of 14 instances: mathematics and reading (Grade 4).
- Students tested in a small group setting occurred more frequently for the non-ELL group than for the ELL group in 10 of 14 instances: mathematics and reading (Grades 6–8, 11) and science (Grades 8, 11).
- Extended time occurred more frequently for the Non-ELL group in five of 14 instances: mathematics (Grades 6–8), reading (Grades 6–7), science (none).
- Frequent breaks occurred more frequently for the non-ELL group than for the ELL group in two of 14 instances: mathematics and reading (Grade 4), science (none).

Tables 10–9M, 10–9R, and 10–9S present the number and percentage of non-ELL and ELL students who received the selected accommodations for each of the assessed grade levels.

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

Accommodation Received	Non-ELL Students		ELL Students	
G.4	**N**	**Pct**	**N**	**Pct**
Test directions read aloud	1,035	40.3	54	38.6
Test items/ questions read aloud or signed	1,524	59.3	92	65.7
Tested in separate setting	1,670	65.0	101	72.1
Small group testing	1,936	75.4	111	79.3
Extended time	492	19.2	29	20.7
Frequent breaks	514	20.0	25	17.9
Column N for Gr. 4	2,568		140	
Gr. 5	**N**	**Pct**	**N**	**Pct**
Test directions read aloud	1,299	36.6	67	37.2
Test items/ questions read aloud or signed	1,993	56.2	90	50.0
Tested in separate setting	2,218	62.5	106	58.9
Small group testing	2,698	76.1	133	73.9
Extended time	638	18.0	33	18.3
Frequent breaks	580	16.4	25	13.9
Column N for Gr. 5	3,546		180	
Gr. 6	**N**	**Pct**	**N**	**Pct**
Test directions read aloud	1,168	30.0	35	21.5
Test items/ questions read aloud or signed	1,682	43.2	62	38.0
Tested in separate setting	1,919	49.2	67	41.1
Small group testing	2,829	72.6	89	54.6
Extended time	572	14.7	15	9.2
Frequent breaks	489	12.5	12	7.4
Column N for Gr. 6	3,898		163	
Gr. 7	**N**	**Pct**	**N**	**Pct**
Test directions read aloud	946	23.0	36	20.2
Test items/ questions read aloud or signed	1,134	27.6	39	21.9
Tested in separate setting	1,705	41.5	59	33.1
Small group testing	2,631	64.1	88	49.4
Extended time	494	12.0	10	5.6
Frequent breaks	397	9.7	11	6.2
Column N for Gr. 7	4,105		178	

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

Accommodation Received	Non-ELL Students		ELL Students	
Gr. 8	**N**	**Pct**	**N**	**Pct**
Test directions read aloud	1,002	23.3	24	16.7
Test items/ questions read aloud or signed	1,025	23.8	34	23.6
Tested in separate setting	1,777	41.3	55	38.2
Small group testing	2,660	61.9	60	41.7
Extended time	484	11.3	9	6.3
Frequent breaks	335	7.8	5	3.5
Column N for Gr. 8	4,300		144	
Gr. 11	**N**	**Pct**	**N**	**Pct**
Test directions read aloud	505	11.2	10	9.8
Test items/ questions read aloud or signed	358	7.9	7	6.9
Tested in separate setting	1,366	30.3	26	25.5
Small group testing	2,324	51.6	40	39.2
Extended time	643	14.3	11	10.8
Frequent breaks	196	4.4	4	3.9
Column N for Gr. 11	4,504		102	

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

Accommodation Received	Non-ELL Students		ELL Students	
Gr. 4	**N**	**Pct**	**N**	**Pct**
Test directions read aloud	1,369	38.8	74	40.2
Tested in separate setting	2,350	66.6	134	72.8
Small group testing	2,689	76.2	145	78.8
Extended time	717	20.3	40	21.7
Frequent breaks	698	19.8	28	15.2
Column N for Gr. 4	3,527		184	
Gr. 5	**N**	**Pct**	**N**	**Pct**
Test directions read aloud	1,611	36.1	82	39.2
Tested in separate setting	2,828	63.4	133	63.6
Small group testing	3,393	76.0	157	75.1
Extended time	816	18.3	41	19.6
Frequent breaks	739	16.6	34	16.3
Column N for Gr. 5	4,463		209	
Gr. 6	**N**	**Pct**	**N**	**Pct**
Test directions read aloud	1,198	27.5	40	22.3
Tested in separate setting	2,120	48.6	74	41.3
Small group testing	3,160	72.4	105	58.7
Extended time	641	14.7	15	8.4
Frequent breaks	556	12.7	11	6.1
Column N for Gr. 6	4,364		179	
Gr. 7	**N**	**Pct**	**N**	**Pct**
Test directions read aloud	977	22.4	31	15.0
Tested in separate setting	1,833	42.0	75	36.4
Small group testing	2,804	64.3	91	44.2
Extended time	601	13.8	17	8.3
Frequent breaks	392	9.0	12	5.8
Column N for Gr. 7	4,364		206	

Table 10–9R (continued). Incidence of Non-ELL and ELL Students Receiving Selected Accommodations: Reading

Accommodation Received	Non-ELL Students		ELL Students	
Gr. 8	**N**	**Pct**	**N**	**Pct**
Test directions read aloud	914	22.1	24	14.7
Tested in separate setting	1,737	41.9	63	38.7
Small group testing	2,591	62.5	75	46.0
Extended time	529	12.8	16	9.8
Frequent breaks	333	8.0	7	4.3
Column N for Gr. 8	4,145		163	
Gr. 11	**N**	**Pct**	**N**	**Pct**
Test directions read aloud	438	10.5	13	12.7
Tested in separate setting	1,254	30.2	33	32.4
Small group testing	2,159	52.0	47	46.1
Extended time	616	14.8	14	13.7
Frequent breaks	197	4.7	3	2.9
Column N for Gr. 11	4,153		102	

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

Accommodation Received	Non-ELL Students		ELL Students	
Gr. 8	**N**	**Pct**	**N**	**Pct**
Test directions read aloud	627	18.4	25	17.5
Test items/ questions read aloud or signed	711	20.8	22	15.4
Tested in separate setting	1,226	35.9	42	29.4
Small group testing	1,823	53.4	60	42.0
Extended time	266	7.8	10	7.0
Frequent breaks	168	4.9	9	6.3
Column N for Gr. 8	3,411		143	
Gr. 11	**N**	**Pct**	**N**	**Pct**
Test directions read aloud	312	8.5	8	9.4
Test items/ questions read aloud or signed	277	7.6	3	3.5
Tested in separate setting	911	24.9	16	18.8
Small group testing	1,613	44.1	27	31.8
Extended time	274	7.5	4	4.7
Frequent breaks	95	2.6	1	1.2
Column N for Gr. 11	3,657		85	

GLOSSARY OF ACCOMMODATIONS TERMS

Table 10–10 provides brief descriptions of accommodations terms as they are used in the PSSA and PSSA-M. School personnel identified the accommodations that 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 side, select "Programs," "Programs O–R," "Pennsylvania System of School Assessment (PSSA)," and then "Testing Accommodations & Security."

Table 10–10. Glossary of Accommodations 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, not define, specific words or test questions on the mathematics and science tests. On the reading, 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.

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

Type of Testing Accommodation	Explanation
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 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.
Other (PDE approval required)	Other presentation accommodations indicated in the *Accommodation Guidelines* 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 3 years may take this version.
Student used the following Response Accommodations	
Brailler/Note taker (per *Accommodations Guidelines*)	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 checker, etc.
Test administrator scribed open-ended responses at student's direction	A test administrator may record word-for-word 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 *Accommodations Guidelines*)	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.

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

Type of Testing Accommodation	Explanation
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.
Keyboard, word processor, or computer (per *Accommodations Guidelines*)	This is 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 *Accommodations Guidelines*)	An electronic recording device may be used to record responses, which must be transcribed into the test booklet by the test administrator. (Students who are unable to use a pencil or have illegible handwriting may answer reading, mathematics, and writing multiple-choice questions orally. Answers must be recorded in the answer booklet without alteration during the testing period.)
Manipulative (Cranmer Abacus, number line)	An adaptive calculator or a Cranmer Abacus may be used for the calculator portion of the test only. Eligible students are only those with blindness, low vision, or partial sight.
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 *Accommodations Guidelines* 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.

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

Type of Testing Accommodation	Explanation
Other (per *Accommodations Guidelines* 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	
Extended time	Extended time may be allotted for each section of the test as a planned accommodation to enable students to finish.
Frequent Breaks	Frequent Breaks (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-M items (i.e., those that contributed to a student's total test score). Related information is discussed elsewhere in this document. Specifically, Rasch item statistics are discussed in Chapter Twelve and test-level statistics in Chapter Seventeen. An analysis of item omit rates is also provided.

Item-Level Statistics

Appendix I provides classical item statistics for all PSSA-M 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

Item difficulty is an important consideration for the PSSA-M tests because of the ranging achievement levels of students in Pennsylvania (Below Basic-M, Basic-M, Proficient-M, and Advanced-M). 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 as it is better known, the *p*-value. In theory, *p*-values can range from 0.0 to 1.0 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 (four points in the case of mathematics). 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 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.)

ITEM DISCRIMINATION

Discrimination is an important consideration for the PSSA-M because the use of more discriminating items on a test is associated with more reliable test scores. This means that score estimates will be more precise (i.e., there will be smaller confidence intervals around the scores) and 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.

At the most general level, item discrimination indicates an item's ability to differentiate between high achievers and low achievers. It is expected that students with high ability (i.e., those who perform well on the PSSA-M overall) would be more likely to answer any given PSSA-M item correctly, while students with low ability (i.e., those who perform poorly on the PSSA-M overall) would be more likely to answer the same item incorrectly. For the PSSA-M 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 that 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-M 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.[1] 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.

Finally, discrimination for dichotomous MC items is typically referred to as the point-biserial correlation coefficient. For OE items, the term *item-test correlation* is sometimes used.

DISCRIMINATION ON DIFFICULTY SCATTERPLOTS

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

- The minimum and maximum values are listed.
- Mean scores are indicated by the red dot.

[1] 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.

- 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 reflected by the scatterplots in these figures. However, it is often the case that items with extreme difficulties can have lower discrimination values, as can be revealed in these scatterplots.

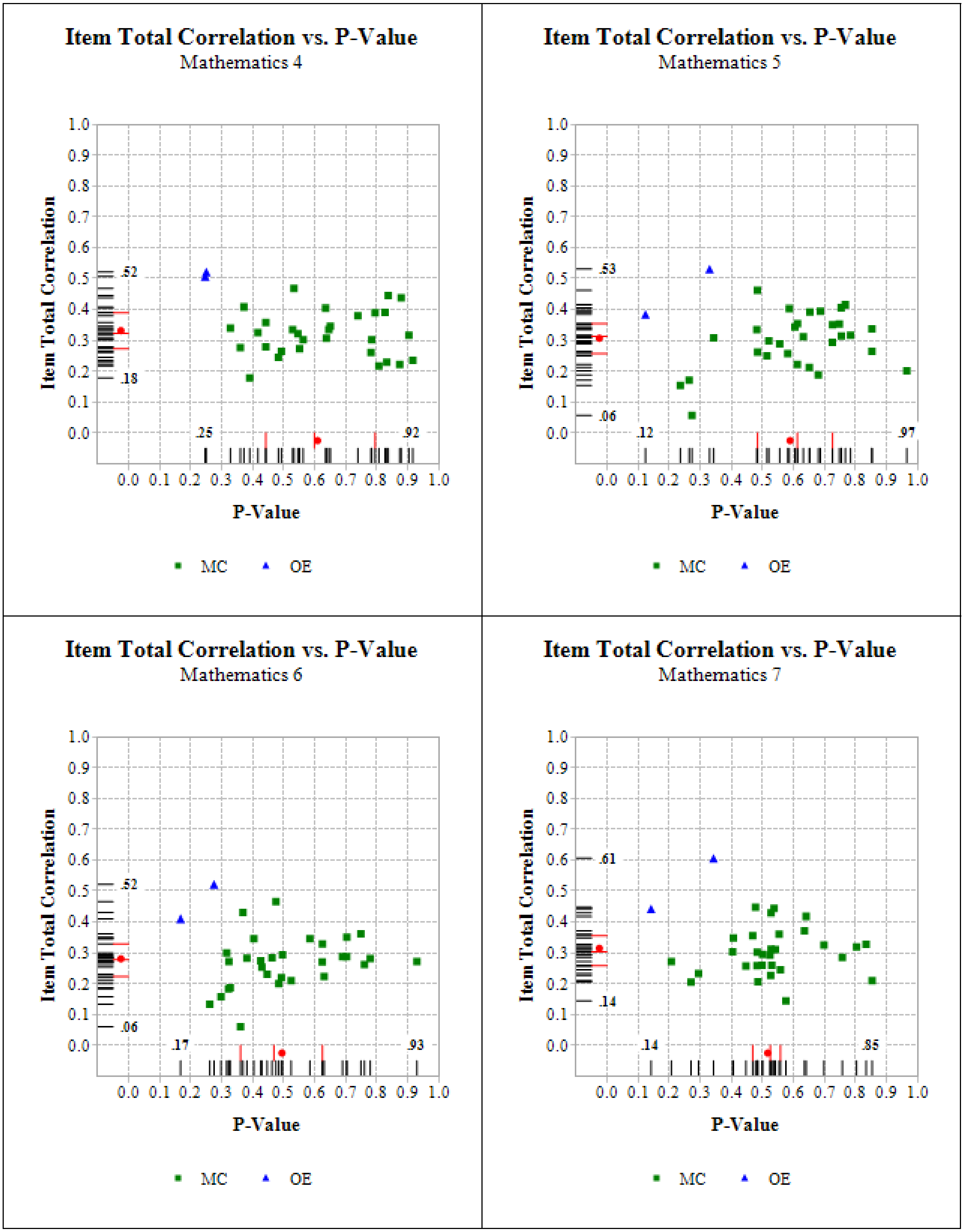
Observations and Interpretations

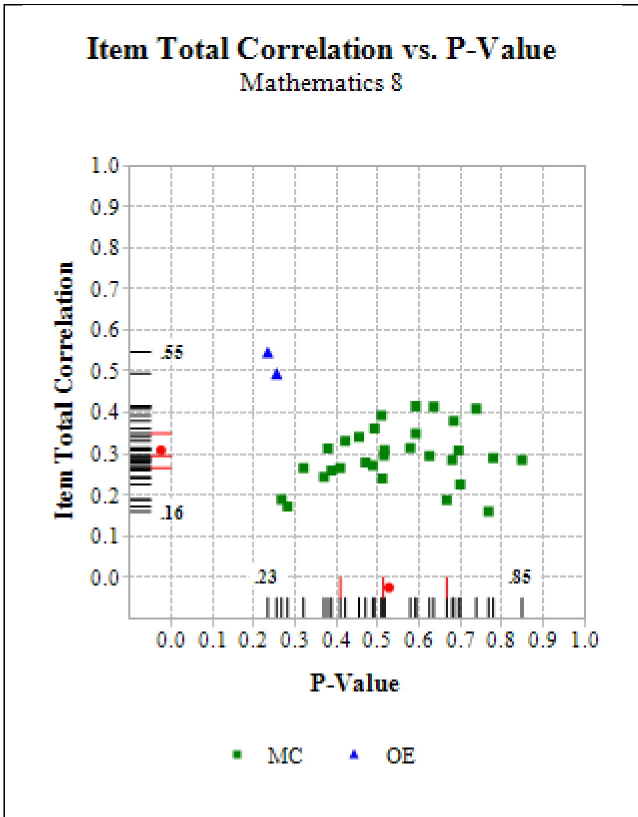
From the difficulty distributions illustrated in the scatterplots, it can be seen that a wide range of item difficulties appeared on each PSSA-M test, which was a desired goal. To support the visuals, Table 11–1 provides break-out results for the MC and OE items. Additional summary statistics (for the MC items only) are provided in Table 11–2. The mean *p*-values for the MC items ranged from about 0.49–0.63, while the mean proportion-correct values for the OE items ranged from about 0.16–0.57. These means were generally lower than 0.65 (a typical mean *p*-value on the general PSSA tests). Relatively speaking, this suggests that the PSSA-M items were somewhat challenging for most students taking the PSSA-M, particularly at the higher grade levels. As noted earlier, lower *p*-values can reflect that the items are more difficult or that the achievement level of the students is lower (or both).

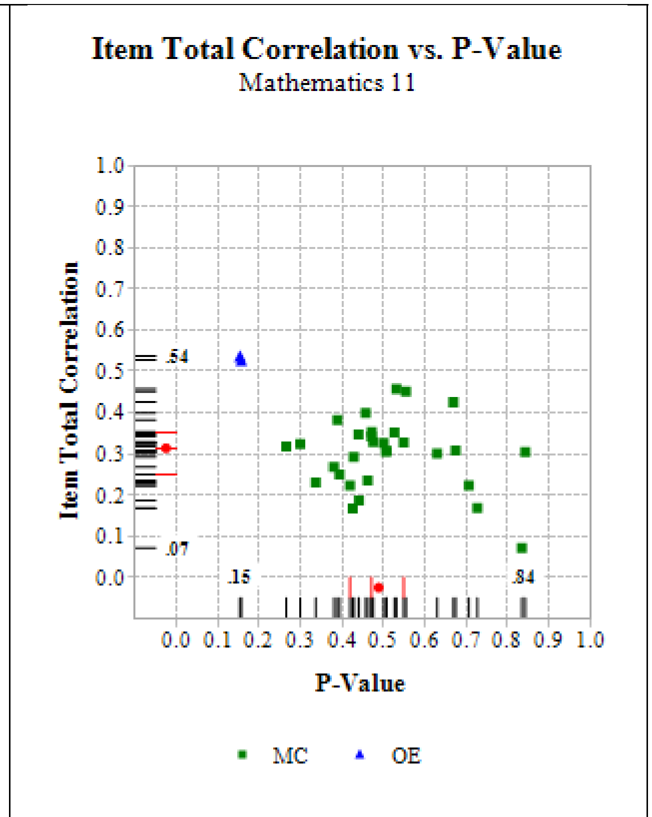
A small number of items had lower item discriminations (e.g., below 0.20). Some of these were observed on items that were very easy or very hard. The mean point-biserial correlations ranged from 0.27–0.37 and 0.36–0.53 for the MC and OE items, respectively. While these values are somewhat lower than those observed on the general PSSA tests (which is not surprising given the PSSA is a longer, more reliable test), most would probably consider these values acceptable. The OE correlations tended to be higher than the MC correlations, which again is not surprising because the OE items include more score points.

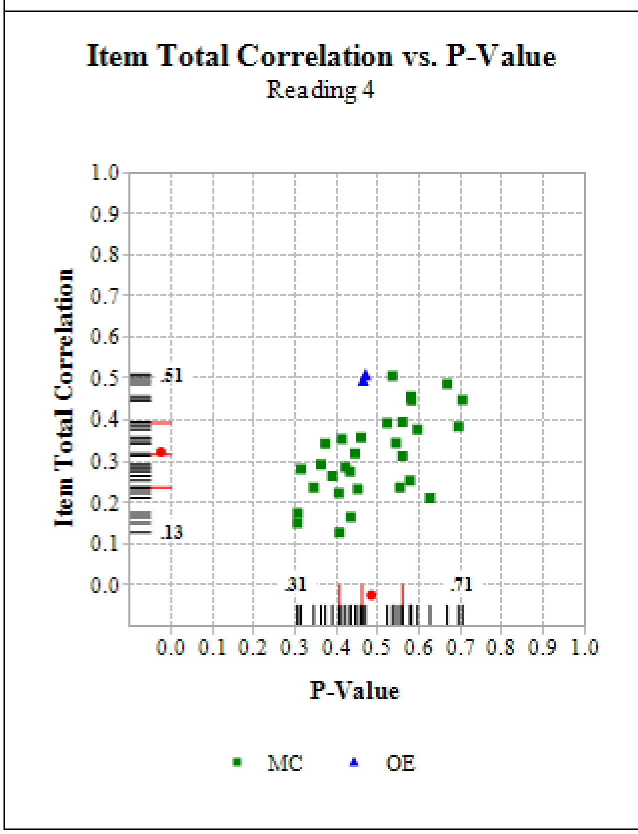
It is difficult to make global conclusions about overall test quality from the item statistics alone. With that caveat in mind, the results presented in this chapter suggest overall adequacy with respect to the PSSA-M items’ difficulty and discrimination. This in turn implies that the items generally functioned as expected for the population of students who took the PSSA-M.

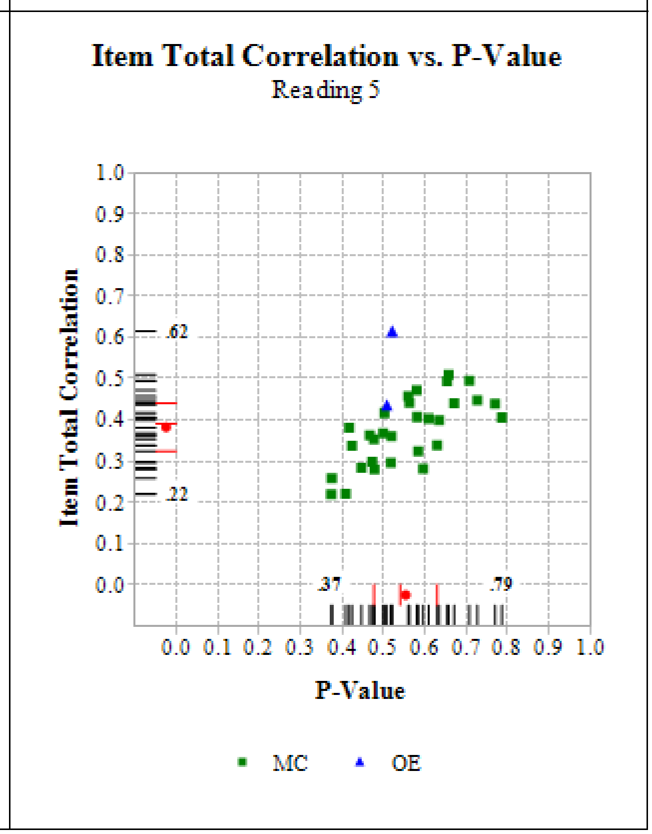
Figure 11–1. Discrimination on Difficulty Scatterplots

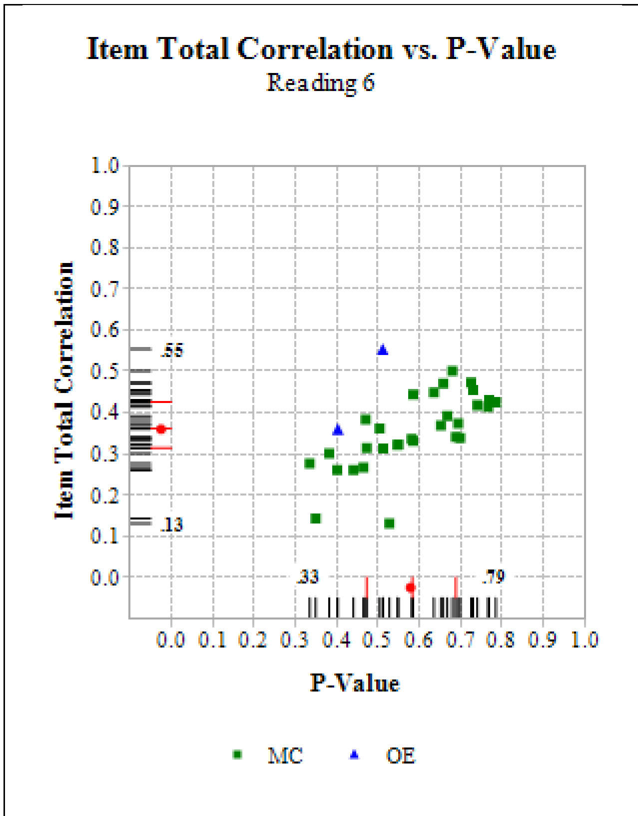


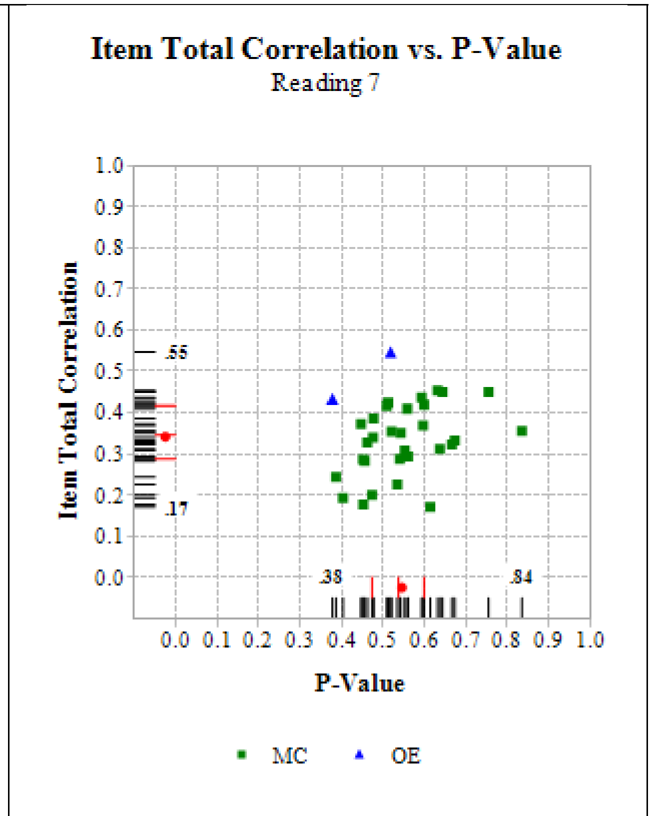

Item Total Correlation vs. P-Value
Mathematics 8
Item Total Correlation
P-Value
.55
.16
.23
.85
MC
OE

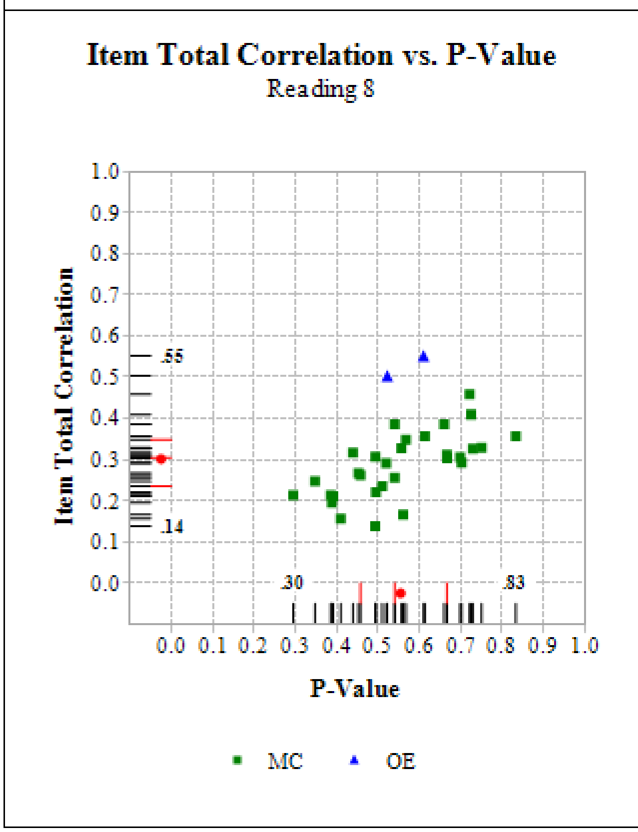

Item Total Correlation vs. P-Value
Mathematics 11
Item Total Correlation
P-Value
.54
.07
.15
.84
MC
OE

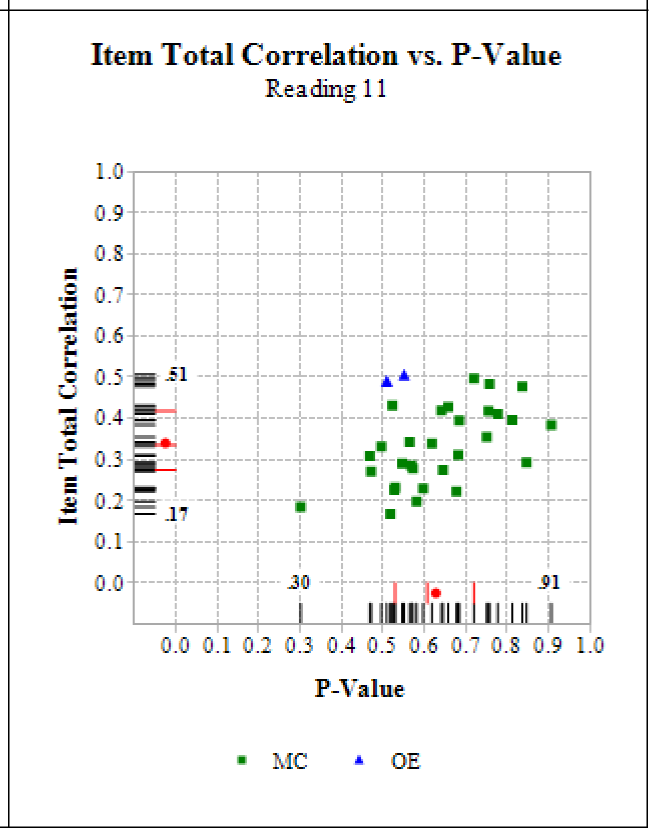

Item Total Correlation vs. P-Value
Reading 4
Item Total Correlation
P-Value
.51
.13
.31
.71
MC
OE

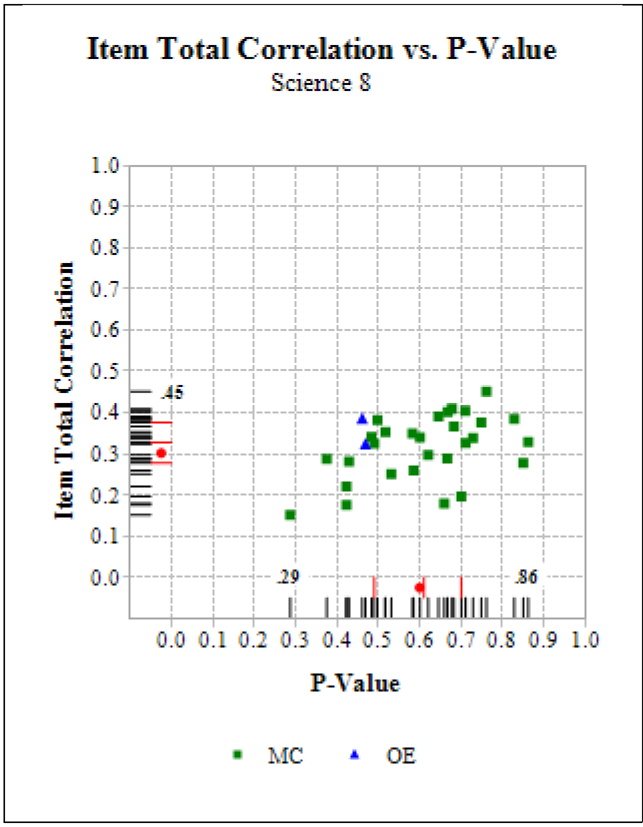

Item Total Correlation vs. P-Value
Reading 5
Item Total Correlation
P-Value
.62
.22
.37
.79
MC
OE


Item Total Correlation vs. P-Value
Reading 6
Item Total Correlation
P-Value
.55
.13
.33
.79
MC
OE


Item Total Correlation vs. P-Value
Reading 7
Item Total Correlation
P-Value
.55
.17
.38
.84
MC
OE


Item Total Correlation vs. P-Value
Reading 8
Item Total Correlation
P-Value
.55
.14
.30
.83
MC
OE


Item Total Correlation vs. P-Value
Reading 11
Item Total Correlation
P-Value
.51
.17
.30
.91
MC
OE


Item Total Correlation vs. P-Value
Science 8
Item Total Correlation
P-Value
.45
.29
.86
MC
OE

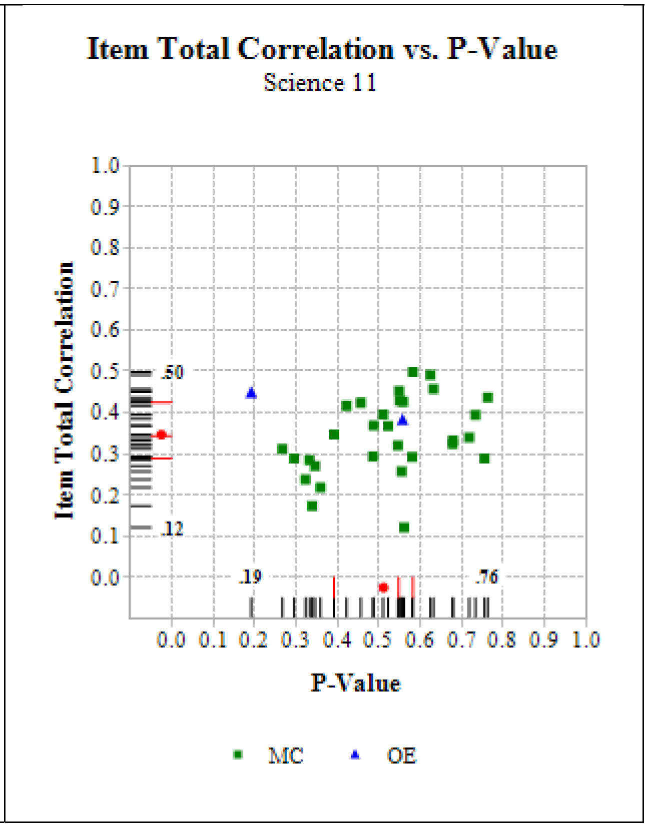

Item Total Correlation vs. P-Value
Science 11
Item Total Correlation
P-Value
.50
.12
.19
.76
MC
OE

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

		Multiple-Choice Items				Open-Ended Items			
		Points	Sum	Mean (%/100)	Mean I-T Corr.	Points	Sum	Mean (%/100)	Mean I-T Corr.
Mathematics	4	30	19.005	0.634	0.320	8	1.990	0.249	0.514
	5	30	18.396	0.613	0.297	8	1.819	0.227	0.457
	6	30	15.387	0.513	0.268	8	1.772	0.222	0.466
	7	30	16.059	0.535	0.301	8	1.942	0.243	0.524
	8	30	16.382	0.546	0.295	8	1.958	0.245	0.520
	11	30	15.323	0.511	0.299	8	1.244	0.155	0.532
Reading	4	30	14.581	0.486	0.311	6	2.806	0.468	0.502
	5	30	16.697	0.557	0.373	6	3.090	0.515	0.525
	6	30	17.609	0.587	0.354	6	2.743	0.457	0.457
	7	30	16.568	0.552	0.332	6	2.689	0.448	0.490
	8	30	16.625	0.554	0.286	6	3.400	0.567	0.527
	11	30	19.046	0.635	0.329	6	3.183	0.530	0.499
Sci.	8	30	18.279	0.609	0.298	4	1.861	0.465	0.356
	11	30	15.611	0.520	0.342	4	1.499	0.375	0.417

Note. 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.

Table 11–2. Additional Summary Statistics for MC Items Only

		P-Value				Point Biserial			
		Min	Max	Mean	Med	Min	Max	Mean	Med
Mathematics	4	0.33	0.92	0.63	0.64	0.18	0.47	0.32	0.32
	5	0.24	0.97	0.61	0.62	0.06	0.46	0.30	0.31
	6	0.26	0.93	0.51	0.48	0.06	0.46	0.27	0.27
	7	0.21	0.85	0.54	0.53	0.14	0.45	0.30	0.30
	8	0.27	0.85	0.55	0.52	0.16	0.41	0.29	0.29
	11	0.27	0.84	0.51	0.47	0.07	0.46	0.30	0.31
Reading	4	0.31	0.71	0.49	0.46	0.13	0.50	0.31	0.30
	5	0.37	0.79	0.56	0.56	0.22	0.51	0.37	0.37
	6	0.33	0.79	0.59	0.59	0.13	0.50	0.35	0.35
	7	0.39	0.84	0.55	0.54	0.17	0.45	0.33	0.34
	8	0.30	0.83	0.55	0.54	0.14	0.46	0.29	0.30
	11	0.30	0.91	0.63	0.63	0.17	0.50	0.33	0.32
Sci.	8	0.29	0.86	0.61	0.63	-0.19	0.45	0.30	0.33
	11	0.27	0.76	0.52	0.55	0.12	0.50	0.34	0.34

Note. Point biserials for operational items were positive when field tested.

Chapter Twelve: Rasch Item Calibration

The particular item response theory (IRT) model used for the PSSA-M 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-M 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-M 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-M 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-M 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 ($x = 0, 1, 2,... m_i$) is given by:

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

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:

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

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 that 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-M, 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 standardized residual setting was used for the PCA because standardized residuals are better for decomposing the unexplained variance into contrasts (Linacre, 2009).

Table 12–1 presents the PCA results for the PSSA-M tests. 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 been seen in Table 12–1, the primary dimension in the Rasch model explained about 28–65 percent of the total variance across Grades 4–8 and 11. If the data fit the model in such a way that only random noise was present, about 28–65 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. According to Reckase (1979), the variance explained by the primary dimension should be greater than 20 percent to indicate unidimensionality. The variance explained for all subjects and grades exceeded this threshold, demonstrating a unidimensional trait of the data.

Another important variance for evaluating dimensionality is in the row named "unexplained variance in 1st contrast." The eigenvalues of unexplained total variance were 32 for all 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 1.5 to 1.8. This indicates that the second dimension accounted for only 1.5 to 1.8 units out of 32 units of item residual variance. Smith and Miao (1994) used simulation studies to show that eigenvalues less than 1.4 are at the random level while Raîche (2005) suggested that, on occasion, eigenvalues as high as 2.0 are at the random level. The fact that all eigenvalues of the first contrast are less than 2.0 along with the amount of variance explained by the primary dimension provides reasonable evidence of unidimensionality for all PSSA-M tests.

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

			Eigenvalue	Empirical	Modeled
Mathematics	4	Total raw variance in observations	77.6	100.0%	100.0%
		Raw variance explained by measures	45.6	58.8%	57.7%
		Raw unexplained variance (total)	32.0	41.2%	42.3%
		Unexplained variance in 1st contrast	1.6	2.1%	
	5	Total raw variance in observations	92.5	100.0%	100.0%
		Raw variance explained by measures	60.5	65.4%	66.3%
		Raw unexplained variance (total)	32.0	34.6%	33.7%
		Unexplained variance in 1st contrast	1.6	1.7%	
	6	Total raw variance in observations	58.6	100.0%	100.0%
		Raw variance explained by measures	26.6	45.4%	44.3%
		Raw unexplained variance (total)	32.0	54.6%	55.7%
		Unexplained variance in 1st contrast	1.5	2.6%	
	7	Total raw variance in observations	85.8	100.0%	100.0%
		Raw variance explained by measures	53.8	62.7%	61.6%
		Raw unexplained variance (total)	32.0	37.3%	38.4%
		Unexplained variance in 1st contrast	1.7	2.0%	
	8	Total raw variance in observations	54.3	100.0%	100.0%
		Raw variance explained by measures	22.3	41.1%	39.7%
		Raw unexplained variance (total)	32.0	58.9%	60.3%
		Unexplained variance in 1st contrast	1.8	3.2%	
	11	Total raw variance in observations	59.8	100.0%	100.0%
		Raw variance explained by measures	27.8	46.5%	44.9%
		Raw unexplained variance (total)	32.0	53.5%	55.1%
		Unexplained variance in 1st contrast	1.7	2.8%	

Table 12–1R. Results from PCA of Residuals in WINSTEPS—Reading

			Eigenvalue	Empirical	Modeled
Reading	4	Total raw variance in observations	44.6	100.0%	100.0%
		Raw variance explained by measures	12.6	28.3%	28.4%
		Raw unexplained variance (total)	32.0	71.7%	71.6%
		Unexplained variance in 1st contrast	1.6	3.6%	
	5	Total raw variance in observations	49.8	100.0%	100.0%
		Raw variance explained by measures	17.8	35.7%	35.6%
		Raw unexplained variance (total)	32.0	64.3%	64.4%
		Unexplained variance in 1st contrast	1.5	3.0%	
	6	Total raw variance in observations	50.0	100.0%	100.0%
		Raw variance explained by measures	18.0	36.0%	35.3%
		Raw unexplained variance (total)	32.0	64.0%	64.7%
		Unexplained variance in 1st contrast	1.5	3.0%	
	7	Total raw variance in observations	46.5	100.0%	100.0%
		Raw variance explained by measures	14.5	31.1%	30.6%
		Raw unexplained variance (total)	32.0	68.9%	69.4%
		Unexplained variance in 1st contrast	1.5	3.1%	
	8	Total raw variance in observations	45.4	100.0%	100.0%
		Raw variance explained by measures	13.4	29.5%	29.2%
		Raw unexplained variance (total)	32.0	70.5%	70.8%
		Unexplained variance in 1st contrast	1.5	3.3%	
	11	Total raw variance in observations	51.0	100.0%	100.0%
		Raw variance explained by measures	19.0	37.2%	36.2%
		Raw unexplained variance (total)	32.0	62.8%	63.8%
		Unexplained variance in 1st contrast	1.5	3.0%	

Table 12–1S. Results from PCA of Residuals in WINSTEPS—Science

			Eigenvalue	Empirical	Modeled
Science	8	Total raw variance in observations	48.1	100.0%	100.0%
		Raw variance explained by measures	16.1	33.5%	32.9%
		Raw unexplained variance (total)	32.0	66.5%	67.1%
		Unexplained variance in 1st contrast	1.6	3.3%	
	11	Total raw variance in observations	52.9	100.0%	100.0%
		Raw variance explained by measures	20.9	39.5%	39.6%
		Raw unexplained variance (total)	32.0	60.5%	60.4%
		Unexplained variance in 1st contrast	1.7	3.1%	

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 $X_1, X_2, \ldots X_n$ is locally independent with respect the latent variable θ if, for all $x = (x_1, x_2, \ldots x_n)$ and θ,

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

This formula essentially states that the probability of any pattern of responses across all items (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:

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

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-M 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 -0.03 for the PSSA-M tests since the PSSA-M tests had 32 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 12–2 shows the summary statistics—mean, SD, minimum, maximum, and several percentiles (P_{10}, P_{25}, P_{50}, P_{75}, P_{90})—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 -0.03. The vast majority of the correlations were very small, suggesting local item independence generally holds for the PSSA-M tests.

Table 12–2M. Summary of Item Residual Correlations for PSSA-M Mathematics

	Mathematics					
Statistic	**4**	**5**	**6**	**7**	**8**	**11**
N Pairs	496	496	496	496	496	496
Mean	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
SD	0.04	0.04	0.04	0.04	0.04	0.04
Minimum	-0.12	-0.15	-0.11	-0.15	-0.11	-0.16
P_{10}	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07
P_{25}	-0.05	-0.05	-0.05	-0.05	-0.06	-0.05
P_{50}	-0.03	-0.03	-0.03	-0.03	-0.04	-0.04
P_{75}	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
P_{90}	0.01	0.01	0.01	0.01	0.02	0.01
Maximum	0.19	0.40	0.20	0.20	0.19	0.15
>0.20	0	1	0	0	0	0

Table 12–2R. Summary of Item Residual Correlations for PSSA-M Reading

	Reading					
Statistic	**4**	**5**	**6**	**7**	**8**	**11**
N Pairs	496	496	496	496	496	496
Mean	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
SD	0.03	0.03	0.04	0.03	0.03	0.03
Minimum	-0.12	-0.11	-0.11	-0.11	-0.12	-0.10
P_{10}	-0.07	-0.07	-0.07	-0.07	-0.07	-0.06
P_{25}	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05
P_{50}	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
P_{75}	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
P_{90}	0.01	0.01	0.01	0.01	0.01	0.00
Maximum	0.10	0.09	0.23	0.16	0.09	0.10
>0.20	0	0	1	0	0	0

Table 12–2S. Summary of Item Residual Correlations for PSSA-M Science

	Science	
Statistic	**8**	**11**
N Pairs	496	496
Mean	-0.03	-0.03
SD	0.03	0.03
Minimum	-0.15	-0.12
P_{10}	-0.07	-0.07
P_{25}	-0.05	-0.05
P_{50}	-0.03	-0.03
P_{75}	-0.01	-0.01
P_{90}	0.00	0.01
Maximum	0.07	0.10
>0.20	0	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-M. 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 12–3 presents the summary statistics of infit and outfit mean square statistics for the PSSA-M 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 12–3. As can be seen, the mean values for both fit statistics were close to 1.00 for all tests. 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-M item data well.

Table 12–3. Summary of Infit and Outfit Mean Square Statistics for PSSA-M

		Infit Mean Square					Outfit Mean Square				
		Mean	SD	Min	Max	[0.7, 1.3]	Mean	SD	Min	Max	[0.7, 1.3]
Mathematics	4	1.00	0.07	0.86	1.13	32/32	0.99	0.15	0.58	1.25	31/32
	5	1.00	0.06	0.86	1.18	32/32	1.00	0.16	0.53	1.50	30/32
	6	1.00	0.07	0.86	1.16	32/32	1.00	0.11	0.69	1.21	31/32
	7	1.00	0.07	0.88	1.21	32/32	1.02	0.13	0.84	1.58	31/32
	8	1.00	0.05	0.89	1.10	32/32	1.01	0.10	0.81	1.21	32/32
	11	1.00	0.07	0.88	1.12	32/32	1.01	0.12	0.74	1.42	31/32
Reading	4	1.00	0.09	0.83	1.16	32/32	1.00	0.12	0.76	1.23	32/32
	5	0.99	0.09	0.85	1.15	32/32	0.99	0.13	0.77	1.26	32/32
	6	0.99	0.10	0.85	1.23	32/32	0.98	0.15	0.76	1.31	31/32
	7	1.00	0.08	0.85	1.16	32/32	0.99	0.12	0.75	1.23	32/32
	8	0.99	0.07	0.85	1.14	32/32	0.99	0.11	0.75	1.18	32/32
	11	0.99	0.09	0.81	1.15	32/32	0.97	0.16	0.59	1.24	30/32
Sci.	8	0.99	0.10	0.85	1.44	31/32	0.98	0.16	0.74	1.59	31/32
	11	0.99	0.09	0.85	1.21	32/32	1.00	0.13	0.75	1.33	31/32

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 fixes the mean difficulty of the items on any form at zero. Under normal circumstances where all students are administered the same set of items, any item with a *p*-value lower than the average item on the form receives a positive logit difficulty and any item with a *p*-value higher than the average receives a negative logit. Consequently, the logits for any calibration relate to an arbitrary origin defined by the center of items on that form. 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-M, 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-M items can be placed on the same logit difficulty scale across years. Chapter Fifteen has more detailed information about the PSSA-M scale linking procedures.

Appendix I reports the item statistics, including classical and Rasch logit difficulties for all the operational items. Table 12–4 summarizes the Rasch logit difficulties of the operational items on each test. Within each content area, most grades had similar mean logits. The minimum and maximum values and standard deviations suggest that the PSSA-M items covered a relatively wide range of difficulties.

Table 12–4. Summary of Rasch Item Difficulties for PSSA-M

		N	Mean	SD	Min	Max
Mathematics	**4**	32	0.10	1.13	-1.86	1.79
	5	32	0.11	1.18	-3.48	2.46
	6	32	0.09	0.95	-2.73	1.46
	7	32	0.07	0.76	-1.74	1.45
	8	32	0.08	0.83	-1.84	1.55
	11	32	0.11	0.82	-1.90	2.04
Reading	**4**	32	0.13	0.53	-0.93	0.99
	5	32	0.21	0.57	-1.08	1.11
	6	32	0.21	0.68	-0.91	1.43
	7	32	0.11	0.53	-1.53	0.97
	8	32	0.11	0.65	-1.41	1.36
	11	32	0.05	0.74	-1.89	1.71
Sci.	**8**	32	0.09	0.75	-1.47	1.65
	11	32	0.08	0.77	-1.24	1.82

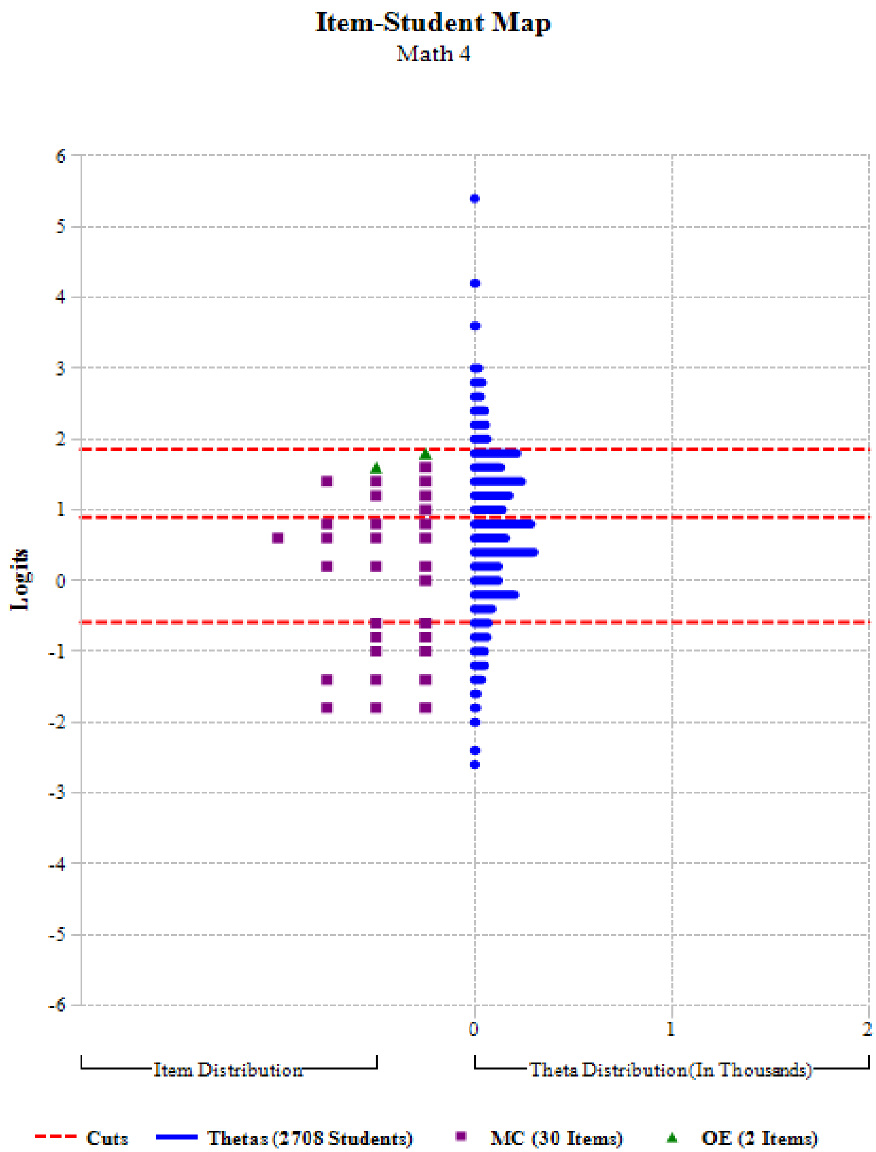
Note. The mean logit values for are not necessarily 0.0 because the items have been placed on a scale that was developed in prior years.

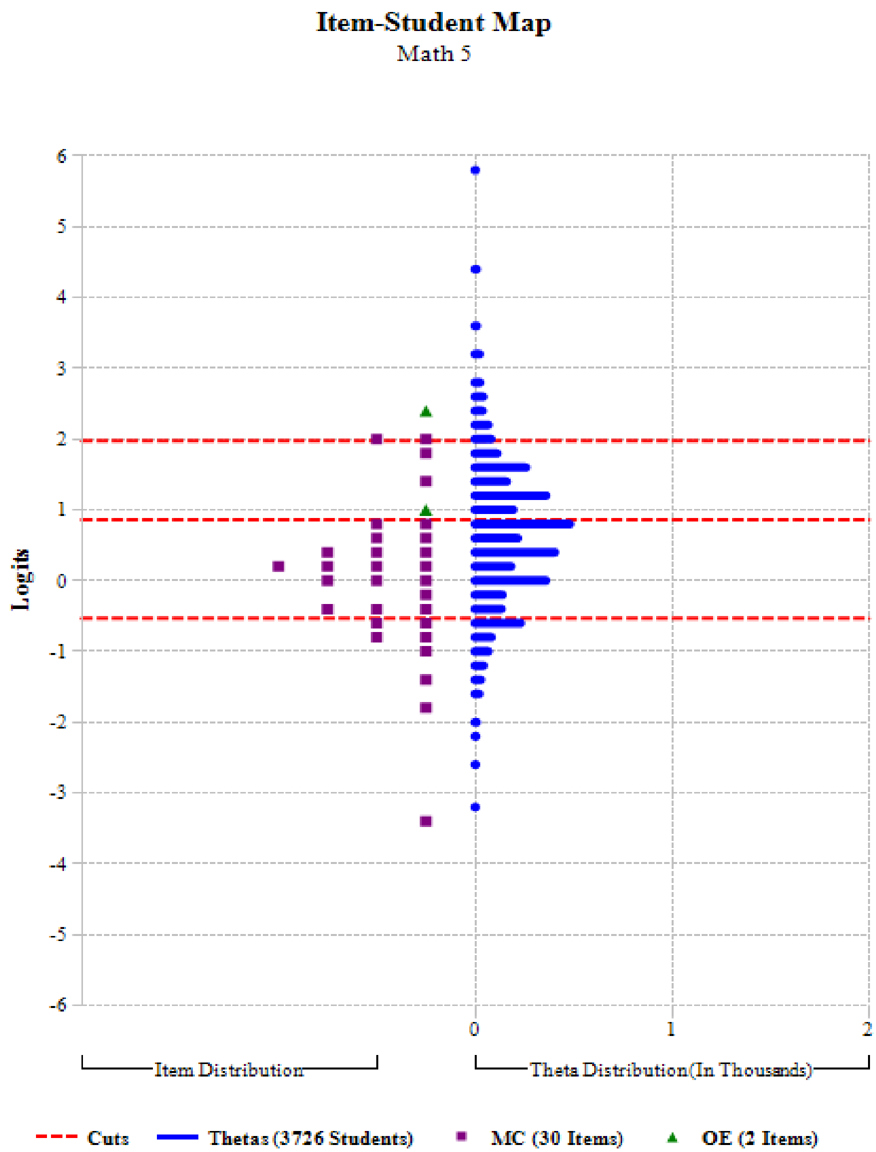
Item Difficulty-Student Ability Maps

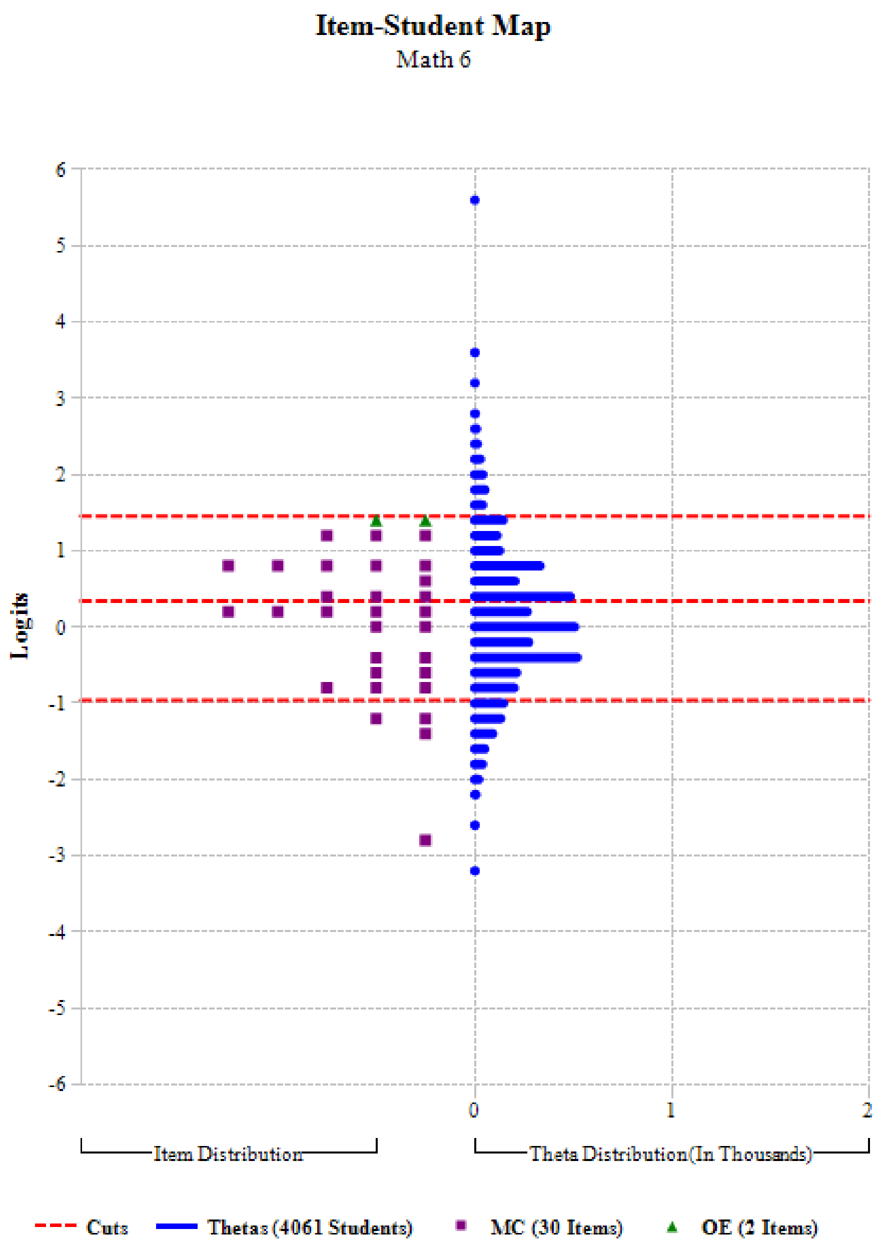
The distributions of the Rasch item logits (item difficulty estimates) are shown on the item difficulty-student ability maps presented in Figure 12–1. In each item-student map, markers on the right-hand side represent student ability values, whereas markers on the left-hand side represent item difficulty 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-right quadrant of any given plot have relatively more ability. Items in the lower-left 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).

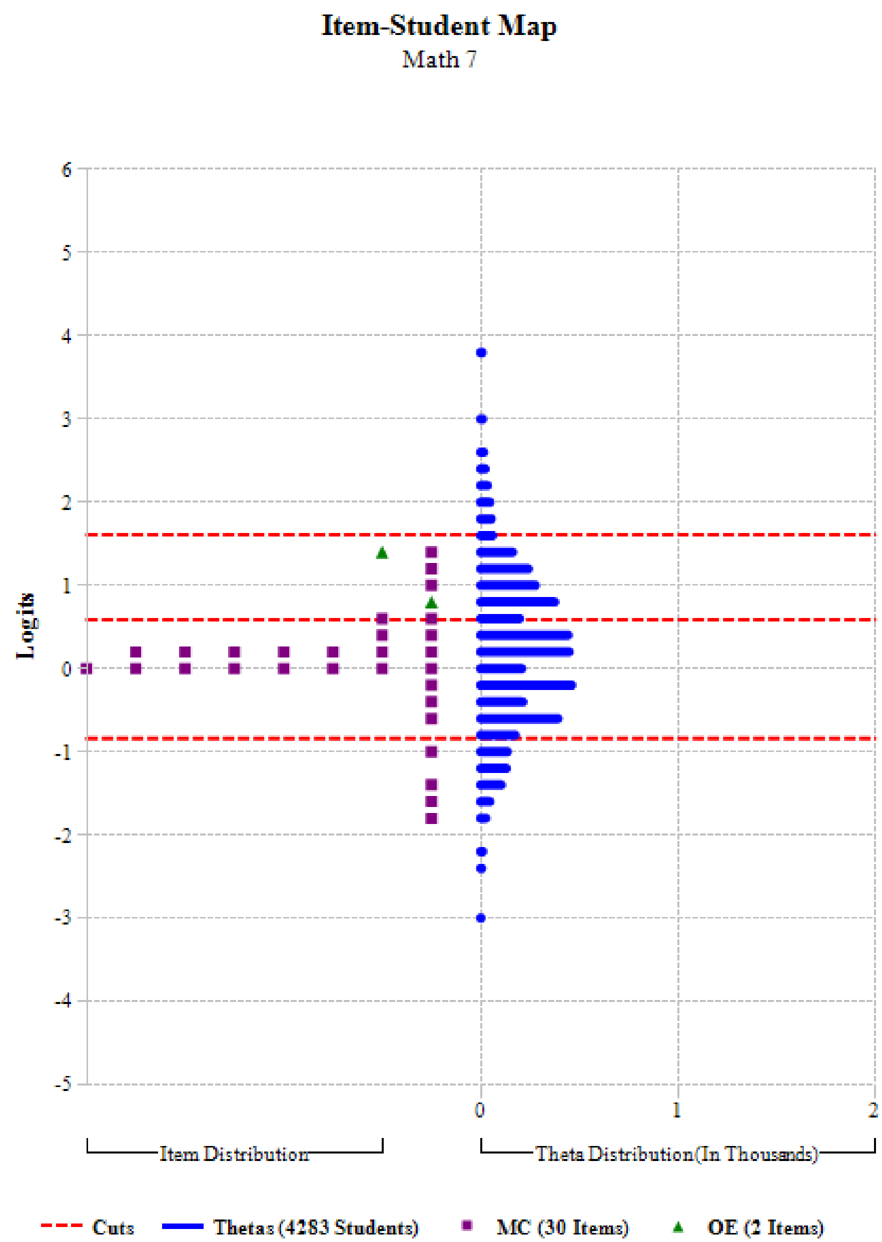
Overall, the distribution of student ability was roughly comparable to the distribution of item difficulties. The mean ability of the students was comparable to the mean item difficulty. The range of student ability and item logit was also comparable. It is also important to understand where the items are providing more accurate measurement (e.g., near the cut scores or away from the cut scores). This issue is addressed more fully in Chapter Eighteen (see Figure 18–2). The OE items (Xs) were relatively more difficult than the MC items (Ds). However, the OEs provide more information for higher-ability students.

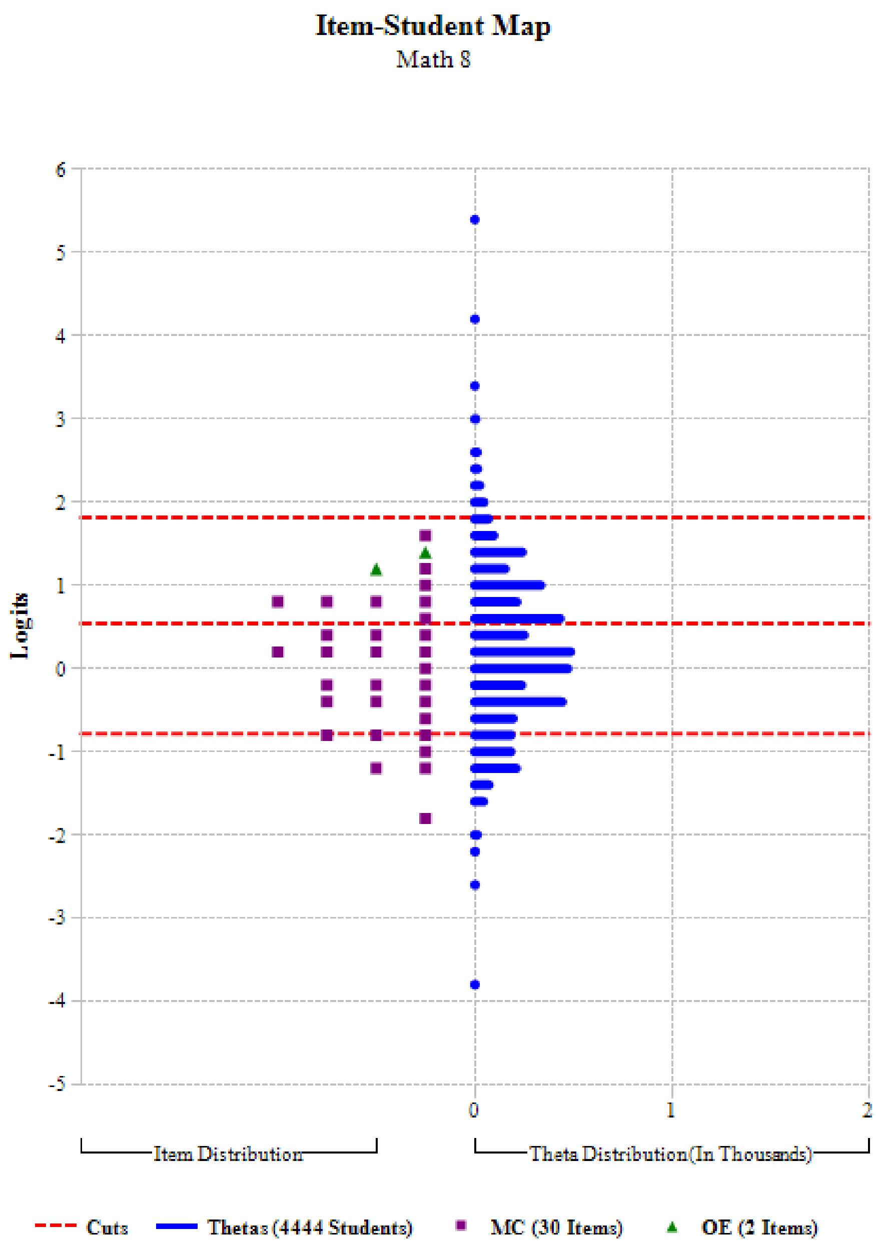
Figure 12–1. Item-Student Maps

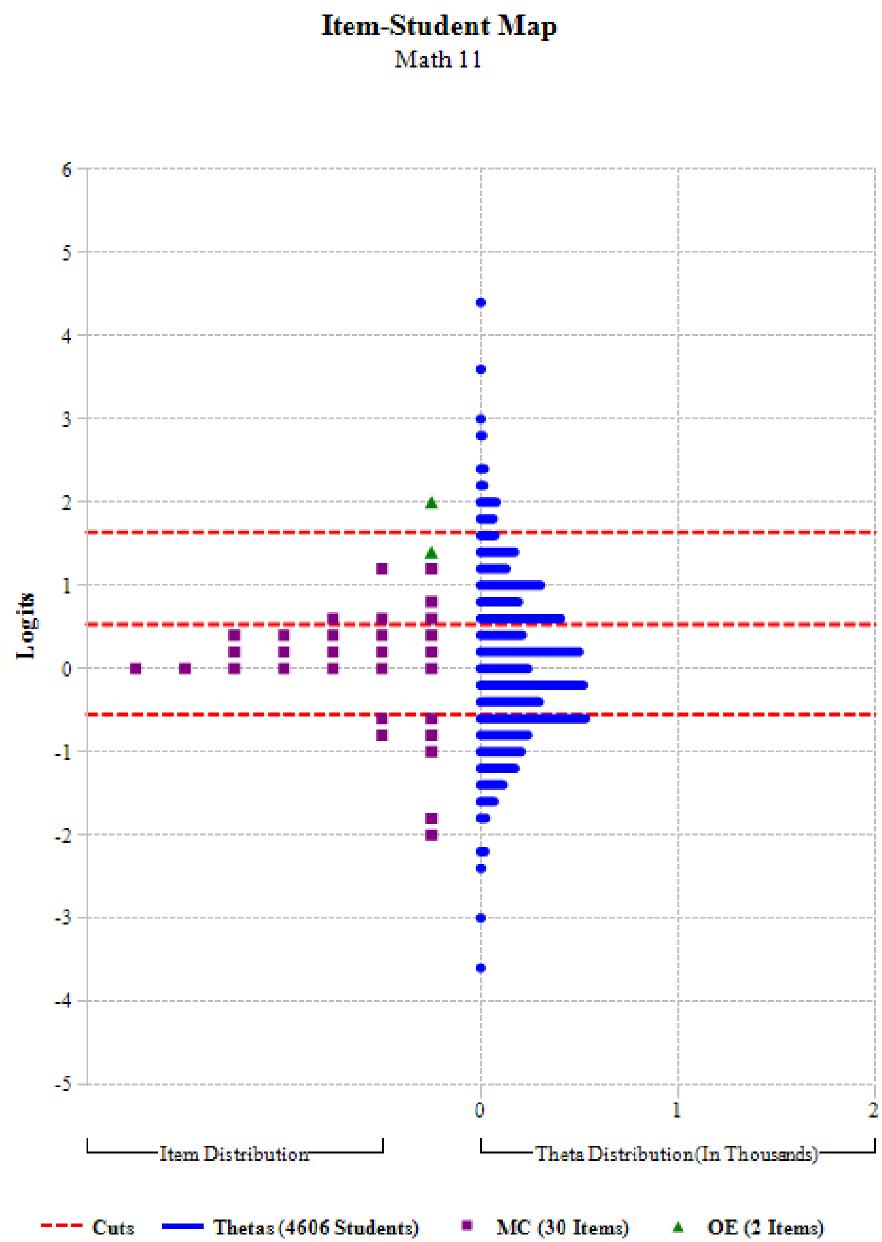


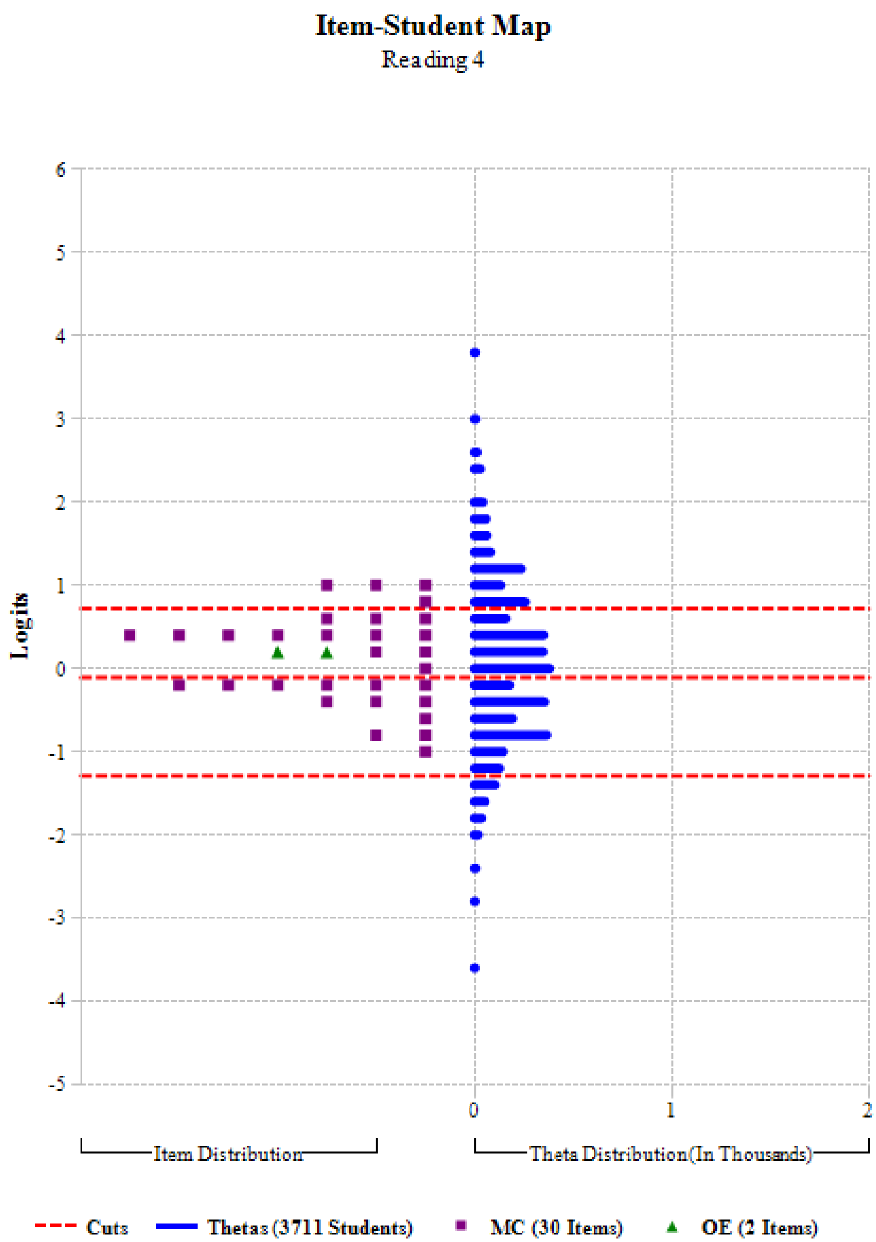



Item-Student Map
Math 6
Logits
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
0
1
2
Item Distribution
Theta Distribution (In Thousands)
Cuts
Thetas (4061 Students)
MC (30 Items)
OE (2 Items)

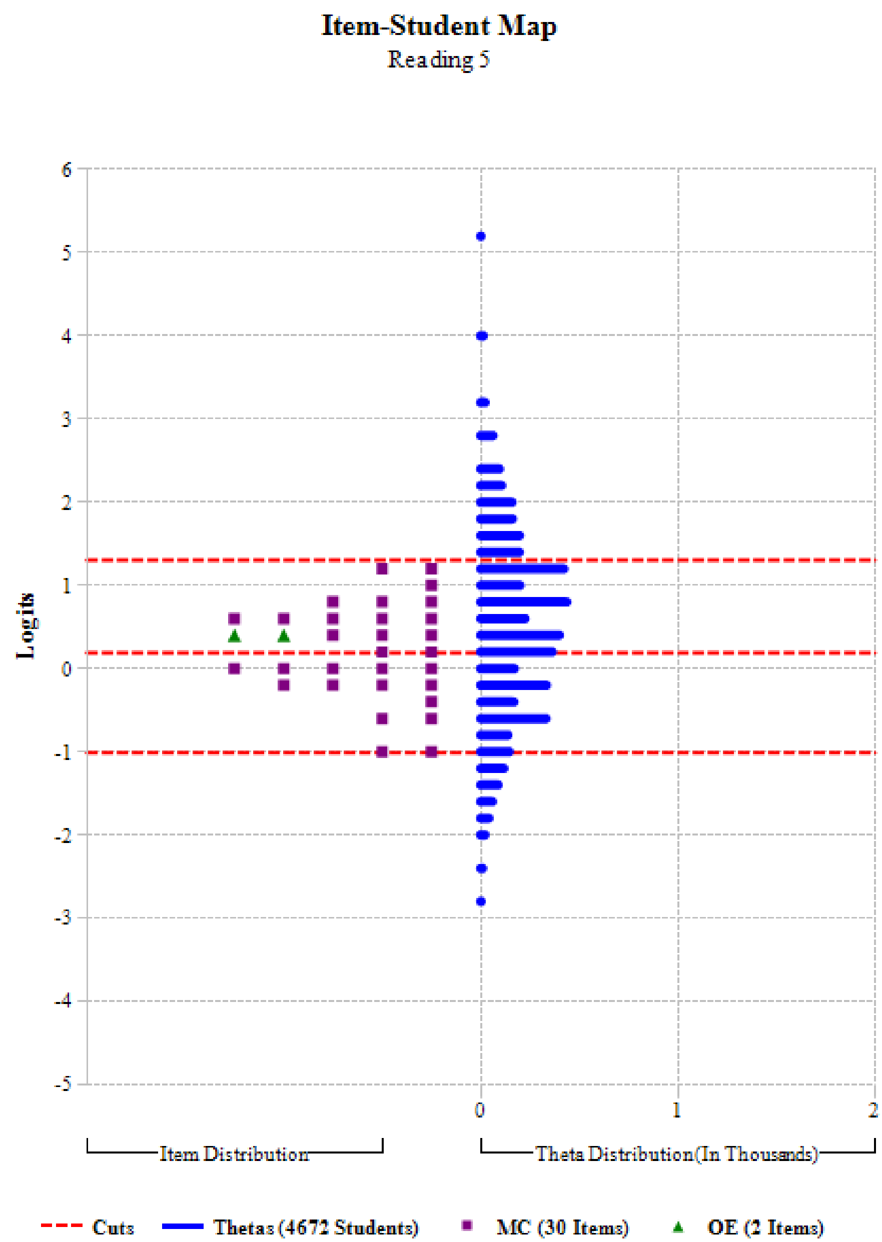

Item-Student Map
Math 7
Logits
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
0
1
2
Item Distribution
Theta Distribution (In Thousands)
Cuts
Thetas (4283 Students)
MC (30 Items)
OE (2 Items)


Item-Student Map
Math 8
Logits
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
0
1
2
Item Distribution
Theta Distribution (In Thousands)
Cuts
Thetas (4444 Students)
MC (30 Items)
OE (2 Items)

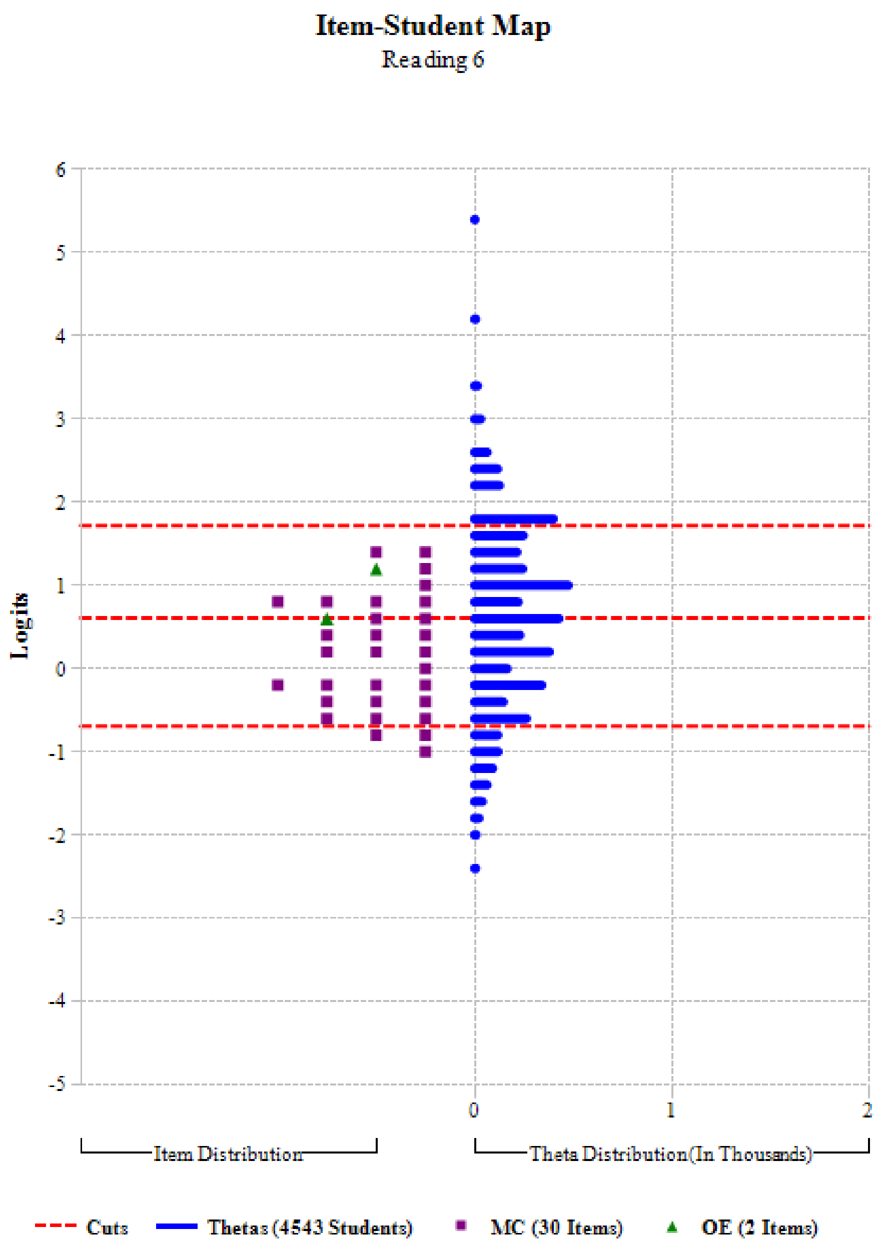

Item-Student Map
Math 11
Logits
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
0
1
2
Item Distribution
Theta Distribution (In Thousands)
Cuts
Thetas (4606 Students)
MC (30 Items)
OE (2 Items)

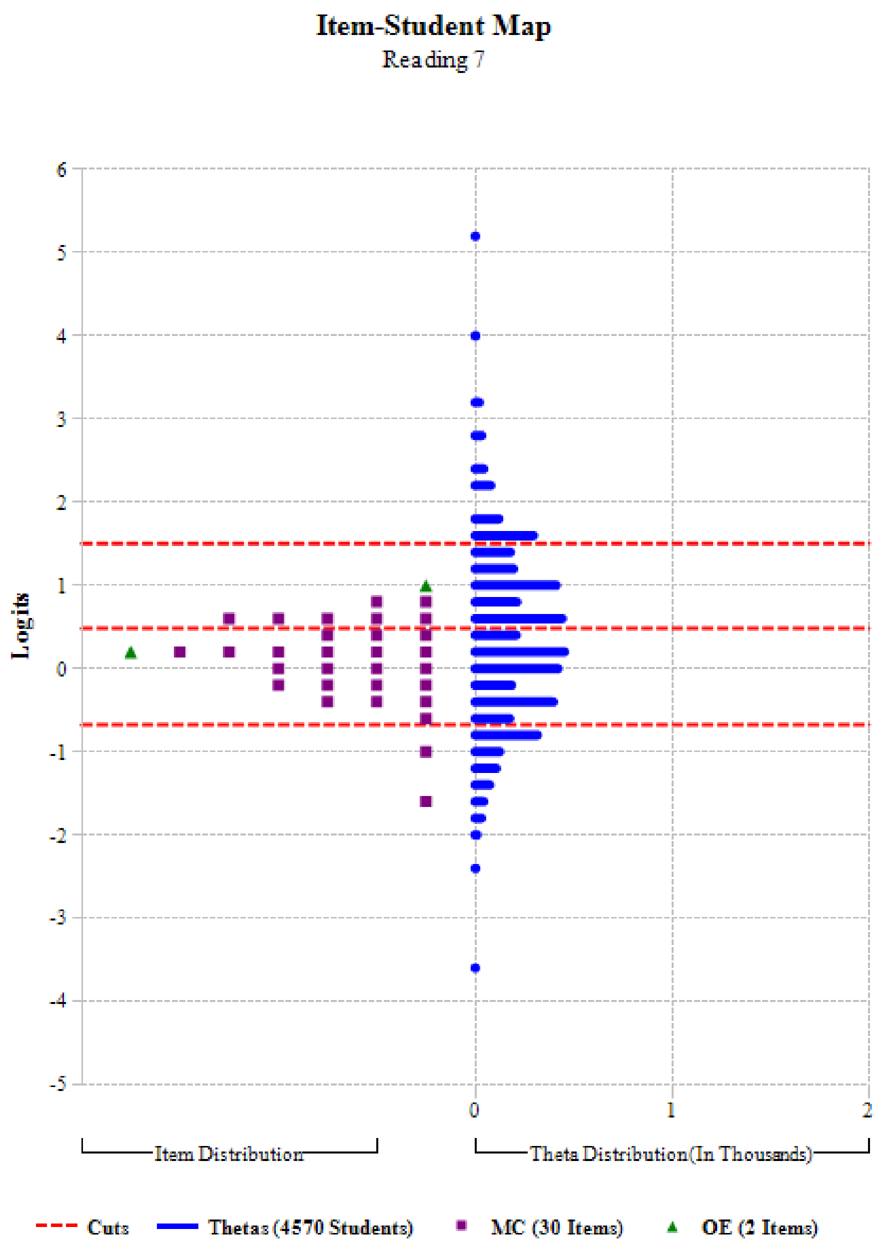


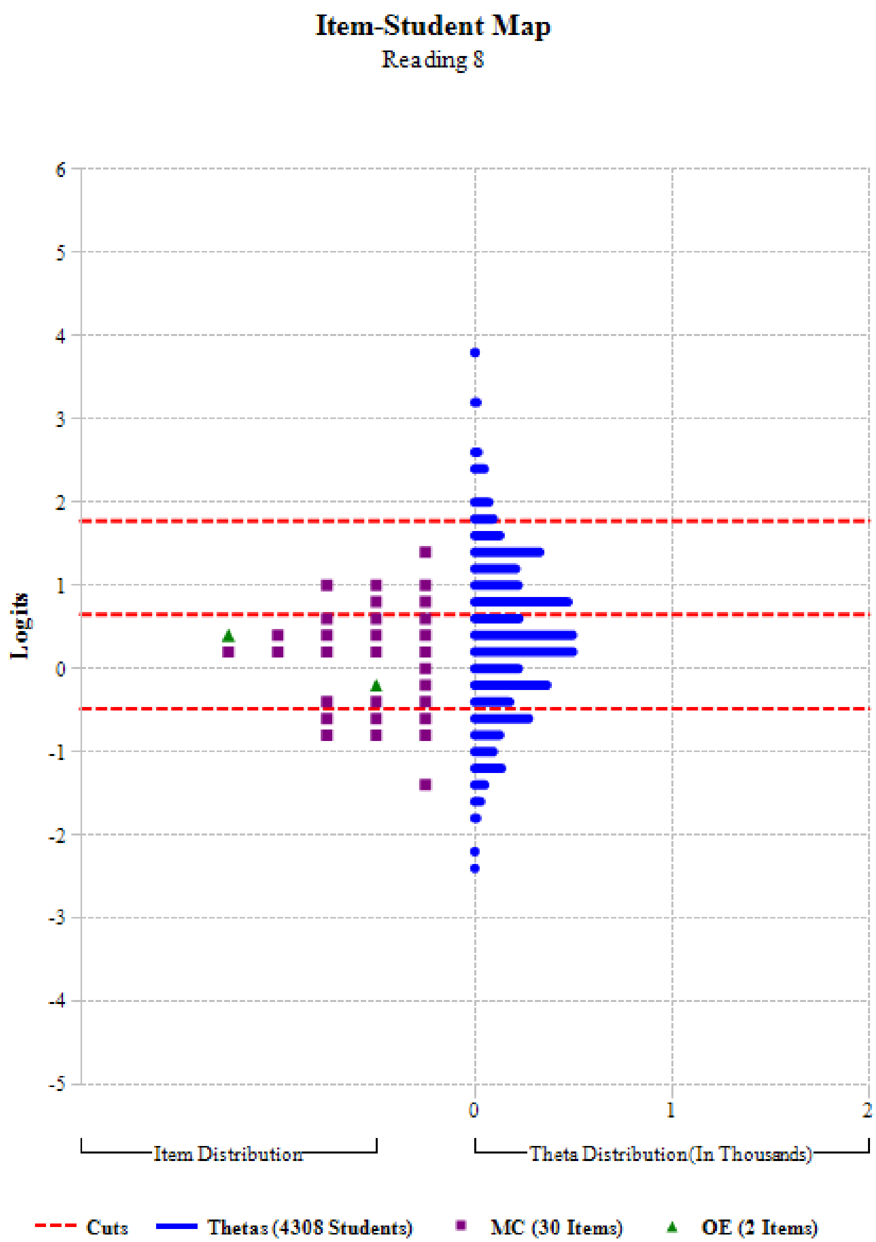
Item-Student Map
Reading 4
Logits
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
0
1
2
Item Distribution
Theta Distribution (In Thousands)
Cuts
Thetas (3711 Students)
MC (30 Items)
OE (2 Items)

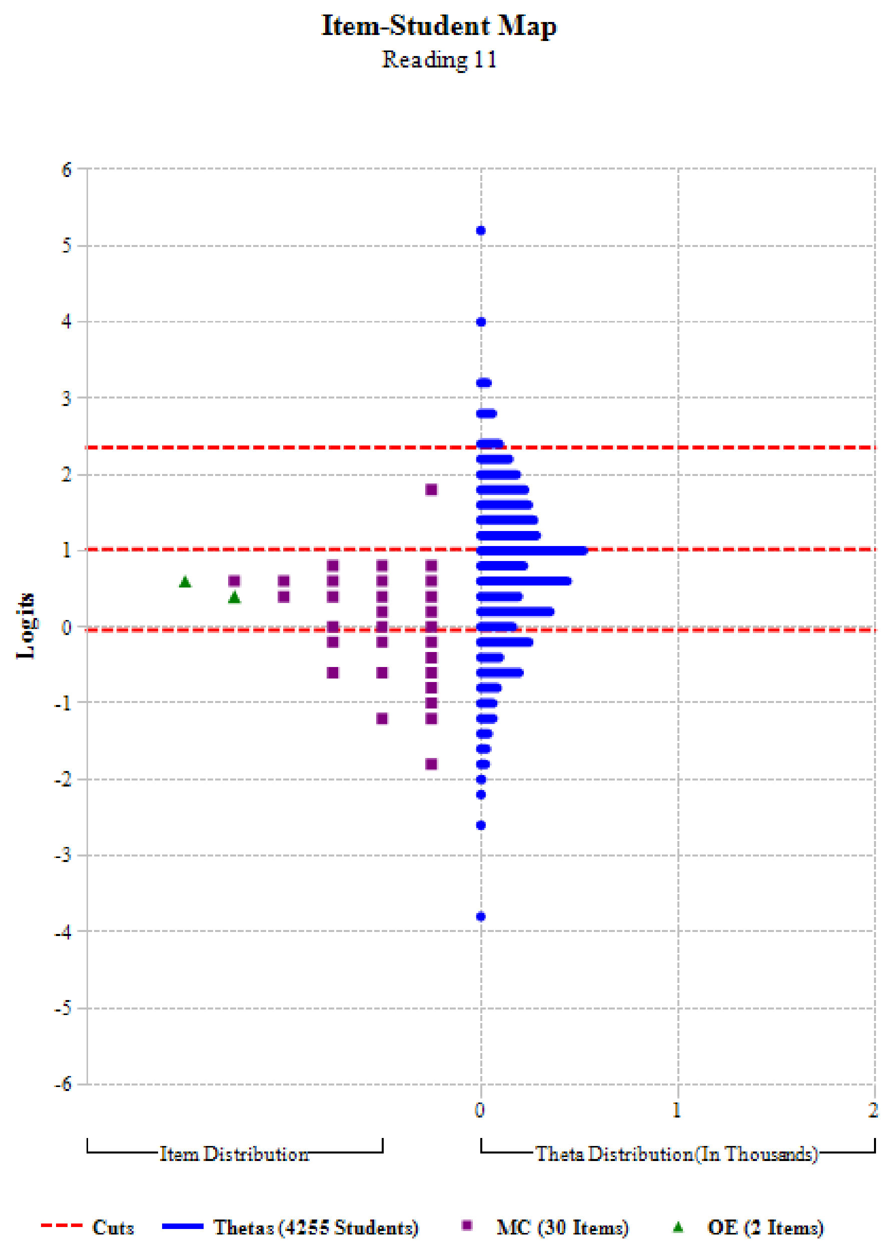


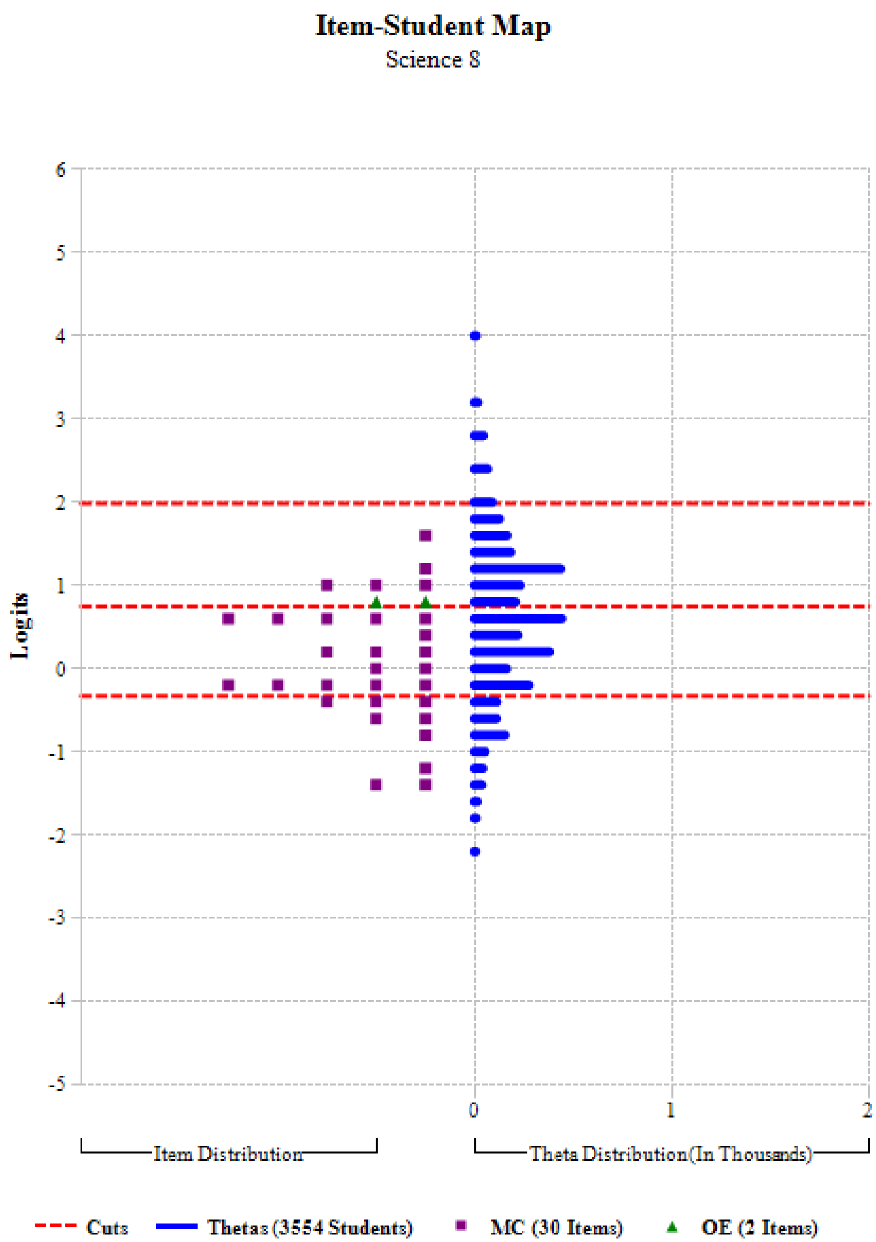
Item-Student Map
Reading 5
Logits
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
0
1
2
Item Distribution
Theta Distribution (In Thousands)
Cuts
Thetas (4672 Students)
MC (30 Items)
OE (2 Items)

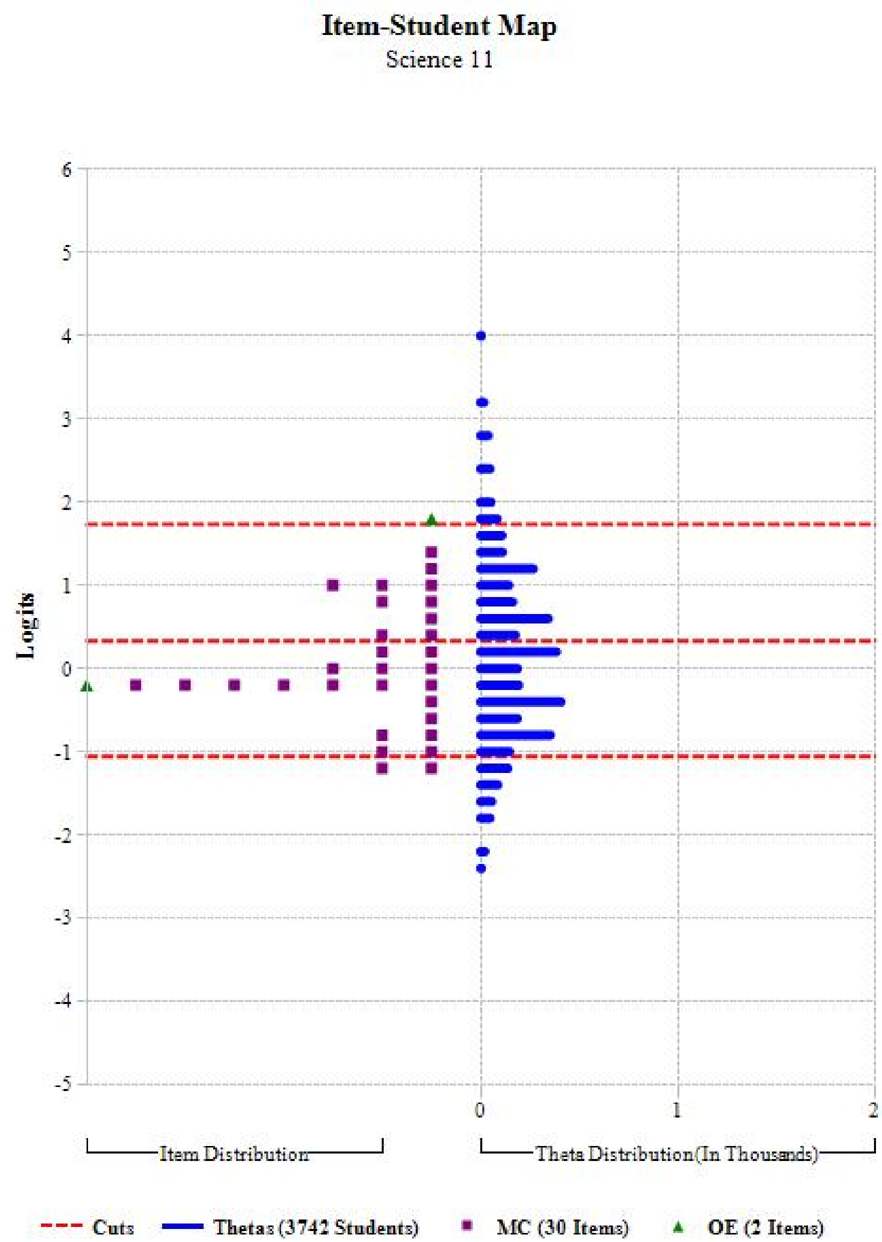

Item-Student Map
Reading 6
Logits
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
0
1
2
Item Distribution
Theta Distribution (In Thousands)
Cuts
Thetas (4543 Students)
MC (30 Items)
OE (2 Items)


Item-Student Map
Reading 7
Logits
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
0
1
2
Item Distribution
Theta Distribution (In Thousands)
Cuts
Thetas (4570 Students)
MC (30 Items)
OE (2 Items)


Item-Student Map
Reading 8
Logits
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
0
1
2
Item Distribution
Theta Distribution (In Thousands)
Cuts
Thetas (4308 Students)
MC (30 Items)
OE (2 Items)


Item-Student Map
Reading 11
Logits
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
0
1
2
Item Distribution
Theta Distribution (In Thousands)
Cuts
Thetas (4255 Students)
MC (30 Items)
OE (2 Items)


Item-Student Map
Science 8
Logits
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
0
1
2
Item Distribution
Theta Distribution(In Thousands)
Cuts
Thetas (3554 Students)
MC (30 Items)
OE (2 Items)


Item-Student Map
Science 11
Logits
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
0
1
2
Item Distribution
Theta Distribution(In Thousands)
Cuts
Thetas (3742 Students)
MC (30 Items)
OE (2 Items)

Chapter Thirteen: Performance-Level Setting

The performance-level setting for the PSSA-M reading and science tests was conducted by Data Recognition Corporation (DRC) using the Ordered-Item Booklet (OIB) Angoff (Yes/No) method during a workshop held in Harrisburg, Pennsylvania, on May 17–20, 2011. A brief summary of the methodology and results is provided below. Full details of the performance-level-setting event can be found in the following technical report:

> *Standard Setting Technical Report for the 2011 Pennsylvania System of School Assessment-Modified Reading and Science Assessments (Data Recognition, 2011)*[2]

A history (dates and methodology) of prior performance-level-setting events are provided in Table 13–1. For additional details about any given event, refer to the technical report for the year that the event occurred (Data Recognition Corporation, 2010, 2011).

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

Subject	Grade	Methodology	Event Date
Mathematics-M	4–8, 11	OIB Angoff	Spring 2010
Reading-M	4–8 11	OIB Angoff	Spring 2011
Science-M	8, 11	OIB Angoff	Spring 2011

SUMMARY

Figure 13–1 presents general information about the performance-level-setting event. The purpose of the event was to establish three cut scores for the modified reading assessment at Grades 4–8 and 11 and for the modified science assessment at Grades 8 and 11. The three cut scores place students into four performance levels: Below Basic-M, Basic-M, Proficient-M, and Advanced-M.

The Pennsylvania Department of Education (PDE) recruited panelists from across the state and targeted educators who had experience in reading or science at a specific grade level and were knowledgeable about modified content standards. A total of 33 educators (22 general educators and 11 special educators) attended the reading performance-level-setting event, and a total of 21 educators (14 general educators and 7 special educators) attended the science performance-level-setting event. For reading, the 33 panelists were assigned to one or two grade-level panels based on their experience. For science, the 21 panelists were assigned to either the Grade 8 or Grade 11 panel. The numbers of panelists in each grade panel ranged from 8 to 13. The ratio of special educators to general educators ranged from 1:3 to 5:7 across the panels.

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

Figure 13–1. General Information about PSSA-M Performance Level Setting

Official Title	Performance-Level Setting for PSSA-M Reading and Science		
Event Dates	May 17–20, 2011		
Methodology	Ordered-Item Booklet Angoff (Yes/No)		
Number of Performance Levels	Four	**Performance Level Names**	Below Basic-M Basic-M Proficient-M Advanced-M
Content Area(s)	Modified Reading & Modified Science	**Grades**	4, 5, 6, 7, 8, and 11 for Reading, 8 and 11 for Science
Panelists	Reading: 33 Total Science: 21 Total at least 8 per Group	**Tables**	1 Table per Group
Rounds	Three (3) plus Articulation	**Impact Groups**	Total Group

The entire PSSA-M performance-level-setting event included the following components:

1. A training session.
2. Phase I: three rounds of the OIB Angoff Yes/No procedure for each grade level.

   Panelists were asked to review the items, one by one, in order of item difficulty. For each item, the panelists were instructed to think about whether the borderline student at each given performance level would answer an item correctly. Only a dichotomous “Yes” or “No” response was required for each item. Since the items were rank ordered in difficulty from the easiest to hardest, panelists were expected to make more “Yes” judgments at the beginning of the OIB (easier items) and more “No” judgments at the end of OIB (more difficult items). Ideally, each panelist might have come to a point where all “Yes” answers would change to “No” answers. However, the actual pattern of ratings could differ as the item ordering only provided useful information to the panelists, not an absolute rule about answering “Yes” or “No.”
3. An evaluation form was used to collect validity evidence from the panelists. The results were positive and suggested that the event processes went efficiently. In addition, the panelists had high confidence about the final recommended cut scores.
4. Phase II: vertical articulation across six reading grades (Grades 4–8 and 11).

Table 13–2 summarizes the final recommended raw, theta, and scaled-score cuts and their associated conditional standard errors of measurement (CSEMs) for each grade. On May 26, 2011, the Pennsylvania State Board of Education approved the panelists’ recommendations at all grades. For more information on scaled scores see Chapter 14.

Table 13–2. Final Cut Scores and Conditional Standard Errors of Measurement (CSEM) for Scale Score Cuts

		Below Basic-M/Basic-M				Basic-M/Proficient-M				Proficient-M/Advanced-M			
		Raw	Theta	Scaled	CSEM	Raw	Theta	Scaled	CSEM	Raw	Theta	Scaled	CSEM
Reading	**4**	8	-1.2893	1150	43	17	-0.1101	1275	36	24	0.7217	1363	38
	5	10	-1.0125	1150	41	19	0.1898	1275	37	27	1.3018	1391	42
	6	12	-0.6956	1150	36	22	0.6103	1275	35	29	1.7201	1381	43
	7	12	-0.6788	1150	40	21	0.4809	1275	39	28	1.5026	1385	45
	8	14	-0.4859	1150	40	23	0.6508	1275	40	30	1.7754	1399	51
	11	17	-0.0445	1150	42	25	1.0155	1275	45	32	2.3512	1433	63
Sci.	**8**	14	-0.3288	1150	43	22	0.7473	1275	44	29	1.9833	1419	58
	11	9	-1.0555	1150	37	19	0.331	1275	33	28	1.7325	1401	42

PSSA-M CUT SCORES

Appendix L provides the Rasch ability and scaled-score cuts for each PSSA-M test. For reader convenience, these are documented in the next table in a different format. Table 13–3 documents the Rasch ability (theta) cut scores for each grade and subject-area test. Table 13–4 documents the same data but provides the cut scores on the scaled-score metric. PSSA-M scaling procedures are discussed further in Chapter Fourteen.

Table 13–3. PSSA-M Theta (θ) Metric Cut Scores by Grade and Subject Area

		θ Cuts		
		BB/B	B/P	P/A
Mathematics	**4**	-0.5891	0.8935	1.8540
	5	-0.5352	0.8640	1.9734
	6	-0.9606	0.3441	1.4543
	7	-0.8442	0.5878	1.6086
	8	-0.7858	0.5407	1.8139
	11	-0.5492	0.5317	1.6389
Reading	**4**	-1.2893	-0.1101	0.7217
	5	-1.0125	0.1898	1.3018
	6	-0.6956	0.6103	1.7201
	7	-0.6788	0.4809	1.5026
	8	-0.4859	0.6508	1.7754
	11	-0.0445	1.0155	2.3512
Sci.	**8**	-0.3288	0.7473	1.9833
	11	-1.0555	0.3310	1.7325

Note. BB = Below Basic; B = Basic; P = Proficient; and A = Advanced.

Table 13–4. PSSA-M Scaled-Score Metric Cut Scores by Grade and Subject Area

		Scaled-Score Cuts		
		BB/B	**B/P**	**P/A**
Mathematics	**4**	1150	1275	1356
	5	1150	1275	1374
	6	1150	1275	1381
	7	1150	1275	1364
	8	1150	1275	1395
	11	1150	1275	1403
Reading	**4**	1150	1275	1363
	5	1150	1275	1391
	6	1150	1275	1381
	7	1150	1275	1385
	8	1150	1275	1399
	11	1150	1275	1433
Sci.	**8**	1150	1275	1419
	11	1150	1275	1401

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 that can be more easily interpreted by users. For the PSSA-M, the resulting scaled scores will be used for score reporting and performance-level classification. The PSSA-M classifies students into four achievement levels: Below Basic-M, Basic-M, Proficient-M, and Advanced-M.

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-M produce numeric values with three or four digits that are unit-interval scaled scores. Each grade and subject has its own unique PSSA-M scaled score. Having positive scores with no decimals makes 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-M scaled scores are derived through a two-step process. First, there is a nonlinear transformation that converts number-correct scores to Rasch ability logits. Next, 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). All omit (i.e., no response) and multiple marks (i.e., more than one response selected without machine-discernable erasures) are scored as zeroes.

WINSTEPS Scaling

Parameter estimates are derived using the WINSTEPS 3.54 computer program (Wright and Linacre, 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, then linked (see Chapter Fifteen).

Zero and Perfect Scores

WINSTEPS does not provide a direct ability estimate for zero (i.e., no points earned) or perfect (i.e., all points earned) raw scores. However, WINSTEPS has a default procedure for estimating such extreme scores, and this was used for the PSSA-M. Essentially, a fractional raw score (i.e., a value less than one) was added to zero scores and subtracted from perfect scores to determine the corresponding logit values for these extreme scores.

Linear Transformation Formulas

PSSA-M 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-M scaled scores are provided in Table 14–1. For reference purposes, the PSSA-M theta cut scores have been reproduced in this table as well.

The linear transformations were chosen such that the Basic and Proficient cut scores were the same across contents and grades. This was possible because the extreme scores after the transformations remained interpretable. Fixing the lower two cut scores was done in an attempt to aid teachers and parents in assessing a student's performance.

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 4 mathematics Proficient-M cut score (in scaled score units) is 1275. If there had been a raw score that converted to an unrounded scaled score of 1274.20, this scaled score would have been rounded up to 1275 for reporting purposes.

Lowest-Obtainable Scaled Scores

All PSSA-M mathematics tests have a lowest-obtainable scaled score (LOSS) of 1075. For PSSA-M reading, the LOSS values have been set to 1075 at Grades 4–8 and 1050 and 1000 for Grades 8 and 11, respectively. For PSSA-M science, the LOSS values have been set to 1050 at Grade 8 and 1000 at Grade 11. LOSS values are documented in Table 14–2. 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-M. 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 14–2 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-M Cut Scores (on θ metric), Intercept, and Slope by Grade and Subject Area

		θ Cuts				
		BB/B	B/P	P/A	Intercept	Slope
Mathematics	4	-0.5891	0.8935	1.854	1199.67	84.31
	5	-0.5352	0.864	1.9734	1197.81	89.34
	6	-0.9606	0.3441	1.4543	1242.03	95.81
	7	-0.8442	0.5878	1.6086	1223.69	87.29
	8	-0.7858	0.5407	1.8139	1224.05	94.23
	11	-0.5492	0.5317	1.6389	1213.51	115.64
Reading	4	-1.2893	-0.1101	0.7217	1286.67	106.00
	5	-1.0125	0.1898	1.3018	1255.27	103.97
	6	-0.6956	0.6103	1.7201	1216.58	95.72
	7	-0.6788	0.4809	1.5026	1223.17	107.79
	8	-0.4859	0.6508	1.7754	1203.43	109.97
	11	-0.0445	1.0155	2.3512	1155.25	117.92
Sci.	8	-0.3288	0.7473	1.9833	1188.19	116.16
	11	-1.0555	0.3310	1.7325	1245.16	90.16

Notes. Linear transformation intercepts and slopes are used to derive the scaled scores. BB = Below Basic-M, B = Basic-M, P = Proficient-M, and A = Advanced-M.

Table 14–2. PSSA-M Scaled Score Cuts for each Performance Level by Grade and Subject Area

			Scaled-Score Cuts[1]			
		Min	BB/B	B/P	P/A	Max[2]
Mathematics	4	1075	1150	1275	1356	1655
	5	1075	1150	1275	1374	1712
	6	1075	1150	1275	1381	1772
	7	1075	1150	1275	1364	1663
	8	1075	1150	1275	1395	1730
	11	1075	1150	1275	1403	1890
Reading	4	1075	1150	1275	1363	1822
	5	1075	1150	1275	1391	1801
	6	1075	1150	1275	1381	1741
	7	1075	1150	1275	1385	1778
	8	1050	1150	1275	1399	1767
	11	1000	1150	1275	1433	1763
Sci.	8	1050	1150	1275	1419	1787
	11	1000	1150	1275	1401	1712

Notes. [1] BB = Below Basic-M, B = Basic-M, P = Proficient-M, and A = Advanced-M.
[2] Scaled-score maximum values are unique for the current year's test.

Strand (Reporting Category) Score Strength Profile

The following process was followed to derive the strand (reporting category) score strength 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 14–1) 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-M and Basic-M); M=Medium (equivalent to Proficient-M); H=High (equivalent to Advanced-M). The maximum possible strand scaled score was converted to H in cases where no strand scaled score equaled or exceeded the Advanced-M scaled-score cut. See Chapter Sixteen for more information on strand scores and how they are used in score reports.

Chapter Fifteen: Linking

FOREWORD

This was the second operational administration of the PSSA-M reading and science tests and the third operational administration of the PSSA-M mathematics test. As such, linking/equating was required only for reading and science.

INTRODUCTION

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 (i.e., 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 as 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-M is the Rasch Partial Credit Model (RPCM; Masters, 1982). Further descriptions of the RPCM are given in Chapter Twelve.

A chained linking design was utilized for the PSSA-M operational scores in reading and science. Scores from the new test form were linked to the scale of the old test form. The chain originates from the 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 existing 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-M scaled scores across different years, the new operational items need to be placed on the bank scale via scale linking.

This chapter begins with a brief summary of the expected PSSA-M linking procedures. This summary is followed by a more detailed explanation of selected design elements and processes.

BRIEF SUMMARY OF THE PSSA-M LINKING PROCEDURE

The first two steps in the linking procedure concern calibration of the multiple-choice (MC) and open-ended (OE) items, which is considered as within-year linking in this chapter.

1. Calibrate selected MC items in an unanchored run:
    - Include all operational (OP) MC items.

2. Calibrate selected OE items in an anchored run by putting them on the MC item scale from step 1:
   - Include all operational (OP) OE items.
   - Fix all MC items from step 1.
3. Evaluate the stability of the linking items using Robust *Z*:
   - Include all operational (OP) linking (LK) items.
   - Calculate Robust *Z* for each item in the linking.

   Once the above calculations are made, the following guidelines are used in determining possible sets of LK 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 LK items may be considered for exclusion.
   - The ratio of the standard deviations of previous-year and current-year 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 LK items follow 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.

   Scatterplots of the LK item difficulties (logits) are constructed (i.e., the current-year values are 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 are further evaluated. The scatterplots with final LK item sets are shown in Figure 15–1.
4. Calculate the mean shift over MC linking items using item difficulties:
   - Include all operational (OP) linking (LK) items.
5. Apply the mean shift to the item parameters calibrated in steps 1 and 2:
   - Include all operational (OP) MC and OE items.
6. Scale the operational test by fixing all operational items obtained in step 5:
   - The result from this step is a Raw-to-Logit (Rasch Ability) table.
7. 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-M Reading and Science

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). These items had been used in previous administrations. The LK items were used in approximately the same context. The *same context* in this situation means the items are not altered in any way, they appeared in about the same position in the booklet, and they are administered at about the same time of year.

The equivalence of student samples across years cannot be assumed. Further, the same item can have different properties in different years because of changes in the item's position or changes in the students' experiences. Consequently, between-year linking requires considerable scrutiny. This chapter focuses more on the linking between years.

The linking design employed for the PSSA-M is often referred to as a common-item nonequivalent groups (CINEG) design. Test forms will contain a set of common items, called core linking (LK) items, which serve as anchors for comparison of test forms across years. LK items are internal anchor items (i.e., they contribute to student test scores).

All LK items were common between years since all came from the prior year's administration. The proportion of the LK items may be different depending on the subject and grade. These are summarized in Table 15–2.

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

Table 15–2. 2012 PSSA-M Linking Designs: Mathematics and Science

		Core		Core Links	
		MC	OE	MC	OE
Mathematics	4	30	2	12	0
	5	30	2	12	0
	6	30	2	12	0
	7	30	2	12	0
	8	30	2	12	0
	11	30	2	12	0
Sci.	8	30	2	12	0
	11	30	2	11	0

Linking Method for PSSA-M 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 current item parameters on the same scale. This was accomplished by first concurrently calibrating all OP (including LK) MC items. Next, the resulting MC item parameters were anchored in WINSTEPS, while all OE items in the operational section (including OP LKs) were calibrated. At this point all item parameters were on a unique scale for the current year. Between-year linking was required to place the items on the bank scale.

Between-year linking utilized the current LK item parameters and their banked counterparts. The scale transformation methodology used for PSSA-M is known as the mean-shift procedure. After evaluating the robustness of the link by identifying items that do not maintain their relative difficulty across years, the difference between the current and banked parameters was then determined. The mean of the differences was then used to statistically adjust the new parameters to the bank scale. The final (LK) item parameters were then used to estimate student abilities, which were, in turn, transformed to scaled scores. (Transformation formulas are provided in Chapter Fourteen.)

Results Summary

Table 15–3 shows the initial and ending number of linking items and associated shift parameters and the correlation of item difficulties across years for each subject and grade. No LK items were dropped in any grade. 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., changes in student ability since the base-year administration, and differences in difficulty).

Table 15–3. Summary Data for Linking Items

		Initial Counts		Final Counts		Initial	Final	Final
		MC	OE	MC	OE	Shift	Shift	Corr.
Reading	4	12	0	12	0	0.1229	0.1229	0.99
	5	12	0	12	0	0.1991	0.1991	0.98
	6	12	0	12	0	0.1647	0.1647	0.99
	7	12	0	12	0	0.0737	0.0737	0.98
	8	12	0	12	0	0.1144	0.1144	0.99
	11	12	0	12	0	0.0229	0.0229	0.99
Sci.	8	12	0	12	0	0.0492	0.0492	0.98
	11	11	0	11	0	0.0257	0.0257	0.99

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-number 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.

Graphs

This technical report uses figures to help one visualize the across-year differences in linking items for each subject at each grade. This section presents four types of figures, three of which illustrate the stability between the old (i.e., banked) and new item data:

1. Scatterplot of 2012 *p*-values on 2011 *p*-values
2. Scatterplot of 2012 logits on 2011 logits
3. Scatterplot of 2011 and 2012 *p*-values on 2012 logits
4. Test characteristic curves (TCCs) for the linked-score distribution

All four figures will be presented for each reading and science test. Each is described further below.

2012 *P*-VALUES ON 2011 *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 increase (i.e., as one moves from left to right). If the *p*-values for both years were correlated at 1.0, one would expect the relationship to fall on a straight line. Generally, linking items are not perfectly stable across years, so some scatter is expected. 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.

2012 LOGITS ON 2011 LOGITS

The top right-hand plot in Figure 15–1 focuses on the logit difficulties. It shows more clearly the relationship between 2012 and 2011 item difficulties. Logit plots often provide more defined trends but can still present varying degrees of scatter and, in some instances, reveal outlier data points.

2012 AND 2011 *P*-VALUES ON NEW-YEAR LOGITS

Plotting *p*-values against logit difficulties across years is not as reliable as it is within a year. 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.

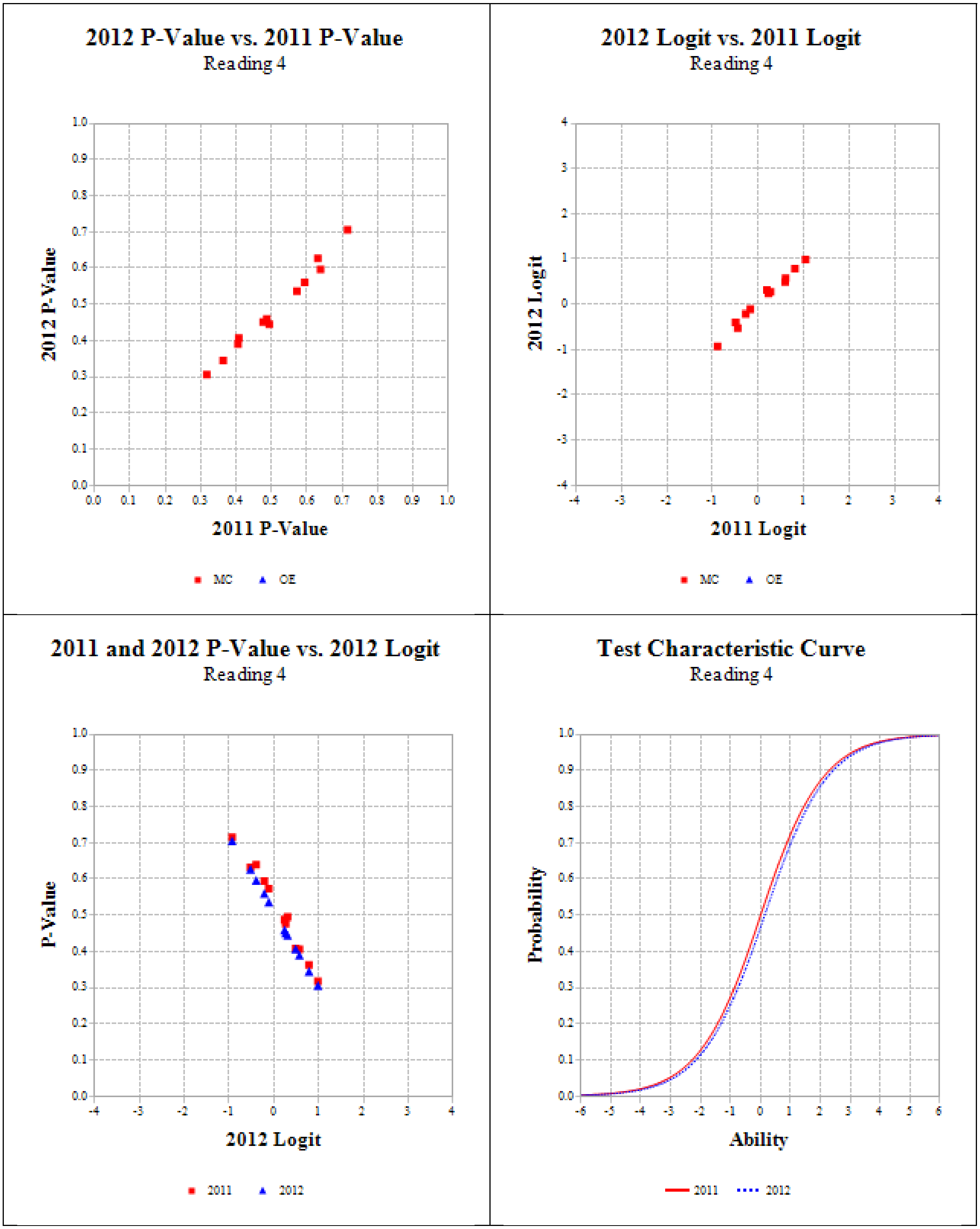
In the bottom right graph in Figure 15–1, the two lines sloping downward toward the right relate item *p*-values for the two years to the 2012 logit difficulties. This graph illustrates the curvilinear relationship required by the model, with low *p*-values being translated into high logit difficulties and high *p*-values being converted into low logit difficulties.

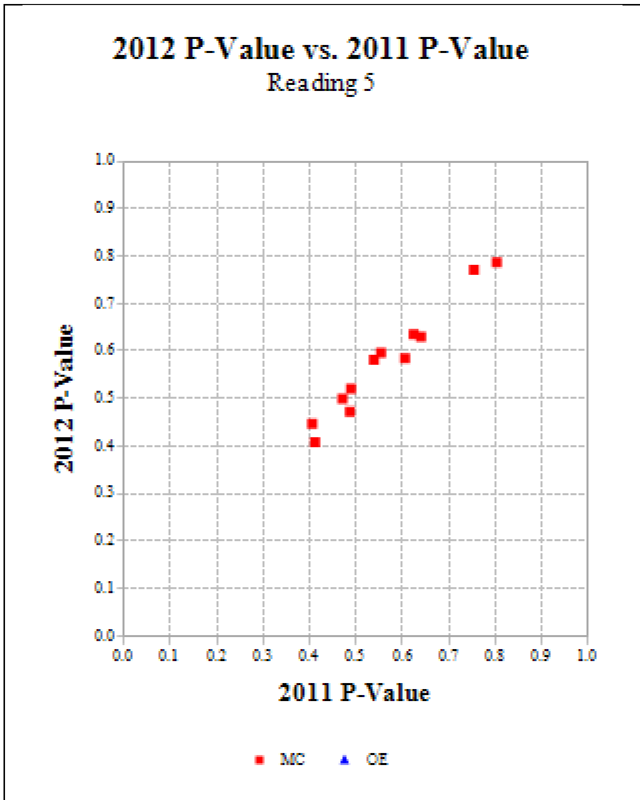
TEST CHARACTERISTIC CURVES

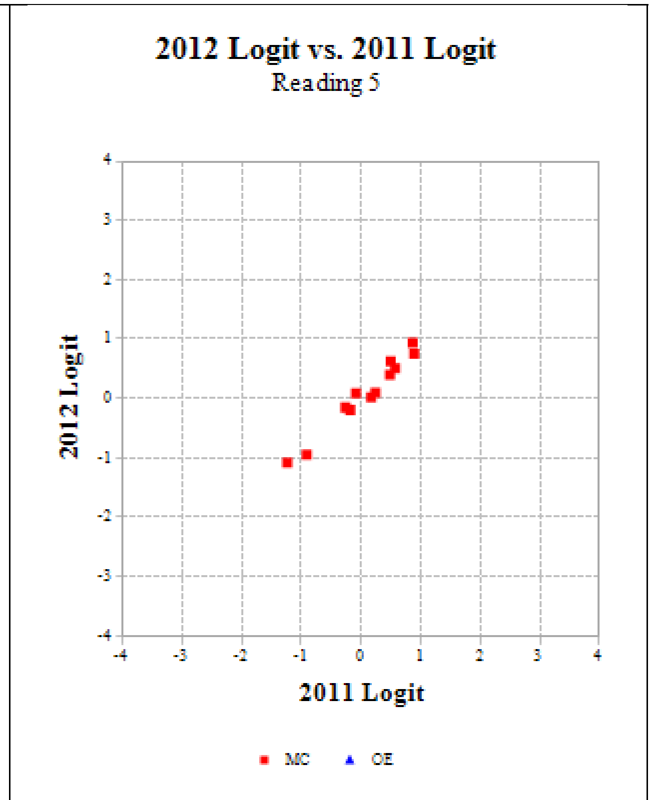
The 2011 and 2012 test characteristic curves (TCCs) by grade and subject are shown in the figures[3]. TCCs show the similarity between the new- and old-year tests in terms of difficulty in the logit metric (new-year results are for the final, linked values). Assuming equal numbers of items for the two 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.

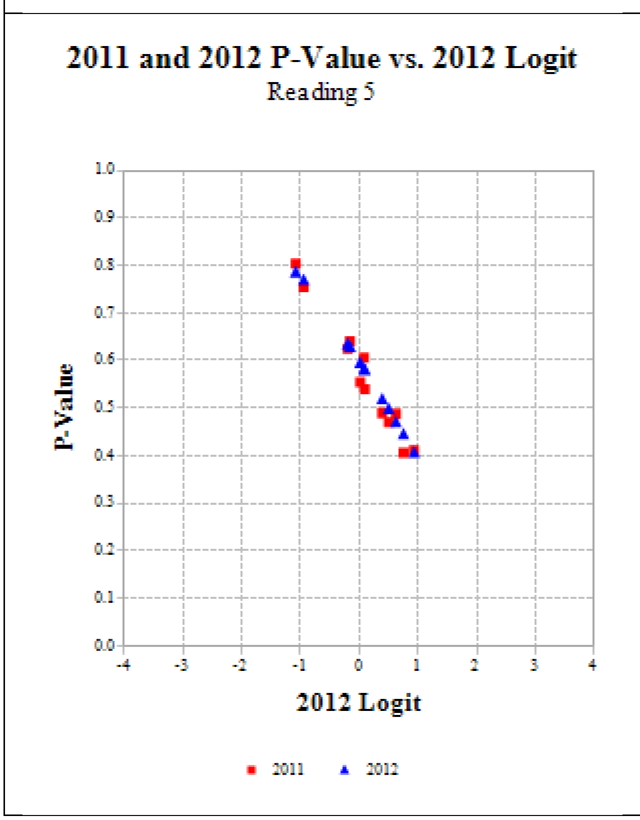
[3] In the TCC figures, the Y-Axis Probability represents total-test raw score expressed on a proportion-correct metric.

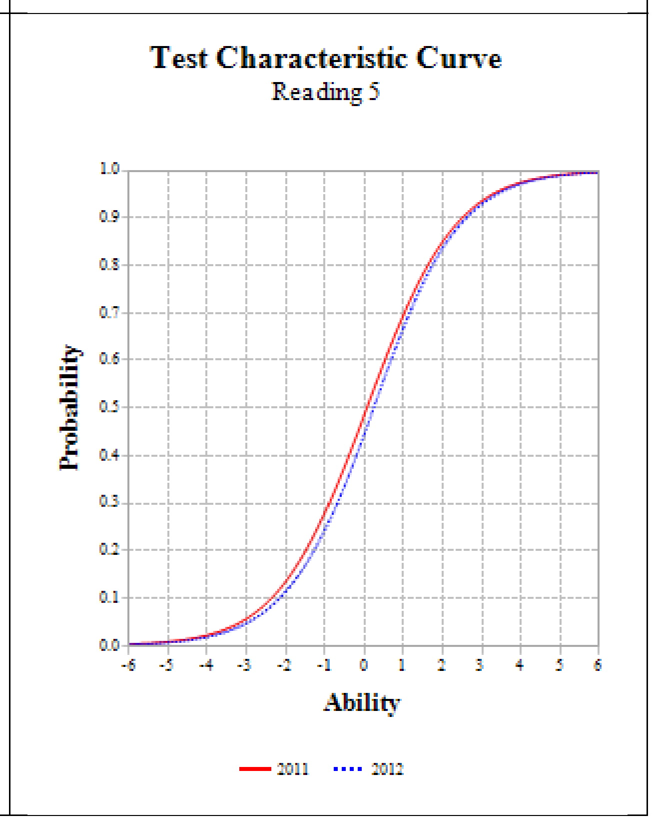
Figure 15–1. Item Stability Plots and Test Characteristic Curves

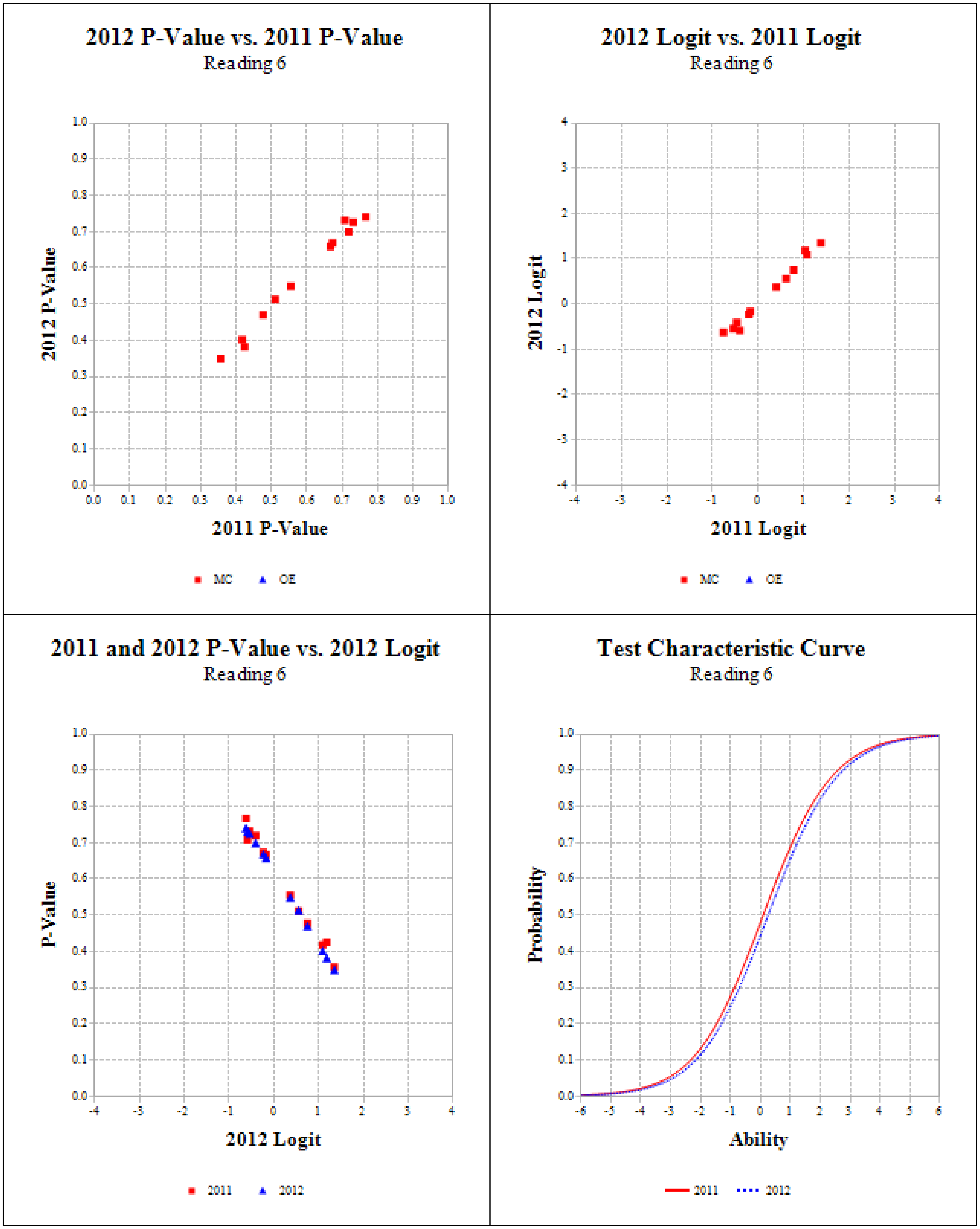



2012 P-Value vs. 2011 P-Value
Reading 5
2012 P-Value
2011 P-Value
MC
OE


2012 Logit vs. 2011 Logit
Reading 5
2012 Logit
2011 Logit
MC
OE


2011 and 2012 P-Value vs. 2012 Logit
Reading 5
P-Value
2012 Logit
2011
2012


Test Characteristic Curve
Reading 5
Probability
Ability
2011
2012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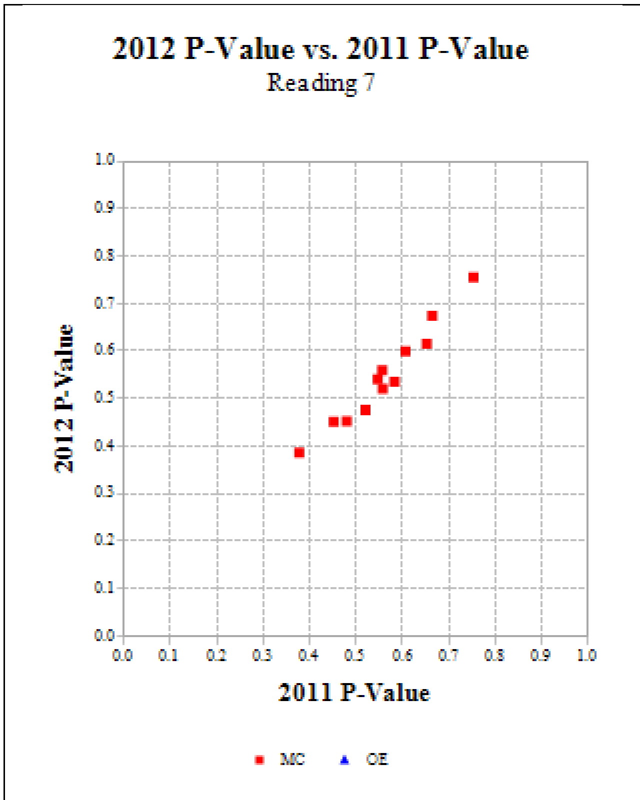
Reading 6
2012 P-Value
2011 P-Value
MC
OE
2012 Logit vs. 2011 Logit
Reading 6
2012 Logit
2011 Logit
MC
OE
2011 and 2012 P-Value vs. 2012 Logit
Reading 6
P-Value
2012 Logit
2011
2012
Test Characteristic Curve
Reading 6
Probability
Ability
2011
2012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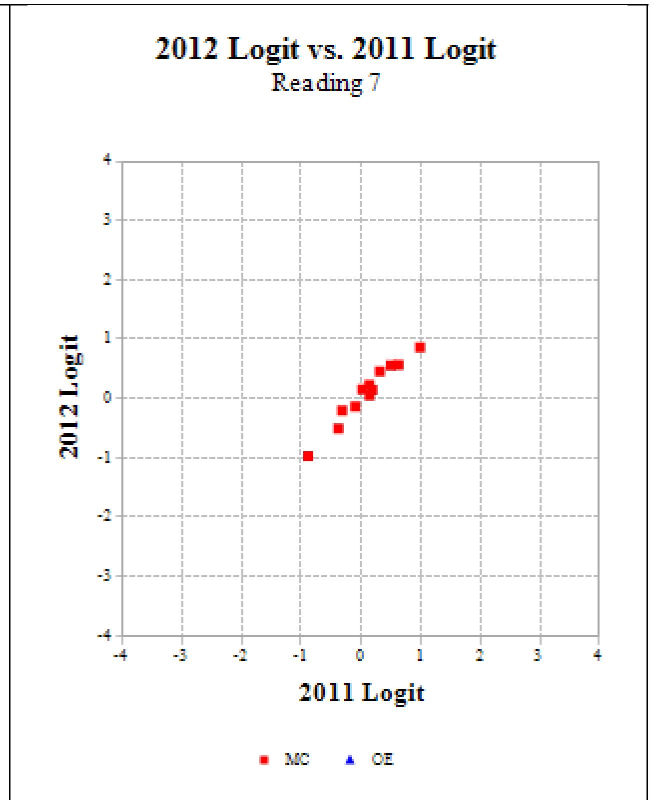
Reading 7
2012 P-Value
2011 P-Value
MC
OE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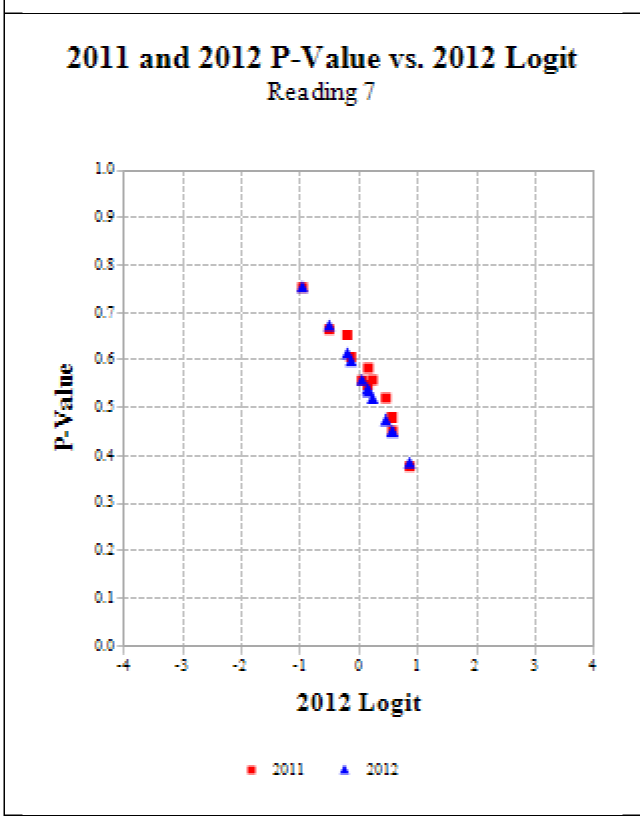
Reading 7
2012 Logit
2011 Logit
MC
OE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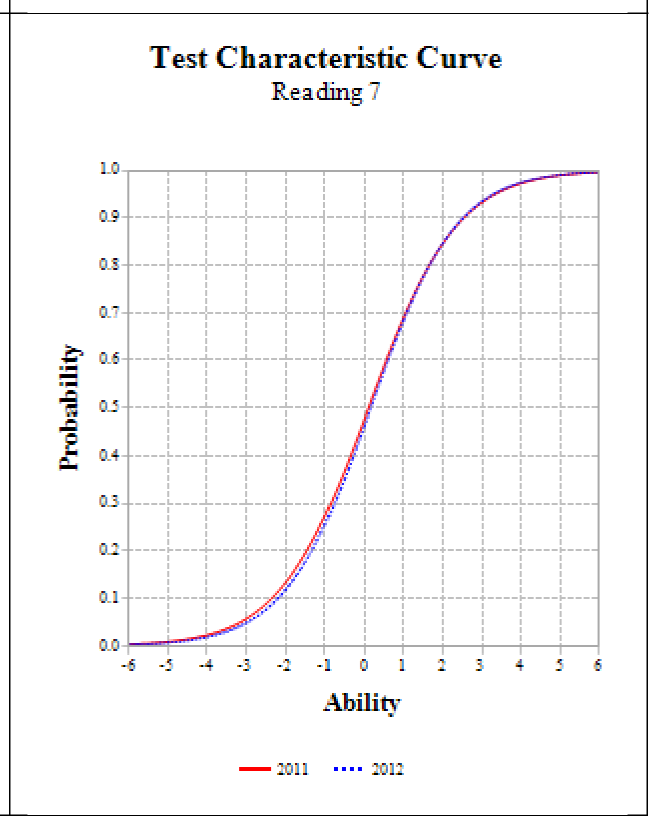
Reading 7
P-Value
2012 Logit
2011
2012


Test Characteristic Curve
Reading 7
Probability
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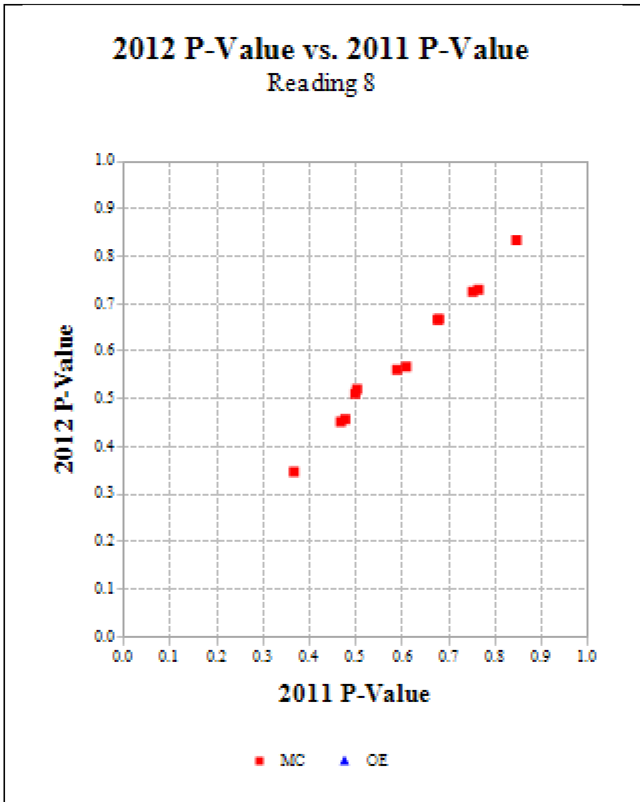
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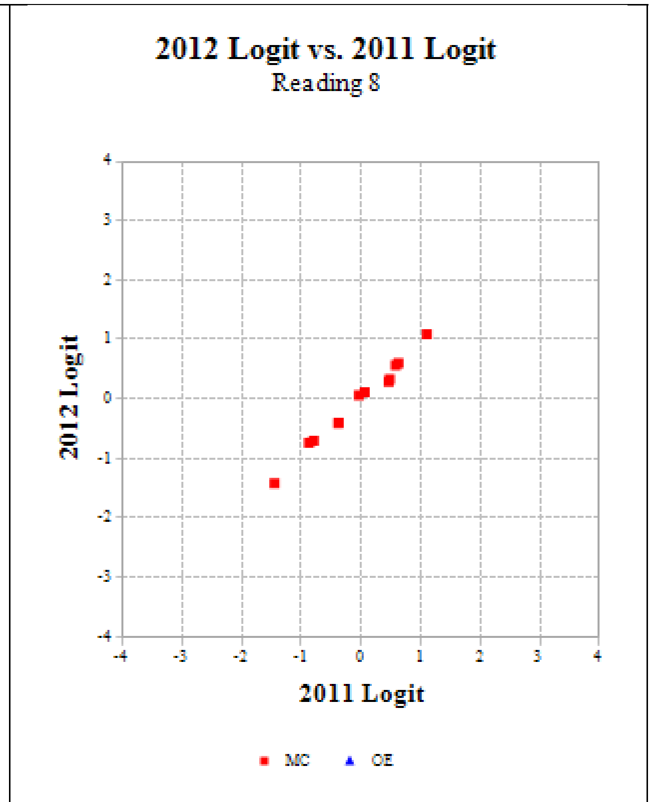
Reading 8
2012 P-Value
2011 P-Value
MC
OE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Reading 8
2012 Logit
2011 Logit
MC
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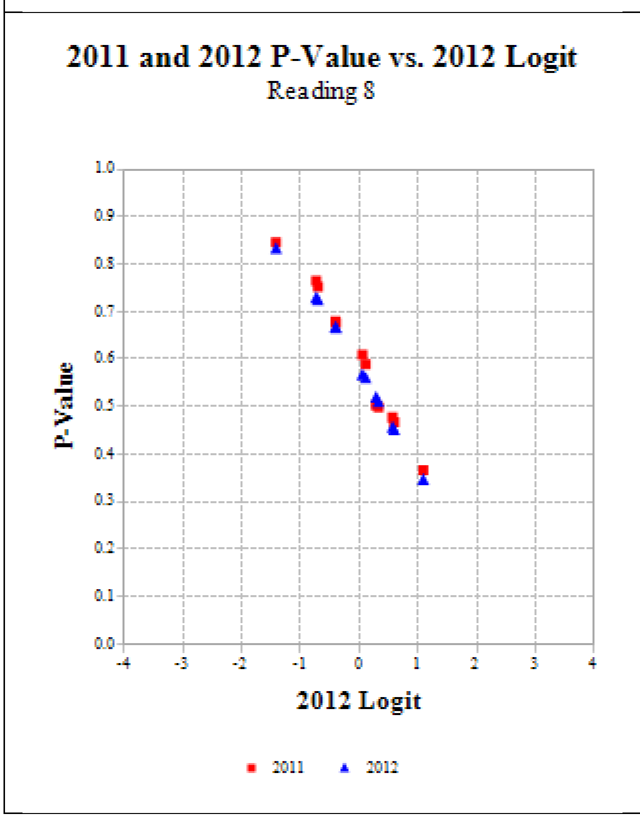
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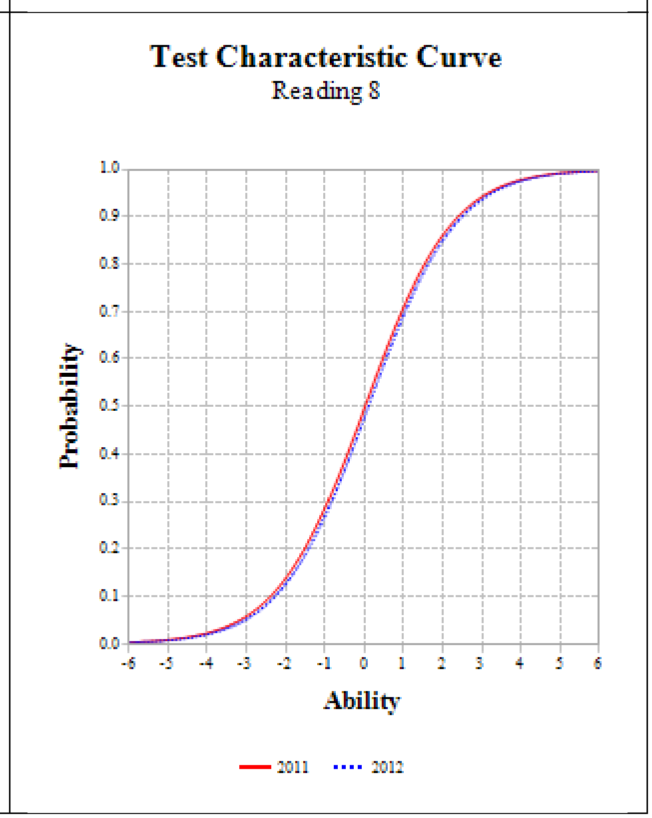
Reading 8
P-Value
2012 Logit
2011
2012


Test Characteristic Curve
Reading 8
Probability
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2011
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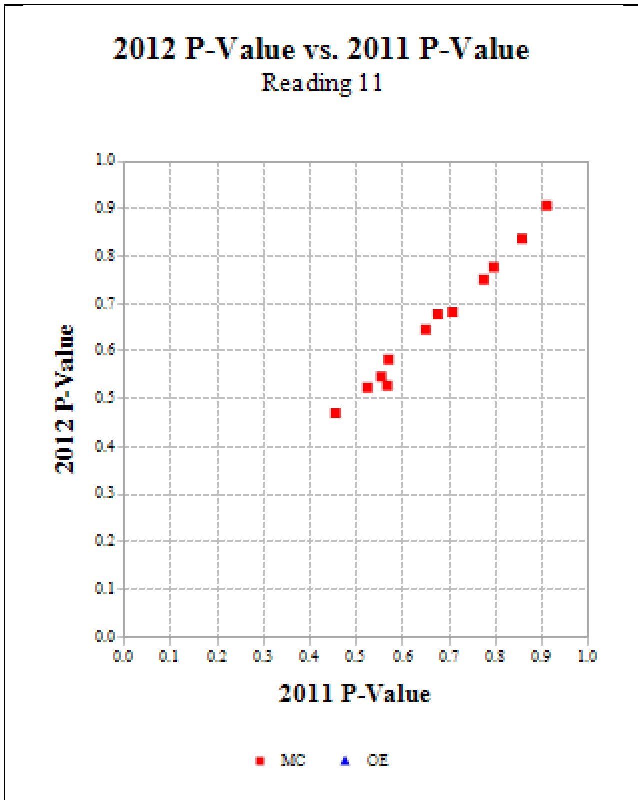
2012 P-Value vs. 2011 P-Value
Reading 11
2012 P-Value
2011 P-Value
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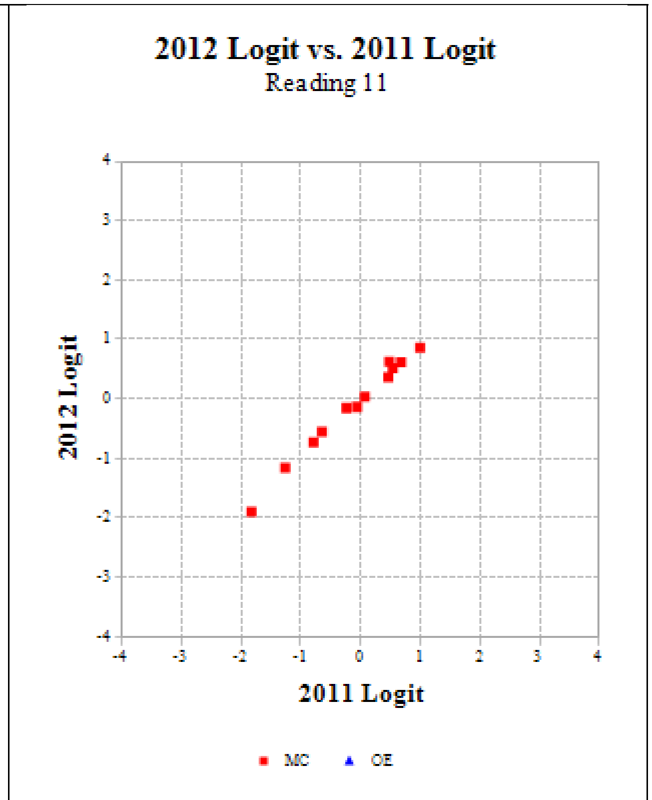
MC
OE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Reading 11
2012 Logit
2011 Logit
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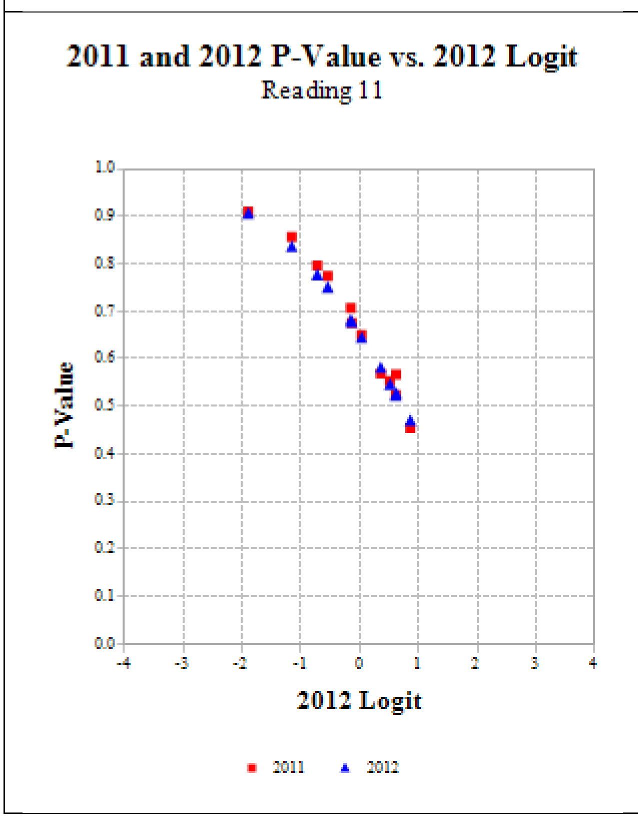
MC
OE


2011 and 2012 P-Value vs. 2012 Logit
Reading 11
P-Value
2012 Logit
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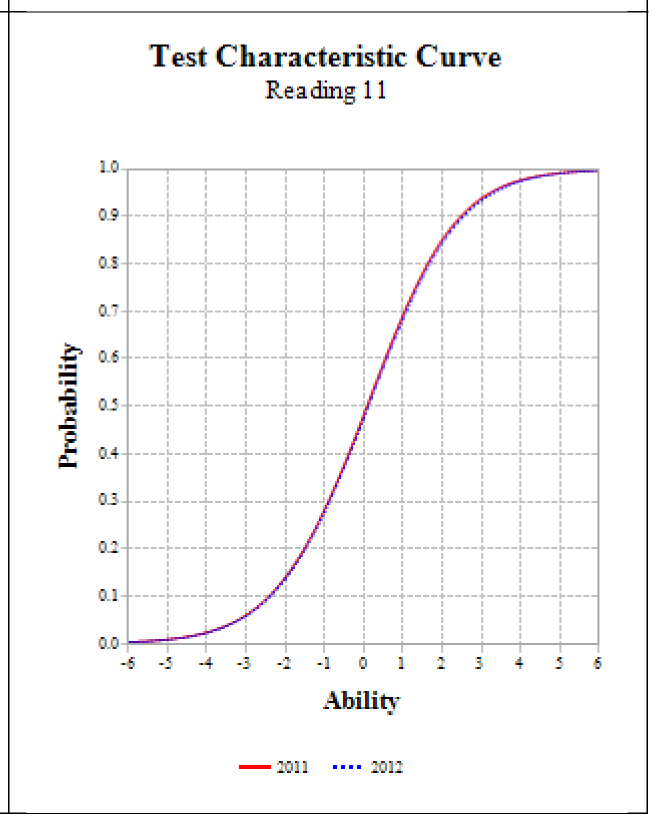
-4 -3 -2 -1 0 1 2 3 4
2011
2012


Test Characteristic Curve
Reading 11
Probability
Ability
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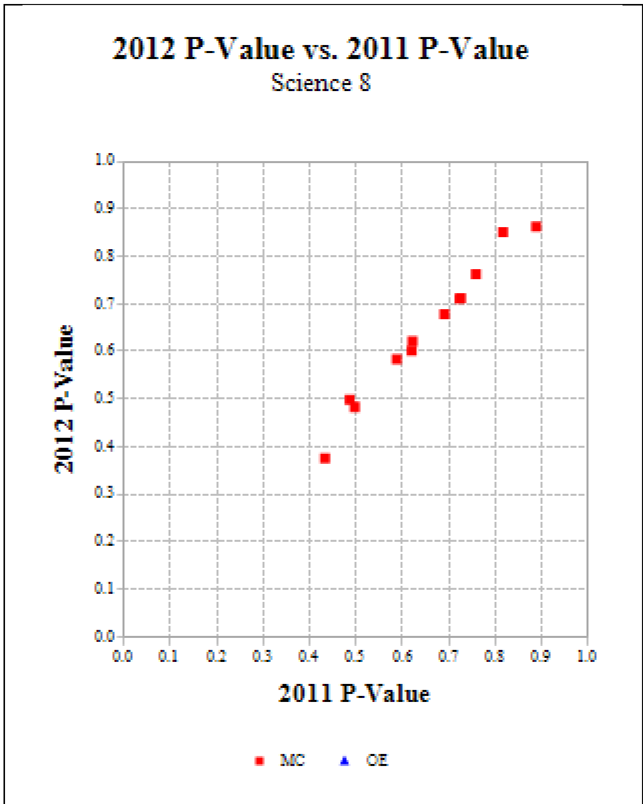
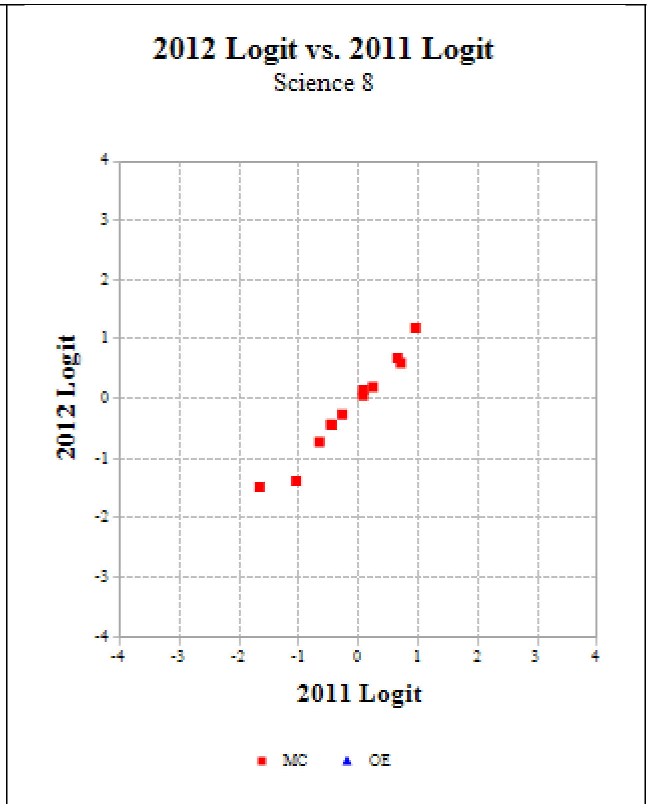
2011
2012


2012 P-Value vs. 2011 P-Value
Science 8
2012 P-Value
2011 P-Value
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
MC
OE


2012 Logit vs. 2011 Logit
Science 8
2012 Logit
2011 Logit
-4
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-1
0
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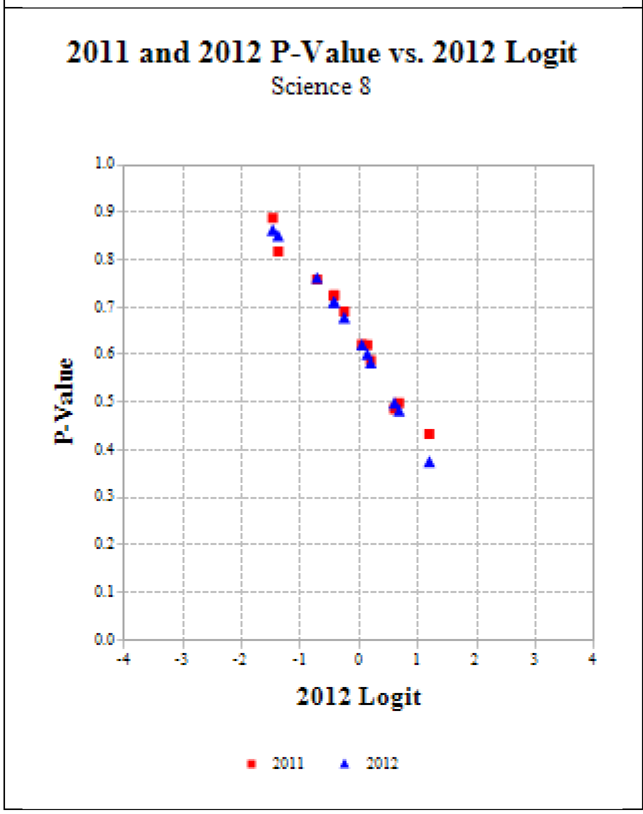
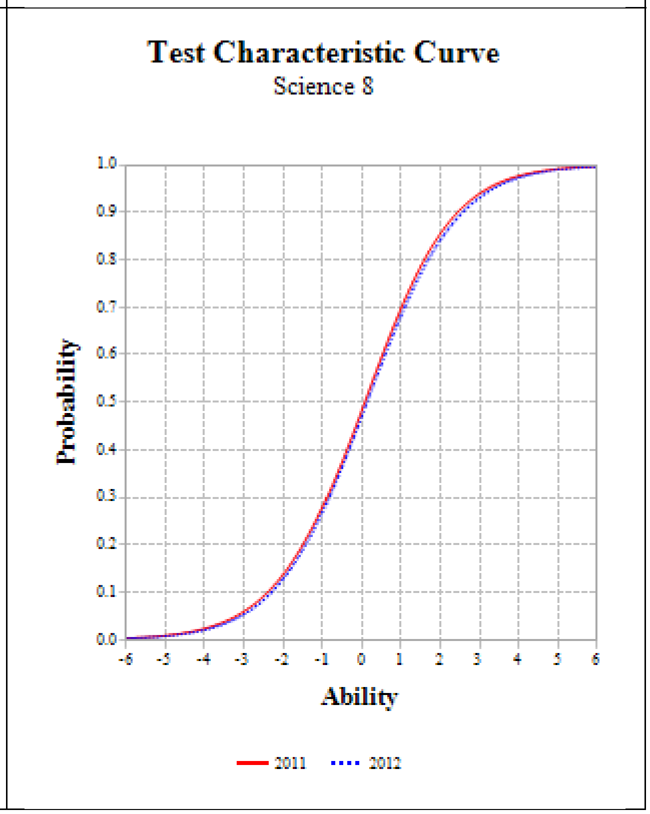
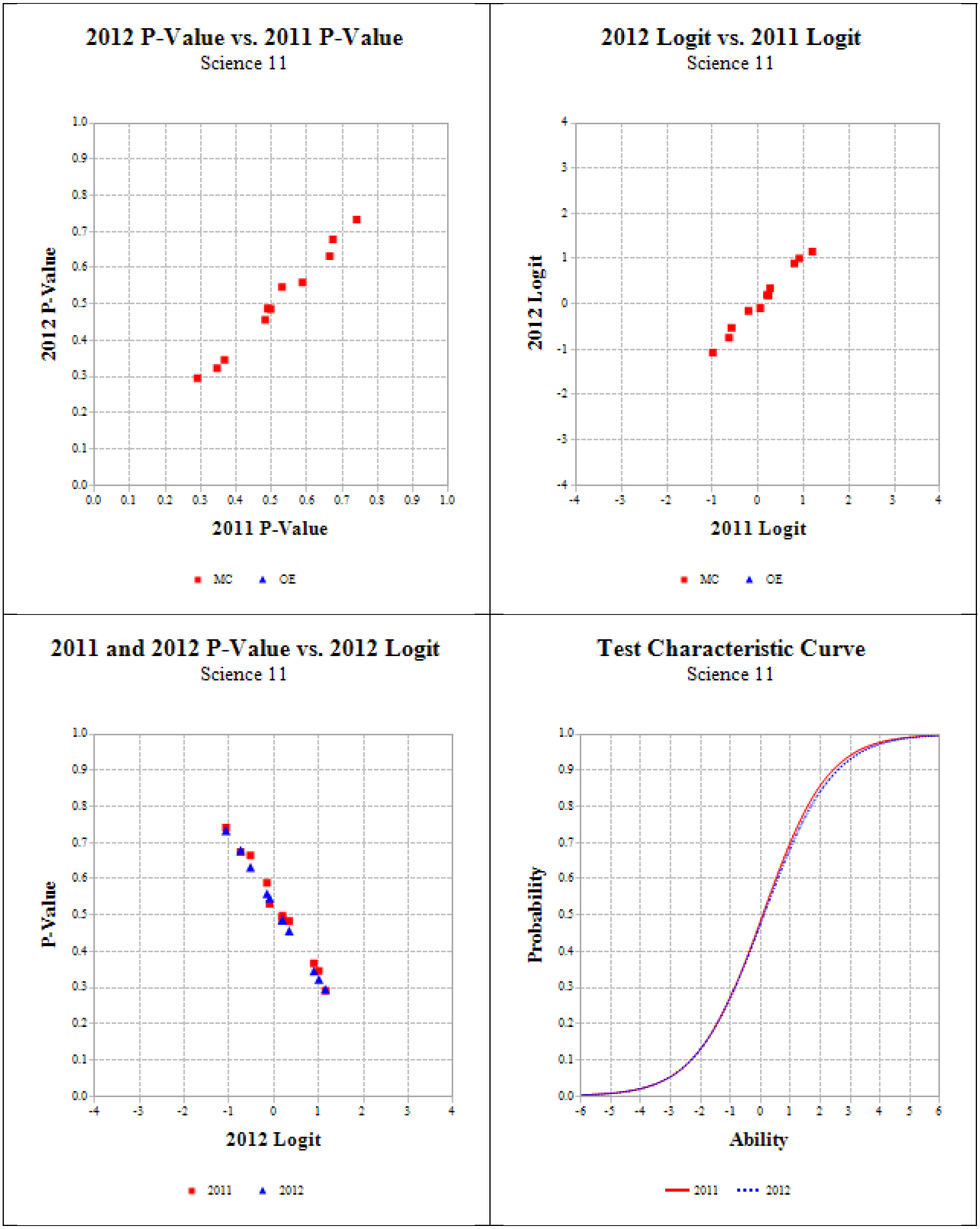
4
MC
OE


2011 and 2012 P-Value vs. 2012 Logit
Science 8
P-Value
2012 Logit
2011
2012


Test Characteristic Curve
Science 8
Probability
Ability
2011
2012


2012 P-Value vs. 2011 P-Value
Science 11
2012 P-Value
2011 P-Value
MC
OE
2012 Logit vs. 2011 Logit
Science 11
2012 Logit
2011 Logit
MC
OE
2011 and 2012 P-Value vs. 2012 Logit
Science 11
P-Value
2012 Logit
2011
2012
Test Characteristic Curve
Science 11
Probability
Ability
2011
2012

Chapter Sixteen: Scores and Score Reports

This chapter provides information about the scores provided for the PSSA-M (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-M

PSSA-M items are comprised 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 0. Scores on OE items range from 0–4, 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

	Subject		
Item Type	**Mathematics**	**Reading**	**Science**
Multiple-choice (1 point)	■	■	■
Open-ended (2 point)			■
Open-ended (3 point)		■	
Open-ended (4 point)	■		

DESCRIPTION OF TOTAL TEST SCORES

Different types of scores have been developed for PSSA-M 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-M 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 from 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 from a raw score of 15 on a test with 20 difficult items). Because the difficulty of the items on a test may change from year to year, raw scores should not be compared across tests or administrations.

Scaled Scores

Scaled scores were introduced in Chapter Fourteen, and additional information is provided there, including information on the development of the PSSA-M 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-M were also discussed in Chapter Fourteen. When all students take the same items, as with the operational items on the PSSA-M, 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 and equitable results. As noted above, a raw score of 30 is meaningless unless the total points possible is known. The difficulty of the test items was also mentioned as an additional challenge to 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.

A scaled score of 1300—or any other value for a particular grade and content-area test, like Grade 4 mathematics—should have the same absolute meaning in the current year as it had in previous years when test scores are properly linked across years. More importantly, an increase in the scaled score for Grade 4 mathematics from last year to the current year means that student performance improved[4]; 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 in further contextualizing PSSA-M scaled scores. Refer to the following information:

- Chapter Fourteen provides information on the development of the PSSA-M scaled-score system, including transformation formulas, rounding rules, and general scale characteristics (e.g., minimum values).
- Chapter Seventeen provides total test-score statistics. In particular, Table 17–1 lists the scaled-score means and standard deviations for this year's test results.

Performance Levels

PSSA-M results are also reported using four performance levels: Below Basic-M, Basic-M, Proficient-M, and Advanced-M. The cut scores on the scaled-score metric (i.e., the lowest possible scaled score to enter the Basic-M, Proficient-M, and Advanced-M levels) were presented earlier in this report. However, the information is repeated in Table 16–2 for convenience.

[4] This example is not an endorsement of conducting a trend analysis with just two years of results. Furthermore, small differences may not be statistically or practically significant.

Table 16–2. PSSA-M Scaled Score Cuts for each Performance Level by Grade and Subject Area

			Scaled Score Cuts[1]			
		Min	**BB/B**	**B/P**	**P/A**	**Max[2]**
Mathematics	**4**	1075	1150	1275	1356	1655
	5	1075	1150	1275	1374	1712
	6	1075	1150	1275	1381	1772
	7	1075	1150	1275	1364	1663
	8	1075	1150	1275	1395	1730
	11	1075	1150	1275	1403	1890
Reading	**4**	1075	1150	1275	1363	1822
	5	1075	1150	1275	1391	1801
	6	1075	1150	1275	1381	1741
	7	1075	1150	1275	1385	1778
	8	1050	1150	1275	1399	1767
	11	1000	1150	1275	1433	1763
Sci.	**8**	1050	1150	1275	1419	1787
	11	1000	1150	1275	1401	1712

Notes. [1] BB = Below Basic-M, B = Basic-M, P = Proficient-M, and A = Advanced-M.
[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. They 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 (PLDs), as developed by PDE and teacher panels, are given below. These are also included on student score reports.

- Advanced-M: More than satisfactory academic performance on grade level standards as measured on an assessment with modifications to the general assessment. Advanced-M work indicates a more-than-adequate understanding of the content and demonstration of the skills included in the Pennsylvania Assessment Anchor Content Standards.
- Proficient-M: Satisfactory academic performance on grade-level standards as measured on an assessment with modifications to the general assessment. Proficient-M work indicates an adequate understanding of the content and demonstration of the skills included in the Pennsylvania Assessment Anchor Content Standards.
- Basic-M: Academic performance approaching satisfactory on grade-level standards as measured on an assessment with modifications to the general assessment. Basic-M work indicates a less-than-adequate understanding of the content and demonstration of the skills included in the Pennsylvania Assessment Anchor Content Standards.

- Below Basic-M: Unsatisfactory academic performance on grade-level skills as measured on an assessment with modifications to the general assessment. Below Basic-M work indicates little understanding of the skills included in the Pennsylvania Assessment Anchor Content Standards.

Description of Strand (Reporting Category) Scores

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

- Strand scores (i.e., reporting category scores)
- Strength profile

Strand (Reporting Category) Scores

A strand score describes a student's or school's/district's performance on a particular strand (i.e., a content standard defined in the test). For the PSSA-M, 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. Also, it is not advisable to compare strand raw scores even within the same form because some reporting categories may contain items that are easier or more difficult than other reporting categories; the strength profile, discussed below, mitigates this problem to some degree. A greater concern is the low reliability of many of these scores, especially for strand scores based on a small number of possible points. Chapter Eighteen provides more information about strand-score reliability.

When compared to other results from the same year, strand scores can be somewhat helpful in identifying a group's strengths and weaknesses on the test. For example, it can be informative to compare the 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 reporting categories. This profile can be used to identify areas in which a student needs to improve and areas in which a student has performed more successfully. Unlike 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-M scaled scores. (Details regarding the creation of the strength profile are provided in Chapter Fourteen. These scaled scores are not printed on score reports. They only exist to determine whether performance in the reporting categories was Low, Medium, or High.) A Low score on the strength profile indicates performance that is below Proficient-M on the overall PSSA-M scale. A Medium score on the strength profile indicates performance that is comparable to Proficient-M on the PSSA-M. A High score on the strength profile indicates performance that is comparable to Advanced-M.

APPROPRIATE SCORE USES

Individual Students

Scaled scores on the PSSA-M indicate a student's achievement of the PSSA-M 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 the scaled scores. If this assumption holds, then it would be safe to infer for grade 4 mathematics that the ability difference between an 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 the 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 beyond the Proficient-M 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-M. 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 USE

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 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-M Grade 6 mathematics test were 1800 (though it is not for this year) 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-M 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-M scale scores should be interpreted only within each content area. PSSA-M 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, a student with scaled scores of 1300 in Grade 4 reading and 1250 in Grade 4 mathematics do not necessarily imply that the student performed better in reading than in mathematics. The PSSA-M scaled scores do not represent a developmental or vertical scale either. This means that no across-grade comparisons or growth statements for a student are appropriate. For example, a 1250 in Grade 4 mathematics and a 1250 in Grade 5 mathematics do not indicate a student had no achievement growth from Grade 4 to Grade 5 in mathematics.

Strength Profile Caveats

The category labels of Low, Medium, and High are deliberately used instead of the PSSA-M performance level names—Below Basic-M, Basic-M, Proficient-M, and Advanced-M—to acknowledge that the PSSA-M cut scores were established on the basis of the total test score. Therefore, the domain categories should not be interpreted in the same way as PSSA-M performance levels because they likely do not carry the same meaning.

While the strength profile might facilitate comparisons of a student’s strengths and weaknesses across reporting categories in some cases, several factors merit caution. As noted earlier, many of the strand scores are very unreliable. The scaling underlying the strength profile does not mitigate this problem.

Additionally, the categories reflect more absolute comparisons. Relative comparisons are more difficult to make. As an example, if one scored High in both strand A and B, we know the student did very well in both strands compared to overall performance in the state (i.e., absolute status). However, we do not know whether the student’s performance in strand A was better or worse relative to the performance in strand B (relative status).

Finally, some seemingly unusual results might occur that may be difficult for users to understand. As one example, it may be possible for a student to earn Medium in all reporting categories but have an Advanced-M performance level. This can happen because the strand scores are correlated, meaning the distributional properties of the total score depend 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-M Results for Other Purposes

Should PSSA-M results be used for placement decisions or for other special programs or services? Frequently asked questions about the PSSA-M pertain to the maximum possible PSSA-M scaled scores for various subjects or the PSSA-M score that 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-M 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 *Standards* (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-M tests in mathematics:

- 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, 2012. This score report provided parents and students with their first glimpse of performance on the spring 2012 PSSA-M tests. This report provides results at the student level. A sample of the report is provided in Figure 16–1.

Figure 16–1. Sample of Parent Letter

Dear Parents:

I am pleased to provide you with information about your child's performance on the 2012 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 www.education.state.pa.us, or contact your child's school.

Sincerely,
Ronald J. Tomalis
Secretary of Education

pennsylvania
DEPARTMENT OF EDUCATION

Student Name: [redacted]
PA Student ID: [redacted]
School: [redacted]
District: [redacted]
Test Date: [redacted]
Grade: [redacted]

MATHEMATICS

How did [redacted] **perform OVERALL?**

Performance Level: Proficient | **Score:** 1334

Below Basic	Basic	Proficient	Advanced
700–1167	1167–1304	1304–1509	1509–2587

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: 1279–1389.

How did [redacted] **perform by REPORTING CATEGORY?**

Reporting Categories	Student's Points	Total Points Possible
Numbers and Operations	8	10
Measurement	5	10
Geometry	7	12
Algebraic Concepts	18	29
Data Analysis and Probability	7	11

WRITING

How did [redacted] **perform OVERALL?**

Performance Level: Proficient | **Score:** 1706

Below Basic	Basic	Proficient	Advanced
700–952	952–1236	1236–1806	1806–2418

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: 1639–1773.

How did [redacted] **perform by REPORTING CATEGORY?**

Reporting Categories	Student's Points	Total Points Possible
Composition	60	80
Persuasive	*30*	*40*
Informational	*30*	*40*
Revising and Editing	18	20
Persuasive	*3*	*4*
Informational	*3*	*4*
Multiple Choice	*12*	*12*

READING

How did [redacted] **perform OVERALL?**

Performance Level: Advanced | **Score:** 1654

Below Basic	Basic	Proficient	Advanced
700–1112	1112–1257	1257–1492	1492–2520

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: 1545–1763.

How did [redacted] **perform by REPORTING CATEGORY?**

Reporting Categories	Student's Points	Total Points Possible
Comprehension and Reading Skills	19	23
Interpretation and Analysis of Fictional and Nonfictional Text	26	29

SCIENCE

How did [redacted] **perform OVERALL?**

Performance Level: Proficient | **Score:** 1328

Below Basic	Basic	Proficient	Advanced
1050–1150	1150–1275	1275–1347	1347–1814

Your student's score is indicated by the ⬆. If your student were to test again, his or her score would likely remain in the following range: 1301–1355.

How did [redacted] **perform by REPORTING CATEGORY?**

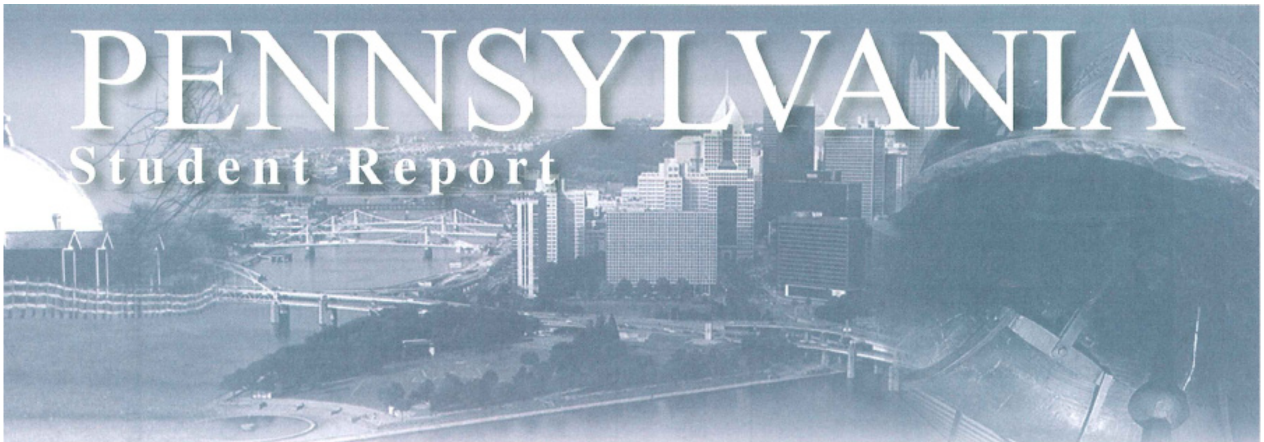
Reporting Categories	Student's Points	Total Points Possible
The Nature of Science	28	37
Biological Sciences	6	9
Physical Sciences	10	15
Earth and Space Sciences	8	13

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-M. This report was delivered to Pennsylvania school districts in September 2012. Districts were responsible for sending the reports home to the 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 to 16–5.

Figure 16–2. Page 1 of the Individual 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 2012 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

Ronald J. Tomalis
Secretary of Education

Student Name: [redacted]
PA Student ID: [redacted]
School:
District:
Test Date: [redacted]
Grade: [redacted]

Student's PSSA Results by Subject

			Goal Range	
Subject	Below Basic	Basic	Proficient	Advanced
Mathematics^				
Reading^				
Science^				
Writing		✓		

^See inside for details

Table of Contents

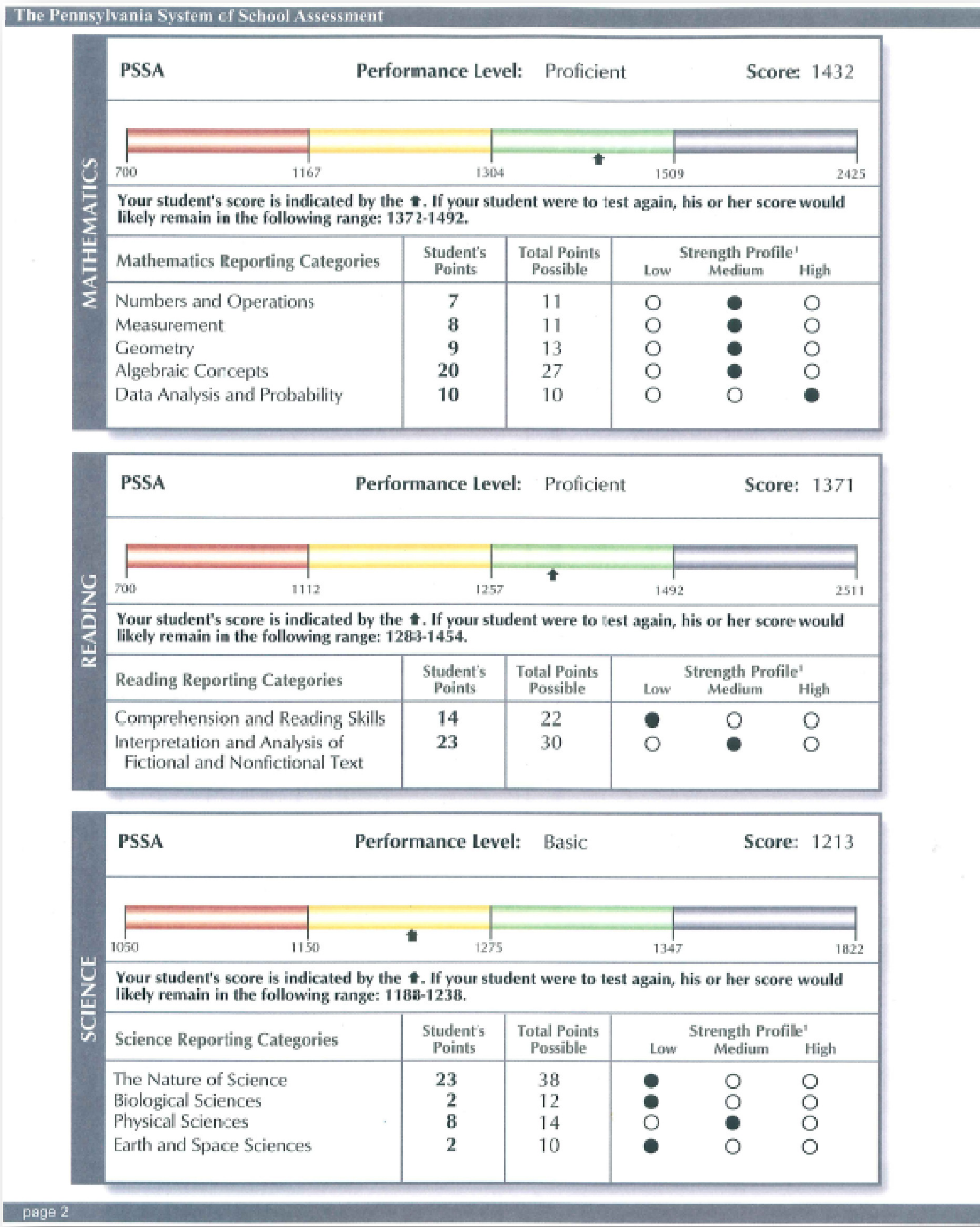
An Interpretation Guide for this report is available at www.education.state.pa.us (type "student report guide" in the search box) or see your local school district.

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

MATHEMATICS

PSSA   Performance Level: Proficient   Score: 1432

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: 1372-1492.

Mathematics Reporting Categories	Student's Points	Total Points Possible	Strength Profile[1] Low	Medium	High
Numbers and Operations	7	11	○	●	○
Measurement	8	11	○	●	○
Geometry	9	13	○	●	○
Algebraic Concepts	20	27	○	●	○
Data Analysis and Probability	10	10	○	○	●

READING

PSSA   Performance Level: Proficient   Score: 1371

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: 1288-1454.

Reading Reporting Categories	Student's Points	Total Points Possible	Strength Profile[1] Low	Medium	High
Comprehension and Reading Skills	14	22	●	○	○
Interpretation and Analysis of Fictional and Nonfictional Text	23	30	○	●	○

SCIENCE

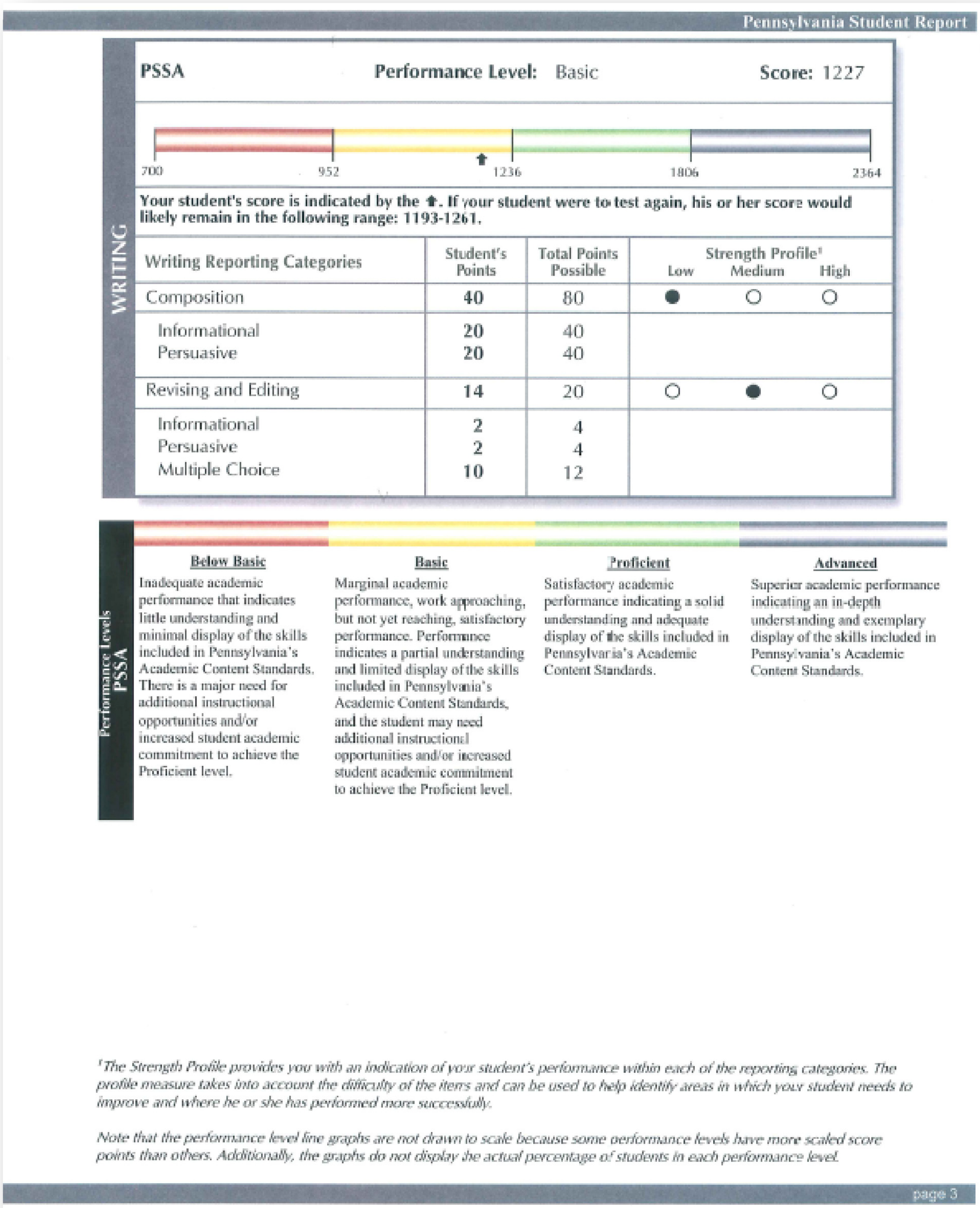
PSSA   Performance Level: Basic   Score: 1213

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: 1188-1238.

Science Reporting Categories	Student's Points	Total Points Possible	Strength Profile[1] Low	Medium	High
The Nature of Science	23	38	●	○	○
Biological Sciences	2	12	●	○	○
Physical Sciences	8	14	○	●	○
Earth and Space Sciences	2	10	●	○	○

page 2

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



Pennsylvania Student Report

WRITING

PSSA | Performance Level: Basic | Score: 1227

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: 1193-1261.

Writing Reporting Categories	Student's Points	Total Points Possible	Strength Profile[1] Low	Medium	High
Composition	40	80	●	○	○
Informational	20	40			
Persuasive	20	40			
Revising and Editing	14	20	○	●	○
Informational	2	4			
Persuasive	2	4			
Multiple Choice	10	12			

PSSA Performance Levels

Below Basic	Basic	Proficient	Advanced
Inadequate academic performance that indicates little understanding and minimal display of the skills included in Pennsylvania's Academic Content Standards. There is a major need for additional instructional opportunities and/or increased student academic commitment to achieve the Proficient level.	Marginal academic performance, work approaching, but not yet reaching, satisfactory performance. Performance indicates a partial understanding and limited display of the skills included in Pennsylvania's Academic Content Standards, and the student may need additional instructional opportunities and/or increased student academic commitment to achieve the Proficient level.	Satisfactory academic performance indicating a solid understanding and adequate display of the skills included in Pennsylvania's Academic Content Standards.	Superior academic performance indicating an in-depth understanding and exemplary display of the skills included in Pennsylvania's Academic Content Standards.

[1]The Strength Profile provides you with an indication of your student's performance within each of the reporting categories. The profile measure takes into account the difficulty of the items and can be used to help identify areas in which your student needs to improve and where he or she has performed more successfully.

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.

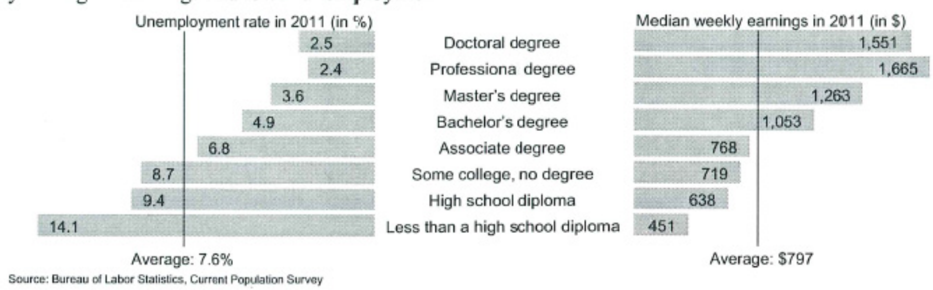
page 3

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

Making the Most of Your Senior Year!

Education pays…

Education pays in higher earnings and lower unemployment rates.



Checklist for your future

Everyone needs to find his/her career path in life. Your senior year should serve as your springboard to your future – make it count!

- Talk to your parents/guardians about your future plans – these could include college, career schools, apprenticeships, the military or other options.
- Make an appointment for you and your parents/guardians to discuss these plans with your school counselor.
- For any postsecondary interests you may have, seek out events related to those opportunities through college or career fairs.
- Take advantage of dual enrollment, which your school may already offer. Dual enrollment provides college courses that can give you college credit(s) during your senior year.
- Ask specific questions about the admission requirements, such as what courses you may need to take during your senior year and what college exams and other types of scores may be needed for entrance into any kind of school, training or service.
- KEEP GOING! High school isn't over yet!

Career planning

- Contact your school or career counselor for information on determining your career interests.
- Free printed materials and career exploration CDs from Pennsylvania Higher Education Assistance Agency (PHEAA) are available by visiting www.educationplanner.org.
- Take interest surveys and explore valuable career information at www.pacareerzone.com.
- Search the latest job postings at https://paworkstats.geosolinc.com/

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www.education.state.pa.us

Data Recognition Corp. 2012 PSSA-13192-54321

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 content strands of strength or weakness.

Interpretative Guide

An interpretative guide is provided to help parents and other PSSA-M stakeholders better understand the 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-M 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). Refer to these chapters for 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 the 2012 PSSA-M

		Percentage in Each Performance Level			
Subject	**Grade**	**Below Basic**	**Basic**	**Proficient**	**Advanced**
Mathematics	**4**	8.3	44.1	34.9	12.8
Reading		5.7	36.5	33.3	24.5
Mathematics	**5**	9.0	48.7	34.9	7.4
Reading		7.2	31.7	39.5	21.6
Mathematics	**6**	8.4	52.3	33.0	6.2
Reading		10.1	37.9	40.4	11.6
Mathematics	**7**	10.6	54.5	29.2	5.7
Reading		15.4	40.2	31.4	13.0
Mathematics	**8**	11.9	51.0	33.1	4.0
Reading		16.8	46.0	31.5	5.7
Science		14.6	41.4	37.8	6.1
Mathematics	**11**	24.0	44.3	26.0	5.7
Reading		19.8	38.4	37.3	4.5
Science		9.3	49.5	34.9	6.3

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 scaled scores.) The difference in standard deviations among tests is a byproduct of fixing the Basic and Proficient cut points during the scaling process.

Table 17–2. Means and Standard Deviations for the 2012 PSSA-M Scaled Scores

	Mathematics		Reading		Science	
Grade	**Mean**	***SD***	**Mean**	***SD***	**Mean**	***SD***
4	1262.1	81.7	1293.4	94.6		
5	1253.5	81.7	1307.3	109.7		
6	1249.4	79.6	1275.2	95.8		
7	1240.2	76.5	1260.6	101.2		
8	1242.7	82.1	1246.5	95.0	1260.1	103.0

11	1222.1	99.8	1242.2	112.4	1258.6	89.6

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

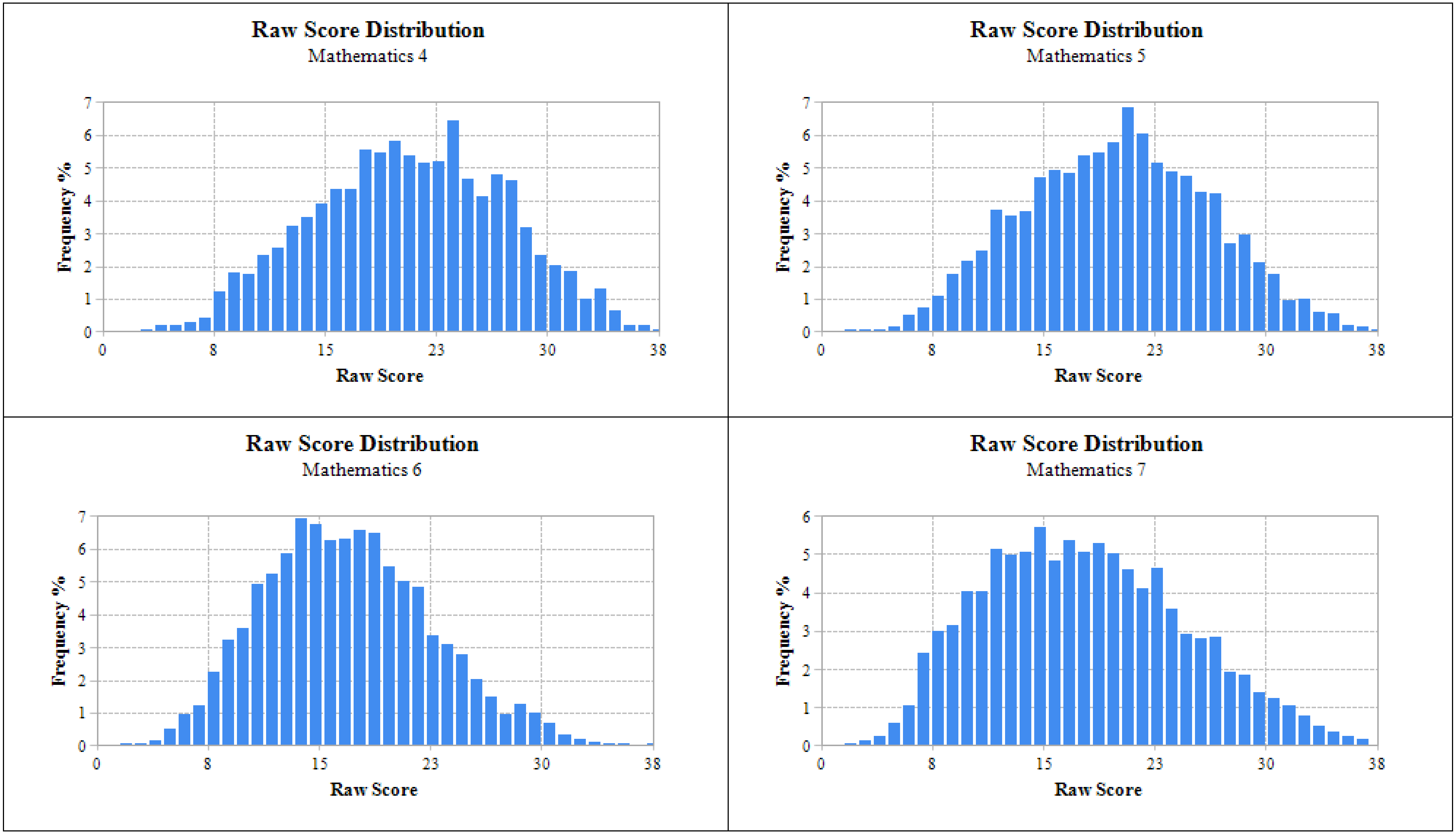
Summary Statistics

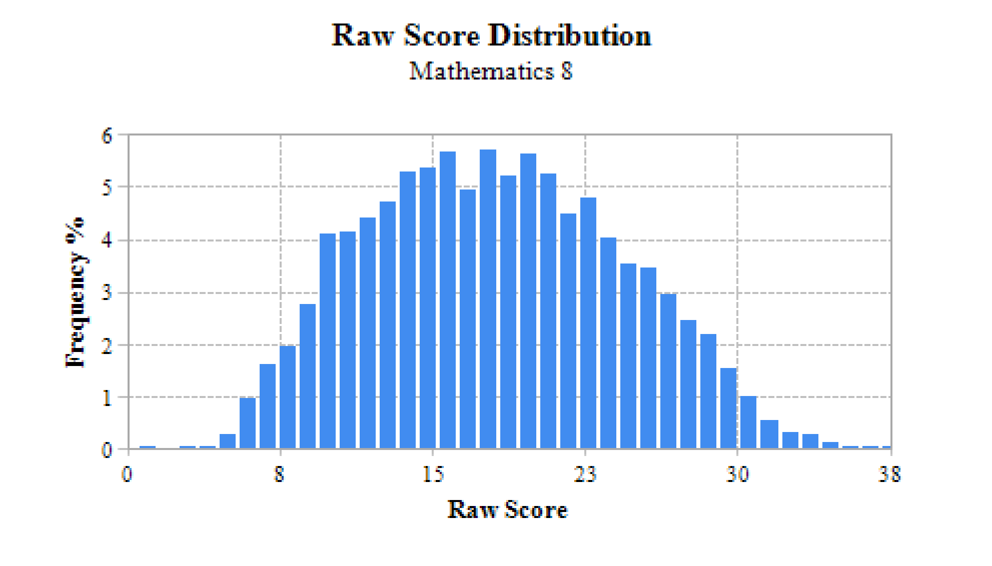
Appendix H provides summary statistics for the operational raw scores. The statistics reported include the number of students tested (N), number of items (L), number of points possible (Pts), minimum score points received (Min), maximum points received (Max), mean score points received (Mean), median score points received (Med), and standard deviation of test scores (SD). 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 those interested in information disaggregated by item type, Chapter Eleven provides breakout statistics for MC and OE items.)

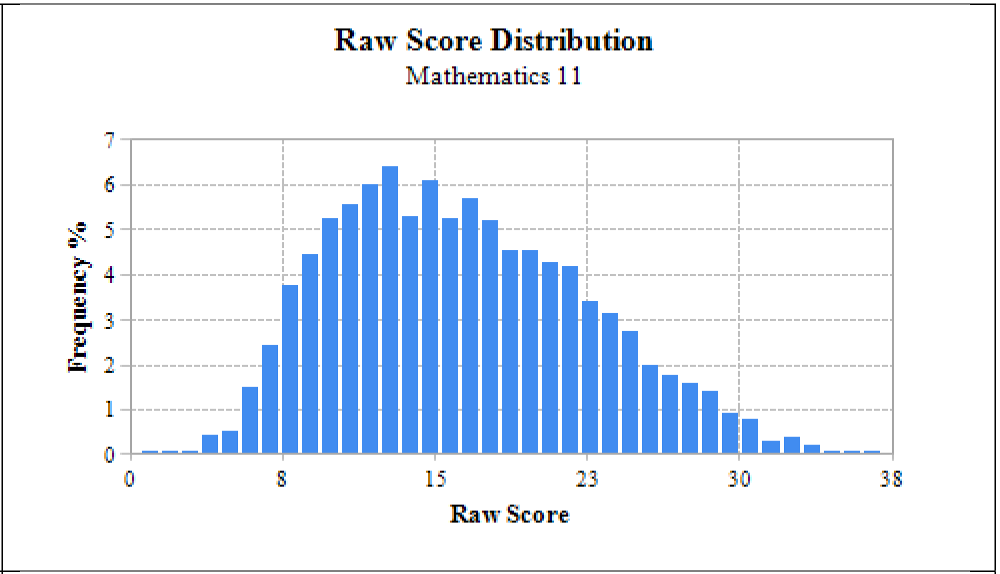
Score Distributions

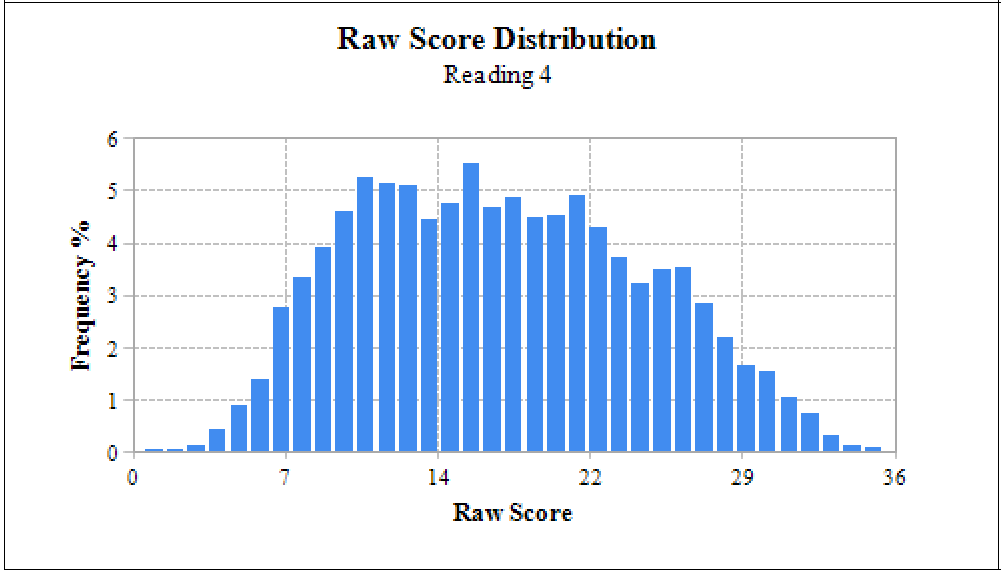
Raw-score relative-frequency (rf) distributions are provided in Figure 17–1. Most distributions are unimodal and slightly positively skewed in mathematics and slightly negatively skewed in reading.

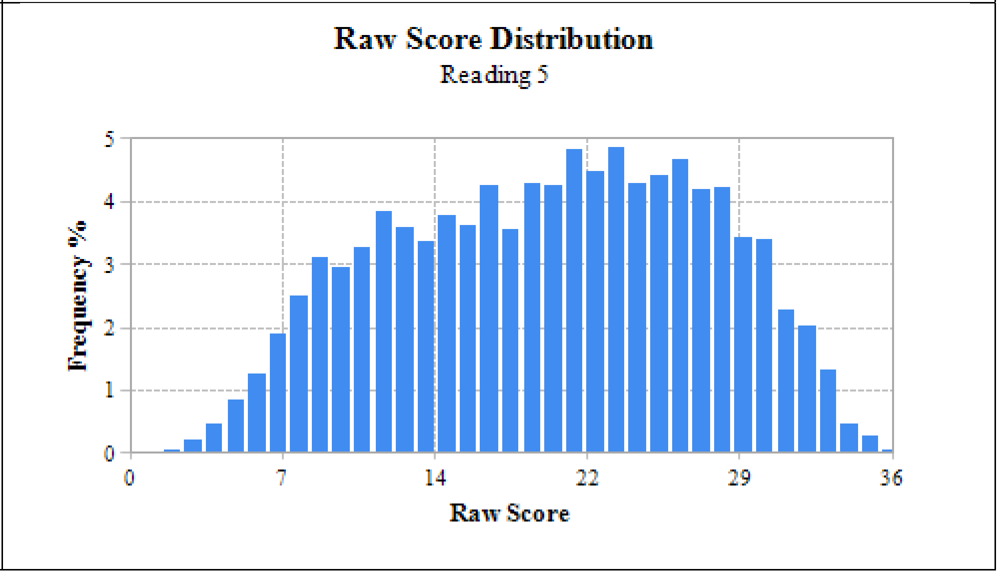
Figure 17–1. Raw Score Distributions

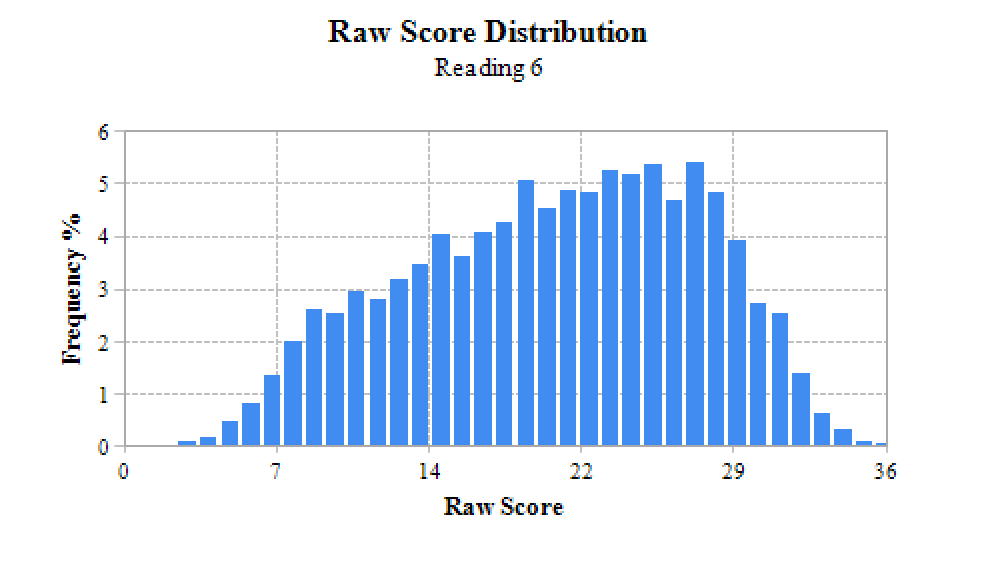


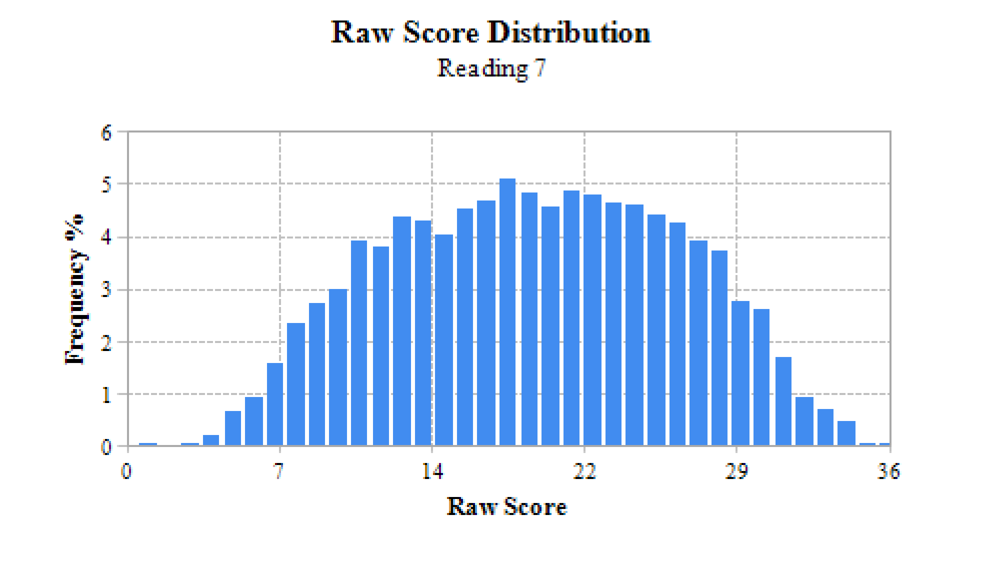

Raw Score Distribution
Mathematics 8
Frequency %
0
1
2
3
4
5
6
0
8
15
23
30
38
Raw Score

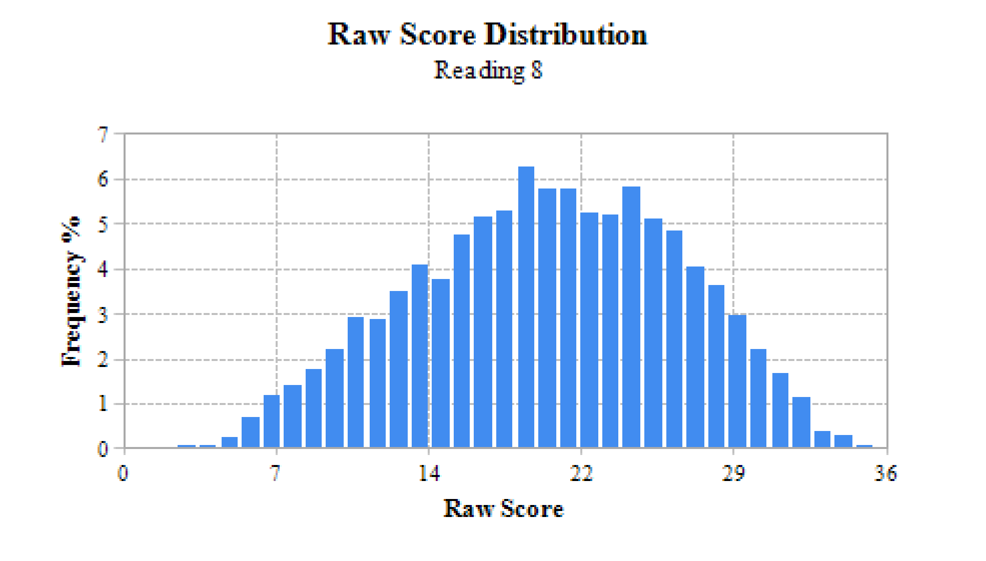

Raw Score Distribution
Mathematics 11
Frequency %
0
1
2
3
4
5
6
7
0
8
15
23
30
38
Raw Score

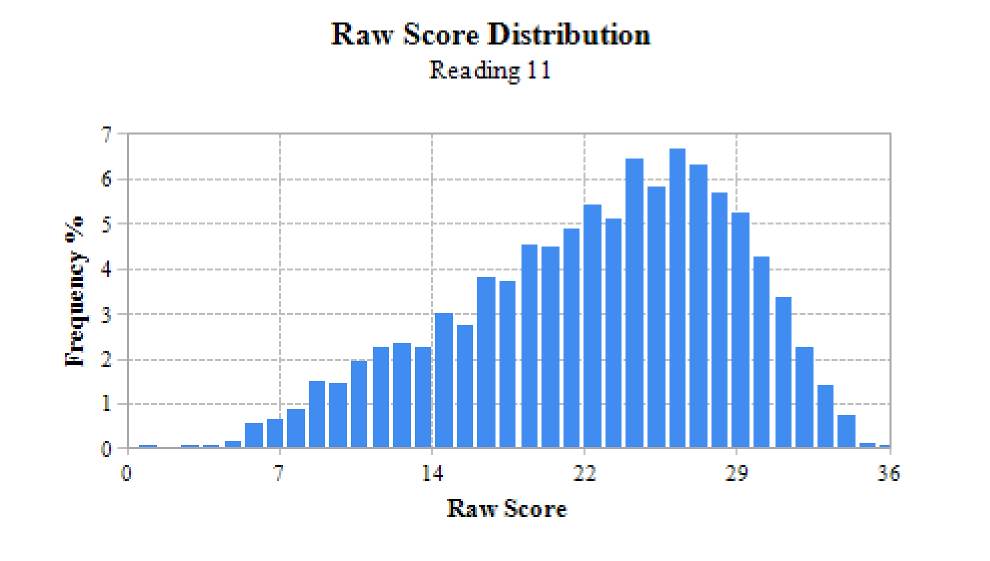

Raw Score Distribution
Reading 4
Frequency %
0
1
2
3
4
5
6
0
7
14
22
29
36
Raw Score

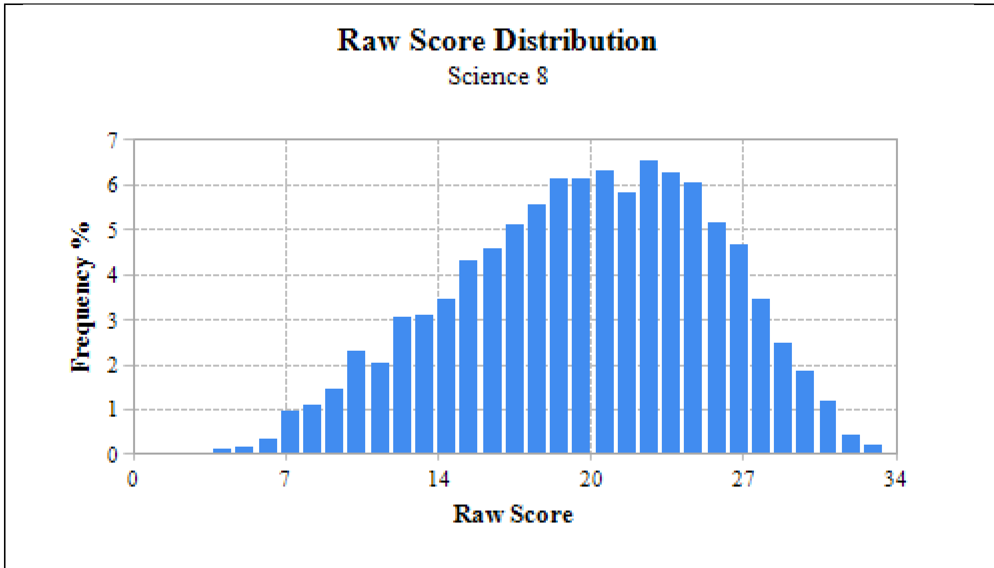

Raw Score Distribution
Reading 5
Frequency %
0
1
2
3
4
5
0
7
14
22
29
36
Raw Score

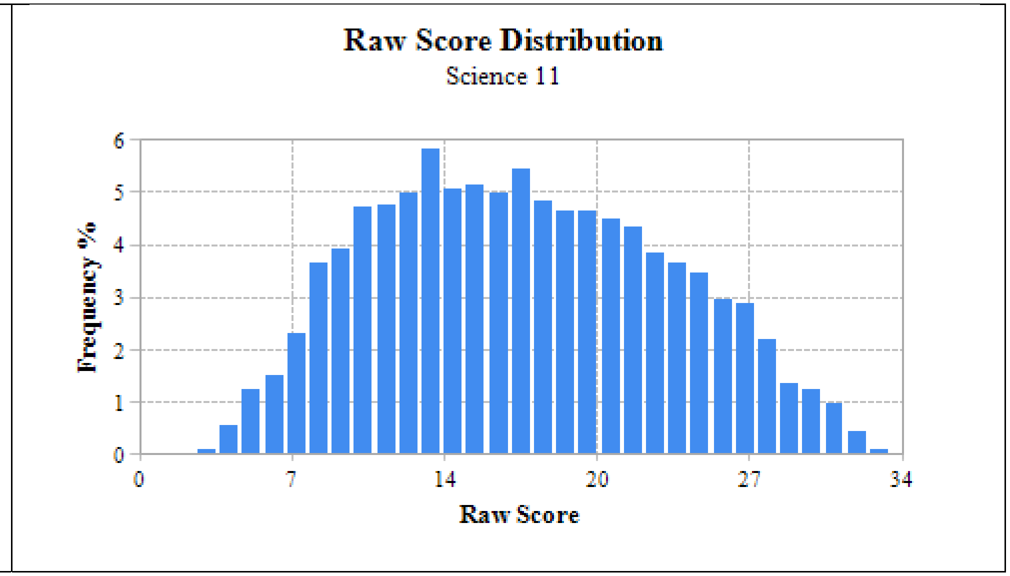

Raw Score Distribution
Reading 6
Frequency %
Raw Score
0
7
14
22
29
36
0
1
2
3
4
5
6


Raw Score Distribution
Reading 7
Frequency %
Raw Score
0
7
14
22
29
36
0
1
2
3
4
5
6


Raw Score Distribution
Reading 8
Frequency %
Raw Score
0
7
14
22
29
36
0
1
2
3
4
5
6
7


Raw Score Distribution
Reading 11
Frequency %
Raw Score
0
7
14
22
29
36
0
1
2
3
4
5
6
7


Raw Score Distribution
Science 8
Frequency %
Raw Score
0
7
14
20
27
34
1
2
3
4
5
6
7


Raw Score Distribution
Science 11
Frequency %
Raw Score
0
7
14
20
27
34
1
2
3
4
5
6

Chapter Eighteen: Reliability

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 the test scores, not of the 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 *Standards* 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 with respect 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 cut scores are used), then one should be interested in absolute error too. Generally, there is more error variance when considering the absolute scores of examinees, which in turn suggests lower reliability.

As suggested above, 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:[5]

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

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 (i.e., true variance) and partly due to random error in the measurement process (i.e., error variance).

Reliability coefficients range from 0.0 to 1.0. If all test score variance were true, the index would equal 1.0. The index would be 0.0 if none of the test score variance 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, as that indicates test scores 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.); or 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-M. 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.

[5] 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 confounding factors 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 took 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 $p \times I$ 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

	Item			
Person	1	2	. . . I	. . . k
1	$Y11$	$Y12$	. . . $Y1i$	. . . $X1k$
2	$Y21$	$Y22$	. . . $Y2i$	. . . $X2k$
. . . . . .				
. . . . . .				
P	$Yp1$	$Yp2$	. . . Ypi	. . . Xpk
. . . . . .				
. . . . . .				
N	$YN1$	$YN2$	. . . YNi	. . . XNk

Note. Adapted from Cronbach and Shavelson (2004).

Then, a general computational formula for alpha is as follows:

$$\alpha = \frac{N}{N-1}\left(1 - \frac{\sum_{i=1}^{N}\sigma_{Y_i}^2}{\sigma_X^2}\right),$$

where N is the number of parts (items or testlets), 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-M, 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 overinterpretation 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 1) tests that are comprised of mixed item types (e.g., multiple-choice (MC) and open-ended (OE) items) and 2) 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 was 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 PSSA-M, most of the total test score reliabilities reported in Appendix K are all close to or above 0.80, indicating fairly consistent test scores for these instruments.

Biases That Might Make Alpha an Overestimate of Reliability

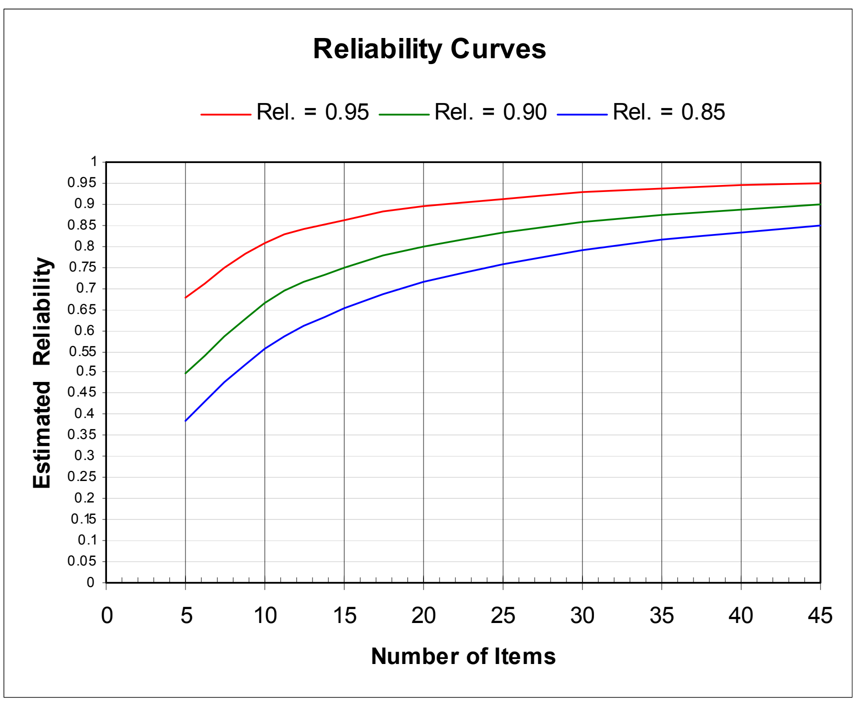
As emphasized in earlier sections, coefficient alpha only takes into account measurement error that arises from the selection of items used on a particular test form. There are other sources of random inaccuracy. One is due to the occasion of testing. Other various random conditions that might affect students on any particular testing occasions include illness, fatigue, and anxiety. Also, when a test includes OE items, as the PSSA-M 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 of 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 (Reporting Category) 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, with the curve for reliability equal to 0.90, 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. It is not surprising 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-M users to note is that some strand score reliabilities may be too low to warrant interpretation at the individual student level.

Figure 18–1. Example of the Relationship between Test Length and Reliability



Note. Tabled values derived using the Spearman-Brown formula.

Individual-Level versus Group-Level Scores

The results presented in this chapter pertain to the reliability of individual scores. Group results (e.g., state and district levels) are also provided on PSSA-M 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 mean 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.

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[6], there would still be some variation in observed scores due to imperfections in the measurement process, such as random differences in attention during instruction, concentration during testing, or the sampling of test items. The standard error is defined as the standard deviation[7] 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:

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

This formula indicates that 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 from an SEM of 3 on a 100-point test.

[6] True score is the score the person would receive if the measurement process were perfect.

[7] 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.

Traditional SEM 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.[8] For +/– 2 SEM confidence intervals, this increases to about 95 percent.

Further Interpretations

ONE SEM 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 one’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.)

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 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-M 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, might be sick, or maybe did not get a good breakfast. The reliability index that captures this source of random error is referred to as the test-retest reliability coefficient. This is not the type of reliability computed for the PSSA-M. 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.

[8] 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.

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.) As an example, if the PSSA-M 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 were taken. (cf. "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." The prior version may be more adequate for lay persons.)

Results and Observations

Coefficient alpha results and associated (traditional) SEMs for various PSSA-M scores are documented in Appendix K. Values were derived using the PSSA-M 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), and the economically disadvantaged (ED). 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.

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 overall test score reliability values are at what many would consider to be the lower end of the adequate range for making decisions about individual students (with many in the low 0.80s). Earlier it was noted that reliabilities tend to go up in value with an increase in test length[9] 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 substrands 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 are too low to warrant interpretation at the individual student level).[10] Once again, there is no firm guideline regarding how low is too low. The lower a given reliability coefficient, the greater the potential for overinterpretation. 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 that interpretation of strand scores at these aggregate levels might be reasonable in some cases.

[9] Using the Spearman-Brown formula, if the PSSA-M mathematics test was the same length as the general PSSA mathematics test, the projected reliability would be in the high 0.80s. Coefficient alpha estimates from the PSSA test are generally in the low 0.90s. The reduced test length largely accounts for the difference. Homogeneity in the testing population may be responsible for the remainder.

[10] In fact, a few reliability values in the appendix are negative. Theoretically, reliability values should be nonnegative. However, the computational formula for alpha can yield negative results on rare occasions (when sample sizes are small). This likely indicates that the true score variance is in reality extremely small and sampling error resulted in the negative alpha estimate.

RASCH CONDITIONAL STANDARD ERRORS OF MEASUREMENT

The conditional standard error of measurement (CSEM) also indicates the degree of measurement error but does so in scaled-score units and varies as a function of one'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:

$$CSEM\,(\hat{\theta}) = \frac{1}{\sqrt{I(\theta)}}$$

where, $\text{CSEM}\left(\hat{\theta}\right)$= conditional standard error of measurement and $I(\theta)$ = 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 multiplying the $\text{CSEM}\left(\hat{\theta}\right)$ by the slope (multiplicative constant, *m*) of the linear transformation equation used to convert the Rasch ability estimates to scaled scores:

$$\text{CSEM(SS)} = CSEM\left(\hat{\theta}\right) * m$$

Chapter Fourteen provides the linear transformation formulas for each PSSA-M test.

Rasch CSEM Confidence Intervals

CSEMs also allow statements regarding the precision of individual test 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 CSEMS 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

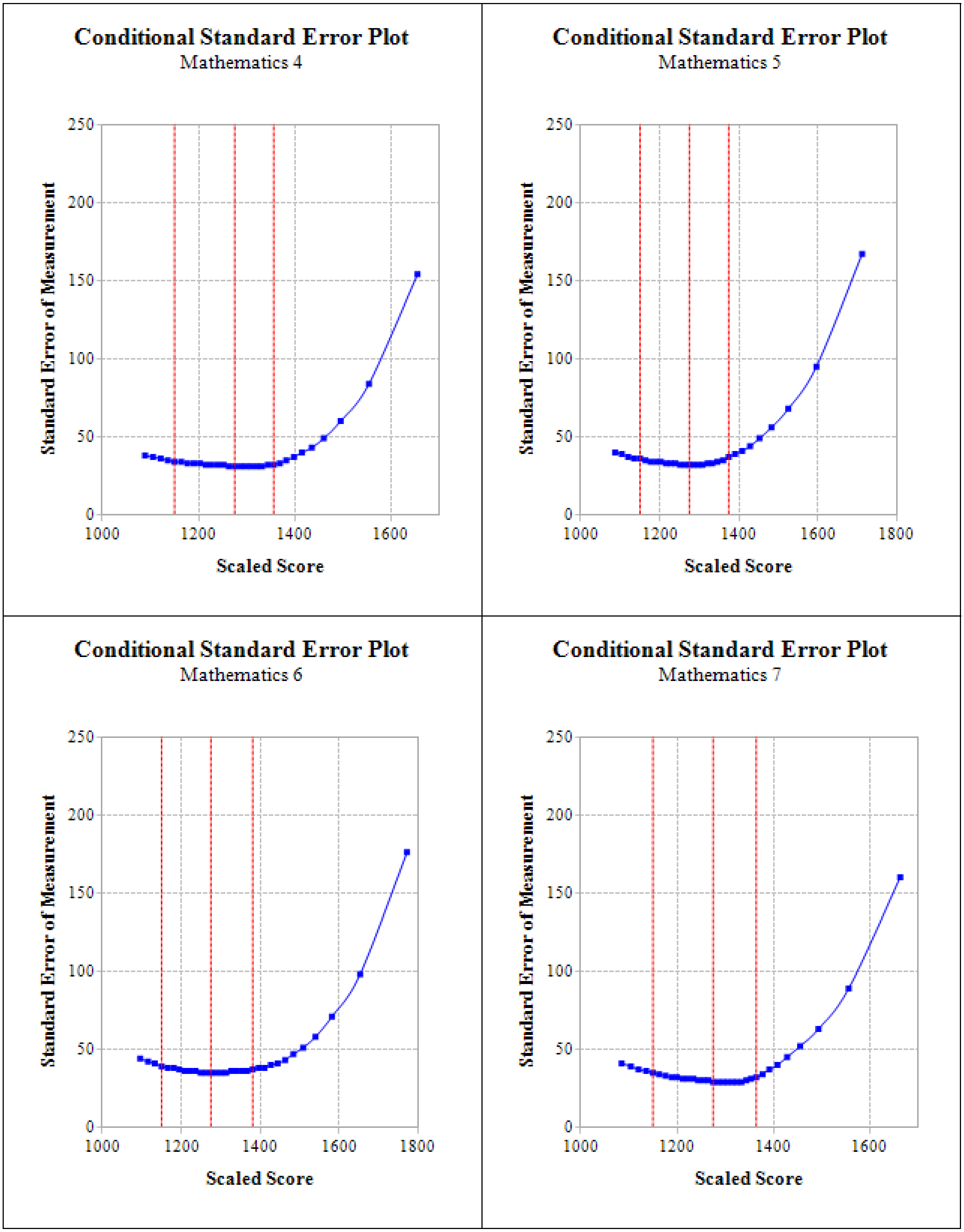
The SEMs documented on the PSSA-M score reports are the Rasch-based conditional standard errors of measurement described above. These are provided by the WINSTEPS scaling program described in Chapter Twelve. As noted earlier, these CSEMs are based on the concept of statistical information. For the purpose of providing a simpler explanation of SEMs to test score users, the PSSA-M score report interpretive documents provided the earlier description of SEMs framed using the idea of internal consistency reliability.[11] Score report content is considered in greater detail in Chapter Sixteen.

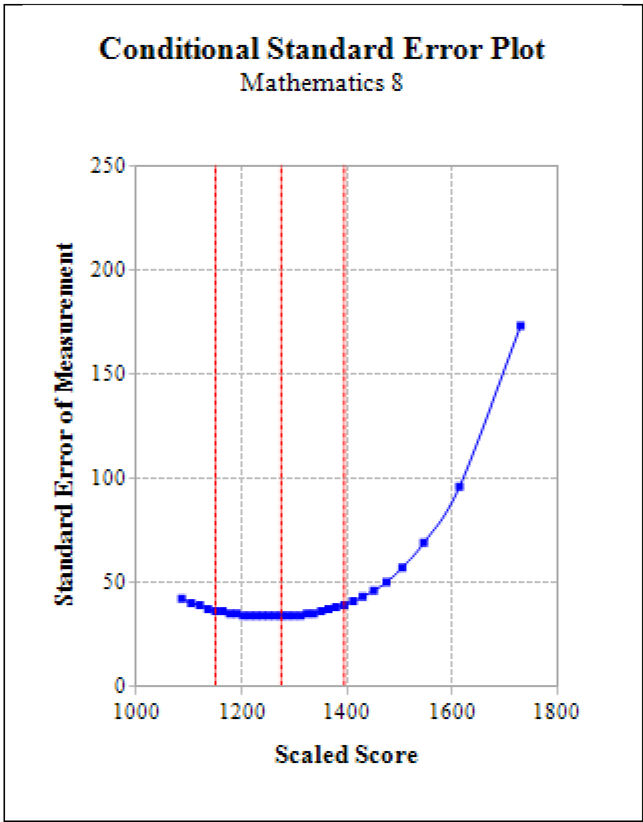
Results and Observations

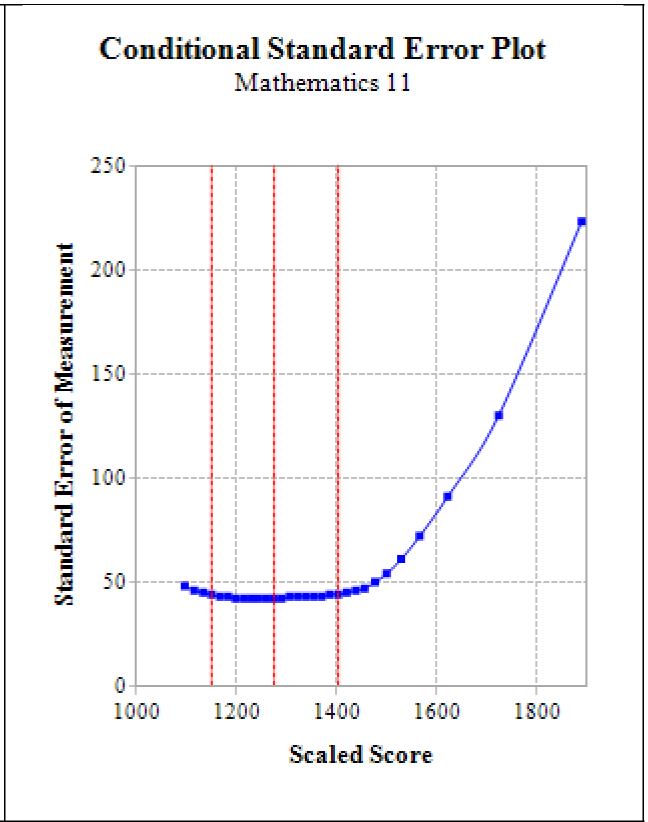
Figure 18–2 shows the Rasch CSEMs associated with each scaled score level. (This information is also provided in tabular form in Appendix N.) Values were derived using the final data file described in Chapter Nine. The values are fairly consistent across a noticeably large range of the scaled scores,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

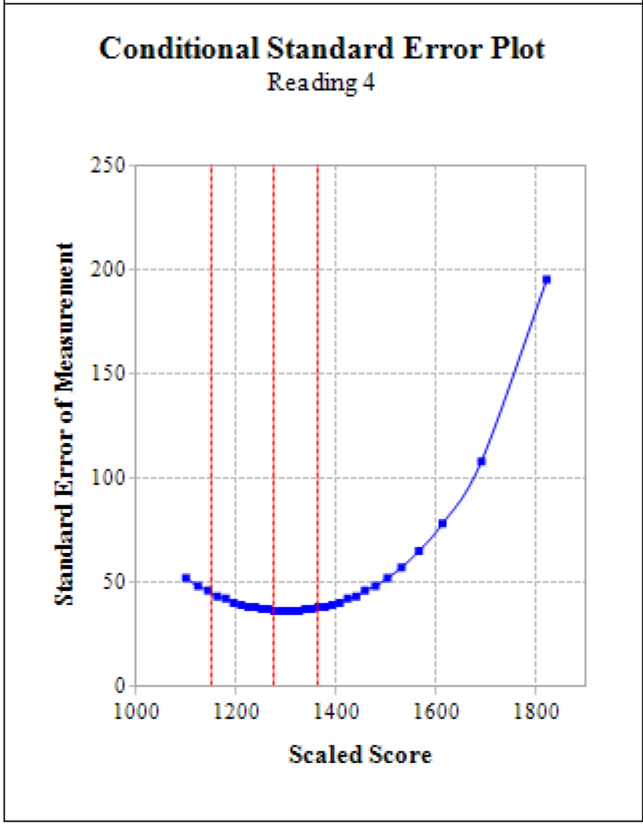
[11] Because IRT CSEMs are based on statistical information, it is questionable if they account for error variance due to items. However, it seems difficult to construct a simple explanation of IRT CSEMs for the general public.

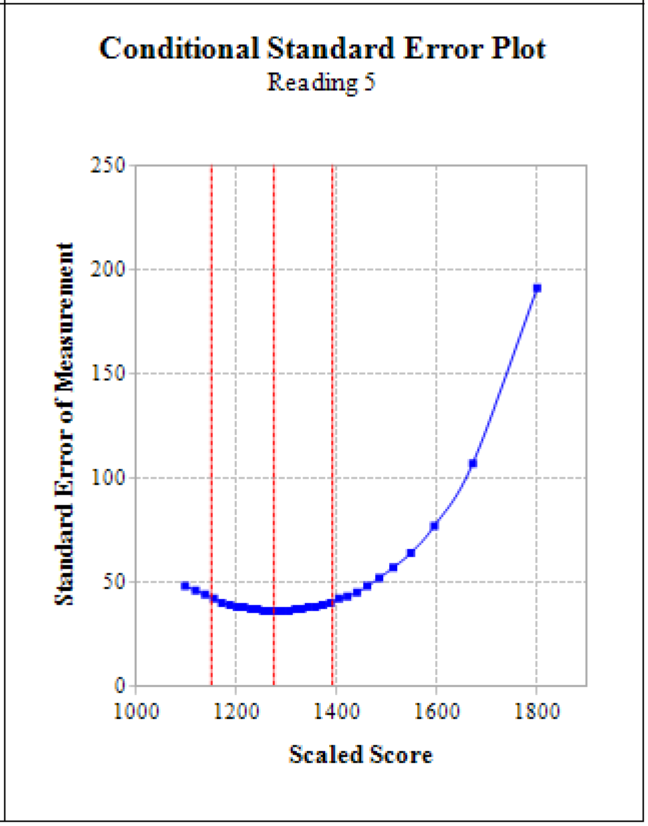
Figure 18–2. Conditional Standard Error Plots for Each Grade and Subject

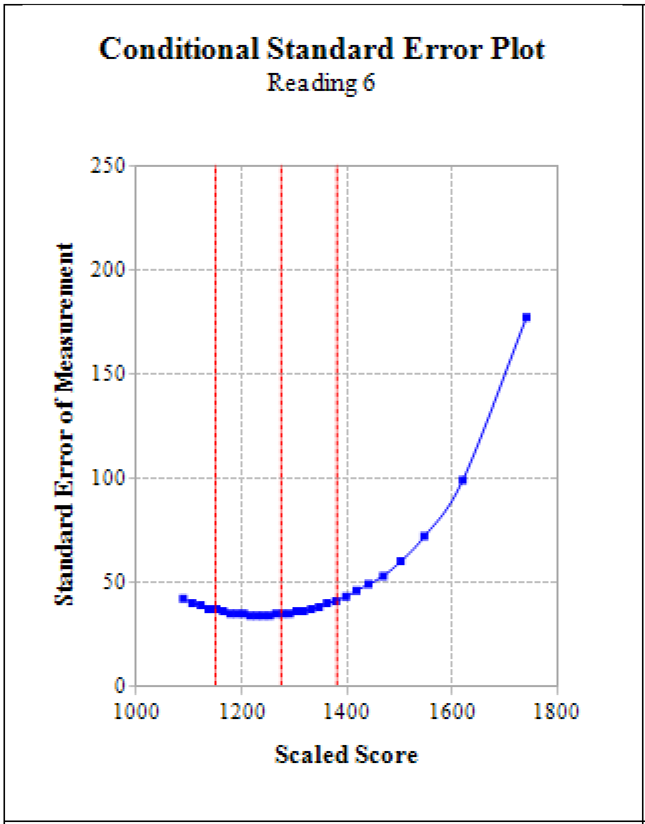



Conditional Standard Error Plot
Mathematics 8
Standard Error of Measurement
Scaled Score
0
50
100
150
200
250
1000
1200
1400
1600
1800


Conditional Standard Error Plot
Mathematics 11
Standard Error of Measurement
Scaled Score
0
50
100
150
200
250
1000
1200
1400
1600
1800


Conditional Standard Error Plot
Reading 4
Standard Error of Measurement
Scaled Score
0
50
100
150
200
250
1000
1200
1400
1600
1800


Conditional Standard Error Plot
Reading 5
Standard Error of Measurement
Scaled Score
0
50
100
150
200
250
1000
1200
1400
1600
1800


Conditional Standard Error Plot
Reading 6
Standard Error of Measurement
Scaled Score
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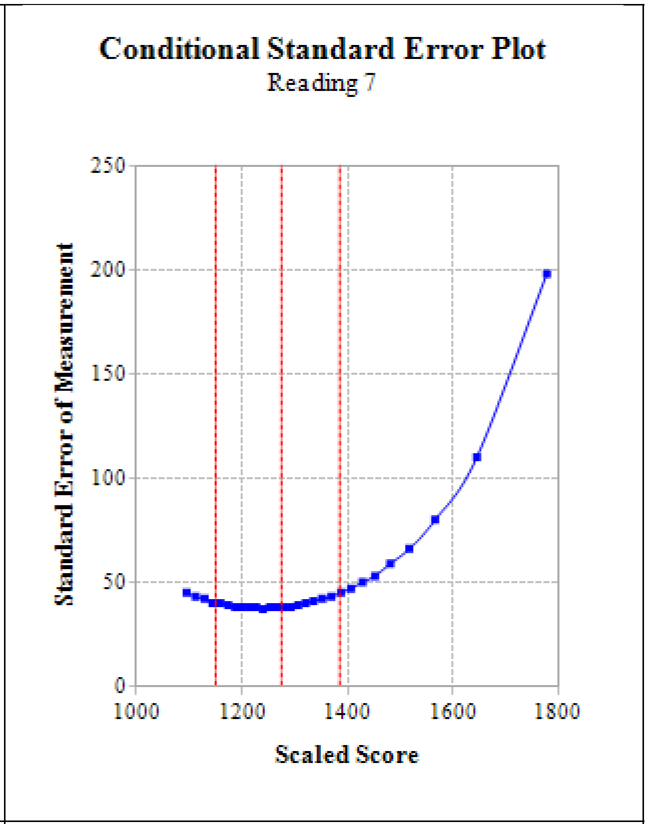
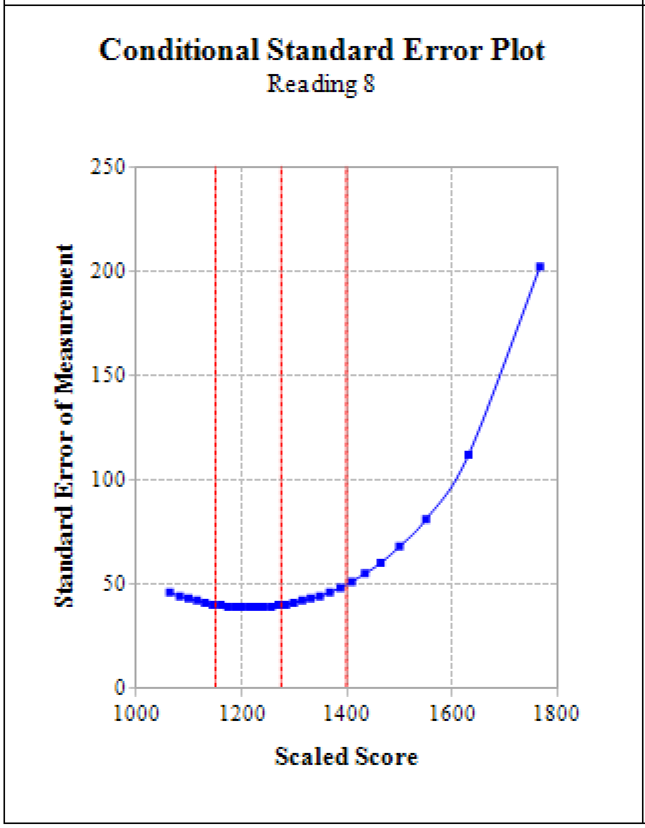
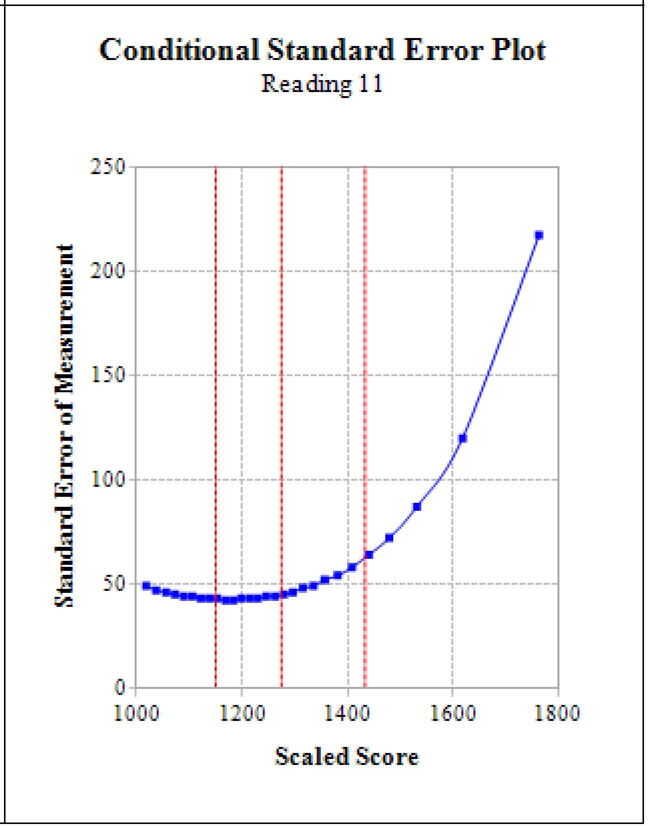
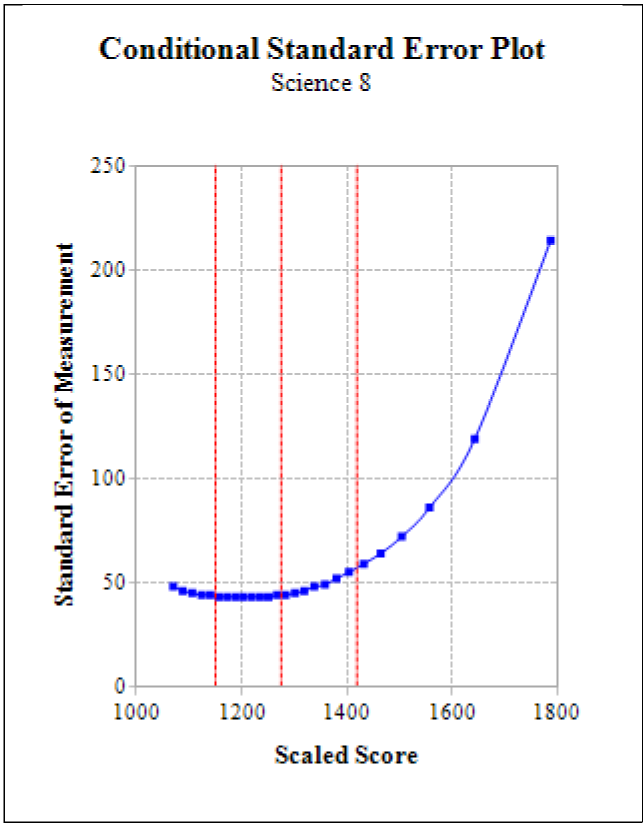
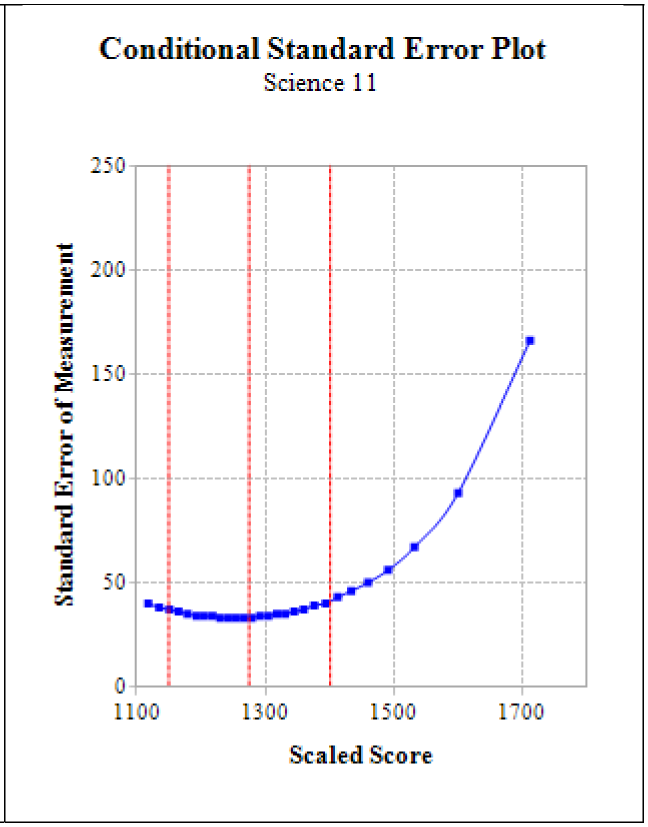
50
100
150
200
250
1000
1200
1400
1600
1800


Conditional Standard Error Plot
Reading 7
Standard Error of Measurement
Scaled Score
0
50
100
150
200
250
1000
1200
1400
1600
1800


Conditional Standard Error Plot
Reading 8
Standard Error of Measurement
Scaled Score
0
50
100
150
200
250
1000
1200
1400
1600
1800


Conditional Standard Error Plot
Reading 11
Standard Error of Measurement
Scaled Score
0
50
100
150
200
250
1000
1200
1400
1600
1800


Conditional Standard Error Plot
Science 8
Standard Error of Measurement
Scaled Score
0
50
100
150
200
250
1000
1200
1400
1600
1800


Conditional Standard Error Plot
Science 11
Standard Error of Measurement
Scaled Score
0
50
100
150
200
250
1100
1300
1500
1700

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, which 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 nonoverlapping, equally difficult forms of the test? If two parallel forms of the test were given to the same students, the consistency of the measurement would be reflected by the extent to which 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 nonoverlapping, 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-M 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 in order to project the consistency of classifications solely using data from the available administration (Hambleton and 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-M 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 and 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)—showed that consistency values across the two methods were generally very similar. The Hanson and Brennan values were equal to or just slightly higher than the Livingston and Lewis values (by about 0.01) in most cases.

The overall decision consistency was generally in the mid-0.60s. It should be noted that the overall consistency indices (across all four performance levels) should logically be lower than those based on two categories (as discussed above).

Regarding dichotomous decisions, the Basic-M cuts generally had the highest consistency values at the lower grade levels, where most exceeded 0.90. The Advanced-M cuts had the highest consistency values at the higher grade levels, where most exceeded 0.90. Proficient-M cut decision consistency values were in the low to mid-0.80s at all grade levels.

As a point of comparison, recent general PSSA decision consistency values typically ranged from the high 0.90s to mid-0.80s with the Basic cut generally yielding the highest values and the Advanced cut yielding the lowest values. Overall consistency values were generally in the low to mid-0.70s. Thus, for the PSSA-M, some individual cut consistencies were as high as the general PSSA, while the overall and Proficient-M cut consistencies were lower. The PSSA-M's shorter test length and lower reliabilities may have been contributing factors in these cases.

Table 18–6. Decision Consistency Results

	Grade	Method	Overall	BBas/Bas	Bas/Prof	Prof/Adv
Mathematics	**4**	HB	0.64	0.92	0.82	0.90
		LL	0.64	0.92	0.81	0.90
	5	HB	0.65	0.91	0.81	0.93
		LL	0.65	0.91	0.81	0.93
	6	HB	0.65	0.90	0.81	0.94
		LL	0.66	0.89	0.81	0.95
	7	HB	0.68	0.89	0.84	0.95
		LL	0.67	0.88	0.84	0.95
	8	HB	0.67	0.89	0.83	0.95
		LL	0.67	0.88	0.83	0.96
	11	HB	0.63	0.83	0.85	0.95
		LL	0.63	0.83	0.85	0.95
Reading	**4**	HB	0.63	0.92	0.83	0.87
		LL	0.62	0.91	0.83	0.87
	5	HB	0.66	0.93	0.86	0.87
		LL	0.66	0.92	0.86	0.87
	6	HB	0.65	0.92	0.85	0.88
		LL	0.65	0.92	0.85	0.88
	7	HB	0.62	0.88	0.84	0.89
		LL	0.62	0.88	0.84	0.90
	8	HB	0.63	0.88	0.82	0.93
		LL	0.63	0.87	0.82	0.93
	11	HB	0.65	0.89	0.82	0.93
		LL	0.65	0.88	0.82	0.94
Science	**8**	HB	0.63	0.89	0.81	0.92
		LL	0.63	0.89	0.81	0.93
	11	HB	0.68	0.89	0.85	0.94
		LL	0.68	0.89	0.85	0.94

RATER AGREEMENT

Because open-ended items are included on the PSSA-M, 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 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," because these terms are somewhat misleading, as explained above.

Further Interpretations

For the PSSA-M, only within-year consistency is available. In future administrations, across-year rater consistency may be available for consideration as well.

Results and Observations

Within-year rater agreement information is provided in Chapter Eight. This information is reformatted in Table 18–7 for PSSA-M mathematics OE items. In addition, the percentages awarded to each score point are also presented in this table. The exact inter-rater agreement percentages generally ranged from the low 80s to high 90s for mathematics and science and from the mid-70s to high 80s for reading. Validity indices generally were nearly 100 for all subjects. The tabled values are similar to results historically obtained for the general PSSA.

Table 18–7. Inter-Rater Agreement and Percentage Awarded for Each Score Point for OE Items—Mathematics

		Inter-Rater Agreement Percentage			Percentage Awarded for Each Score Point					
Grade	**Item**	**Exact**	**Adjacent**	**Validity**	**0**	**1**	**2**	**3**	**4**	**B/NS**
4	1	97	3	100	87	46	31	8	7	8
	2	98	2	100	93	42	30	18	5	4
5	1	93	7	100	85	68	20	7	3	1
	2	96	3	99	97	39	27	10	10	14
6	1	93	7	100	95	48	41	7	2	1
	2	94	6	100	94	19	57	19	4	1
7	1	94	6	100	95	29	34	14	15	7
	2	96	4	100	89	77	4	4	7	5
8	1	90	10	100	94	32	41	20	4	2
	2	94	6	100	94	38	39	13	8	1
11	1	97	3	100	94	52	34	6	1	3
	2	95	5	100	94	43	46	3	3	0

Note. B = blank; NS=non-scoreable. For more information regarding validity, see the section on handscoring validity process in Chapter Eight.

Table 18–8. Inter-Rater Agreement and Percentage Awarded for Each Score Point for OE Items—Reading

		Inter-Rater Agreement Percentage			Percentage Awarded for Each Score Point				
Grade	**Item**	**Exact**	**Adjacent**	**Validity**	**0**	**1**	**2**	**3**	**B/NS**
4	1	74	26	100	72	16	35	36	10
	2	81	19	100	68	26	29	20	24
5	1	89	11	100	85	20	26	28	25
	2	77	23	100	73	6	41	38	11
6	1	78	22	100	84	18	47	28	6
	2	79	21	100	77	13	33	36	15
7	1	80	19	99	70	16	31	31	20
	2	77	22	99	70	20	50	22	6
8	1	79	21	100	82	14	30	40	15
	2	82	18	100	62	6	26	40	24
11	1	75	25	100	65	9	41	29	17
	2	81	19	100	83	6	36	35	18

Note. B = blank; NS=non-scoreable. For more information regarding validity, see the section on handscoring validity process in Chapter Eight.

Table 18–9. Inter-Rater Agreement and Percentage Awarded for Each Score Point for OE Items—Science

		Inter-Rater Agreement Percentage			Percentage Awarded for Each Score Point			
Grade	**Item**	**Exact**	**Adjacent**	**Validity**	**0**	**1**	**2**	**B/NS**
8	1	88	12	100	96	29	45	24
	2	85	15	100	95	25	54	19
11	1	81	19	100	82	16	41	32
	2	88	12	100	90	61	25	5

Note. B = blank; NS=non-scoreable. For more information regarding validity, see the section on handscoring validity process in Chapter Eight.

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 technical report describes the technical aspects of the PSSA-M 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, and linking; score reporting; and reliability. This chapter summarizes and synthesizes the evidence based on the *Standards* framework. The purposes and intended uses of PSSA-M test scores are reviewed first, then each type of validity evidence is addressed in turn.

Purposes and Intended Uses of the PSSA-M

The *Standards* emphasizes that validity pertains to how test scores are used. To help contextualize the evidence that will be presented below, the purposes of the PSSA-M will be reviewed first. As stated in Chapter One, the main purposes of the PSSA-M (as with the general PSSA) are to

- Provide students, parents, educators, and citizens with an understanding of student and school performance.
- Determine the degree to which programs enable students to attain proficiency of academic standards.
- Provide results to school districts, including charter schools, and Career and Technical Centers (CTCs) for consideration in the development of strategic plans.
- Provide information to state policymakers, including the General Assembly, and the State Board, on how effective schools are in promoting and demonstrating student proficiency in meeting the academic standards.
- Provide information to the general public on school performance.
- Provide results to school districts, including charter schools, and CTCs based on the aggregate performance of all students and for relevant subgroups, such as students with an Individualized Education Program (IEP) and for those without an IEP.

EVIDENCE BASED ON TEST CONTENT

Test content validity evidence for the PSSA-M 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-M tests are intended to measure students' knowledge and skills described in the Assessment Anchors, as defined by the Eligible Content for mathematics, and thus the evidence supporting the alignment among the PSSA-M tasks and the Assessment Anchors, as defined by the Eligible Content.

Lane (1999) suggests taking the following steps to support the validity of an assessment, such as the PSSA-M:

- Evaluate the degree to which the PSSA-M test specifications represent and align with the knowledge and skills described in the Assessment Anchors, as defined by the Eligible Content, in terms of both content and cognitive processes.
- Evaluate the alignment between the PSSA-M 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 the PSSA-M should not be interpreted as meaning that instruction was ineffective.
- Conduct content reviews of the PSSA-M items using a panel of content experts to see whether they measure the intended constructs 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.

Chapters Two–Eight of this report present a considerable amount of evidence related to test content. As described in these chapters, all the PSSA-M items were developed and aligned with the Assessment Anchors and Eligible Content 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. Finally, the 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) DOK model to ensure the PSSA-M 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, 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 or/and WestEd to ensure all items measured the intended Assessment Anchors, as defined by the Eligible Content for mathematics. Appropriateness for the intended grade was also considered, as well as depth of knowledge, graphics, grammar and punctuation, language demand, and distractor reasonableness.
- Prior to 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 and distractor analyses. Items were once again carefully reviewed by DRC staff and a committee of Pennsylvania teachers with respect to their statistical characteristics.
- The PSSA-M 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 interviews 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 for these items accurately when assigning scores to students' responses also provides validity of the response-processes evidence.

Cognitive interviews were conducted in Pennsylvania schools between May 11 and May 19, 2009. Information collected from these interviews was then used to aid decision making in the strategies currently used to revise and/or enhance items for the PSSA-M to ensure that these enhancements would appropriately facilitate student access to the assessed content. See Chapter Three for information about the results of the cognitive interviews. For all the PSSA-M 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 among test items and test components conform to the construct on which the proposed test interpretations are based. For each PSSA-M test, one total test score as well as strand scores are reported (see Chapter Sixteen for more information about PSSA-M 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 were reviewed in Chapter Eleven. All values were positive. Although a few items had low correlations, the average correlation over all items appeared reasonable in magnitude.

Item Response Theory Dimensionality

Results from principle components analyses conducted using WINSTEPS were presented in Chapter Twelve. The PSSA-M tests were essentially unidimensional, providing evidence supporting interpretations based on the total scores for the respective PSSA-M tests.

Strand (Reporting Category) Correlations

Correlations and disattenuated correlations among strand (reporting category) scores within each subject area are presented below. Values were derived from the PSSA-M 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-M mathematics tests have five strands (denoted by M.A, M.B, M.C, M.D, and M.E), the PSSA-M reading tests have two strands (denoted by R.A and R.B), and the PSSA science tests have four strands (denoted by S.A, S.B, S.C, and S.D).

For each grade, Pearson's correlation coefficients among these strands are reported in Tables 19–1a through 19–1f, with reliabilities listed on the diagonal. The intercorrelations among the strands within the content areas were positive and generally moderate in value.

Table 19–1a. Correlations among Strands for Grade 4

M.A	-						
M.B	0.51	-					
M.C	0.41	0.27	-				
M.D	0.48	0.40	0.34	-			
M.E	0.52	0.39	0.43	0.45	-		
R.A	0.41	0.30	0.31	0.30	0.41	-	
R.B	0.41	0.30	0.30	0.27	0.37	0.67	-
	M.A	**M.B**	**M.C**	**M.D**	**M.E**	**R.A**	**R.B**

Table 19–1b. Correlations among Strands for Grade 5

M.A	-						
M.B	0.49	-					
M.C	0.41	0.36	-				
M.D	0.52	0.47	0.38	-			
M.E	0.44	0.41	0.41	0.41	-		
R.A	0.41	0.39	0.40	0.36	0.40	-	
R.B	0.43	0.38	0.44	0.37	0.41	0.74	-
	M.A	**M.B**	**M.C**	**M.D**	**M.E**	**R.A**	**R.B**

Table 19–1c. Correlations among Strands for Grade 6

M.A	-						
M.B	0.40	-					
M.C	0.41	0.34	-				
M.D	0.48	0.29	0.32	-			
M.E	0.47	0.32	0.38	0.39	-		
R.A	0.36	0.26	0.34	0.33	0.36	-	
R.B	0.39	0.25	0.33	0.31	0.37	0.70	-
	M.A	**M.B**	**M.C**	**M.D**	**M.E**	**R.A**	**R.B**

Table 19–1d. Correlations among Strands for Grade 7

M.A	-						
M.B	0.47	-					
M.C	0.53	0.43	-				
M.D	0.51	0.40	0.42	-			
M.E	0.45	0.34	0.41	0.40	-		
R.A	0.37	0.25	0.29	0.33	0.34	-	
R.B	0.40	0.25	0.30	0.35	0.36	0.74	-
	M.A	**M.B**	**M.C**	**M.D**	**M.E**	**R.A**	**R.B**

Table 19–1e. Correlations among Strands for Grade 8

M.A	-										
M.B	0.43	-									
M.C	0.37	0.35	-								
M.D	0.48	0.47	0.44	-							
M.E	0.44	0.41	0.40	0.53	-						
R.A	0.34	0.34	0.26	0.42	0.45	-					
R.B	0.29	0.31	0.22	0.38	0.39	0.67	-				
S.A	0.35	0.36	0.30	0.42	0.46	0.58	0.52	-			
S.B	0.27	0.27	0.23	0.34	0.33	0.45	0.41	0.52	-		
S.C	0.24	0.24	0.21	0.28	0.33	0.42	0.38	0.49	0.44	-	
S.D	0.26	0.26	0.25	0.30	0.32	0.45	0.40	0.50	0.45	0.45	-
	M.A	**M.B**	**M.C**	**M.D**	**M.E**	**R.A**	**R.B**	**S.A**	**S.B**	**S.C**	**S.D**

Table 19–1f. Correlations among Strands for Grade 11

M.A	-										
M.B	0.36	-									
M.C	0.40	0.39	-								
M.D	0.49	0.49	0.46	-							
M.E	0.39	0.39	0.39	0.51	-						
R.A	0.35	0.32	0.34	0.42	0.36	-					
R.B	0.35	0.32	0.35	0.44	0.37	0.72	-				
S.A	0.38	0.36	0.38	0.43	0.38	0.58	0.57	-			
S.B	0.27	0.28	0.28	0.30	0.30	0.41	0.40	0.53	-		
S.C	0.25	0.26	0.26	0.28	0.25	0.41	0.39	0.51	0.41	-	
S.D	0.27	0.29	0.29	0.30	0.30	0.44	0.42	0.59	0.53	0.48	-
	M.A	**M.B**	**M.C**	**M.D**	**M.E**	**R.A**	**R.B**	**S.A**	**S.B**	**S.C**	**S.D**

The correlations in Tables 19–1a through 19–1f are for 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 among strands if there were no measurement error. (An important caveat is provided 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. Tables 19–2a through 19–2f show the corresponding disattenuated correlations.

Disattenuated correlations very near 1.0 might suggest that the same or very similar constructs are being measured. Values somewhat less than 1.0 might suggest that different strands are measuring slightly different aspects of the same construct. Values markedly less than 1.0 might suggest the strands reflect different constructs.

Given that none of these strands have perfect reliabilities (see Chapter Eighteen), the disattenuated strand correlations are higher than their observed-score counterparts. Within-subject strand correlations varied considerably in value. Some within-subject correlations were very high (e.g., above 0.95). As noted above, extremely high disattenuated correlations suggest 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, there were some within-subject strand correlations that were somewhat lower than 1.0. For such strands, partial evidence is provided regarding the multidimensional structure of some tests and further supporting the validity of those specific strand scores.

Table 19–2a. Disattenuated Strand Correlations: Grade 4

M.A	-						
M.B	1.29	-					
M.C	0.75	0.86	-				
M.D	0.87	1.29	0.78	-			
M.E	0.81	1.06	0.84	0.88	-		
R.A	0.56	0.74	0.54	0.53	0.60	-	
R.B	0.63	0.80	0.57	0.52	0.60	0.98	-
	M.A	**M.B**	**M.C**	**M.D**	**M.E**	**R.A**	**R.B**

Table 19–2b. Disattenuated Strand Correlations: Grade 5

M.A	-						
M.B	0.99	-					
M.C	0.76	0.82	-				
M.D	1.17	1.29	0.93	-			
M.E	0.82	0.95	0.86	1.05	-		
R.A	0.58	0.68	0.64	0.70	0.65	-	
R.B	0.66	0.72	0.75	0.77	0.71	0.99	-
	M.A	**M.B**	**M.C**	**M.D**	**M.E**	**R.A**	**R.B**

Table 19–2c. Disattenuated Strand Correlations: Grade 6

M.A	-						
M.B	0.96	-					
M.C	0.84	1.00	-				
M.D	0.97	0.85	0.81	-			
M.E	0.89	0.86	0.89	0.90	-		
R.A	0.53	0.55	0.62	0.58	0.60	-	
R.B	0.62	0.56	0.65	0.60	0.68	0.97	-
	M.A	**M.B**	**M.C**	**M.D**	**M.E**	**R.A**	**R.B**

Table 19–2d. Disattenuated Strand Correlations: Grade 7

M.A	-						
M.B	1.01	-					
M.C	1.02	0.94	-				
M.D	0.98	0.87	0.82	-			
M.E	0.87	0.76	0.82	0.79	-		
R.A	0.59	0.46	0.48	0.54	0.56	-	
R.B	0.66	0.47	0.50	0.57	0.61	1.03	-
	M.A	**M.B**	**M.C**	**M.D**	**M.E**	**R.A**	**R.B**

Table 19–2e. Disattenuated Strand Correlations: Grade 8

M.A	-										
M.B	1.00	-									
M.C	0.76	0.81	-								
M.D	0.93	1.04	0.84	-							
M.E	0.86	0.90	0.77	0.97	-						
R.A	0.58	0.65	0.43	0.67	0.72	-					
R.B	0.54	0.65	0.40	0.67	0.70	1.01	-				
S.A	0.64	0.74	0.54	0.72	0.80	0.85	0.85	-			
S.B	0.57	0.66	0.49	0.68	0.67	0.78	0.79	0.97	-		
S.C	0.52	0.61	0.45	0.58	0.69	0.75	0.76	0.95	1.01	-	
S.D	0.53	0.60	0.52	0.59	0.64	0.76	0.74	0.91	0.96	1.00	-
	M.A	**M.B**	**M.C**	**M.D**	**M.E**	**R.A**	**R.B**	**S.A**	**S.B**	**S.C**	**S.D**

Table 19–2f. Disattenuated Strand Correlations: Grade 11

M.A	-										
M.B	1.19	-									
M.C	0.99	1.37	-								
M.D	0.90	1.28	0.90	-							
M.E	0.90	1.25	0.94	0.92	-						
R.A	0.65	0.82	0.66	0.60	0.64	-					
R.B	0.65	0.83	0.68	0.63	0.66	1.01	-				
S.A	0.68	0.91	0.72	0.60	0.67	0.80	0.79	-			
S.B	0.63	0.88	0.67	0.53	0.66	0.72	0.71	0.92	-		
S.C	0.62	0.93	0.70	0.55	0.62	0.79	0.76	0.98	1.01	-	
S.D	0.55	0.81	0.61	0.47	0.59	0.69	0.65	0.90	1.03	1.02	-
	M.A	**M.B**	**M.C**	**M.D**	**M.E**	**R.A**	**R.B**	**S.A**	**S.B**	**S.C**	**S.D**

Much 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 many instances will appear larger than the theoretical correlation maximum value of 1.0).

Exploratory Factor Analysis

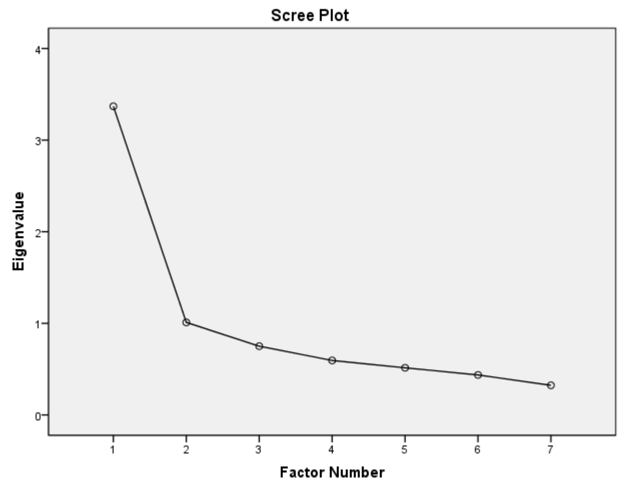
In order to further explore the internal structure of the PSSA-M, an exploratory factor analysis (EFA) of the strand scores was conducted. The PSSA-M final data file (see Chapter Nine) was used to create the observed correlation matrices shown in Tables 19–1a through 19–1f, which in turn were used in the EFAs. In SPSS, Principal 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-M 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 4 PSSA-M test. The scree plot graphing the eigenvalues against the factor number is shown in Figure 19–1. The first factor accounted for about 48 percent of the total variance, while the second factor explained about 14 percent of the total variance. The first two factors had an eigenvalue greater than 1.0, typically suggesting a two-factor solution using the Kaiser criterion. Based on this finding and the prior belief that there should be two distinct factors at Grade 4 (one for mathematics and another for reading), a two-factor solution was further explored.

Table 19–3. Eigenvalues and Explained Variance for Grade 4

Factor	Eigenvalue	%
1	3.37	48.13
2	1.01	14.43
3	0.75	10.72
4	0.59	8.50
5	0.51	7.36
6	0.44	6.24
7	0.32	4.62

Figure 19–1. Scree Plot for Grade 4



The pattern loadings resulting from the two-factor solution are presented in Table 19–4a. The pattern loadings have simple structure which show that the five mathematics domains clearly loaded on the first factor, while the two reading domains clearly loaded on the second factor. The respective factor loadings are quite high. The factor correlation matrix shows that the correlation between the two latent factors is 0.61, which is equal to the disattenuated correlation between mathematics and reading.

Table 19–4a. Factor Loadings for Grade 4

	Factor	
Domain	**1**	**2**
Mathematics		
M.A	0.75	0.04
M.B	0.60	-0.01
M.C	0.49	0.07
M.D	0.68	-0.07
M.E	0.66	0.07
Reading		
R.A	0.02	0.81
R.B	-0.01	0.82
Correlation (F1, F2) = 0.61		

Similar results were found for the other grades. The eigenvalue scree plots consistently indicated a multi-factor solution. The eigenvalues and explained variances are not shown for the other grades due to space considerations. Factor loadings are reported in Tables 19–4b through 19–4f for the remaining grades. The pattern loadings clearly suggested that the PSSA tests measured different but correlated constructs.

Table 19–4b. Factor Loadings for Grade 5

Domain	Factor 1	Factor 2
Mathematics		
M.A	0.73	0.01
M.B	0.65	0.01
M.C	0.43	0.21
M.D	0.74	-0.06
M.E	0.54	0.12
Reading		
R.A	0.04	0.81
R.B	-0.01	0.90
Correlation (F1, F2) = 0.65		

Table 19–4c. Factor Loadings for Grade 6

Domain	Factor 1	Factor 2
Mathematics		
M.A	0.78	-0.03
M.B	0.55	-0.03
M.C	0.52	0.08
M.D	0.59	0.01
M.E	0.58	0.08
Reading		
R.A	0.01	0.83
R.B	0.01	0.83
Correlation (F1, F2) = 0.61		

Table 19–4d. Factor Loadings for Grade 7

Domain	Factor 1	Factor 2
Mathematics		
M.A	0.76	0.03
M.B	0.65	-0.07
M.C	0.71	-0.05
M.D	0.62	0.06
M.E	0.52	0.12
Reading		
R.A	0.00	0.83
R.B	0.00	0.89
Correlation (F1, F2) = 0.55		

Table 19–4e. Factor Loadings for Grade 8

Domain	Factor 1	Factor 2	Factor 3
Mathematics			
M.A	0.68	-0.03	-0.01
M.B	0.62	-0.01	0.02
M.C	0.64	0.07	-0.16
M.D	0.75	-0.05	0.06
M.E	0.57	0.06	0.11
Reading			
R.A	0.00	0.06	0.79
R.B	-0.05	0.02	0.81
Science			
S.A	0.11	0.55	0.18
S.B	0.02	0.64	0.03
S.C	-0.04	0.72	-0.04
S.D	-0.01	0.69	-0.01

Correlation (F1, F2) = 0.63 Correlation (F1, F3) = 0.64
Correlation (F2, F3) = 0.76

Table 19–4f. Factor Loadings for Grade 11

Domain	Factor 1	Factor 2	Factor 3
Mathematics			
M.A	0.59	0.01	0.03
M.B	0.62	0.08	-0.08
M.C	0.58	0.06	-0.01
M.D	0.82	-0.11	0.05
M.E	0.61	0.03	0.01
Reading			
R.A	-0.02	0.05	0.82
R.B	0.02	-0.01	0.84
Science			
S.A	0.10	0.59	0.19
S.B	0.03	0.68	-0.03
S.C	0.00	0.59	0.05
S.D	-0.03	0.84	-0.07

Correlation (F1, F2) = 0.61 Correlation (F1, F3) = 0.65
Correlation (F2, F3) = 0.70

Taken as a whole, all the internal structure evidence presented above generally indicates that related elements of each of the PSSA-M tests correlate in the intended manner. Different PSSA-M 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 intersubject 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 an individual student's strengths and weaknesses. Certainly, instructional programs should be based not on strand score information alone, but in conjunction with other sources of evidence available (e.g., teacher observations, other exam performance).

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 the 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 apparent to trained judges, DIF may have no clear cause. However, studying how DIF arises and how it presents itself has an effect on how to detect and correct it.

LIMITATIONS OF STATISTICAL DETECTION

No statistical procedure should be used as a substitute for rigorous, hands-on review by content and bias specialists. The statistical results can help organize the review so 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 one 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 a 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

The Mantel-Haenszel procedure 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 (Mantel & Haenszel, 1959) for each item is computed from a contingency table. It has two groups (focal and reference) and two outcomes (right and wrong). The ability groups are defined by the test's score distribution for the total examinee population.

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 and Bleistein, 1992), 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 a moderate indication of DIF, but may be judged to be acceptable for future use. Items classified as C+ or C- have strong evidence of DIF. The plus sign indicates that the item favors the focal group, and a minus sign indicates that the item favors the reference group.

Counts of the number of items from each grade and content area that were assigned to each severity code are shown below in Tables 19–5a (MC items) and 19–5b (OE items). DIF analyses were conducted only on operational items. Only a handful of items reached the C magnitude.[12]

Table 19–5a. DIF Summary—MC Items

		Male/Female							White/Black						
		A+	A-	B+	B-	C+	C-	Tot	A+	A-	B+	B-	C+	C-	Tot
Mathematics	4	16	11	1	2	0	0	30	14	14	0	1	0	1	30
	5	16	11	1	2	0	0	30	14	14	0	1	0	1	30
	6	13	16	1	0	0	0	30	13	17	0	0	0	0	30
	7	18	9	0	1	0	2	30	11	18	0	1	0	0	30
	8	16	13	0	1	0	0	30	13	17	0	0	0	0	30
	11	17	10	0	3	0	0	30	13	16	1	0	0	0	30
Reading	4	15	15	0	0	0	0	30	11	18	1	0	0	0	30
	5	17	13	0	0	0	0	30	14	16	0	0	0	0	30
	6	14	16	0	0	0	0	30	13	17	0	0	0	0	30
	7	17	13	0	0	0	0	30	12	17	0	1	0	0	30
	8	15	15	0	0	0	0	30	14	14	0	2	0	0	30
	11	16	14	0	0	0	0	30	8	20	1	1	0	0	30
Sci.	8	14	14	1	0	0	1	30	13	16	0	1	0	0	30
	11	9	16	1	3	1	0	30	14	13	0	3	0	0	30

[12] These results are based on the final data set as described in Chapter Nine. Nearly all PSSA-M items are modified versions of general PSSA items that were previously screened for DIF and approved for use on the general assessment.

Table 19–5b. DIF Summary—OE Items

		Male/Female							White/Black						
		A+	A-	B+	B-	C+	C-	Tot	A+	A-	B+	B-	C+	C-	Tot
Mathematics	4	2	0	0	0	0	0	2	2	0	0	0	0	0	2
	5	2	0	0	0	0	0	2	2	0	0	0	0	0	2
	6	1	1	0	0	0	0	2	0	2	0	0	0	0	2
	7	2	0	0	0	0	0	2	1	1	0	0	0	0	2
	8	0	2	0	0	0	0	2	0	2	0	0	0	0	2
	11	1	1	0	0	0	0	2	1	1	0	0	0	0	2
Reading	4	2	0	0	0	0	0	2	0	2	0	0	0	0	2
	5	1	1	0	0	0	0	2	0	2	0	0	0	0	2
	6	1	1	0	0	0	0	2	0	2	0	0	0	0	2
	7	1	1	0	0	0	0	2	1	1	0	0	0	0	2
	8	1	1	0	0	0	0	2	0	2	0	0	0	0	2
	11	0	1	1	0	0	0	2	1	1	0	0	0	0	2
Sci.	8	1	1	0	0	0	0	2	0	2	0	0	0	0	2
	11	1	0	0	1	0	0	2	0	1	0	1	0	0	2

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. It is important to note that the consequences of the assessment program themselves do not serve as indicators of validity. That is, the investigation and evaluation of the consequences provides a richer context for establishing the validity of an assessment program.

Given that the evaluation of consequential validity is broadly defined, it is difficult to specifically measure aspects of consequential validity. Test data only provide one small insight into this type of validation evidence. Chapter Sixteen includes several different types of scores and score reports used for the PSSA-M. This chapter also provides accurate and clear test score and report information to help users avoid unintended uses and interpretations of the PSSA-M results. 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. PDE continues to gather evidence to improve or guide decisions pertaining to all aspects of intended and unintended consequences of the PSSA-M program.

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-M, 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-M data, indicating the appropriateness of using the Rasch models to analyze the PSSA-M data.

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-M item and its associated eligible content. Details regarding how the PSSA-M 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.

Validity of score inferences is bolstered when test scores are consistent. Here, the reliabilities of the total test scores (see Chapter Eighteen) were on the low end of the adequate range. Considering the length of the tests and the relatively homogeneous achievement level of test takers, the reported values are reasonable.

As reported above, differential item functioning (DIF) 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. Only a very small percentage of items were flagged for severe DIF.

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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 the PSSA-M. The Assessment Anchors for the PSSA-M are exactly the same as the Assessment Anchors for the PSSA. 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 and PSSA-M 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.

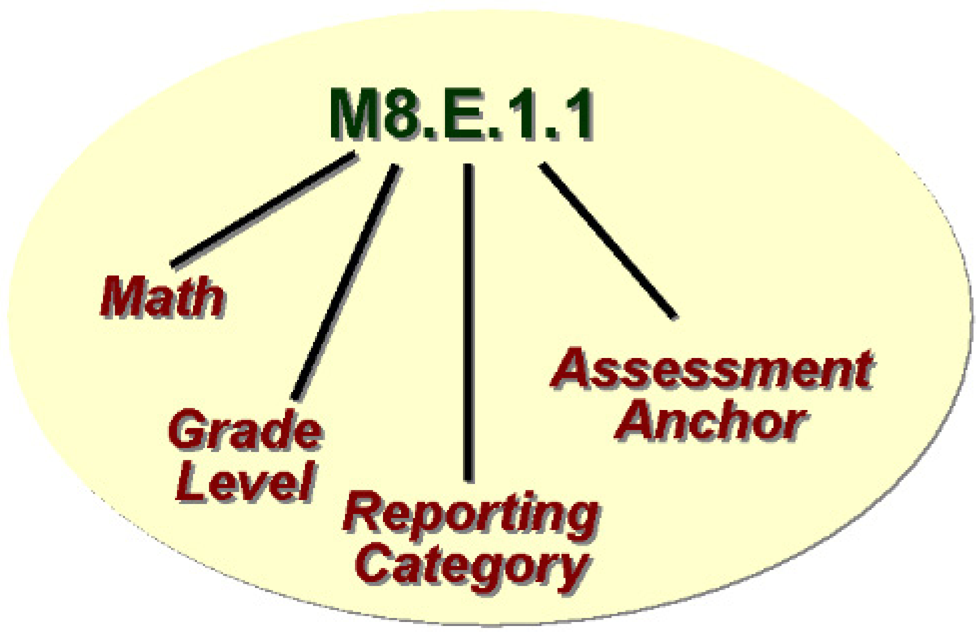
How the Assessment Anchors are Organized
These categories are similar to the five NCTM (National Council of Teachers of Mathematics) Standards and the five NAEP (National Assessment of Educational Progress) Reporting Categories. Each PA Standard Category was examined and then placed in the appropriate 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:

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-M. 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.

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, 4 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, the Assessment Anchors are read 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.

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 4 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.

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 4 or 8).

MD.4 Describe or use models to represent quantitative relationships (not assessed at Grade 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.

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 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 the PSSA-M. The Assessment Anchors for the PSSA-M are exactly the same as the Assessment Anchors for the PSSA. 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 has 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:

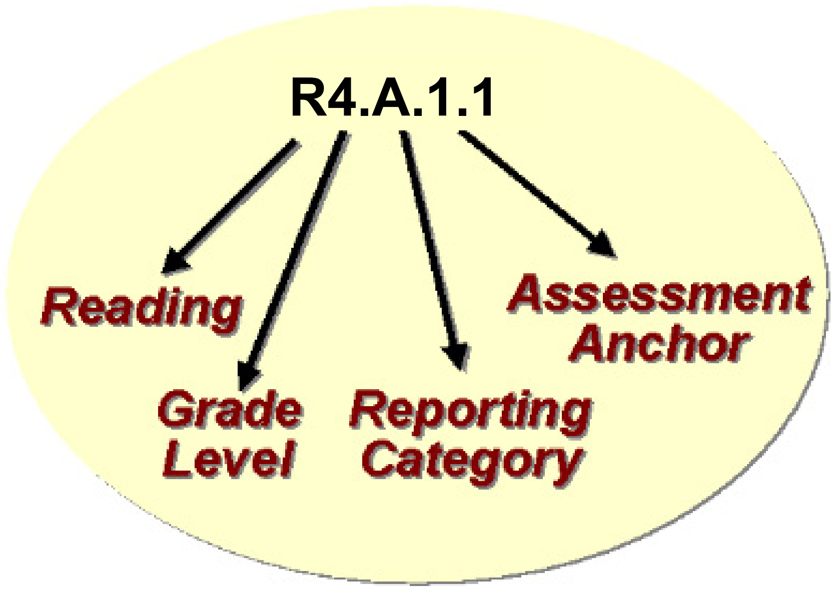
B.1 Components within text **or** components within and across texts
B.2 Literary Devices
B.3 Concepts and Organization of Nonfiction Text

The Anchors generally target the same comprehension skills from Grades 4 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., R4 would be Reading at fourth grade). The second letter in the labeling system is the Reporting Category (A or B). The same reporting categories continue across all Grades 4 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, R4.A.1.1 is a Reading Assessment Anchor (R stands for Reading) at 4th grade (4). 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.

PENNSYLVANIA DEPARTMENT OF EDUCATION

Overview of Reading Assessment Anchors

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 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 Devises	**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

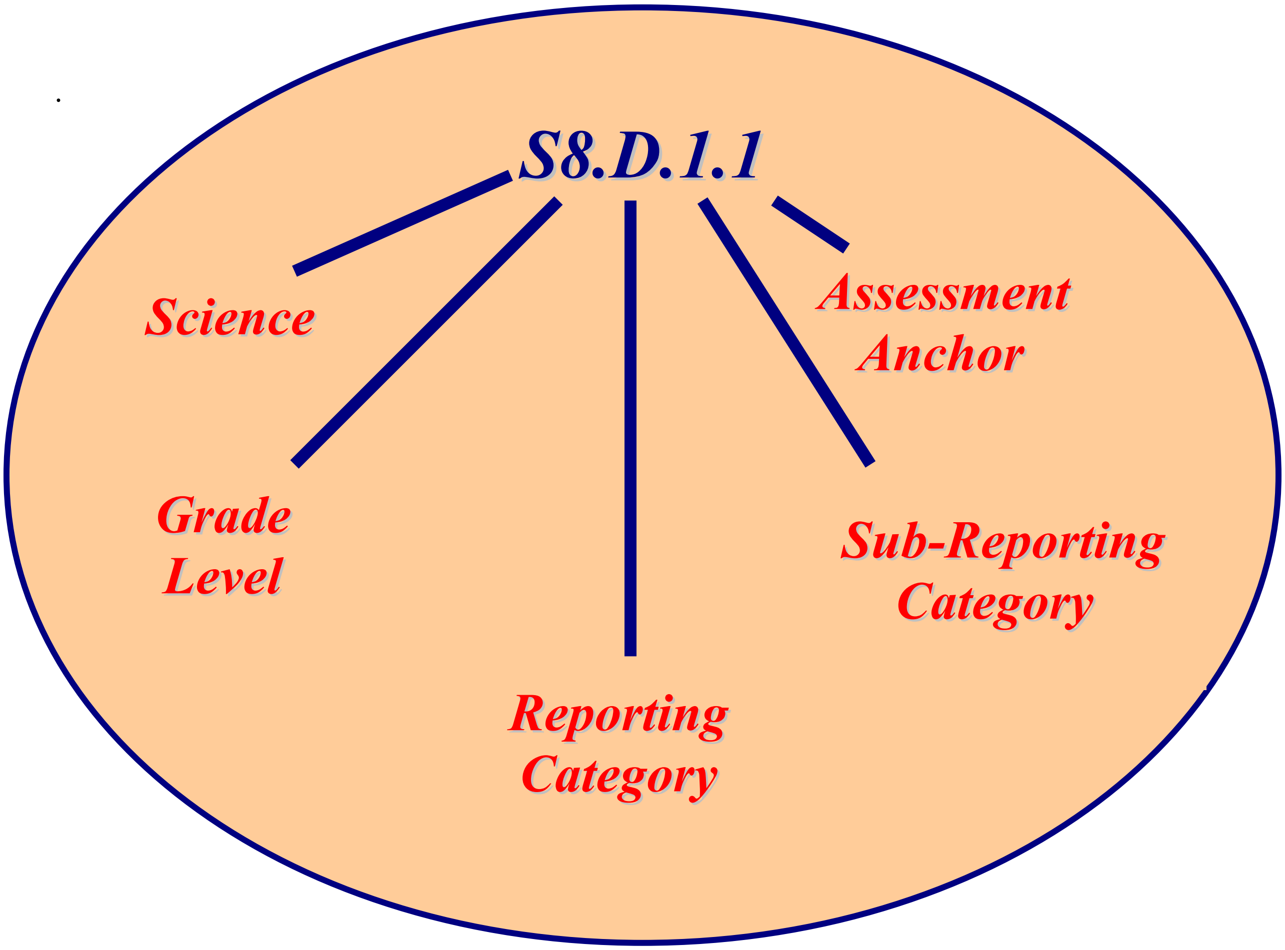
The four reporting categories are similar to those used by the National Assessment of Educational Progress (NEAP) and The Third International Mathematics and Science Study (TIMSS). The four categories for the assessment anchors are included in these major assessments, but are organized differently. Below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

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.

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 (8 and 11).*

SA. The Nature of Science

SA.1 Reasoning and Analysis

SA.2 Processes, Procedures, and Tools of Scientific Investigations

SA.3 Systems, Models, and Patterns

SB. Biological Sciences

SB.1 Structure and Function of Organisms

SB.2 Continuity of Life

SB.3 Ecological Behavior and Systems

SC. Physical Sciences

SC.1 Structure, Properties, and Interaction of Matter and Energy

SC.2 Forms, Sources, Conversion, and Transfer of Energy

SC.3 Principles of Motion and Force

SD. Earth and Space Sciences

SD.1 Earth Features and Processes that Change Earth and Its Resources

SD.2 Weather, Climate, and Atmospheric Processes

SD.3 Composition and Structure of the Universe

Appendix B:

PSSA and PSSA-M 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" or omission in work or explanation that does not detract from demonstrating a *thorough* understanding.

3 – The response demonstrates a *general* understanding of the mathematical concepts and procedures required by the task.

The response and explanation (as required by the task) are mostly complete and correct. The response may have minor errors or omissions that do not detract from demonstrating a *general* understanding.

2 – The response demonstrates a *partial* understanding of the mathematical concepts and procedures required by the task.

The response is somewhat correct with *partial* understanding of the required mathematical concepts and/or procedures demonstrated and/or explained. The response may contain some work that is incomplete or unclear.

1 – The response demonstrates a *minimal* understanding of the mathematical concepts and procedures required by the task.

0 – The response has no correct answer and *insufficient* evidence to demonstrate any understanding of the mathematical concepts and procedures required by the task for that grade level.

Response may show only information copied from the question.

Special Categories within zero reported separately:
BLK (blank)...Blank, entirely erased, or written refusal to respond
OT ....Off task
IL....................Illegible
LOE................Response in a language other than English

This document is available on the PDE website.

Note: The PSSA General Description of Mathematics Scoring Guidelines also applies to the PSSA-M mathematics assessments.

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.**

Note: The PSSA General Scoring Guidelines for Open-Ended Reading Items also apply to the PSSA-M reading assessments.

PENNSYLVANIA DEPARTMENT OF EDUCATION
PSSA
SCIENCE

DESCRIPTION OF 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 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

Note: The PSSA Description of Scoring Guidelines for 2-Point Open-Ended Items for Science also applies to the PSSA-M science assessments.

Appendix C:

2012 PSSA-M 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
A: Numbers and Operations	1			Understand relationships and representations of numbers and number systems														
	1	1	1	Match word to number														
	1	1	2	Differentiate between even & odd														
	1	1	3	Compare two whole numbers														
	1	1	4	Order a set of whole numbers														
	1	1	5	Match symbolic representation														
	1	2	1	Write fraction that corresponds to drawing														
	1	2	2	Draw representation of a fraction														
	1	3	1	Count a collection of bills & coins														
	1	3	2	Compare total values of combinations of coins														
	1	3	3	Make change up to $5.00														
	Total For Assessment Anchor A.1 Understand relationships among and representations of numbers and number systems																	
	2			Understand meanings, uses and relations of operations														
	2	1	1	Represent multiplication as repeated addition														
	2	1	2	Demonstrate inverse relationships														
	2	1	3	Identify correct operation(s)														
	Total For Assessment Anchor A.2 Understand meanings, uses of operations and how they relate to each other																	
	3			Compute accurately/fluently and make reasonable estimates														
	3	1	1	Solve single- & double-digit addition & subtraction problems														
	3	1	2	Solve multiplication problems														
	3	1	3	Solve triple digit addition & subtraction problems														
	3	2	1	Estimate sums and differences														
	Total For Assessment Anchor A.3 Compute accurately and fluently and make reasonable estimates																	
Total For Reporting Category A																		

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
B: Measurement	1			Understand measurable attributes and units, systems, processes of measurement														
	1	1	1	Tell/show analog time to the minute														
	1	1	2	Find elapsed time														
	1	1	3	Identify times as AM or PM														
	1	2	1	Select appropriate unit for measurement														
	1	2	2	Compare and/or order objects by length, area, or weight														
	Total For Assessment Anchor B.1 Understand measurable attributes and units, systems, processes of measurement																		
	2			Apply techniques, tools & formulas to determine measurements														
	2	1	1	Use a ruler to nearest 1/2 inch														
	2	2	1	Match object with measurement														
	Total For Assessment Anchor B.2 Apply appropriate techniques, tools and formulas to determine measurements																		
Total For Reporting Category B																			

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

Grade 03 **Mathematics**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	OE	Equating Block (EB) MC	OE	Total Points (Core & EB) MC	OE	Total	Items: Number of Items Core MC	OE	EB MC	OE	Total Number of Items (Core & EB) MC	OE	Total
D: Algebraic Concepts	1			Understand patterns, relations and functions														
	1	1	1	Extend or find a missing element in a pattern														
	1	1	2	Identify/describe rule for a pattern														
	Total For Assessment Anchor D.1 Understand patterns, relations and functions																	
	2			Represent/analyze mathematical situations														
	2	1	1	Create or match a story														
	2	1	2	Match number sentence to story														
	2	2	1	Find a missing number														
	2	2	2	Identify the missing symbol														
	Total For Assessment Anchor D.2 Represent/analyze mathematical situations using numbers, symbols, words, tables and/or graphs																	
Total For Reporting Category D																		

Grade 03 **Mathematics**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	Points: Student Scores (Core Points) OE	Points: Equating Block (EB) MC	Points: Equating Block (EB) OE	Points: Total Points (Core & EB) MC	Points: Total Points (Core & EB) OE	Points: Total Points (Core & EB) Total	Items: Number of Items Core MC	Items: Number of Items Core OE	Items: Number of Items EB MC	Items: Number of Items EB OE	Items: Total Number of Items (Core & EB) MC	Items: Total Number of Items (Core & EB) OE	Items: Total Number of Items (Core & EB) Total
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														
	1	1	2	Describe, interpret and/or answer questions based on data														
	1	2	1	Graph data														
	1	2	2	Translate information from one type of display to another														
	Total For Assessment Anchor E.1 Formulate or answer questions about data and/or organize, display, interpret or analyze data																	
Total For Reporting Category E																		

Grade 04 **Mathematics**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points)		Points: Equating Block (EB)		Points: Total Points (Core & EB)			Items: Number of Items: Core		Items: Number of Items: EB		Items: Total Number of Items (Core & EB)		
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total
A: Numbers and Operations	1			Understand relationships and representations of numbers and number systems														
	1	1	1	Match drawing to fraction, decimal, mixed number	1				1		1	1				1		1
	1	1	2	Create a drawing or set to represent a fraction	2				2		2	2				2		2
	1	1	3	Match standard form to word form (decimals)	1				1		1	1				1		1
	1	1	4	Write in expanded, standard or word form (whole numbers)	1				1		1	1				1		1
	1	2	1	Locate/identify fractions or decimals on number line	1				1		1	1				1		1
	1	2	2	Compare/order whole numbers	1				1		1	1				1		1
	1	3	1	Find/identify/list factors	1				1		1	1				1		1
	1	3	2	Find/identify/list multiples	1				1		1	1				1		1
	Total For Assessment Anchor A.1 Understand relationships among and representations of numbers and number systems				9				9		9	9				9		9
	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	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				2	4			2	4	6	2	1			2	1	3
	3			Compute accurately/fluently and make reasonable estimates														
	3	1	1	Round whole numbers	1				1		1	1				1		1
	3	1	2	Round to nearest dollar	1				1		1	1				1		1
	3	1	3	Estimate answers with whole numbers														
	3	2	1	Solve addition/subtraction problems involving decimals														
	3	2	2	Solve addition/subtraction problems involving fractions	1				1		1	1				1		1
	Total For Assessment Anchor A.3 Compute accurately and fluently and make reasonable estimates				3				3		3	3				3		3
Total For Reporting Category A					14	4			14	4	18	14	1			14	1	15

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

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)		
												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	1				1		1	1				1		1
	Total For Assessment Anchor C.1 Analyze characteristics and properties of two- and three-dimensional geometric shapes				3				3		3	3				3		3
	2			Identify and/or apply concepts of transformations and symmetry														
	2	1	1	Identify/draw figures having one, two, or no lines of symmetry	1				1		1	1				1		1
	Total For Assessment Anchor C.2 Identify and/or apply concepts of transformations and symmetry				1				1		1	1				1		1
	3			Locate points/describe relationships using the coordinate plane														
	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				1		1	1				1		1
Total For Reporting Category C					5				5		5	5				5		5

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)		
												Core		EB				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total
D: Algebraic Concepts	1			Understand patterns, relations and functions														
	1	1	1	Extend or find a missing element in a numerical or geometric pattern	1				1		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														
	Total For Assessment Anchor D.1 Understand patterns, relations and functions				3				3		3	3				3		3
	2			Represent/analyze mathematical situations														
	2	1	1	Correlate story with expression or equation														
	2	2	1	Solve for missing number in equation	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				2				2		2	2				2		2
Total For Reporting Category D					5				5		5	5				5		5

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)		
												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		2
	1	2	1	Graph data or complete a graph	1				1		1	1				1		1
	1	2	2	Translate data from one type of display to another	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				4				4		4	4				4		4
	3			Understand and apply basic concepts of probability														
	3	1	1	Make a prediction based on data or chance	1				1		1	1				1		1
	Total For Assessment Anchor E.3 Understand and apply basic concepts of probability				1				1		1	1				1		1
Total For Reporting Category E					5				5		5	5				5		5

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)		
												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 expanded notation	1				1		1	1				1		1
	1	2	1	Read/write decimals	1				1		1	1				1		1
	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	3	3	Compare proper fractions	1				1		1	1				1		1
	1	4	1	Identify negative numbers on number line	1				1		1	1				1		1
	1	4	2	Identify negative numbers on thermometer	1				1		1	1				1		1
	1	5	1	Model fractions/mixed numbers	2				2		2	2				2		2
	1	6	1	Name/identify prime and composite numbers	1				1		1	1				1		1
	1	6	2	List/identify factors, multiples	1				1		1	1				1		1
	Total For Assessment Anchor A.1 Understand relationships among and representations of numbers and number systems				11				11		11	11				11		11
	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	1	2	Solve problems involving addition/subtraction (fractions)														
	2	1	3	Choose correct operation														
	Total For Assessment Anchor A.2 Understand meanings, uses of operations and how they relate to each other					4				4	4		1				1	1
	3			Compute accurately/fluently and make reasonable estimates														
	3	1	1	Round whole numbers & decimals	1				1		1	1				1		1
	3	1	2	Estimate to solve	1				1		1	1				1		1
	3	2	1	Compute without calculator														
	Total For Assessment Anchor A.3 Compute accurately and fluently and make reasonable estimates				2				2		2	2				2		2
Total For Reporting Category A					13	4			13	4	17	13	1			13	1	14

Grade 05 **Mathematics**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	Points: Student Scores (Core Points) OE	Points: Equating Block (EB) MC	Points: Equating Block (EB) OE	Points: Total Points (Core & EB) MC	Points: Total Points (Core & EB) OE	Points: Total Points (Core & EB) Total	Items: Number of Items Core MC	Items: Number of Items Core OE	Items: Number of Items EB MC	Items: Number of Items EB OE	Items: Total Number of Items (Core & EB) MC	Items: Total Number of Items (Core & EB) OE	Items: Total Number of Items (Core & EB) Total
B: Measurement	1			Understand measurable attributes and units, systems, processes of measurement														
	1	1	1	Select appropriate unit	1				1		1	1				1		1
	1	2	1	Convert measurements	1				1		1	1				1		1
	1	2	2	Add/subtract measurements														
	1	3	1	Estimate polygon perimeter/area														
	1	3	2	Estimate area of irregular figure														
	Total For Assessment Anchor B.1 Understand measurable attributes and units, systems, processes of measurement				2				2		2	2				2		2
	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														
	2	2	2	Find area of square or rectangle	1				1		1	1				1		1
	2	2	3	Solve measurement problems	1				1		1	1				1		1
	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					5				5		5	5				5		5

Grade 05 **Mathematics**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	OE	Equating Block (EB) MC	OE	Total Points (Core & EB) MC	OE	Total	Items: Number of Items Core MC	OE	EB MC	OE	Total Number of Items (Core & EB) MC	OE	Total
C: Geometry	1			Analyze characteristics & properties of 2-D & 3-D shapes														
	1	1	1	Identify/classify/compare 3-D figures	1				1		1	1				1		1
	1	1	2	Identify/classify/compare quadrilaterals														
	1	2	1	Identify/draw/label points, lines, segments, rays, planes	1				1		1	1				1		1
	Total For Assessment Anchor C.1 Analyze characteristics and properties of two- and three-dimensional geometric shapes				2				2		2	2				2		2
	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	1				1		1	1				1		1
	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					5				5		5	5				5		5

Grade 05 **Mathematics**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	OE	Equating Block (EB) MC	OE	Total Points (Core & EB) MC	OE	Total	Items: Number of Items Core MC	OE	EB MC	OE	Total Number of Items (Core & EB) 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	2	Create numerical or geometric pattern														
	1	2	1	Form/illustrate pattern rule														
	Total For Assessment Anchor D.1 Understand patterns, relations and functions					4				4	4		1				1	1
	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	1				1		1	1				1		1
	Total For Assessment Anchor D.2 Represent/analyze mathematical situations using numbers, symbols, words, tables and/or graphs				2				2		2	2				2		2
Total For Reporting Category D					2	4			2	4	6	2	1			2	1	3

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)		
												Core		EB				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total
E: Data Analysis and Probability	1			Formulate/answer questions; organize, display, interpret or analyze data														
	1	1	1	Interpret/display data	1				1		1	1				1		1
	Total For Assessment Anchor E.1 Formulate or answer questions about data and/or organize, display, interpret or analyze data				1				1		1	1				1		1
	2			Select and/or use appropriate statistical methods to analyze data														
	2	1	1	Determine the mean, median, range	1				1		1	1				1		1
	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				2				2		2	2				2		2
	3			Understand/apply basic concepts of probability or outcomes														
	3	1	1	Predict/determine likelihood of outcomes	1				1		1	1				1		1
	3	1	2	Determine probability of outcome	1				1		1	1				1		1
	Total For Assessment Anchor E.3 Understand and/or apply basic concepts of probability or outcomes				2				2		2	2				2		2
Total For Reporting Category E					5				5		5	5				5		5

Grade 06 **Mathematics**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points)		Points: Equating Block (EB)		Points: Total Points (Core & EB)			Items: Number of Items: Core		Items: Number of Items: EB		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	1	2	Convert between fractions and decimals/differentiate between terminating & repeating decimals	1				1		1	1				1		1
	1	1	3	Represent number in exponential form	1				1		1	1				1		1
	1	1	4	Represent mixed number as an improper fraction	1				1		1	1				1		1
	1	2	1	Compare/order rational numbers except integers														
	1	3	1	Find GCF of two numbers	1				1		1	1				1		1
	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	4	1	Model percents														
	Total For Assessment Anchor A.1 Understand relationships among and representations of numbers and number systems				6				6		6	6				6		6
	2			Understand meanings, uses and relations of operations														
	2	1	1	Complete equations by using properties: associative, commutative, distributive, Identity	2				2		2	2				2		2
	Total For Assessment Anchor A.2 Select /use operations to solve problems				2				2		2	2				2		2
	3			Compute accurately/fluently and make reasonable estimates		4				4	4		1				1	1
	3	1	1	Estimate to solve														
	3	2	1	Solve problems involving operations														
	Total For Assessment Anchor A.3 Compute accurately and fluently and make reasonable estimates					4				4	4		1				1	1
Total For Reporting Category A					8	4			8	4	12	8	1			8	1	9

Grade 06 **Mathematics**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	Points: Student Scores (Core Points) OE	Points: Equating Block (EB) MC	Points: Equating Block (EB) OE	Points: Total Points (Core & EB) MC	Points: Total Points (Core & EB) OE	Points: Total Points (Core & EB) Total	Items: Number of Items Core MC	Items: Number of Items Core OE	Items: Number of Items EB MC	Items: Number of Items EB OE	Items: Total Number of Items (Core & EB) MC	Items: Total Number of Items (Core & EB) OE	Items: Total Number of Items (Core & EB) Total
B: Measurement	1			Understand measurable attributes and units, systems, processes of measurement														
	1	1	1	Determine/compare elapsed time	1				1		1	1				1		1
	Total For Assessment Anchor B.1 Understand measurable attributes and units, systems, processes of measurement				1				1		1	1				1		1
	2			Apply techniques, tools & formulas to determine measurements														
	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	1				1		1	1				1		1
	2	3	1	Define/label/identify angles	1				1		1	1				1		1
	Total For Assessment Anchor B.2 Apply appropriate techniques, tools and formulas to determine measurements				4				4		4	4				4		4
Total For Reporting Category B					5				5		5	5				5		5

Grade 06 **Mathematics**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	Points: Student Scores (Core Points) OE	Points: Equating Block (EB) MC	Points: Equating Block (EB) OE	Points: Total Points (Core & EB) MC	Points: Total Points (Core & EB) OE	Points: Total Points (Core & EB) Total	Items: Number of Items Core MC	Items: Number of Items Core OE	Items: Number of Items EB MC	Items: Number of Items EB OE	Items: Total Number of Items (Core & EB) MC	Items: Total Number of Items (Core & EB) OE	Items: Total Number of Items (Core & EB) Total
C: Geometry	1			Analyze characteristics & properties of 2-D & 3-D shapes														
	1	1	1	Identify, classify, and compare types of polygons	1				1		1	1				1		1
	1	1	2	Identify properties of all types of triangles	2				2		2	2				2		2
	1	1	3	Solve radius/diameter problems	1				1		1	1				1		1
	1	1	4	Identify/use polygon/circle degrees	1				1		1	1				1		1
	1	2	1	Identify/describe/label parallel, perpendicular, and intersecting lines	1				1		1	1				1		1
	1	2	2	Identify points, planes, lines, line segments, rays, angles, and vertices														
	Total For Assessment Anchor C.1 Analyze characteristics and properties of two- and three-dimensional geometric shapes				6				6		6	6				6		6
	3			Locate points/describe relationships using the coordinate plane														
	3	1	1	Plot points in Quadrant I & on axes	1				1		1	1				1		1
	Total For Assessment Anchor C.3 Locate points or describe relationships using the coordinate plane				1				1		1	1				1		1
Total For Reporting Category C					7				7		7	7				7		7

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)		
												Core		EB				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total
D: Algebraic Concepts	1			Understand patterns, relations and functions														
	1	1	1	Create/extend/complete pattern	1				1		1	1				1		1
	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				3				3		3	3				3		3
	2			Represent/analyze mathematical situations														
	2	1	1	Identify inverse operation to solve one step equation	1				1		1	1				1		1
	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	1				1		1	1				1		1
	Total For Assessment Anchor D.2 Represent/analyze mathematical situations using numbers, symbols, words, tables and/or graphs				4				4		4	4				4		4
Total For Reporting Category D					7				7		7	7				7		7

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)		
												Core		EB				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total
E: Data Analysis and Probability	1			Formulate/answer questions; organize, display, interpret or analyze data														
	1	1	1	Analyze data	1				1		1	1				1		1
	1	1	2	Choose appropriate data representation														
	1	1	3	Display data in graphs, etc.														
	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/use appropriate statistical methods to analyze data		4				4	4		1				1	1
	2	1	1	Determine/calculate mean, median, mode, range	1				1		1	1				1		1
	Total For Assessment Anchor E.2 Select and/or use appropriate statistical methods to analyze data				1	4			1	4	5	1	1			1	1	2
	3			Understand/apply basic concepts of probability or outcomes														
	3	1	1	Define/find probability														
	3	1	2	Determine/show combinations	1				1		1	1				1		1
	Total For Assessment Anchor E.3 Understand and/or apply basic concepts of probability or outcomes				1				1		1	1				1		1
Total For Reporting Category E					3	4			3	4	7	3	1			3	1	4

Grade 07 **Mathematics**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points)		Points: Equating Block (EB)		Points: Total Points (Core & EB)			Items: Number of Items: Core		Items: Number of Items: EB		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	1				1		1	1				1		1
	1	2	1	Compare/order rational numbers	2				2		2	2				2		2
	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				3				3		3	3				3		3
	2			Understand meanings, uses and relations of operations		4				4	4		1				1	1
	2	1	1	Use order of operations														
	2	2	1	Write ratios to compare quantities														
	2	2	2	Solve for a variable in proportions														
	2	2	3	Use proportions to test equivalency														
	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		1	1				1		1
	Total For Assessment Anchor A.2 Understand meanings, uses of operations and how they relate to each other				1	4			1	4	5	1	1			1	1	2
	3			Compute accurately/fluently and make reasonable estimates														
	3	1	1	Estimate answers involving operations with whole numbers, decimals, fractions and mixed numbers														
	3	2	1	Solve problems involving operations with whole numbers, decimals, fractions and mixed numbers														
	3	2	2	Solve problems involving addition/subtraction of integers	1				1		1	1				1		1
	Total For Assessment Anchor A.3 Compute accurately and fluently and make reasonable estimates				1				1		1	1				1		1
Total For Reporting Category A					5	4			5	4	9	5	1			5	1	6

Grade 07 **Mathematics**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	Points: Student Scores (Core Points) OE	Points: Equating Block (EB) MC	Points: Equating Block (EB) OE	Points: Total Points (Core & EB) MC	Points: Total Points (Core & EB) OE	Points: Total Points (Core & EB) Total	Items: Number of Items Core MC	Items: Number of Items Core OE	Items: Number of Items EB MC	Items: Number of Items EB OE	Items: Total Number of Items (Core & EB) MC	Items: Total Number of Items (Core & EB) OE	Items: Total Number of Items (Core & EB) Total
B: Measurement	1			Understand measurable attributes and units, systems, processes of measurement														
	1	1	1	Add/subtract/convert measurements	1				1		1	1				1		1
	Total For Assessment Anchor B.1 Understand measurable attributes and units, systems, processes of measurement				1				1		1	1				1		1
	2			Apply techniques, tools & formulas to determine measurements														
	2	1	1	Find perimeter and/or area of compound figures														
	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		2	2				2		2
	2	2	1	Interpret and apply scale drawings	1				1		1	1				1		1
	2	2	2	Determine appropriate scale for reduction and enlargement														
	Total For Assessment Anchor B.2 Apply appropriate techniques, tools and formulas to determine measurements				4				4		4	4				4		4
Total For Reporting Category B					5				5		5	5				5		5

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
C: Geometry	1			Analyze characteristics & properties of 2-D & 3-D shapes														
	1	1	1	Identify diameter, radius, chord, circumference in circles	1				1		1	1				1		1
	1	1	2	Solve problems using radius/diameter relationship	1				1		1	1				1		1
	1	1	3	Identify parallel, perpendicular, and skew lines in a 3-dimensional figure	1				1		1	1				1		1
	1	2	1	Identify similar/congruent polygons	1				1		1	1				1		1
	1	2	2	Identify corresponding sides/angles	1				1		1	1				1		1
	Total For Assessment Anchor C.1 Analyze characteristics and properties of two- and three-dimensional geometric shapes				5				5		5	5				5		5
	3			Locate points/describe relationships using the coordinate plane														
	3	1	1	Plot/identify ordered pairs	1				1		1	1				1		1
	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				2				2		2	2				2		2
Total For Reporting Category C					7				7		7	7				7		7

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				3		3	3				3		3
	Total For Assessment Anchor D.1 Understand patterns, relations and functions				3				3		3	3				3		3
	2			Represent/analyze mathematical situations														
	2	1	1	Solve one-step equations	1				1		1	1				1		1
	2	1	2	Use substitution of variables to simplify expression	1				1		1	1				1		1
	2	2	1	Identify mathematical models	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
	3			Analyze change in various contexts		4				4	4		1				1	1
	3	1	1	Solve problems w/ constant rate of change	1				1		1	1				1		1
	3	1	2	Describe or use a rate of change shown on a graph														
	Total For Assessment Anchor D.3 Analyze change in various contexts				1	4			1	4	5	1	1			1	1	2
Total For Reporting Category D					7	4			7	4	11	7	1			7	1	8

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

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)		
												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	1				1		1	1				1		1
	1	1	2	Find the square/cube/square root	1				1		1	1				1		1
	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		1	1				1		1
	2	2	1	Use ratios, proportions, percents to solve problems														
	2	2	2	Represent or solve rate problems														
	Total For Assessment Anchor A.2 Understand meanings, uses of operations and how they relate to each other				1	4			1	4	5	1	1			1	1	2
	3			Compute accurately/fluently and make reasonable estimates														
	3	1	1	Explain when to round up or down														
	3	1	2	Explain when to estimate														
	3	2	1	Estimate percent problems														
	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				1				1		1	1				1		1
Total For Reporting Category A					4	4			4	4	8	4	1			4	1	5

Grade 08 **Mathematics**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	Points: Student Scores (Core Points) OE	Points: Equating Block (EB) MC	Points: Equating Block (EB) OE	Points: Total Points (Core & EB) MC	Points: Total Points (Core & EB) OE	Points: Total Points (Core & EB) Total	Items: Number of Items Core MC	Items: Number of Items Core OE	Items: Number of Items EB MC	Items: Number of Items EB OE	Items: Total Number of Items (Core & EB) MC	Items: Total Number of Items (Core & EB) OE	Items: Total Number of Items (Core & EB) Total
B: Measurement	1			Understand measurable attributes and units, systems, processes of measurement														
	1	1	1	Convert metric measurements	1				1		1	1				1		1
	1	1	2	Convert customary measurements	1				1		1	1				1		1
	1	1	3	Convert time														
	1	1	4	Convert temperature														
	Total For Assessment Anchor B.1 Understand measurable attributes and units, systems, processes of measurement				2				2		2	2				2		2
	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														
	2	2	1	Calculate surface area of cubes and rectangular prisms														
	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														
	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					5				5		5	5				5		5

Grade 08 **Mathematics**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	OE	Equating Block (EB) MC	OE	Total Points (Core & EB) MC	OE	Total	Items: Number of Items Core MC	OE	EB MC	OE	Total Number of Items (Core & EB) 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	1				1		1	1				1		1
	1	1	3	Define, identify, and use properties of angles formed when parallel lines are cut by a transversal	1				1		1	1				1		1
	1	2	1	Use the Pythagorean Theorem	2				2		2	2				2		2
	Total For Assessment Anchor C.1 Analyze characteristics and properties of two- and three-dimensional geometric shapes				6				6		6	6				6		6
	3			Locate points/describe relationships using the coordinate plane														
	3	1	1	Plot/locate/identify ordered pairs	1				1		1	1				1		1
	Total For Assessment Anchor C.3 Locate points or describe relationships using the coordinate plane				1				1		1	1				1		1
Total For Reporting Category C					7				7		7	7				7		7

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)		
												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	Continue numeric/algebraic pattern	2				2		2	2				2		2
	1	1	2	Find missing element in pattern														
	1	1	3	Write/state rule of function	1				1		1	1				1		1
	Total For Assessment Anchor D.1 Understand patterns, relations and functions				3				3		3	3				3		3
	2			Represent/analyze mathematical situations		4				4	4		1				1	1
	2	1	1	Solve equations/inequalities														
	2	1	2	Use substitution to check solution														
	2	1	3	Simplify/substitute for expression	2				2		2	2				2		2
	2	2	1	Match written situation to expression, equation, or inequality														
	2	2	2	Write/solve equation for a situation														
	Total For Assessment Anchor D.2 Represent/analyze mathematical situations using numbers, symbols, words, tables and/or graphs				2	4			2	4	6	2	1			2	1	3
	4			Describe/use models to represent quantitative relationships														
	4	1	1	Graph linear function from x/y table	1				1		1	1				1		1
	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														
	Total For Assessment Anchor D.4 Describe/use models to represent quantitative relationships				2				2		2	2				2		2
Total For Reporting Category D					7	4			7	4	11	7	1			7	1	8

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)		
												Core		EB				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total
E: Data Analysis and Probability	1			Formulate/answer questions; organize, display, interpret or analyze data														
	1	1	1	Choose correct data representation	1				1		1	1				1		1
	1	1	2	Display and/or interpret data	1				1		1	1				1		1
	1	1	3	Interpret stem-and-leaf, box-and-whisker plots	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				4				4		4	4				4		4
	3			Understand/apply basic concepts of probability or outcomes														
	3	1	1	Find probability	1				1		1	1				1		1
	3	2	1	Calculate show number of permutations/combinations														
	Total For Assessment Anchor E.3 Understand and/or apply basic concepts of probability or outcomes				1				1		1	1				1		1
	4			Develop/evaluate inferences & predictions based on data														
	4	1	1	Fit line to scatter plot; describe correlation	1				1		1	1				1		1
	4	1	2	Make predictions based on data	1				1		1	1				1		1
	Total For Assessment Anchor E.4 Develop/evaluate inferences & predictions or draw conclusions based on data or data displays				2				2		2	2				2		2
Total For Reporting Category E					7				7		7	7				7		7

Grade 11 **Mathematics**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	Points: Student Scores (Core Points) OE	Points: Equating Block (EB) MC	Points: Equating Block (EB) OE	Points: Total Points (Core & EB) MC	Points: Total Points (Core & EB) OE	Points: Total Points (Core & EB) Total	Items: Number of Items Core MC	Items: Number of Items Core OE	Items: Number of Items EB MC	Items: Number of Items EB OE	Items: Total Number of Items (Core & EB) MC	Items: Total Number of Items (Core & EB) OE	Items: Total Number of Items (Core & EB) Total
A: Numbers and Operations	1			Understand relationships and representations of numbers and number systems														
	1	1	1	Find square root of an integer	1				1		1	1				1		1
	1	1	2	Use scientific notation														
	1	1	3	Simplify square roots														
	1	2	1	Find/use GCF (monomial)														
	1	3	1	Identify irrational numbers on a number line	1				1		1	1				1		1
	1	3	2	Compare and/or order real numbers														
	Total For Assessment Anchor A.1 Understand relationships among and representations of numbers and number systems				2				2		2	2				2		2
	2			Understand meanings, uses and relations of operations														
	2	1	1	Solve problems using operations with rational numbers	1				1		1	1				1		1
	2	1	2	Solve problems using direct and inverse proportions	1				1		1	1				1		1
	2	1	3	Identify/use proportional relationships														
	2	2	1	Simplify expressions with exponents/roots/absolute value														
	2	2	2	Simplify expressions involving operations of powers														
	Total For Assessment Anchor A.2 Understand meanings, uses of operations and how they relate to each other				2				2		2	2				2		2
	3			Compute accurately/fluently and make reasonable estimates														
	3	1	1	Use order of operations to simplify	1				1		1	1				1		1
	3	2	1	Use estimation to solve problems														
	Total For Assessment Anchor A.3 Compute accurately and fluently and make reasonable estimates				1				1		1	1				1		1
Total For Reporting Category A					5				5		5	5				5		5

Grade 11 **Mathematics**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	OE	Equating Block (EB) MC	OE	Total Points (Core & EB) MC	OE	Total	Items: Number of Items Core MC	OE	EB MC	OE	Total Number of Items (Core & EB) MC	OE	Total
B: Measurement	2			Apply techniques, tools & formulas to determine measurements		4				4	4		1				1	1
	2	1	1	Measure and/or compare angles	1				1		1	1				1		1
	2	2	1	Calculate surface area of prisms, cylinders, cones, pyramids, and/or spheres														
	2	2	2	Calculate volume of prisms, cylinders, cones, pyramids, and/or spheres														
	2	2	3	Estimate area, perimeter, or circumference of irregular figure														
	2	2	4	Find missing length measurement														
	2	3	1	Describe effect of linear dimension change														
	Total For Assessment Anchor B.2 Apply appropriate techniques, tools and formulas to determine measurements				1	4			1	4	5	1	1			1	1	2
Total For Reporting Category B					1	4			1	4	5	1	1			1	1	2

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	1	2	Recognize or use properties of arcs, angles, semicircles	1				1		1	1				1		1
	1	2	1	Identify/use triangle properties														
	1	2	2	Recognize/use quadrilateral properties														
	1	2	3	Identify and/or use properties of isosceles and equilateral triangles	1				1		1	1				1		1
	1	3	1	Recognize/use properties of congruent & similar polygons/solids	1				1		1	1				1		1
	1	4	1	Use the Pythagorean Theorem	1				1		1	1				1		1
	Total For Assessment Anchor C.1 Analyze characteristics and properties of two- and three-dimensional geometric shapes				5				5		5	5				5		5
	3			Locate points/describe relationships using the coordinate plane														
	3	1	1	Find distance and/or midpoint	1				1		1	1				1		1
	3	1	2	Relate slope to perpendicularity and/or parallelism														
	Total For Assessment Anchor C.3 Locate points or describe relationships using the coordinate plane				1				1		1	1				1		1
Total For Reporting Category C					6				6		6	6				6		6

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 Core		Number of Items EB		Total Number of Items (Core & EB)		
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total
D: Algebraic Concepts	1			Understand patterns, relations and functions		4				4	4		1				1	1
	1	1	1	Analyze data for pattern; represent pattern algebraically/graphically	1				1		1	1				1		1
	1	1	2	Determine if relation is a function														
	1	1	3	Identify domain, range, and inverse of a relation														
	Total For Assessment Anchor D.1 Understand patterns, relations and functions				1	4			1	4	5	1	1			1	1	2
	2			Represent/analyze mathematical situations														
	2	1	1	Solve compound inequalities and/or graph solution sets on number line														
	2	1	2	Identify or graph linear inequalities on coordinate plane														
	2	1	3	Write and/or solve linear equation	1				1		1	1				1		1
	2	1	4	Solve systems of equations	1				1		1	1				1		1
	2	1	5	Solve quadratic equations using factoring	1				1		1	1				1		1
	2	2	1	Add/subtract/multiply polynomials	1				1		1	1				1		1
	2	2	2	Factor algebraic expressions	1				1		1	1				1		1
	2	2	3	Simplify algebraic fractions														
	Total For Assessment Anchor D.2 Represent/analyze mathematical situations using numbers, symbols, words, tables and/or graphs				5				5		5	5				5		5
	3			Analyze change in various contexts														
	3	1	1	Identify/describe rates of change	1				1		1	1				1		1
	3	1	2	Determine relations in variable changes	1				1		1	1				1		1
	3	2	1	Apply formula for slope of line	1				1		1	1				1		1
	3	2	2	Write/identify linear equation	1				1		1	1				1		1
	3	2	3	Compute slope and/or y-intercept														
	Total For Assessment Anchor D.3 Analyze change in various contexts				4				4		4	4				4		4
	4			Describe/use models to represent quantitative relationships														
	4	1	1	Match graph to table/equation	2				2		2	2				2		2
	Total For Assessment Anchor D.4 Describe or use models to represent quantitative relationships				2				2		2	2				2		2
Total For Reporting Category D					12	4			12	4	16	12	1			12	1	13

Grade 11 **Mathematics**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	OE	Points: Equating Block (EB) MC	OE	Points: Total Points (Core & EB) MC	OE	Total	Items: Number of Items Core MC	OE	Items: Number of Items EB MC	OE	Items: Total Number of Items (Core & EB) 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	2	Answer questions based on displayed data	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				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	1				1		1	1				1		1
	2	1	2	Calculate and/or interpret range, quartiles, interquartile range	1				1		1	1				1		1
	2	1	3	Describe influence of outliers														
	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	Determine probabilities														
	3	1	2	Determine, convert and/or compare probability and/or odds														
	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																	
	4			Develop/evaluate inferences, predictions or draw conclusions based on data														
	4	1	1	Estimate or calculate predictions based on circle, line, bar graphs	1				1		1	1				1		1
	4	1	2	Use probability to predict outcomes														
	4	2	1	Draw/write equation for best-fit line	1				1		1	1				1		1
	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					6				6		6	6				6		6

Grade 03 **Reading**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	OE	Equating Block (EB) MC	OE	Total Points (Core & EB) MC	OE	Total	Items: Number of Items Core MC	OE	EB MC	OE	Total Number of Items (Core & EB) MC	OE	Total
A: Comprehension and Reading Skills	1	1	1	Identify meaning of multiple-meaning words														
	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														
	1	3	1	Make inferences/draw conclusions														
	1	4	1	Identify main ideas/relevant details														
	1	5	1	Summarize key details and events of a text as a whole														
	1	6	1	Identify author's purpose for writing text														
	Total For Assessment Anchor A.1 Understand fiction appropriate to grade level.																	
	2	1	1	Identify meaning of multiple-meaning words														
	2	1	2	Identify meaning of content-specific words														
	2	2	1	Identify meaning of word with an affix/how meaning changes														
	2	2	2	Define words from context clues														
	2	3	1	Make inferences/draw conclusions														
	2	4	1	Identify main ideas/relevant details														
	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.																	
Total For Reporting Category A																		

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)		
												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														
	1	2	1	Connections between texts														
	Total For Assessment Anchor B.1 Understand components within and between texts.																	
	2	1	1	Identify examples of personification														
	Total For Assessment Anchor B.2 Understand literary devices in fictional and nonfictional text.																	
	3	1	1	Identify fact/opinion														
	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														
	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.																	
Total For Reporting Category B																		

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	2	Identify synonym/antonym														
	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	3	1	Make inferences/draw conclusions	5				5		5	5				5		5
	1	4	1	Identify main ideas/relevant details	4				4		4	4				4		4
	1	5	1	Summarize key details and events of a text as a whole														
	1	6	1	Identify author's purpose for writing text	1				1		1	1				1		1
	Total For Assessment Anchor A.1 Understand fiction appropriate to grade level.				11				11		11	11				11		11
	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	1				1		1	1				1		1
	2	4	1	Identify main ideas/relevant details	4	3			4	3	7	4	1			4	1	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	1				1		1	1				1		1
	Total For Assessment Anchor A.2 Understand nonfiction appropriate to grade level.				8	3			8	3	11	8	1			8	1	9
Total For Reporting Category A					19	3			19	3	22	19	1			19	1	20

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
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	5	3			5	3	8	5	1			5	1	6
	1	2	1	Connections between texts														
	Total For Assessment Anchor B.1 Understand components within and between texts.				5	3			5	3	8	5	1			5	1	6
	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 examples of alliteration	1				1		1	1				1		1
	Total For Assessment Anchor B.2 Understand literary devices in fictional and nonfictional text.				4				4		4	4				4		4
	3	1	1	Identify fact/opinion														
	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														
	Total For Assessment Anchor B.3 Understand concepts and organization of nonfictional text.				2				2		2	2				2		2
Total For Reporting Category B					11	3			11	3	14	11	1			11	1	12

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)		
												Core		EB				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total
A: Comprehension and Reading Skills	1	1	1	Identify meaning of multiple-meaning words														
	1	1	2	Identify synonym/antonym	1				1		1	1				1		1
	1	2	1	Identify meaning of word with an affix/how meaning changes	1				1		1	1				1		1
	1	2	2	Define words from context clues	1				1		1	1				1		1
	1	3	1	Make inferences/draw conclusions	4				4		4	4				4		4
	1	3	2	Cite evidence from text to support generalizations														
	1	4	1	Identify and/or interpret main ideas/relevant details	2				2		2	2				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	2				2		2	2				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.				11				11		11	11				11		11
	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	1				1		1	1				1		1
	2	2	2	Define words from context clues														
	2	3	1	Make inferences/draw conclusions	2				2		2	2				2		2
	2	3	2	Cite evidence from text to support generalizations														
	2	4	1	Identify and/or interpret main ideas/relevant details	5	3			5	3	8	5	1			5	1	6
	2	5	1	Summarize major points/processes/events of a text as a whole														
	2	6	1	Identify author's purpose for writing text	1				1		1	1				1		1
	2	6	2	Identify text that supports the author's intended purpose														
	Total For Assessment Anchor A.2 Understand nonfiction appropriate to grade level.				10	3			10	3	13	10	1			10	1	11
Total For Reporting Category A					21	3			21	3	24	21	1			21	1	22

Grade 05 **Reading**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	Points: Student Scores (Core Points) OE	Points: Equating Block (EB) MC	Points: Equating Block (EB) OE	Points: Total Points (Core & EB) MC	Points: Total Points (Core & EB) OE	Points: Total Points (Core & EB) Total	Items: Number of Items Core MC	Items: Number of Items Core OE	Items: Number of Items EB MC	Items: Number of Items EB OE	Items: Total Number of Items (Core & EB) MC	Items: Total Number of Items (Core & EB) OE	Items: Total Number of Items (Core & EB) 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	4	3			4	3	7	4	1			4	1	5
	1	2	1	Connections between texts														
	Total For Assessment Anchor B.1 Understand components within and between texts.				4	3			4	3	7	4	1			4	1	5
	2	1	1	Identify examples of personification														
	2	1	2	Identify examples of similes	2				2		2	2				2		2
	2	1	3	Identify/interpret examples of alliteration														
	2	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.				4				4		4	4				4		4
	3	1	1	Identify fact/opinion	1				1		1	1				1		1
	3	2	1	Identify exaggeration (bias)														
	3	3	1	Identify text organization (sequence, question/answer, comparison/contrast, cause/effect, problem/solution)														
	3	3	2	Use headings to locate information or identify content that fits into a specific section														
	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.				1				1		1	1				1		1
Total For Reporting Category B					9	3			9	3	12	9	1			9	1	10

Grade 06 **Reading**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	Points: Student Scores (Core Points) OE	Points: Equating Block (EB) MC	Points: Equating Block (EB) OE	Points: Total Points (Core & EB) MC	Points: Total Points (Core & EB) OE	Points: Total Points (Core & EB) Total	Items: Number of Items Core MC	Items: Number of Items Core OE	Items: Number of Items EB MC	Items: Number of Items EB OE	Items: Total Number of Items (Core & EB) MC	Items: Total Number of Items (Core & EB) OE	Items: Total Number of Items (Core & EB) Total
A: Comprehension and Reading Skills	1	1	1	Apply meaning of multiple-meaning words in text														
	1	1	2	Identify synonym/antonym	1				1		1	1				1		1
	1	2	1	Identify meaning of word with an affix/how meaning changes	2				2		2	2				2		2
	1	2	2	Define words from context clues	1				1		1	1				1		1
	1	3	1	Make inferences/draw conclusions	1				1		1	1				1		1
	1	3	2	Cite evidence from text to support generalizations														
	1	4	1	Identify and/or interpret main ideas/relevant details	1				1		1	1				1		1
	1	5	1	Summarize key details and events of a text as a whole														
	1	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				6		6	6				6		6
	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														
	2	2	2	Define words from context clues	3				3		3	3				3		3
	2	3	1	Make inferences/draw conclusions	1				1		1	1				1		1
	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	7	3			7	3	10	7	1			7	1	8
	2	5	1	Summarize major points/processes/events of a text as a whole														
	2	6	1	Identify author's purpose for writing text	1				1		1	1				1		1
	2	6	2	Identify text that supports the author's intended purpose														
	Total For Assessment Anchor A.2 Understand nonfiction appropriate to grade level.				13	3			13	3	16	13	1			13	1	14
Total For Reporting Category A					19	3			19	3	22	19	1			19	1	20

Grade 06 **Reading**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	Student Scores OE	Equating Block (EB) MC	Equating Block (EB) OE	Total Points (Core & EB) MC	Total Points OE	Total Points Total	Items: Number of Items Core MC	Core OE	EB MC	EB OE	Total Number of Items (Core & EB) 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	3	6	3	1			3	1	4
	1	2	1	Connections between texts	1				1		1	1				1		1
	Total For Assessment Anchor B.1 Understand components within and between texts.				4	3			4	3	7	4	1			4	1	5
	2	1	1	Identify examples of personification														
	2	1	2	Identify examples of similes	2				2		2	2				2		2
	2	1	3	Identify/interpret examples of alliteration	1				1		1	1				1		1
	2	1	4	Identify/interpret examples of metaphors														
	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														
	Total For Assessment Anchor B.2 Understand literary devices in fictional and nonfictional text.				3				3		3	3				3		3
	3	1	1	Identify fact/opinion	2				2		2	2				2		2
	3	2	1	Identify exaggeration (bias)	1				1		1	1				1		1
	3	3	1	Identify text organization (sequence, question/answer, comparison/contrast, cause/effect, problem/solution)	1				1		1	1				1		1
	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														
	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					11	3			11	3	14	11	1			11	1	12

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)		
												Core		EB				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total
A: Comprehension and Reading Skills	1	1	1	Apply meaning of multiple-meaning words in text	1				1		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
	1	2	2	Define words from context clues														
	1	3	1	Make inferences/draw conclusions	4				4		4	4				4		4
	1	3	2	Cite evidence from text to support generalizations														
	1	4	1	Identify and/or interpret main ideas/relevant details	2				2		2	2				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	6	2	Identify text that supports the author's intended purpose														
	Total For Assessment Anchor A.1 Understand fiction appropriate to grade level.				8				8		8	8				8		8
	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														
	2	2	2	Define words from context clues														
	2	3	1	Make inferences/draw conclusions	2	3			2	3	5	2	1			2	1	3
	2	3	2	Cite evidence from text to support generalizations														
	2	4	1	Identify and/or interpret main ideas/relevant details	5				5		5	5				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	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.				8	3			8	3	11	8	1			8	1	9
Total For Reporting Category A					16	3			16	3	19	16	1			16	1	17

Grade 07 **Reading**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	Student Scores (Core Points) OE	Equating Block (EB) MC	Equating Block (EB) OE	Total Points (Core & EB) MC	Total Points (Core & EB) OE	Total Points (Core & EB) Total	Items: Number of Items Core MC	Number of Items Core OE	Number of Items EB MC	Number of Items EB OE	Total Number of Items (Core & EB) MC	Total Number of Items (Core & EB) OE	Total Number of Items (Core & EB) 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	11	3			11	3	14	11	1			11	1	12
	1	2	1	Connections between texts														
	Total For Assessment Anchor B.1 Understand components within and between texts.				11	3			11	3	14	11	1			11	1	12
	2	1	1	Interpret/analyze examples of personification, simile, alliteration, metaphor, hyperbole, and imagery	1				1		1	1				1		1
	2	1	2	Identify author's purpose/effectiveness of figurative language	1				1		1	1				1		1
	2	2	1	Identify point of view of the narrator as first or third person														
	2	2	2	Describe the effectiveness of the point of view used by the author														
	Total For Assessment Anchor B.2 Understand literary devices in fictional and nonfictional text.				2				2		2	2				2		2
	3	1	1	Use of facts and opinions to make a point/construct an argument														
	3	2	1	Identify bias/propaganda techniques														
	3	3	1	Analyze text organization (sequence, question/answer, comparison/contrast, cause/effect, problem/solution)														
	3	3	2	Identify content that fits into a specific section														
	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														
	Total For Assessment Anchor B.3 Understand concepts and organization of nonfictional text.				1				1		1	1				1		1
Total For Reporting Category B					14	3			14	3	17	14	1			14	1	15

Grade 08 **Reading**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	Points: Student Scores (Core Points) OE	Points: Equating Block (EB) MC	Points: Equating Block (EB) OE	Points: Total Points (Core & EB) MC	Points: Total Points (Core & EB) OE	Points: Total Points (Core & EB) Total	Items: Number of Items Core MC	Items: Number of Items Core OE	Items: Number of Items EB MC	Items: Number of Items EB OE	Items: Total Number of Items (Core & EB) MC	Items: Total Number of Items (Core & EB) OE	Items: Total Number of Items (Core & EB) Total
A: Comprehension and Reading Skills	1	1	1	Apply meaning of multiple-meaning words in text	1				1		1	1				1		1
	1	1	2	Identify synonym/antonym	1				1		1	1				1		1
	1	2	1	Identify meaning of word with an affix/how meaning changes														
	1	2	2	Define words from context clues														
	1	3	1	Make inferences/draw conclusions	3				3		3	3				3		3
	1	3	2	Cite evidence from text to support generalizations														
	1	4	1	Identify and/or interpret main ideas/relevant details	1				1		1	1				1		1
	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	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			6	3	9	6	1			6	1	7
	2	1	1	Apply meaning of multiple-meaning words in text														
	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	1				1		1	1				1		1
	2	3	1	Make inferences/draw conclusions	1				1		1	1				1		1
	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	2	3			2	3	5	2	1			2	1	3
	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				2		2	2				2		2
	2	6	2	Identify text that supports the author's intended purpose														
	Total For Assessment Anchor A.2 Understand nonfiction appropriate to grade level.				9	3			9	3	12	9	1			9	1	10
Total For Reporting Category A					15	6			15	6	21	15	2			15	2	17

Grade 08 **Reading**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	Points: Student Scores (Core Points) OE	Points: Equating Block (EB) MC	Points: Equating Block (EB) OE	Points: Total Points (Core & EB) MC	Points: Total Points (Core & EB) OE	Points: Total Points (Core & EB) Total	Items: Number of Items Core MC	Items: Number of Items Core OE	Items: Number of Items EB MC	Items: Number of Items EB OE	Items: Total Number of Items (Core & EB) MC	Items: Total Number of Items (Core & EB) OE	Items: Total Number of Items (Core & EB) 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	3				3		3
	1	2	1	Connections between texts	2				2		2	2				2		2
	Total For Assessment Anchor B.1 Understand components within and between texts.				5				5		5	5				5		5
	2	1	1	Interpret/analyze examples of personification, simile, metaphor, hyperbole, and imagery	2				2		2	2				2		2
	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	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				4		4	4				4		4
	3	1	1	Use of facts and opinions to make a point/construct an argument	3				3		3	3				3		3
	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	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														
	Total For Assessment Anchor B.3 Understand concepts and organization of nonfictional text.				6				6		6	6				6		6
Total For Reporting Category B					15				15		15	15				15		15

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)		
												Core		EB				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total
A: Comprehension and Reading Skills	1	1	1	Apply meaning of multiple-meaning words in text														
	1	1	2	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	3	1	Make inferences/draw conclusions	3				3		3	3				3		3
	1	3	2	Cite evidence from text to support generalizations														
	1	4	1	Identify and/or interpret main ideas/relevant details	1				1		1	1				1		1
	1	5	1	Summarize key details and events of a text as a whole														
	1	6	1	Identify author's purpose for writing text														
	1	6	2	Identify text that supports the author's intended purpose														
	Total For Assessment Anchor A.1 Understand fiction appropriate to grade level.				5				5		5	5				5		5
	2	1	1	Apply meaning of multiple-meaning words in text														
	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	1				1		1	1				1		1
	2	3	1	Make inferences/draw conclusions		3				3	3		1				1	1
	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	7				7		7	7				7		7
	2	5	1	Summarize major points/processes/events of a text as a whole														
	2	6	1	Identify author's purpose for writing text	1				1		1	1				1		1
	2	6	2	Identify text that supports the author's intended purpose														
	Total For Assessment Anchor A.2 Understand nonfiction appropriate to grade level.				12	3			12	3	15	12	1			12	1	13
Total For Reporting Category A					17	3			17	3	20	17	1			17	1	18

Grade 11 **Reading**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	Points: Student Scores (Core Points) OE	Points: Equating Block (EB) MC	Points: Equating Block (EB) OE	Points: Total Points (Core & EB) MC	Points: Total Points (Core & EB) OE	Points: Total Points (Core & EB) Total	Items: Number of Items Core MC	Items: Number of Items Core OE	Items: Number of Items EB MC	Items: Number of Items EB OE	Items: Total Number of Items (Core & EB) MC	Items: Total Number of Items (Core & EB) OE	Items: Total Number of Items (Core & EB) 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	3	3			3	3	6	3	1			3	1	4
	1	2	1	Connections between texts	2				2		2	2				2		2
	Total For Assessment Anchor B.1 Understand components within and between texts.				5	3			5	3	8	5	1			5	1	6
	2	1	1	Analyze examples of personification, simile, metaphor, hyperbole, satire, imagery, foreshadowing, flashbacks, and irony	2				2		2	2				2		2
	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	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				4		4	4				4		4
	3	1	1	Use of facts and opinions to make a point/construct an argument														
	3	2	1	Identify bias/propaganda techniques														
	3	2	2	Analyze the effectiveness of bias/propaganda techniques	1				1		1	1				1		1
	3	3	1	Analyze the effect of text organization including use of headers														
	3	3	2	Analyze author's purpose for text organization and content	1				1		1	1				1		1
	3	3	3	Analyze and make connections between graphics/charts/texts	1				1		1	1				1		1
	3	3	4	Sequence of steps in a list of directions	1				1		1	1				1		1
	Total For Assessment Anchor B.3 Understand concepts and organization of nonfictional text.				4				4		4	4				4		4
Total For Reporting Category B					13	3			13	3	16	13	1			13	1	14

Grade 04 **Science**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	Points: Student Scores (Core Points) OE	Points: Equating Block (EB) MC	Points: Equating Block (EB) OE	Points: Total Points (Core & EB) MC	Points: Total Points (Core & EB) OE	Points: Total Points (Core & EB) Total	Items: Number of Items Core MC	Items: Number of Items Core OE	Items: Number of Items EB MC	Items: Number of Items EB OE	Items: Total Number of Items (Core & EB) MC	Items: Total Number of Items (Core & EB) OE	Items: Total Number of Items (Core & EB) Total
	1	1	1	Distinguish between a scientific fact and an opinion, providing clear explanations that connect observations and results (e.g., a scientific fact can be supported by making observations).														
	1	1	2	Identify and describe examples of common technological changes past to present in the community (e.g., energy production, transportation, communications, agriculture, packaging materials) that have either positive or negative impacts on society or the environment.														
	1	3	1	Observe and record change by using time and measurement.														
	1	3	2	Describe relative size, distance, or motion.														
	1	3	3	Observe and describe the change to objects caused by temperature change or light.														
	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	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.														
	Total For Assessment Anchor A.1 Reasoning and Analysis																	
	2	1	1	Generate questions about objects, organisms, or events that can be answered through scientific investigations.														
	2	1	2	Design and describe an investigation (a fair test) to test one variable.														

A: Nature of Science	2	1	3	Observe a natural phenomenon (e.g., weather changes, length of daylight/night, movement of shadows, animal migrations, growth of plants), record observations, and then make a prediction based on those observations.															
	2	1	4	State a conclusion that is consistent with the information/data.															
	2	2	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).															
	Total For Assessment Anchor A.2 Processes, Procedures, and Tools of Scientific Investigations																		
	3	1	1	Categorize systems as either natural or human-made (e.g., ballpoint pens, simple electrical circuits, plant anatomy, water cycle).															
	3	1	2	Explain a relationship between the living and nonliving components in a system (e.g., food web, terrarium).															
	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															
	3	2	2	Use models to make observations to explain how systems work (e.g., water cycle, Sun-Earth-Moon system).															

	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).														
	3	3	1	Identify and describe observable patterns (e.g., growth patterns in plants, weather, water cycle).														
	3	3	2	Predict future conditions/events based on observable patterns (e.g., day/night, seasons, sunrise/sunset, lunar phases).														
	Total For Assessment Anchor A.3 Systems, Models, and Patterns																	
Total For Reporting Category A																		

Grade 04 **Science**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	OE	Points: Equating Block (EB) MC	OE	Points: Total Points (Core & EB) MC	OE	Total	Items: Number of Items Core MC	OE	Items: Number of Items EB MC	OE	Items: Total Number of Items (Core & EB) MC	OE	Total
	1	1	1	Identify life processes of living things (e.g., growth, digestion, respiration).														
	1	1	2	Compare similar functions of external characteristics of organisms (e.g., anatomical characteristics: appendages, type of covering, body segments).														
	1	1	3	Describe basic needs of plants and animals (e.g., air, water, food).														
	1	1	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	5	Describe the life cycles of different organisms (e.g., moth, grasshopper, frog, seed-producing plant).														
	Total For Assessment Anchor B.1 Structures and Functions of Organisms																	
	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).														
	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.														
	Total For Assessment Anchor B.2 Continuity of Life																	

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.															
	3	2	1	Describe what happens to a living thing when its habitat is changed.															
	3	2	2	Describe and predict how changes in the environment (e.g., fire, pollution, flood, building dams) can affect systems.															
	3	2	3	Explain and predict how changes in seasons affect plants, animals, or daily human life (e.g., food availability, shelter, mobility).															
	3	3	1	Identify everyday human activities (e.g., driving, washing, eating, manufacturing, farming) within a community that depend on the natural environment.															
	3	3	2	Describe the human dependence on the food and fiber systems from production to consumption (e.g., food, clothing, shelter, products).															
	3	3	3	Identify biological pests (e.g., fungi – molds, plants – foxtail, purple loosestrife, Eurasian water milfoil; animals – aphides, ticks, zebra mussels, starlings, mice) that compete with humans for resources.															
	3	3	4	Identify major land uses in the urban, suburban and rural communities (e.g., housing, commercial, recreation).															
	3	3	5	Describe the effects of pollution (e.g., litter) in the community.															
	Total For Assessment Anchor B.3 Ecological Behavior and Systems																		
Total For Reporting Category B																			

Grade 04 **Science**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points							Items						
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)		
												Core		EB				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total
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.														
	Total For Assessment Anchor C.1 Structures, Properties, and Interaction of Matter and Energy																	
	2	1	1	Identify energy forms, energy transfer, and energy examples (e.g., light, heat, electrical).														
	2	1	2	Describe the flow of energy through an object or system (e.g., feeling radiant heat from a light bulb, eating food to get energy, using a battery to light a bulb or run a fan).														
	2	1	3	Recognize or illustrate simple direct current series and parallel circuits composed of batteries, light bulbs (or other common loads), wire, and on/off switches.														
	2	1	4	Identify characteristics of sound (e.g., pitch, loudness, reflection).														
	Total For Assessment Anchor C.2 Forms, Sources, Conversions, and Transer of Energy																	
	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).														
	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).														
	Total For Assessment Anchor C.3 Principles of Motion and Force																	
Total For Reporting Category C																		

Grade 04 **Science**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	OE	Equating Block (EB) MC	OE	Total Points (Core & EB) MC	OE	Total	Items: Number of Items Core MC	OE	EB MC	OE	Total Number of Items (Core & EB) 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	2	Identify various Earth structures (e.g., mountains, watersheds, peninsulas, lakes, rivers, valleys) through the use of models.														
	1	1	3	Describe the composition of soil as weathered rock and decomposed organic remains.														
	1	2	1	Identify products and by-products of plants and animals for human use (e.g., food, clothing, building materials, paper products).														
	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	2	3	Recognize ways that humans benefit from the use of water resources (e.g., agriculture, energy, recreation).														
	1	3	1	Describe types of freshwater and saltwater bodies (e.g., lakes, rivers, wetlands, oceans).														
	1	3	2	Explain how water goes through phase changes (i.e., evaporation, condensation, freezing, and melting).														
	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																	

	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).														
	2	1	3	Identify appropriate instruments (i.e., thermometer, rain gauge, weather vane, anemometer, and barometer) to study weather and what they measure.														
	Total For Assessment Anchor D.2 Weather, Climate, and Atmospheric Processes																	
	3	1	1	Describe motions of the Sun - Earth - Moon system.														
	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																	
Total For Reporting Category D																		

Grade 08 **Science**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	Points: Student Scores (Core Points) OE	Points: Equating Block (EB) MC	Points: Equating Block (EB) OE	Points: Total Points (Core & EB) MC	Points: Total Points (Core & EB) OE	Points: Total Points (Core & EB) Total	Items: Number of Items Core MC	Items: Number of Items Core OE	Items: Number of Items EB MC	Items: Number of Items EB OE	Items: Total Number of Items (Core & EB) MC	Items: Total Number of Items (Core & EB) OE	Items: Total Number of Items (Core & EB) Total
	1	1	1	Distinguish between a scientific theory and an opinion, explaining how a theory is supported with evidence, or how new data/information may change existing theories and practices														
	1	1	2	Explain how certain questions can be answered through scientific inquiry and/or technological design.	1				1		1	1				1		1
	1	1	3	Use evidence, such as observations or experimental results, to support inferences about a relationship.														
	1	1	4	Develop descriptions, explanations, predictions, and models using evidence.	1				1		1	1				1		1
	1	2	1	Describe the positive and negative, intended and unintended, effects of specific scientific results or technological developments (e.g., air/space travel, genetic engineering, nuclear fission/fusion, artificial intelligence, lasers, organ transplants).														
	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).	1				1		1	1				1		1
	1	2	4	Explain society's standard of living in terms of technological advancements and how these advancements impact on agriculture (e.g., transportation, processing, production, storage).														
	1	3	1	Use ratio to describe change (e.g., percents, parts per million, grams per cubic centimeter, mechanical advantage).														

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.	1				1		1	1				1		1
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.	1				1		1	1				1		1
Total For Assessment Anchor A.1 Reasoning and Analysis				7				7		7	7				7		7
2	1	1	Use evidence, observations, or a variety of scales (e.g., mass, distance, volume, temperature) to describe relationships.														
2	1	2	Use space/time relationships, define concepts operationally, raise testable questions, or formulate hypotheses.	1				1		1	1				1		1
2	1	3	Design a controlled experiment by specifying how the independent variables will be manipulated, how the dependent variable will be measured, and which variables will be held constant.														
2	1	4	Interpret data/observations; develop relationships among variables based on data/observations to design models as solutions.														
2	1	5	Use evidence from investigations to clearly communicate and support conclusions.														
2	1	6	Identify a design flaw in a simple technological system and devise possible working solutions.														
2	2	1	Describe the appropriate use of instruments and scales to accurately and safely measure time, mass, distance, volume, or temperature under a variety of conditions.	2				2		2	2				2		2

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		1
2	2	3	Describe ways technology (e.g., microscope, telescope, micrometer, hydraulics, barometer) extends and enhances human abilities for specific purposes.														
Total For Assessment Anchor A.2 Processes, Procedures, and Tools of Scientific Investigations				4				4		4	4				4		4
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.														
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)].	2				2		2	2				2		2
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.														
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.														
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).														

	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).														
	Total For Assessment Anchor A.3 Systems, Models, and Patterns				4				4		4	4				4		4
Total For Reporting Category A					15				15		15	15				15		15

Grade 08 **Science**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	Points: Student Scores (Core Points) OE	Points: Equating Block (EB) MC	Points: Equating Block (EB) OE	Points: Total Points (Core & EB) MC	Points: Total Points (Core & EB) OE	Points: Total Points (Core & EB) Total	Items: Number of Items Core MC	Items: Number of Items Core OE	Items: Number of Items EB MC	Items: Number of Items EB OE	Items: Total Number of Items (Core & EB) MC	Items: Total Number of Items (Core & EB) OE	Items: Total Number of Items (Core & EB) Total
	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	1	3	Apply knowledge of characteristic structures to identify or categorize organisms (i.e., plants, animals, fungi, bacteria, and protista).														
	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		1
	Total For Assessment Anchor B.1 Structures and Functions of Organisms				2				2		2	2				2		2
	2	1	1	Explain how inherited structures or behaviors help organisms survive and reproduce in different environments.														
	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														

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.														
Total For Assessment Anchor B.2 Continuity of Life				2				2		2	2				2		2
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				1		1	1				1		1
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).														
3	3	3	Describe how waste management affects the environment (e.g., recycling, composting, landfills, incineration, sewage treatment).														

	3	3	4	Explain the long-term effects of using integrated pest management (e.g., herbicides, natural predators, biogenetics) on the environment.														
	Total For Assessment Anchor B.3 Ecological Behavior and Systems				1				1		1	1				1		1
Total For Reporting Category B					5				5		5	5				5		5

Grade 08 **Science**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	Points: Student Scores (Core Points) OE	Points: Equating Block (EB) MC	Points: Equating Block (EB) OE	Points: Total Points (Core & EB) MC	Points: Total Points (Core & EB) OE	Points: Total Points (Core & EB) Total	Items: Number of Items Core MC	Items: Number of Items Core OE	Items: Number of Items EB MC	Items: Number of Items EB OE	Items: Total Number of Items (Core & EB) MC	Items: Total Number of Items (Core & EB) OE	Items: Total Number of Items (Core & EB) Total
C: Physical Sciences	1	1	1	Explain the differences among elements, compounds, and mixtures.														
	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	3	Identify and describe reactants and products of simple chemical reactions.														
	Total For Assessment Anchor C.1 Structures, Properties, and Interaction of Matter and Energy																	
	2	1	1	Distinguish among forms of energy (e.g., electrical, mechanical, chemical, light, sound, nuclear) and sources of energy (i.e., renewable and nonrenewable energy)														
	2	1	2	Explain how energy is transferred from one place to another through convection, conduction, or radiation.	1				1		1	1				1		1
	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		1	1				1		1
	2	2	2	Compare the time span of renewability for fossil fuels and the time span of renewability for alternative fuels.														
	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		1	1				1		1
	Total For Assessment Anchor C.2 Forms, Sources, Conversions, and Transer of Energy				3				3		3	3				3		3
	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.														

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

Grade 08 **Science**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	Points: Student Scores (Core Points) OE	Points: Equating Block (EB) MC	Points: Equating Block (EB) OE	Points: Total Points (Core & EB) MC	Points: Total Points (Core & EB) OE	Points: Total Points (Core & EB) Total	Items: Number of Items Core MC	Items: Number of Items Core OE	Items: Number of Items EB MC	Items: Number of Items EB OE	Items: Total Number of Items (Core & EB) MC	Items: Total Number of Items (Core & EB) OE	Items: Total Number of Items (Core & EB) 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	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
	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).														

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				1		1	1				1		1
	1	3	3	Distinguish among different water systems (e.g., wetland systems, ocean systems, river systems, watersheds) and describe their relationships to each other as well as to landforms.														
	1	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				3				3		3	3				3		3
	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

	3	1	3	Compare and contrast characteristics of celestial bodies found in the solar system (e.g., moons, asteroids, comets, meteors, inner and outer planets).														
	Total For Assessment Anchor D.3 Composition and Structure of the Universe				1				1		1	1				1		1
Total For Reporting Category D					4				4		4	4				4		4

Grade 11 **Science**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	OE	Points: Equating Block (EB) MC	OE	Points: Total Points (Core & EB) MC	OE	Total	Items: Number of Items Core MC	OE	Items: Number of Items EB MC	OE	Items: Total Number of Items (Core & EB) 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.	1				1		1	1				1		1
	1	1	3	Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).	1				1		1	1				1		1
	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).		2				2	2		1				1	1
	1	1	5	Analyze or compare the use of both direct and indirect observation as means to study the world and the universe (e.g., behavior of atoms, functions of cells, birth of stars).														
	1	2	1	Explain and apply scientific concepts to societal issues using case studies (e.g., spread of HIV, deforestation, environmental health, energy).	1				1		1	1				1		1
	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).														

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	3	3	Describe how changes in physical and biological indicators (e.g., soil, plants, animals) of water systems reflect changes in these systems (e.g. changes in bloodworm populations reflect changes in pollution levels in streams).														
1	3	4	Compare the rate of use of natural resources and their impact on sustainability.														
Total For Assessment Anchor A.1 Reasoning and Analysis				4	2			4	2	6	4	1			4	1	5
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.														
2	1	2	Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate, communicate results) applicable to a specific technological design.	1				1		1	1				1		1
2	1	3	Use data to make inferences and predictions, or to draw conclusions, demonstrating understanding of experimental limits.	1				1		1	1				1		1
2	1	4	Critique the results and conclusions of scientific inquiry for consistency and logic.	2				2		2	2				2		2
2	1	5	Communicate results of investigations using multiple representations.	1				1		1	1				1		1
2	2	1	Evaluate appropriate methods, instruments, and scale for precise quantitative and qualitative observations (e.g., to compare properties of materials, water quality).	1				1		1	1				1		1

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														
Total For Assessment Anchor A.2 Processes, Procedures, and Tools of Scientific Investigations				6				6		6	6				6		6
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).														
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.														
3	2	1	Compare the accuracy of predictions represented in a model to actual observations and behavior.														
3	2	2	Describe advantages and disadvantages of using models to simulate processes and outcomes.														
3	2	3	Describe how relationships represented in models are used to explain scientific or technological concepts (e.g., dimensions of objects within the solar system, life spans, size of atomic particles, topographic maps).	1				1		1	1				1		1
3	3	1	Describe or interpret recurring patterns that form the basis of biological classification, chemical periodicity, geological order, or astronomical order.	1				1		1	1				1		1
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).	1				1		1	1				1		1
	Total For Assessment Anchor A.3 Systems, Models, and Patterns				5				5		5	5				5		5
Total For Reporting Category A					15	2			15	2	17	15	1			15	1	16

Grade 11 **Science**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	Points: Student Scores (Core Points) OE	Points: Equating Block (EB) MC	Points: Equating Block (EB) OE	Points: Total Points (Core & EB) MC	Points: Total Points (Core & EB) OE	Points: Total Points (Core & EB) Total	Items: Number of Items Core MC	Items: Number of Items Core OE	Items: Number of Items EB MC	Items: Number of Items EB OE	Items: Total Number of Items (Core & EB) MC	Items: Total Number of Items (Core & EB) OE	Items: Total Number of Items (Core & EB) Total
	1	1	1	Explain how structure determines function at multiple levels of organization (e.g., chemical, cellular, anatomical).														
	1	1	2	Compare and contrast the structural and functional similarities and differences among living things (e.g., classify organisms into classification groups, compare systems).														
	1	1	3	Compare and contrast cellular processes (e.g., photosynthesis and respiration, meiosis and mitosis, protein synthesis and DNA replication).														
	Total For Assessment Anchor B.1 Structures and Functions of Organisms																	
	2	1	1	Explain the theory of evolution by interpreting data from fossil records, similarities in anatomy and physiology, or DNA studies that are relevant to the theory of evolution.														
	2	1	2	Explain the role of mutations, differential reproduction, and gene recombination in changing the genetic makeup of a population.	1				1		1	1				1		1
	2	1	3	Explain the role of selective breeding and biotechnology in changing the genetic makeup of a population.														
	2	1	4	Explain why natural selection can act only on inherited traits.														
	2	2	1	Describe how genetic information is expressed (i.e., DNA, genes, chromosomes, transcription, translation, and replication).														
	2	2	2	Compare and contrast mitosis and meiosis in passing on genetic information.														
	2	2	3	Explain how different patterns of inheritance affect population variability (i.e., multiple alleles, co-dominance, dominance, recessiveness, sex-influenced traits, and sex-linked traits).														
	Total For Assessment Anchor B.2 Continuity of Life				1				1		1	1				1		1

B: Biological Sciences	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.	1				1		1	1				1		1
	3	1	4	Compare the similarities and differences in the major biomes (e.g., desert, tropical rain forest, temperate forest, coniferous forest, tundra) and the communities that inhabit them.														
	3	1	5	Predict how limiting factors (e.g., physical, biological, chemical) can affect organisms.														
	3	2	1	Use evidence to explain how cyclical patterns in population dynamics affect natural systems.														
	3	2	2	Explain biological diversity as an indicator of a healthy environment.	1				1		1	1				1		1
	3	2	3	Explain how natural processes (e.g., seasonal change, catastrophic events, habitat alterations) impact the environment over time.	1				1		1	1				1		1
	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).	1				1		1	1				1		1
	Total For Assessment Anchor B.3 Ecological Behavior and Systems				4				4		4	4				4		4
Total For Reporting Category B					5				5		5	5				5		5

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)		
												Core		EB				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total
	1	1	1	Explain that matter is made of particles called atoms and that atoms are composed of even smaller particles (e.g., protons, neutrons, electrons).	1				1		1	1				1		1
	1	1	2	Explain the relationship between the physical properties of a substance and its molecular or atomic structure.														
	1	1	3	Explain the formation of compounds (ionic and covalent) and their resulting properties using bonding theories.														
	1	1	4	Explain how the relationships of chemical properties of elements are represented in the repeating patterns within the periodic table.														
	1	1	5	Predict the behavior of gases though the application of laws (e.g., Boyle's law, Charles' law, or ideal gas law).														
	1	1	6	Describe factors that influence the frequency of collisions during chemical reactions that might affect the reaction rates (e.g., surface area, concentration, catalyst, temperature).surface area, concentration, catalyst, temperature).	1				1		1	1				1		1
	Total For Assessment Anchor C.1 Structures, Properties, and Interaction of Matter and Energy				2				2		2	2				2		2
	2	1	1	Compare or analyze waves in the electromagnetic spectrum (e.g., ultraviolet, infrared, visible light, X-rays, microwaves) as well as their properties, energy levels, and motion.														
	2	1	2	Describe energy changes in chemical reactions.														
	2	1	3	Apply the knowledge of conservation of energy to explain common systems (e.g., refrigeration, rocket propulsion, heat pump).														
ciences	2	1	4	Use Ohm's Law to explain relative resistances, currents, and voltage.														

C: Physical S	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.	1				1		1	1				1		1
	Total For Assessment Anchor C.2 Forms, Sources, Conversions, and Transer of Energy				1				1		1	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).	1				1		1	1				1		1
	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				1				1		1	1				1		1
Total For Reporting Category C					4				4		4	4				4		4

Grade 11 **Science**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	Points: Student Scores (Core Points) OE	Points: Equating Block (EB) MC	Points: Equating Block (EB) OE	Points: Total Points (Core & EB) MC	Points: Total Points (Core & EB) OE	Points: Total Points (Core & EB) Total	Items: Number of Items Core MC	Items: Number of Items Core OE	Items: Number of Items EB MC	Items: Number of Items EB OE	Items: Total Number of Items (Core & EB) MC	Items: Total Number of Items (Core & EB) OE	Items: Total Number of Items (Core & EB) 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	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).	1				1		1	1				1		1
	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)		2				2	2		1				1	1
	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).	1				1		1	1				1		1

D: Earth and Space Sciences	1	3	2	Explain relationships among physical characteristics, vegetation, topography, and flow as it relates to water systems.														
	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				3	2			3	2	5	3	1			3	1	4
	2	1	1	Describe how changes in concentration of minor components (e.g., O2, CO2, dust, pollution) in Earth's atmosphere may be linked to climate change.														
	2	1	2	Compare the transmission, reflection, absorption, and radiation of solar energy to and by Earth's surface under different environmental conditions (e.g., major volcanic eruptions, greenhouse effect, reduction of ozone layer, increased global cloud cover)	1				1		1	1				1		1
	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				1				1		1	1				1		1
	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.	1				1		1	1				1		1
	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).	1				1		1	1				1		1
	Total For Assessment Anchor D.3 Composition and Structure of the Universe				2				2		2	2				2		2
Total For Reporting Category D					6	2			6	2	8	6	1			6	1	7

Grade 05 **Writing**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	Points: Student Scores (Core Points) OE	Points: Equating Block (EB) MC	Points: Equating Block (EB) OE	Points: Total Points (Core & EB) MC	Points: Total Points (Core & EB) OE	Points: Total Points (Core & EB) Total	Items: Number of Items Core MC	Items: Number of Items Core OE	Items: Number of Items EB MC	Items: Number of Items EB OE	Items: Total Number of Items (Core & EB) MC	Items: Total Number of Items (Core & EB) OE	Items: Total Number of Items (Core & EB) Total
A: Composition	1			Narrative														
	Total For Assessment Anchor A.1 A.S. 1.4 -- Types of Writing																	
	2			Informational														
	Total For Assessment Anchor A.2 A.S. 1.4 -- Types of Writing																	
	3			Persuasive														
	Total For Assessment Anchor A.3 A.S. 1.4 -- Types of Writing																	
Total For Reporting Category A																		

Grade 05 **Writing**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	Points: Student Scores (Core Points) OE	Points: Equating Block (EB) MC	Points: Equating Block (EB) OE	Points: Total Points (Core & EB) MC	Points: Total Points (Core & EB) OE	Points: Total Points (Core & EB) Total	Items: Number of Items Core MC	Items: Number of Items Core OE	Items: Number of Items EB MC	Items: Number of Items EB OE	Items: Total Number of Items (Core & EB) MC	Items: Total Number of Items (Core & EB) OE	Items: Total Number of Items (Core & EB) Total
B: Revising and Edit	5			Editing														
	Total For Assessment Anchor B.5 A.S. 1.5 -- Quality of Writing																	
	6			Revising														
	Total For Assessment Anchor B.6 A.S. 1.5 -- Quality of Writing																	
Total For Reporting Category B																		

Grade 08 **Writing**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points							Items						
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)		
												Core		EB				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total
A: Composition	1			Narrative														
	Total For Assessment Anchor A.1 A.S. 1.4 -- Types of Writing																	
	2			Informational														
	Total For Assessment Anchor A.2 A.S. 1.4 -- Types of Writing																	
	3			Persuasive														
	Total For Assessment Anchor A.3 A.S. 1.4 -- Types of Writing																	
Total For Reporting Category A																		

Grade 08 **Writing**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points							Items						
					Student Scores (Core Points)		Equating Block (EB)		Total Points (Core & EB)			Number of Items				Total Number of Items (Core & EB)		
												Core		EB				
					MC	OE	MC	OE	MC	OE	Total	MC	OE	MC	OE	MC	OE	Total
B: Revising and Edit	5			Editing														
	Total For Assessment Anchor B.5 A.S. 1.5 -- Quality of Writing																	
	6			Revising														
	Total For Assessment Anchor B.6 A.S. 1.5 -- Quality of Writing																	
Total For Reporting Category B																		

Grade 11 **Writing**

<table>
<tr><th rowspan="4">Reporting Category</th><th rowspan="4">Assessment Anchor</th><th rowspan="4">Descriptor (Sub-anchor)</th><th rowspan="4">Eligible Content</th><th rowspan="4">Focus</th><th colspan="7">Points</th><th colspan="7">Items</th></tr>
<tr><th colspan="2" rowspan="2">Student Scores (Core Points)</th><th colspan="2" rowspan="2">Equating Block (EB)</th><th colspan="3" rowspan="2">Total Points (Core & EB)</th><th colspan="4">Number of Items</th><th colspan="3" rowspan="2">Total Number of Items (Core & EB)</th></tr>
<tr><th colspan="2">Core</th><th colspan="2">EB</th></tr>
<tr><th>MC</th><th>OE</th><th>MC</th><th>OE</th><th>MC</th><th>OE</th><th>Total</th><th>MC</th><th>OE</th><th>MC</th><th>OE</th><th>MC</th><th>OE</th><th>Total</th></tr>
<tr><td rowspan="6">A: Composition</td><td>1</td><td></td><td></td><td>Narrative</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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A.S. 1.4 -- Types of Writing</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>2</td><td></td><td></td><td>Informational</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="4">Total For Assessment Anchor A.2
A.S. 1.4 -- Types of Writing</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>3</td><td></td><td></td><td>Persuasive</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="4">Total For Assessment Anchor A.3
A.S. 1.4 -- Types of Writing</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Total For Reporting Category A</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

Grade 11 **Writing**

Reporting Category	Assessment Anchor	Descriptor (Sub-anchor)	Eligible Content	Focus	Points: Student Scores (Core Points) MC	Points: Student Scores (Core Points) OE	Points: Equating Block (EB) MC	Points: Equating Block (EB) OE	Points: Total Points (Core & EB) MC	Points: Total Points (Core & EB) OE	Points: Total Points (Core & EB) Total	Items: Number of Items Core MC	Items: Number of Items Core OE	Items: Number of Items EB MC	Items: Number of Items EB OE	Items: Total Number of Items (Core & EB) MC	Items: Total Number of Items (Core & EB) OE	Items: Total Number of Items (Core & EB) Total
B: Revising and Edit	5			Editing														
	Total For Assessment Anchor B.5 A.S. 1.5 -- Quality of Writing																	
	6			Revising														
	Total For Assessment Anchor B.6 A.S. 1.5 -- Quality of Writing																	
Total For Reporting Category B																		

Appendix D:

Item and Test Development Process

Item and Test Development Process for the PSSA-M

Step	Description
1. Create and Review Guiding Documentation	Item and test development specialists meet internally to review all guiding documentation related to the PSSA and PSSA-M. Documentation reviewed includes the test design blueprints, the Pennsylvania Assessment Anchors and Eligible Content, the test item specifications, and all test content descriptions. In addition, the test style specifications (style guide) are updated with new styles and formats specifically designed for the PSSA-M assessment.
2. Meet with PDE to Confirm Understanding of Program	The goal of the meeting 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, and a projected schedule for the modification of test items—including the number of test items to be modified for review by PDE and subsequent review by the committees of Pennsylvania educators.
4. Meet with PDE to Finalize Test Item Development Plan	Item and test development specialists verify all steps in the development process including timelines and schedules for item modifications and test development.
5. Analyze Item Bank	Existing test items in the current PSSA Item Bank are reviewed as potential candidates for modification and enhancement. During this phase, test development specialists also make a tally of the modified item candidates in the PSSA-M item pool by assessment anchor.
6. Refine Modified Test Item Development Plan to Include Reviewers and Subcontractors	Item and test development specialists identify the item reviewers who will modify the test items (test development specialists or other professional item writers, subcontractors, etc.), the estimated number of item reviewers needed, the qualifications of the item reviewers, and the approximate number of modified test items to be submitted by each source.
7. Train Reviewers	Item and test development specialists train item reviewers, as needed. Item reviewers who have written for the PSSA in the past receive updated information concerning modification and style guidelines for the PSSA-M as needed.

Item and Test Development Process for the PSSA-M

Step	Description
8. Modify and Review Items	Test items are modified by item reviewers after training is complete, and feedback is provided by the item and test development specialists to item reviewers on a regular basis. As test items are modified, 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. The items are also reviewed to ensure that the PSSA-M guidelines for enhancement and modifications have been met.
9. Enter Test Items into Database	Upon acceptance from item writers, test items are entered into the item management system, IDEAS (*Item Development and Educational Assessment System*). 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.
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 Modify and Review Items	The remaining items are modified, and feedback is provided by the item and test development specialists to item reviewers on a regular basis. Items are entered into the item management system, IDEAS (*Item Development and Educational Assessment System*) (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 stimuli 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-M

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 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 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 come to a consensus about any issues that are noted. At both meetings, the results are 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. DRC item and test development specialists then apply the changes to the test items per PDE's decisions.
17. Construct Standalone Field Test Forms	DRC item and test development specialists select test items for inclusion on the standalone field test forms. Selections are based on recommendations from item review committees and their estimations of cognitive and difficulty levels, as well as input and recommendations from PDE.
18. Submit Field Test Forms for Final Sign-Off	PDE-approved changes are applied to the items, stimuli, etc. (Changes reflect PDE's arbitration of the committee decisions.) Once all revisions to the items and/or to the art used by test items are completed, the field test forms are submitted to PDE for final review and sign-off.

Item and Test Development Process for the PSSA-M

Step	Description
19. Review Results of the Field Test	Following the administration of a field test form and the subsequent rangefinding 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. Normally, only field test items with marginal performance data are prepared for the Field Test Item Data Review meeting. However, since the PSSA-M program is in its initial stages, all of the items from the field test are eligible for review.
20. Prepare for Field Test Item Data Review	Test development specialists prepare all items and stimuli 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.
21. Conduct Field Test Item Data Review	Committees of Pennsylvania educators review the performance data of field test items. Psychometrians 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-M 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.
22. Conduct Field Test Item Data Review Reconciliation	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 *Item Development and Educational Assessment System*, IDEAS.
23. Select Core Items for Operational Test Forms	After 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 positions in all test forms.

Item and Test Development Process for the PSSA-M

Step	Description
24. Review Core Selections	After test content and psychometric requirements have been achieved for core positions, the core items are provided to PDE for review and approval. Any changes to the content of the core requested by PDE are balanced with psychometric requirements until all core positions are approved by PDE, test development specialists, and psychometricians.
25. Construct Test Forms	Items and test components are assembled into forms using the form construction and typesetting function of DRC's *Item Development and Educational Assessment System*, IDEAS. Forms are reviewed internally for style and formatting requirements.
26. 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 requested by PDE are balanced with psychometric requirements until all core items are approved by PDE, test development specialists, and psychometricians.
27. 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.
28. 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.

Guidelines for Item Revision and Enhancement

Overview

The PSSA-M will be developed to facilitate students' ability to demonstrate their grade-level content knowledge and skills, as specified in the Pennsylvania Academic Assessment Anchor Content Standards as defined by the Eligible Content. The assessment tasks (items and graphics/stimuli) will be designed with the goal (revised and/or enhanced) to minimize or remove the effects of processing (e.g., cognitive, linguistic) or physical challenges related to students' disabilities without significant alteration of the assessed construct. Therefore, the PSSA-M design considers the particular needs of students eligible for this assessment in order to increase their access to the assessed content—appropriate access to test content is necessary to ensure the validity of the assessment results. Lack of access could result in the measurement of sources of variance that are not related to the intended test content (*construct irrelevance*) or could allow construct-irrelevant factors to interfere with the student's ability to fully demonstrate what he or she knows and can do, and subsequently the test results could underestimate the student's actual level of achievement. Therefore, for the initial field tests (spring 2009 for mathematics and 2010 for reading and science), PSSA-M assessment items, tasks, etc. will be revised and/or enhanced to maintain the integrity of the grade-level content; however, revisions and/or enhancements will be purposefully and necessarily made in the operationalization of the grade-level content in order to address the specific access needs of the students who will be eligible for the PSSA-M.

Three main areas of consideration will affect the initial revision and/or enhancement process involved in the PSSA-M items: student characteristics, assessed content, and item format. Although each of these areas is discussed separately below, the areas interact and have real implications for item revisions and/or enhancements.

Student Characteristics

Students who will be eligible for the PSSA-M generally have difficulty processing information (e.g., working memory limitations, attention deficits). Therefore, reflected in the item revisions and/or enhancements will be methods for (1) appropriately reducing the cognitive load (e.g., amount and complexity of information), (2) appropriately reducing language load (i.e., construct-irrelevant language) of the assessed content, and/or (3) supporting students' processing of information (e.g., by segmenting or chunking information or by providing graphics that support understanding) in order to address their access needs and increase the validity of assessment results for these students.

Assessed Content

Given the capabilities and limitations of students eligible for the PSSA-M, some grade-level content may be less accessible to these students. For example, the ability to infer and to make connections among multiple pieces of information is a common challenge for learning disabled (LD) students in this population. Therefore, reflected in each item will be specific parameters for content that ensure it (1) is appropriate for the student population, (2) is consistent with the intention of the grade-level Assessment Anchor Content Standard as defined by the Eligible Content, and (3) adequately represents the breadth and depth of the Assessment Anchor Content Standard as defined by the Eligible Content (i.e., does not under-represent the targeted construct). This may well mean that some of the Eligible Content may be simplified and/or eliminated.

Note: The initial phases of PSSA-M item revisions and/or enhancement of the items will rely primarily on expert judgment (e.g., PDE content-area experts and special educators; Pennsylvania content-area experts and special education experts; and additional content-area experts and special education experts from WestEd and DRC). Expert judgment will be supplemented with PDE's analyses of the student performance data (e.g., p-values, point biserials, and omission rates). In addition, Cognitive Interviews will also be conducted prior to the field test.

Item Format

Item formats involve consideration of the degree to which the item format could (1) reliably measure the student's knowledge/skill, (2) yield an accurate measure of the student's knowledge/skill, and (3) have embedded the type of support or enhancement (e.g., graphic, context clues, range of permissible ways the student can process—reception and/or production—the assessed content) the student needs to access and demonstrate understanding of the assessed content. Item format considerations are as follows:

Font (Typeface)

- Introducing bolding, underlining, and other text changes (font size, italics, etc.) if item validity and construct alignment are not affected.
- Adding more space between letters and words if item validity is not affected.

Item Layout

- Adding more white space between items or having fewer items per page, when appropriate.
- Increasing the width of an item or line length (two column to one, single column layout), when appropriate.
- Restructuring the stem of an item into a "stacked" format. (Indenting stacked facts may be also be used.)
- Inserting bullets to organize complex information or inserting bullets to break complex text within an item stem into smaller parts.

Scaffolding

- For reading, segmenting Passages/Prompts. (For example, students are provided the same passage/prompt as the general education PSSA at a given grade level, but the passage is "segmented" or divided into meaningful parts. Those items that apply directly to each segment would appear right after or adjacent to the referenced section of the text. In other words, questions would follow an order that parallels how information generally appears in the passage or prompt. For reading, inferential questions, such as author's purpose or theme, would appear at the end after the entire passage had been read.)
- Other types of scaffolding include, but are not limited to, the following:
    - Adding helpful hints or thought boxes (visual cues) to provide further definition of words and terminology and/or to support the text or emphasize main ideas.
    - Providing support or scaffolding for the number of steps and/or operations in a multi-step item such as adding sub-questions or steps to break up or help students think through multi-step problems/items.
    - Adding additional directions to explain a process or activity.
    - Adding pre-reading information to clarify the purpose of a passage or prompt.
    - Embedding a formula (as appropriate for intention of the assessed standard).

General Guidelines for Revising and/or Enhancing PSSA-M Items

Guidelines for revising and/or enhancing PSSA- M items will include, but will not be limited to, those listed below. While many of these guidelines are common "best practices" and are included in guidelines for writing, reviewing, and revising items for the PSSA, further revisions and/or enhancements may apply.

Context

Context helps make language that is reflective of abstract/highly-generalized situations more concrete and relevant in order to ground the content being tested. Context that facilitates access includes the following:

- Concrete language
- Illustrative language
- Illustration/graphic

Graphics: Best Practices for the PSSA and the PSSA-M (Note: With graphics, the visual discrimination and visual processing challenges of students are considered).

- Graphic and labeling/naming conventions should be consistent.
- Graphics should support students' understanding of assessed content.
- Graphics should clarify (1) key aspects of the content/construct assessed and/or (2) what the student is expected to do (graphics used should be purposeful).
- Graphics should support context without requiring additional language (and may reinforce what is in the text of the item).
- Graphics should help students shift from one context to another within an assessment (e.g., from one type of item to another).
- Graphics should allow students to verify understanding of key elements of the text of the item.

- Graphics should allow representation of key elements of the problem (necessary information; construct-relevant) so that this information does not need to be presented in words.

  Consideration: How central is the information in the graphic to the construct? For example, if the graphic helps clarify construct-irrelevant information, then it may not be necessary—perhaps it would be better to alter the construct-irrelevant information. But, if the graphic helps to clarify the context or content that is construct-relevant or an operation related to the construct, then it may be necessary; otherwise, the graphic may be misleading or distracting. Note: Certain graphics are required/assessed in mathematics and science.

  Consideration: Can the graphic accurately represent the complexity of the problem in its totality? If not, then the graphic may be misleading.
  - If the problem has a number of operations/steps, then it is important to simplify structures of the item (e.g., bulleted list with context or a graphic/ diagram that accurately reflects the problem in its totality).
  - Graphics should allow for reduction of language and/or complexity of language.
  - A graphic needs to be consistent with the key elements of the item.
  - Intervals (e.g., on number lines) should be consistent/equal.

Graphics: Additional Considerations for the PSSA-M

- Adding graphic organizers as enhancements: Graphic organizers (e.g., Venn diagram for compare and contrast, timelines, story maps)
- Altering a graphic or adding or expanding a graphic to duplicate text-described context (e.g., the stem in the unaltered item may refer to the weight of a car; for the altered version, a graphic showing a car with the weight written on or near it may be included. The graphic should reinforce or clarify the text, not replace it. The text should be removed and replaced with a graphic only in exceptionally rare and unique instances.)
- Adding a graphic to illustrate a term
- Adding a support that provides a visual representation for helping students determine a solution to a problem (adding a blank grid or a blank number chart)

Item Sentence Structure: *Best Practices for the PSSA and the PSSA-M* (Note: The closed stem format is preferable to the open-stem format as the closed stem helps to reduce the retention load of content for the student as the student formulates the answer to a given question.)

- Referents should be clear; noun-pronoun relationships should be clear; antecedent references should be clear.
- Grammatical structures should be clear. Typically,
  - past or future-tense verb forms are changed to present tense,
  - passive verb forms are changed to active verb forms,
  - complex structures are changed to subject-verb-object structures,
  - long nominals/names/phrases are shortened (e.g., “last year’s class vice president” becomes “a student leader”),

  - compound sentences are replaced with two separate sentences, especially in comparative structures,
  - long prepositional phrases are reduced or removed,
  - conditional clauses are replaced with separate sentences or the ordering of clauses within a sentence is changed for clarity, and
  - relative clauses are removed or rephrased for clarity.
- Questions framed in negative terms are rephrased.
- Changing tense may help remove passive-voice construction.
- Identifying the agent (e.g., proper noun) helps remove passive voice construction.
- The verb should follow the subject (subject and verb should be adjacent to each other) —use common construction.
- One sentence per idea for each complex item helps reduce inappropriate complexity of sentence structure (e.g., could use bulleted lists).
- Introductory phrases are removed (e.g., last week)—unless necessary for the item.
- Key information is presented up front (first/early in item) and typically in simple sentence structure.
- Proper nouns should be ones that are familiar to students.
- Complexity of sentence structure should be at or below grade level (depends on intention of assessed standard).
- Traditional constructions should be used—e.g., _'s for possessive; _s or _es for plural.

Vocabulary/Wording: *Best Practices for the PSSA and the PSSA-M*

Use words/phrases consistently within the context of the item—(also consider consistency within a strand—e.g., reading, measurement).

- Support with context-familiar content-based abbreviations; make explicit connections between terms/abbreviations.
- Avoid words that are both nouns and verbs (e.g., race, value, cost); however, if a choice needs to be made, then the tendency is to use the word as a noun.
- Avoid hyphenated and compound words.
  Consideration: Balance the amount and complexity of language with the amount of information necessary for the student to understand/access the item (economy of language with meaning—purposeful use of language).
- Relative pronouns (e.g., which) should have a referent (e.g., which expression, which adjective). Note: This is preferable, but may not always be possible for a given content area or at a given grade level within a content area.
- Use construct-irrelevant vocabulary/phrases that are at or below grade level.

Vocabulary/Wording: *Additional Considerations for the PSSA-M*

- Repeat key words/phrases needed by the student to understand and respond to the item—providing synonyms for a key word may not always be helpful, given length and/or context of item; sometimes repeating the same key word is more appropriate (keep in mind the difference between instructional and assessment settings).

Appendix E:

PSSA-M Item Review Cards

1. [redacted]

- $\frac{1}{10}$
- $\frac{1}{4}$
- $\frac{4}{10}$
- $\frac{4}{6}$

PSSA-M Item Card

Item ID	[redacted]
Content Area	Mathematics
Passage ID	
Passage Title	
Grade	5
AACS Standards	E.3.1.2
Item Type	Multiple Choice
Points	1
Depth of Knowledge	2
Est Difficulty	Low
Key	C
Calculator	C
Focus	Probability

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1. [illegible]

- [illegible]
- [illegible]
- [illegible]
- [illegible]

[illegible]

Equation: ______________________

[illegible]

Show or explain your work here:

[illegible] ____________

PSSA-M Item Card
Item ID
[illegible]
Content Area
Mathematics
Passage ID
Passage Title
Grade
5
AACS Standards
D.2
Item Type
Open Ended
Points
4
Depth of Knowledge
3
Est Difficulty
High
Calculator
C
Focus
Solve for missing nu

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Kelly has a toy animal collection. Kelly's toy animal collection is larger than Anna's by **more than** 26 animals.

E. Write an inequality that can be used to show the number of animals (a) in Kelly's collection.

Inequality: ______________________________

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1. Simplify:

[illegible]

(Hint: Remember to use order of operations.)

- ○ 4
- ○ 5
- ○ 10
- ○ 12

PSSA-M Data Card

Item ID	[illegible]
Content Area	Mathematics
Passage ID	
Passage Title	
Grade	8
Standards	AACS: A.2.1.1
Item Type	Multiple Choice
Points	1
Depth of Knowledge	1
Est Difficulty	Low
Calculator	Yes
Key	A
Focus	Order of operations

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PSSA-M Data Card continued

Administration

Name	Use Function	Rptg Flag	Seq	Period	Year	Day	Session	Calc	Model/Ext	Grade
23_M	FT			Spring	2010		2	Yes		8

Traditional Statistics

N	P-Val	Mean	Item Total Corr
999	0.50		0.47

Fit Statistics

Outfit t	Infit t	Outfit MnSq	Infit MnSq	Chi-sq	Deg Free	Mean Sq	Fit
-5.0	-5.7	0.85	0.87				

IRT Statistics

Label	Final	Final S.E.	Preliminary	Preliminary S.E.
Location	0.24	0.07		

Distractor/Step Specific

Label	Proportion	Corr	Avg Meas	Step Meas
A*	0.50	0.47		
B	0.13	-0.34		
C	0.22	-0.45		
D	0.14	-0.44		
MULTS	0.00			
OMITS	0.01			

DIF Analysis

Category	Bias Code	Num Value	N - Ref	N - Focal

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Appendix F:

Item Rating Sheet and Item Review Criteria Guidelines

Item Rating Sheet

Reviewer Signature: ____________________

Content Area: ____________ **Grade:** ____________

	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
Unique ID number	—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	— Approved as is — Accepted with suggested revisions — Dissenting View

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: 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

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

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? *A thorough, independent bias review* (separate from this meeting) *will be completed for all items.*	**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**

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:

2012 Test Book Section Layout Plans

2012 Modified Mathematics Test Book Section Layout for Grades 4 – 8 & 11

Mathematics Core	
Core/common MC items	30
2 core 4 pt OE items	8
Total	38 points

The estimated testing time for mathematics is approximately 100-120 minutes. [Timing assumes 10 min per OE and 3 min per MC.]

Section	Content	Number of MC	MC Item Breakdown	Number of OE	OE Item Breakdown	Section Time (in minutes)
1	Mathematics	15	15–common (core) items	1	1–common (core) item	50–60
2	Mathematics	15	15–common (core) items	1	1–common (core) item	50–60

Notes:
1) There is 1 form.
2) The ruler items may fall in Sections 1 or 2.
3) All items in the PSSA-M mathematics test allow for calculator use.

2012 Modified Reading Test Book Section Layout for Grades 4, 5, 7, 8 & 11

Reading Core

Core/common MC items	30
2 core 3 pt OE items	6
Total	36 points

The estimated testing time for reading is approximately 100-120 minutes. [Timing assumes 10 min per OE and 3 min per MC.]

Section	Content	Number of MC	MC Item Breakdown	Number of OE	OE Item Breakdown	Section Time (in minutes)
1	Reading	18	18–common (core) items	1	1–common (core) item	60–70
2	Reading	12	12–common (core) items	1	1–common (core) item	40–50

2012 Modified Reading Test Book Section Layout for Grade 6

Reading Core

Core/common MC items	30
2 core 3 pt OE items	6
Total	36 points

The estimated testing time for reading is approximately 100-120 minutes. [Timing assumes 10 min per OE and 3 min per MC.]

Section	Content	Number of MC	MC Item Breakdown	Number of OE	OE Item Breakdown	Section Time (in minutes)
1	Reading	19	19–common (core) items	1	1–common (core) item	60–70
2	Reading	11	11–common (core) items	1	1–common (core) item	40–50

2012 Modified Science Test Book Section Layout for Grades 8 & 11

Science Core	
Core/common MC items	30
2 core 2 pt OE items	4
Total	34 points

The estimated testing time for science is approximately 60-80 minutes. [Timing assumes 5 min per OE and 2 min per MC.]

Section	Content	Number of MC	MC Item Breakdown	Number of OE	OE Item Breakdown	Section Time (in minutes)
1	Science	15	15–common (core) items	1	1–common (core) item	30□40
2	Science	15	15–common (core) items	1	1–common (core) item	30□40

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
SD	Standard deviation

		Form	N	L	Pts	Min	Max	Mean	Med	*SD*
Mathematics	**4**	0	2708	32	38	3	38	21.0	21.0	6.51
	5	0	3726	32	38	2	38	20.2	20.0	6.34
	6	0	4061	32	38	2	38	17.2	17.0	5.72
	7	0	4283	32	38	2	37	18.0	18.0	6.78
	8	0	4444	32	38	1	38	18.3	18.0	6.34
	11	0	4606	32	38	1	37	16.6	16.0	6.29
Reading	**4**	0	3711	32	36	1	35	17.4	17.0	6.71
	5	0	4672	32	36	2	36	19.8	20.0	7.37
	6	0	4543	32	36	3	36	20.3	21.0	6.82
	7	0	4570	32	36	1	36	19.2	19.0	6.82
	8	0	4308	32	36	3	35	20.0	20.0	6.21
	11	0	4255	32	36	1	36	22.2	23.0	6.44
Sci.	**8**	0	3554	32	34	4	33	20.1	21.0	5.78
	11	0	3742	32	34	3	33	17.1	17.0	6.50

Appendix I:

Item Statistics

Column Heading	Definition
PubID	Public ID
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

Item Information					Classical												Rasch		Infit		Outfit	
Cont	Grade	PubID	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
Math	4	0633	E.3.1.1	2	2707	0.87	0.03	0.02	0.87	0.07	0.00	0.22	-0.17	-0.14	0.22	-0.08	-1.4874	0.0745	1.3	1.1	2.1	1.2
Math	4	0688	A.1.2.2	1	2707	0.55	0.24	0.09	0.12	0.55	0.00	0.32	-0.15	-0.17	-0.13	0.32	0.5382	0.0471	0.8	1.0	0.1	1.0
Math	4	0767	A.2.1.2	2	2707	0.64	0.07	0.64	0.06	0.23	0.00	0.40	-0.23	0.40	-0.20	-0.20	-0.0594	0.0508	-2.3	0.9	-2.7	0.9
Math	4	0914	D.1.1.3	2	2707	0.36	0.20	0.31	0.12	0.36	0.00	0.28	-0.11	-0.13	-0.09	0.28	1.4888	0.0468	0.6	1.0	2.0	1.1
Math	4	0988	A.1.3.1	1	2707	0.44	0.10	0.37	0.08	0.44	0.00	0.28	-0.09	-0.22	-0.02	0.28	1.1137	0.0461	1.3	1.0	1.7	1.0
Math	4	1114	E.1.2.2	1	2707	0.88	0.07	0.88	0.03	0.02	0.00	0.44	-0.34	0.44	-0.20	-0.15	-1.7097	0.0807	-2.3	0.9	-4.5	0.6
Math	4	1567	C.3.1.1	1	2707	0.64	0.07	0.64	0.07	0.22	0.00	0.31	-0.24	0.31	-0.17	-0.10	0.2294	0.0486	5.8	1.1	6.8	1.3
Math	4	1586	E.1.1.1	2	2707	0.53	0.53	0.09	0.19	0.19	0.00	0.47	0.47	-0.07	-0.21	-0.33	0.5150	0.0472	-5.0	0.9	-4.7	0.9
Math	4	1700	D.1.1.2	2	2707	0.65	0.65	0.09	0.07	0.19	0.00	0.35	0.35	-0.31	-0.08	-0.14	0.1626	0.0491	-1.4	1.0	-2.1	0.9
Math	4	2116	E.1.2.1	1	2707	0.84	0.08	0.84	0.05	0.04	0.00	0.44	-0.31	0.44	-0.20	-0.20	-1.3155	0.0702	-2.5	0.9	-3.8	0.7
Math	4	2133	E.1.1.1	1	2707	0.83	0.04	0.05	0.83	0.09	0.00	0.39	-0.18	-0.17	0.39	-0.27	-1.3053	0.0700	-2.0	0.9	-2.4	0.8
Math	4	2807	A.1.1.2	1	2707	0.65	0.32	0.65	0.01	0.03	0.00	0.33	-0.26	0.33	-0.09	-0.18	0.1173	0.0494	-0.2	1.0	-0.1	1.0
Math	4	3099	A.1.1.2	1	2707	0.48	0.03	0.48	0.35	0.13	0.00	0.24	-0.17	0.24	-0.15	-0.06	0.7251	0.0465	6.0	1.1	5.2	1.1
Math	4	3232	A.1.3.2	1	2707	0.37	0.32	0.11	0.37	0.20	0.00	0.41	-0.22	-0.08	0.41	-0.18	1.3200	0.0464	-4.9	0.9	-3.5	0.9
Math	4	3577	A.1.1.1	1	2707	0.81	0.12	0.01	0.81	0.06	0.00	0.22	-0.15	-0.08	0.22	-0.12	-0.9424	0.0625	1.2	1.1	2.6	1.2
Math	4	3981	D.1.1.1	2	2707	0.92	0.05	0.01	0.92	0.02	0.00	0.24	-0.14	-0.11	0.24	-0.15	-1.8584	0.0854	-0.3	1.0	-1.6	0.8
Math	4	3993	C.1.2.2		2707	0.78	0.08	0.06	0.07	0.78	0.00	0.30	-0.20	-0.16	-0.12	0.30	-0.5233	0.0559	1.1	1.0	1.3	1.1
Math	4	4004	A.1.1.3	1	2707	0.42	0.11	0.42	0.17	0.30	0.00	0.32	-0.10	0.32	-0.03	-0.26	1.2120	0.0462	1.5	1.0	2.4	1.1
Math	4	4652	D.2.2.1	1	2707	0.80	0.06	0.80	0.04	0.11	0.00	0.39	-0.21	0.39	-0.14	-0.25	-0.8069	0.0601	-2.5	0.9	-3.4	0.8
Math	4	4859	B.2.2.1	1	2707	0.49	0.21	0.19	0.10	0.49	0.00	0.26	-0.06	-0.29	0.02	0.26	0.7319	0.0465	1.2	1.0	1.3	1.0
Math	4	5197	C.1.2.1	1	2707	0.83	0.02	0.07	0.83	0.07	0.00	0.23	-0.14	-0.13	0.23	-0.11	-1.0589	0.0647	0.9	1.0	2.0	1.2
Math	4	5836	A.3.1.1	1	2707	0.53	0.14	0.20	0.53	0.13	0.01	0.34	-0.09	-0.18	0.34	-0.19	0.7971	0.0463	0.1	1.0	-0.3	1.0
Math	4	6052	D.2.2.2	1	2707	0.90	0.02	0.05	0.02	0.90	0.01	0.32	-0.16	-0.21	-0.15	0.32	-1.7437	0.0817	-1.1	0.9	-2.3	0.8
Math	4	6320	A.2.1.2	2	2707	0.74	0.07	0.11	0.74	0.08	0.00	0.38	-0.22	-0.14	0.38	-0.24	-0.6429	0.0576	-1.8	0.9	-0.7	1.0
Math	4	6706	C.1.1.1	1	2707	0.55	0.08	0.09	0.27	0.55	0.00	0.27	-0.14	-0.15	-0.12	0.27	0.5289	0.0471	2.2	1.0	2.3	1.1
Math	4	8463	A.1.2.1	1	2707	0.33	0.28	0.33	0.33	0.06	0.00	0.34	-0.23	-0.04	0.34	-0.15	1.5864	0.0472	1.6	1.0	3.7	1.1
Math	4	8841	A.1.1.4	1	2707	0.44	0.30	0.14	0.44	0.11	0.00	0.36	-0.23	-0.05	0.36	-0.17	1.0536	0.0461	-0.3	1.0	0.6	1.0
Math	4	9421	C.2.1.1	1	2707	0.78	0.78	0.08	0.09	0.05	0.00	0.26	0.26	-0.17	-0.13	-0.12	-0.7483	0.0592	0.5	1.0	1.3	1.1
Math	4	9455	A.3.1.2	1	2707	0.39	0.18	0.21	0.22	0.39	0.00	0.18	-0.07	0.03	-0.17	0.18	1.4911	0.0469	2.8	1.1	3.7	1.1
Math	4	9806	A.3.2.2	1	2707	0.56	0.26	0.11	0.56	0.06	0.00	0.30	-0.09	-0.22	0.30	-0.17	0.5910	0.0469	3.1	1.1	2.5	1.1
Math	5	0036	A.1.3.3		3724	0.26	0.26	0.09	0.51	0.14	0.00	0.17	0.17	-0.07	0.00	-0.16	1.9581	0.0467	2.2	1.1	4.6	1.2
Math	5	0254	C.2.1.1		3724	0.75	0.04	0.12	0.75	0.08	0.00	0.31	-0.13	-0.20	0.31	-0.15	-0.6867	0.0511	-0.2	1.0	0.6	1.0
Math	5	0652	A.1.5.1		3724	0.73	0.14	0.73	0.09	0.05	0.00	0.29	-0.15	0.29	-0.17	-0.14	-0.4297	0.0482	0.9	1.0	0.3	1.0
Math	5	1106	D.2.1.1		3724	0.77	0.77	0.06	0.07	0.09	0.00	0.41	0.41	-0.18	-0.26	-0.22	-0.9803	0.0553	-2.9	0.9	-4.2	0.8
Math	5	1579	A.1.6.1	1	3724	0.27	0.27	0.20	0.25	0.27	0.00	0.06	0.06	-0.07	0.06	-0.06	1.9718	0.0469	7.5	1.2	9.9	1.5
Math	5	1844	B.1.1.1		3724	0.68	0.13	0.08	0.11	0.68	0.00	0.19	-0.06	-0.13	-0.10	0.19	-0.3051	0.0470	3.0	1.1	2.1	1.1
Math	5	2104	B.2.2.3		3724	0.75	0.05	0.75	0.03	0.17	0.00	0.41	-0.24	0.41	-0.17	-0.26	-0.8497	0.0533	-3.1	0.9	-4.1	0.8
Math	5	2152	A.1.4.2	1	3724	0.51	0.15	0.03	0.51	0.31	0.00	0.25	-0.20	-0.10	0.25	-0.08	0.6908	0.0422	2.6	1.0	2.8	1.1
Math	5	2185	D.2.1.2	1	3724	0.63	0.22	0.63	0.12	0.03	0.00	0.31	-0.20	0.31	-0.14	-0.10	0.0641	0.0443	-0.7	1.0	-1.3	1.0
Math	5	2789	E.2.1.1	1	3724	0.34	0.12	0.40	0.34	0.13	0.00	0.31	-0.16	-0.04	0.31	-0.22	1.4489	0.0435	-0.6	1.0	-0.3	1.0
Math	5	3144	A.1.3.1		3724	0.65	0.08	0.21	0.65	0.06	0.00	0.39	-0.23	-0.20	0.39	-0.19	-0.0906	0.0453	-2.9	0.9	-2.5	0.9

Item Information					Classical												Rasch		Infit		Outfit	
Cont	Grade	PubID	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
Math	5	3303	B.2.2.2		3724	0.52	0.19	0.04	0.26	0.52	0.00	0.30	-0.30	-0.17	0.00	0.30	0.4688	0.0426	-0.9	1.0	-0.9	1.0
Math	5	3904	A.1.5.1		3724	0.97	0.01	0.01	0.97	0.01	0.00	0.20	-0.12	-0.11	0.20	-0.13	-3.4765	0.1527	-0.1	1.0	-2.3	0.5
Math	5	4144	A.1.6.2		3724	0.60	0.60	0.25	0.09	0.05	0.00	0.34	0.34	-0.22	-0.14	-0.13	0.2367	0.0434	-1.4	1.0	-1.9	1.0
Math	5	4523	B.2.1.1		3724	0.61	0.20	0.61	0.10	0.08	0.00	0.22	-0.07	0.22	-0.16	-0.12	0.1008	0.0441	3.8	1.1	3.1	1.1
Math	5	6202	A.1.2.1		3724	0.65	0.06	0.27	0.65	0.02	0.00	0.21	-0.15	-0.11	0.21	-0.10	0.1008	0.0441	4.2	1.1	4.7	1.2
Math	5	6831	A.1.4.1		3724	0.75	0.75	0.16	0.03	0.06	0.00	0.35	0.35	-0.23	-0.14	-0.18	-0.6598	0.0508	-1.8	1.0	-1.9	0.9
Math	5	6877	E.2.1.2	1	3724	0.73	0.73	0.06	0.09	0.13	0.00	0.35	0.35	-0.18	-0.16	-0.21	-0.4081	0.0480	-0.8	1.0	-0.7	1.0
Math	5	7018	A.1.1.1		3724	0.69	0.07	0.21	0.69	0.03	0.00	0.39	-0.21	-0.25	0.39	-0.17	-0.2596	0.0466	-2.9	0.9	-3.4	0.9
Math	5	7079	A.3.1.1		3724	0.48	0.48	0.24	0.15	0.13	0.00	0.26	0.26	-0.17	-0.07	-0.10	0.8437	0.0421	1.8	1.0	1.8	1.0
Math	5	7585	C.1.1.1		3724	0.85	0.05	0.02	0.85	0.08	0.00	0.26	-0.17	-0.11	0.26	-0.15	-1.3173	0.0613	0.0	1.0	0.1	1.0
Math	5	7852	B.1.2.1		3724	0.48	0.13	0.27	0.12	0.48	0.00	0.46	-0.24	-0.21	-0.17	0.46	0.5934	0.0423	-9.2	0.9	-7.8	0.8
Math	5	8181	A.1.2.2	1	3724	0.59	0.21	0.59	0.09	0.11	0.00	0.40	-0.25	0.40	-0.14	-0.18	0.2170	0.0435	-2.8	1.0	-2.3	0.9
Math	5	8366	A.3.1.2		3724	0.24	0.16	0.24	0.19	0.41	0.00	0.15	-0.12	0.15	-0.09	0.02	1.8285	0.0457	1.9	1.0	3.7	1.1
Math	5	8555	E.3.1.1		3724	0.78	0.04	0.78	0.13	0.05	0.00	0.32	-0.14	0.32	-0.26	-0.09	-0.8674	0.0536	-0.8	1.0	0.6	1.0
Math	5	8795	C.2.1.1		3724	0.61	0.61	0.07	0.20	0.11	0.00	0.35	0.35	-0.15	-0.16	-0.22	0.0374	0.0445	-1.1	1.0	-1.4	1.0
Math	5	8871	E.3.1.2		3724	0.56	0.18	0.18	0.56	0.09	0.00	0.29	-0.12	-0.16	0.29	-0.12	0.4402	0.0427	0.2	1.0	-0.1	1.0
Math	5	9138	C.1.2.1	1	3724	0.58	0.22	0.03	0.16	0.58	0.00	0.26	-0.20	-0.10	-0.06	0.26	0.3519	0.0430	4.0	1.1	4.5	1.1
Math	5	9351	E.1.1.1		3724	0.85	0.02	0.02	0.85	0.11	0.00	0.34	-0.11	-0.10	0.34	-0.29	-1.7559	0.0717	-1.0	1.0	-1.4	0.9
Math	5	9595	C.2.1.2		3724	0.48	0.06	0.48	0.21	0.25	0.00	0.34	-0.04	0.34	-0.10	-0.27	0.7338	0.0422	1.1	1.0	1.9	1.0
Math	6	1624	A.1.3.1		4052	0.48	0.26	0.09	0.48	0.17	0.00	0.20	0.05	-0.07	0.20	-0.27	0.1428	0.0407	5.2	1.1	4.4	1.1
Math	6	1715	A.1.3.2	1	4052	0.45	0.25	0.23	0.45	0.07	0.00	0.23	-0.14	-0.05	0.23	-0.14	0.4502	0.0408	2.7	1.0	2.9	1.1
Math	6	2037	D.2.1.2		4052	0.32	0.34	0.23	0.11	0.32	0.00	0.30	0.05	-0.20	-0.25	0.30	1.1078	0.0434	0.4	1.0	1.2	1.0
Math	6	2547	C.1.1.2		4052	0.62	0.18	0.62	0.08	0.11	0.00	0.27	-0.19	0.27	-0.18	-0.02	-0.3656	0.0420	0.2	1.0	-0.5	1.0
Math	6	3044	B.1.1.1		4052	0.32	0.26	0.32	0.33	0.09	0.00	0.18	-0.12	0.18	-0.03	-0.06	0.8922	0.0422	3.4	1.1	4.0	1.1
Math	6	3048	D.1.1.1		4052	0.43	0.33	0.43	0.16	0.09	0.00	0.27	-0.14	0.27	-0.11	-0.10	0.4193	0.0408	-2.1	1.0	-1.6	1.0
Math	6	3252	A.1.1.4		4052	0.48	0.12	0.48	0.09	0.32	0.00	0.46	-0.11	0.46	-0.12	-0.35	0.1957	0.0407	-9.8	0.9	-8.4	0.9
Math	6	3340	B.2.1.1	1	4052	0.49	0.49	0.25	0.09	0.17	0.00	0.22	0.22	-0.16	-0.09	-0.05	0.2417	0.0407	4.2	1.1	3.8	1.1
Math	6	3403	D.1.2.1	1	4052	0.36	0.28	0.36	0.18	0.18	0.00	0.06	0.01	0.06	-0.03	-0.06	0.7526	0.0416	9.6	1.2	8.9	1.2
Math	6	3775	E.3.1.2		4052	0.50	0.18	0.23	0.50	0.09	0.00	0.29	-0.14	-0.14	0.29	-0.10	0.0933	0.0407	-0.4	1.0	-0.4	1.0
Math	6	4391	C.1.1.3		4052	0.43	0.20	0.43	0.13	0.24	0.00	0.25	-0.08	0.25	-0.23	-0.04	0.2945	0.0407	1.7	1.0	1.2	1.0
Math	6	4621	C.1.1.1	1	4052	0.63	0.63	0.23	0.13	0.01	0.00	0.22	0.22	-0.13	-0.12	-0.10	-0.5857	0.0432	0.5	1.0	0.1	1.0
Math	6	5517	B.2.1.3		4052	0.52	0.14	0.09	0.52	0.24	0.00	0.21	-0.04	-0.14	0.21	-0.12	-0.0529	0.0410	4.2	1.1	3.3	1.1
Math	6	5687	A.1.1.1		4052	0.37	0.03	0.37	0.24	0.36	0.00	0.43	0.00	0.43	-0.26	-0.20	0.6270	0.0412	-9.6	0.9	-8.8	0.8
Math	6	6763	D.1.2.1		4052	0.40	0.11	0.24	0.25	0.40	0.00	0.35	-0.16	-0.13	-0.15	0.35	0.4347	0.0408	-5.4	0.9	-4.9	0.9
Math	6	7407	D.2.1.1	1	4052	0.46	0.46	0.31	0.15	0.08	0.00	0.28	0.28	-0.14	-0.09	-0.15	0.2928	0.0407	1.3	1.0	1.0	1.0
Math	6	7479	E.1.1.1		4052	0.78	0.07	0.08	0.06	0.78	0.00	0.28	-0.15	-0.13	-0.17	0.28	-1.2961	0.0498	-1.0	1.0	-1.6	0.9
Math	6	7610	C.1.1.4		4052	0.30	0.19	0.27	0.30	0.24	0.00	0.16	-0.04	-0.07	0.16	-0.06	1.1907	0.0440	2.5	1.1	3.4	1.1
Math	6	7851	D.2.2.1		4052	0.26	0.26	0.27	0.40	0.06	0.00	0.13	0.13	-0.03	-0.07	-0.03	1.1947	0.0440	4.1	1.1	6.0	1.2
Math	6	7924	A.2.1.1		4052	0.76	0.10	0.76	0.08	0.05	0.00	0.26	-0.15	0.26	-0.14	-0.11	-1.3507	0.0505	-0.3	1.0	0.2	1.0
Math	6	8199	C.1.1.2		4052	0.33	0.21	0.32	0.14	0.33	0.00	0.19	0.07	-0.23	-0.03	0.19	0.8995	0.0422	6.5	1.1	6.7	1.2
Math	6	8225	A.1.1.2		4052	0.38	0.33	0.38	0.13	0.16	0.00	0.28	-0.18	0.28	-0.10	-0.06	0.7741	0.0417	2.2	1.0	3.4	1.1

Item Information					Classical												Rasch		Infit		Outfit	
Cont	Grade	PubID	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
Math	6	8585	D.2.1.2		4052	0.75	0.04	0.06	0.75	0.14	0.01	0.36	-0.06	-0.20	0.36	-0.26	-1.2258	0.0489	-3.6	0.9	-3.8	0.8
Math	6	8813	C.1.2.1		4052	0.70	0.70	0.11	0.13	0.05	0.00	0.29	0.29	-0.21	-0.05	-0.21	-0.7734	0.0445	-1.1	1.0	0.2	1.0
Math	6	8818	A.1.1.3		4052	0.63	0.05	0.15	0.17	0.63	0.00	0.33	-0.20	-0.22	-0.10	0.33	-0.5513	0.0430	-3.4	0.9	-3.1	0.9
Math	6	9009	C.3.1.1		4052	0.69	0.02	0.69	0.03	0.25	0.00	0.29	-0.17	0.29	-0.17	-0.18	-0.7856	0.0446	0.0	1.0	-0.4	1.0
Math	6	9363	E.2.1.1	2	4052	0.32	0.15	0.32	0.21	0.32	0.00	0.27	-0.03	0.27	0.02	-0.26	0.8959	0.0422	0.4	1.0	1.0	1.0
Math	6	9837	B.2.3.1	1	4052	0.70	0.70	0.15	0.12	0.03	0.00	0.35	0.35	-0.18	-0.22	-0.15	-0.8688	0.0453	-2.6	0.9	-1.7	0.9
Math	6	9875	A.2.1.1		4052	0.58	0.21	0.13	0.58	0.07	0.00	0.35	-0.09	-0.21	0.35	-0.22	-0.3168	0.0418	-2.5	1.0	-2.0	1.0
Math	6	9988	B.2.2.1		4052	0.93	0.03	0.93	0.02	0.02	0.00	0.27	-0.17	0.27	-0.15	-0.14	-2.7267	0.0816	-1.2	0.9	-3.2	0.7
Math	7	0057	D.1.1.1	2	4276	0.56	0.02	0.56	0.20	0.21	0.00	0.24	-0.08	0.24	-0.10	-0.18	0.0385	0.0404	3.0	1.0	1.8	1.0
Math	7	0073	E.2.1.2	2	4276	0.52	0.15	0.16	0.52	0.16	0.00	0.29	-0.06	-0.17	0.29	-0.16	0.1179	0.0403	2.1	1.0	1.8	1.0
Math	7	0140	A.2.2.6	2	4276	0.50	0.13	0.22	0.50	0.14	0.00	0.29	-0.12	-0.20	0.29	-0.06	0.0419	0.0404	0.3	1.0	0.6	1.0
Math	7	0944	D.1.1.1	2	4276	0.29	0.38	0.17	0.15	0.29	0.00	0.23	0.01	-0.20	-0.10	0.23	1.0737	0.0421	4.8	1.1	5.4	1.2
Math	7	1392	A.1.2.1		4276	0.54	0.27	0.09	0.10	0.54	0.00	0.44	-0.41	-0.04	-0.09	0.44	-0.0175	0.0405	-7.4	0.9	-6.8	0.9
Math	7	2025	A.1.2.1		4276	0.48	0.19	0.19	0.14	0.48	0.00	0.45	-0.19	-0.22	-0.17	0.45	0.1868	0.0402	-6.5	0.9	-6.2	0.9
Math	7	2055	D.3.1.1	2	4276	0.50	0.14	0.50	0.24	0.11	0.00	0.26	-0.22	0.26	-0.04	-0.12	0.1583	0.0402	2.8	1.0	2.0	1.0
Math	7	2229	B.2.1.3	1	4276	0.53	0.16	0.53	0.07	0.23	0.00	0.31	-0.24	0.31	-0.15	-0.06	0.0943	0.0403	0.7	1.0	0.7	1.0
Math	7	2395	E.3.1.1	2	4276	0.40	0.40	0.11	0.21	0.27	0.00	0.30	0.30	-0.09	-0.19	-0.10	0.6483	0.0405	0.4	1.0	0.5	1.0
Math	7	2485	D.1.1.1	2	4276	0.58	0.13	0.25	0.58	0.04	0.00	0.14	-0.09	-0.03	0.14	-0.13	-0.0448	0.0406	8.2	1.1	6.8	1.2
Math	7	2638	D.2.1.2	1	4276	0.53	0.21	0.22	0.53	0.04	0.00	0.43	-0.22	-0.25	0.43	-0.09	0.1801	0.0402	-6.1	0.9	-4.9	0.9
Math	7	2708	A.1.1.1		4276	0.85	0.85	0.11	0.02	0.02	0.00	0.21	0.21	-0.20	-0.05	-0.03	-1.6574	0.0553	0.3	1.0	1.4	1.1
Math	7	3026	A.3.2.2	1	4276	0.49	0.49	0.25	0.17	0.09	0.00	0.21	0.21	-0.21	0.01	-0.05	0.2706	0.0401	5.1	1.1	4.5	1.1
Math	7	3039	E.2.1.1	1	4276	0.76	0.14	0.05	0.76	0.06	0.00	0.28	-0.19	-0.07	0.28	-0.18	-0.9248	0.0458	0.0	1.0	0.3	1.0
Math	7	3108	D.2.1.1	1	4276	0.64	0.64	0.16	0.11	0.09	0.00	0.42	0.42	-0.20	-0.28	-0.13	-0.4671	0.0423	-6.9	0.9	-6.1	0.8
Math	7	3681	E.4.1.1	1	4276	0.83	0.05	0.04	0.06	0.83	0.00	0.33	-0.17	-0.14	-0.22	0.33	-1.7379	0.0567	-1.9	0.9	-2.7	0.8
Math	7	4540	B.2.2.1	2	4276	0.21	0.33	0.29	0.17	0.21	0.00	0.27	-0.26	0.08	-0.06	0.27	1.4522	0.0447	-0.7	1.0	-0.4	1.0
Math	7	4589	C.3.1.2	1	4276	0.48	0.48	0.22	0.21	0.09	0.00	0.26	0.26	-0.09	-0.12	-0.15	0.3359	0.0401	2.7	1.0	2.6	1.1
Math	7	4599	B.1.1.1	2	4276	0.48	0.09	0.48	0.13	0.30	0.00	0.30	-0.18	0.30	-0.22	-0.06	0.1549	0.0402	-1.0	1.0	-1.5	1.0
Math	7	4737	C.1.1.2	1	4276	0.54	0.10	0.54	0.31	0.05	0.00	0.31	-0.08	0.31	-0.24	-0.09	-0.0704	0.0407	-0.4	1.0	-0.8	1.0
Math	7	4822	D.2.2.1	2	4276	0.53	0.16	0.53	0.10	0.21	0.00	0.23	-0.13	0.23	-0.16	-0.04	0.0656	0.0403	4.6	1.1	4.4	1.1
Math	7	5378	B.2.1.3	1	4276	0.41	0.14	0.41	0.41	0.04	0.00	0.35	-0.22	0.35	-0.16	-0.07	0.5767	0.0403	-1.0	1.0	0.6	1.0
Math	7	5570	B.2.1.2	1	4276	0.53	0.31	0.53	0.12	0.04	0.00	0.26	-0.21	0.26	-0.03	-0.10	-0.0311	0.0406	2.8	1.0	2.1	1.0
Math	7	5797	C.1.1.1	1	4276	0.47	0.47	0.17	0.19	0.18	0.00	0.36	0.36	-0.15	-0.17	-0.14	0.2119	0.0402	-1.4	1.0	-1.6	1.0
Math	7	5844	E.1.1.1	1	4276	0.45	0.18	0.11	0.45	0.26	0.00	0.26	-0.06	-0.12	0.26	-0.15	0.4753	0.0402	1.6	1.0	2.3	1.1
Math	7	6485	C.1.2.2	1	4276	0.55	0.55	0.15	0.10	0.19	0.00	0.36	0.36	-0.14	-0.10	-0.25	-0.0824	0.0407	-2.4	1.0	-2.6	0.9
Math	7	6543	C.3.1.1	1	4276	0.64	0.64	0.27	0.05	0.05	0.00	0.37	0.37	-0.23	-0.16	-0.20	-0.2933	0.0414	-1.8	1.0	-1.7	1.0
Math	7	8806	C.1.1.3	1	4276	0.80	0.09	0.05	0.06	0.80	0.00	0.32	-0.22	-0.15	-0.13	0.32	-1.3639	0.0508	-1.6	1.0	-1.1	1.0
Math	7	9678	E.2.1.1	1	4276	0.70	0.15	0.70	0.09	0.05	0.00	0.33	-0.24	0.33	-0.08	-0.17	-0.6902	0.0438	-1.2	1.0	0.5	1.0
Math	7	9757	C.1.2.1	1	4276	0.27	0.09	0.27	0.16	0.48	0.00	0.21	-0.06	0.21	-0.14	-0.04	1.2977	0.0435	3.5	1.1	4.8	1.2
Math	8	0167	A.1.1.1	1	4440	0.64	0.02	0.64	0.16	0.18	0.00	0.41	-0.08	0.41	-0.20	-0.29	-0.3466	0.0400	-5.5	0.9	-5.3	0.9
Math	8	0936	D.1.1.1	2	4440	0.37	0.12	0.12	0.37	0.39	0.00	0.24	-0.05	-0.05	0.24	-0.17	0.7749	0.0395	4.2	1.1	4.8	1.1
Math	8	0970	E.1.1.2	2	4440	0.77	0.04	0.77	0.06	0.13	0.00	0.16	-0.03	0.16	-0.05	-0.15	-1.2504	0.0471	2.3	1.1	4.0	1.2

Item Information					Classical												Rasch		Infit		Outfit	
Cont	Grade	PubID	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
Math	8	1289	D.1.1.3	2	4440	0.42	0.19	0.19	0.42	0.19	0.00	0.33	-0.01	-0.15	0.33	-0.25	0.6720	0.0392	1.1	1.0	1.5	1.0
Math	8	2407	B.1.1.1	1	4440	0.52	0.09	0.14	0.52	0.25	0.00	0.30	-0.14	-0.16	0.30	-0.12	0.1542	0.0387	1.8	1.0	1.9	1.0
Math	8	2530	E.1.1.3	1	4440	0.78	0.04	0.78	0.11	0.06	0.00	0.29	-0.11	0.29	-0.15	-0.20	-1.2711	0.0473	-0.4	1.0	-1.1	1.0
Math	8	2650	D.2.1.3	1	4440	0.27	0.46	0.27	0.13	0.14	0.00	0.19	-0.18	0.19	-0.04	0.07	1.5511	0.0444	2.6	1.1	3.5	1.1
Math	8	3129	E.3.1.1	2	4440	0.51	0.12	0.29	0.08	0.51	0.00	0.39	-0.08	-0.29	-0.14	0.39	0.2347	0.0387	-3.3	1.0	-3.0	1.0
Math	8	3229	A.3.3.1	2	4440	0.28	0.26	0.19	0.28	0.26	0.01	0.17	-0.06	-0.05	0.17	-0.07	1.2843	0.0422	5.1	1.1	6.5	1.2
Math	8	3435	C.1.1.1	2	4440	0.52	0.15	0.05	0.27	0.52	0.00	0.31	-0.17	-0.09	-0.17	0.31	0.0984	0.0388	1.7	1.0	1.2	1.0
Math	8	3599	B.2.1.1	1	4440	0.63	0.18	0.63	0.09	0.11	0.00	0.29	-0.23	0.29	-0.10	-0.09	-0.2828	0.0397	-0.7	1.0	-1.6	1.0
Math	8	4404	D.2.1.3	1	4440	0.59	0.23	0.13	0.59	0.05	0.00	0.35	-0.20	-0.16	0.35	-0.15	-0.1145	0.0392	-4.3	0.9	-4.2	0.9
Math	8	4773	D.1.1.1	2	4440	0.70	0.70	0.12	0.09	0.09	0.00	0.31	0.31	-0.11	-0.14	-0.22	-0.7595	0.0424	-1.7	1.0	-2.2	0.9
Math	8	4802	B.2.2.2	1	4440	0.85	0.08	0.85	0.05	0.02	0.00	0.29	-0.22	0.29	-0.14	-0.09	-1.8432	0.0560	-1.0	1.0	-1.9	0.9
Math	8	5304	E.4.1.1	1	4440	0.41	0.41	0.23	0.21	0.15	0.00	0.27	0.27	-0.11	-0.15	-0.07	0.7635	0.0395	1.5	1.0	2.5	1.1
Math	8	5317	E.1.1.1	2	4440	0.58	0.14	0.58	0.13	0.15	0.00	0.31	-0.20	0.31	-0.18	-0.07	-0.1989	0.0394	0.7	1.0	0.3	1.0
Math	8	6780	C.1.1.1	2	4440	0.70	0.02	0.16	0.12	0.70	0.00	0.23	-0.07	-0.16	-0.10	0.23	-0.7082	0.0420	2.3	1.0	3.0	1.1
Math	8	7279	A.1.1.2	1	4440	0.74	0.04	0.15	0.07	0.74	0.00	0.41	-0.17	-0.21	-0.28	0.41	-0.9411	0.0439	-5.2	0.9	-5.6	0.8
Math	8	7605	C.1.1.3		4440	0.39	0.14	0.36	0.39	0.11	0.00	0.26	-0.15	-0.06	0.26	-0.14	0.7619	0.0395	1.2	1.0	2.3	1.1
Math	8	7811	A.2.1.1	1	4440	0.67	0.06	0.25	0.67	0.02	0.00	0.19	-0.15	-0.08	0.19	-0.11	-0.3830	0.0401	5.2	1.1	3.8	1.1
Math	8	8214	C.3.1.1	1	4440	0.68	0.05	0.06	0.68	0.21	0.00	0.29	-0.18	-0.21	0.29	-0.11	-0.5749	0.0411	-0.6	1.0	0.5	1.0
Math	8	8507	C.1.1.2	2	4440	0.49	0.08	0.13	0.49	0.30	0.00	0.27	-0.15	-0.17	0.27	-0.09	0.1728	0.0387	2.3	1.0	1.7	1.0
Math	8	8600	C.1.2.1	2	4440	0.38	0.14	0.09	0.38	0.39	0.00	0.31	-0.14	-0.06	0.31	-0.18	0.7200	0.0393	-1.2	1.0	-0.2	1.0
Math	8	8753	D.4.1.2	1	4440	0.51	0.25	0.12	0.11	0.51	0.00	0.24	-0.05	-0.17	-0.12	0.24	0.2316	0.0387	4.9	1.1	4.3	1.1
Math	8	8754	E.1.1.3	1	4440	0.68	0.08	0.12	0.68	0.12	0.00	0.38	-0.13	-0.19	0.38	-0.24	-0.7010	0.0420	-4.7	0.9	-5.0	0.9
Math	8	8821	B.2.1.2	1	4440	0.47	0.23	0.47	0.20	0.09	0.01	0.28	-0.13	0.28	-0.14	-0.10	0.3538	0.0387	2.7	1.0	2.6	1.1
Math	8	8827	C.1.2.1	2	4440	0.32	0.20	0.32	0.12	0.36	0.00	0.27	-0.08	0.27	0.06	-0.23	1.0955	0.0410	2.3	1.0	3.4	1.1
Math	8	8917	D.4.1.1	1	4440	0.49	0.49	0.15	0.16	0.19	0.00	0.36	0.36	-0.16	-0.15	-0.17	0.3802	0.0387	-1.2	1.0	-0.6	1.0
Math	8	9782	B.1.1.2	1	4440	0.45	0.20	0.17	0.17	0.45	0.00	0.34	-0.15	-0.18	-0.11	0.34	0.4485	0.0388	-2.3	1.0	-1.9	1.0
Math	8	9833	E.4.1.2	2	4440	0.59	0.08	0.29	0.59	0.04	0.00	0.41	-0.22	-0.27	0.41	-0.12	-0.3220	0.0399	-5.4	0.9	-4.3	0.9
Math	11	0029	D.2.1.4	1	4603	0.48	0.13	0.19	0.20	0.48	0.00	0.33	-0.15	-0.13	-0.16	0.33	0.1646	0.0359	-0.7	1.0	-0.7	1.0
Math	11	0990	C.1.1.2	1	4603	0.38	0.27	0.23	0.38	0.11	0.00	0.27	-0.11	-0.10	0.27	-0.13	0.6302	0.0367	1.5	1.0	1.7	1.0
Math	11	1459	D.3.1.1		4603	0.34	0.19	0.34	0.20	0.27	0.00	0.23	0.10	0.23	-0.10	-0.24	0.6636	0.0368	2.0	1.0	2.1	1.0
Math	11	1527	A.2.1.1	2	4603	0.46	0.16	0.21	0.46	0.17	0.00	0.24	0.06	-0.17	0.24	-0.19	0.1395	0.0359	7.2	1.1	6.4	1.1
Math	11	1673	E.4.2.2		4603	0.50	0.10	0.22	0.50	0.18	0.00	0.33	-0.14	-0.25	0.33	-0.04	0.0471	0.0359	0.4	1.0	1.1	1.0
Math	11	1859	D.2.2.2		4603	0.42	0.26	0.42	0.24	0.08	0.01	0.22	-0.04	0.22	-0.14	-0.12	0.3932	0.0361	4.6	1.1	4.7	1.1
Math	11	1945	A.2.1.2		4603	0.47	0.07	0.24	0.47	0.21	0.00	0.35	-0.18	-0.22	0.35	-0.08	0.1884	0.0359	-1.0	1.0	-1.4	1.0
Math	11	3256	A.3.1.1		4603	0.47	0.09	0.47	0.33	0.11	0.00	0.34	-0.19	0.34	-0.12	-0.19	0.2586	0.0359	-1.5	1.0	-1.7	1.0
Math	11	3664	C.1.2.3		4603	0.51	0.21	0.20	0.51	0.09	0.00	0.31	-0.19	-0.09	0.31	-0.14	-0.0190	0.0359	2.6	1.0	3.1	1.1
Math	11	4126	D.2.2.1		4603	0.39	0.39	0.36	0.13	0.12	0.00	0.38	0.38	-0.13	-0.21	-0.16	0.5626	0.0365	-5.2	0.9	-4.1	0.9
Math	11	4131	D.1.1.1	2	4603	0.46	0.20	0.23	0.46	0.11	0.00	0.40	-0.20	-0.19	0.40	-0.12	0.3464	0.0360	-5.3	0.9	-5.2	0.9
Math	11	4211	D.2.1.5		4603	0.43	0.19	0.18	0.19	0.43	0.00	0.29	-0.11	-0.13	-0.13	0.29	0.3517	0.0360	0.8	1.0	1.3	1.0
Math	11	4475	E.1.1.2		4603	0.44	0.44	0.32	0.14	0.10	0.00	0.35	0.35	-0.27	-0.05	-0.09	0.3157	0.0360	-0.9	1.0	-0.9	1.0
Math	11	4570	A.1.3.1		4603	0.68	0.23	0.68	0.04	0.05	0.00	0.31	-0.25	0.31	-0.11	-0.08	-0.6527	0.0377	-1.8	1.0	-1.0	1.0

Item Information					Classical												Rasch		Infit		Outfit	
Cont	Grade	PubID	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
Math	11	4628	D.4.1.1		4603	0.67	0.10	0.08	0.15	0.67	0.00	0.42	-0.14	-0.18	-0.30	0.42	-0.7397	0.0381	-7.3	0.9	-6.5	0.8
Math	11	4844	E.4.1.1		4603	0.63	0.10	0.63	0.21	0.05	0.00	0.30	-0.15	0.30	-0.14	-0.18	-0.5620	0.0372	1.2	1.0	1.5	1.0
Math	11	5762	D.3.2.2	1	4603	0.55	0.13	0.22	0.55	0.10	0.01	0.33	-0.13	-0.20	0.33	-0.12	0.0021	0.0359	0.4	1.0	0.4	1.0
Math	11	6142	C.1.3.1		4603	0.84	0.84	0.10	0.04	0.03	0.00	0.07	0.07	0.03	-0.11	-0.10	-1.7270	0.0475	3.4	1.1	7.4	1.4
Math	11	6232	A.1.1.1		4603	0.84	0.06	0.84	0.05	0.05	0.00	0.30	-0.19	0.30	-0.16	-0.14	-1.9019	0.0502	-2.7	0.9	-5.1	0.7
Math	11	6290	E.4.2.1		4603	0.30	0.30	0.18	0.34	0.18	0.01	0.32	0.32	-0.03	-0.19	-0.11	1.1325	0.0392	0.0	1.0	1.5	1.0
Math	11	6327	C.3.1.1	1	4603	0.55	0.12	0.27	0.55	0.05	0.00	0.45	-0.16	-0.34	0.45	-0.09	-0.0548	0.0359	-8.7	0.9	-7.5	0.9
Math	11	6622	C.1.4.1	1	4603	0.51	0.12	0.51	0.14	0.23	0.00	0.31	-0.16	0.31	0.00	-0.24	-0.0866	0.0360	3.5	1.0	2.9	1.1
Math	11	6761	C.1.1.1	2	4603	0.43	0.40	0.43	0.12	0.06	0.00	0.17	-0.05	0.17	-0.13	-0.06	0.2679	0.0359	8.8	1.1	8.5	1.2
Math	11	7089	E.2.1.1		4603	0.73	0.06	0.16	0.73	0.05	0.00	0.17	-0.09	-0.09	0.17	-0.09	-0.8878	0.0390	3.3	1.1	2.6	1.1
Math	11	7216	D.2.1.3		4603	0.53	0.15	0.53	0.17	0.15	0.00	0.35	-0.19	0.35	-0.19	-0.10	-0.0641	0.0359	-0.8	1.0	-1.2	1.0
Math	11	7229	B.2.1.1		4603	0.71	0.12	0.14	0.71	0.03	0.00	0.22	-0.04	-0.19	0.22	-0.11	-0.9624	0.0395	1.5	1.0	0.3	1.0
Math	11	8275	D.3.2.1	1	4603	0.53	0.11	0.15	0.21	0.53	0.00	0.46	-0.17	-0.20	-0.24	0.46	-0.0376	0.0359	-9.4	0.9	-8.7	0.9
Math	11	8811	E.2.1.2		4603	0.27	0.13	0.41	0.27	0.19	0.00	0.32	0.05	-0.17	0.32	-0.18	1.1182	0.0391	-0.2	1.0	0.7	1.0
Math	11	8894	D.4.1.1		4603	0.39	0.30	0.16	0.14	0.39	0.00	0.25	-0.05	-0.15	-0.13	0.25	0.7029	0.0370	4.8	1.1	5.1	1.1
Math	11	8908	D.3.1.2		4603	0.44	0.29	0.07	0.19	0.44	0.01	0.19	0.07	-0.19	-0.19	0.19	0.4106	0.0361	7.3	1.1	7.1	1.1
Reading	4	0139	A.2.4.1	1	3710	0.58	0.58	0.16	0.09	0.16	0.01	0.25	0.25	-0.03	-0.18	-0.16	-0.2985	0.0362	3.4	1.0	3.8	1.1
Reading	4	0941	A.1.3.1	2	3710	0.36	0.21	0.36	0.20	0.22	0.01	0.29	-0.11	0.29	-0.17	-0.05	0.6986	0.0372	0.7	1.0	2.0	1.0
Reading	4	0984	A.2.4.1	1	3710	0.45	0.45	0.23	0.14	0.18	0.00	0.32	0.32	-0.15	-0.21	-0.04	0.3086	0.0361	-0.2	1.0	0.9	1.0
Reading	4	1373	B.2.1.2	2	3710	0.55	0.28	0.55	0.07	0.09	0.00	0.24	0.00	0.24	-0.22	-0.22	-0.1961	0.0360	5.3	1.1	4.7	1.1
Reading	4	1510	B.1.1.1	2	3710	0.37	0.35	0.16	0.37	0.11	0.01	0.34	-0.07	-0.21	0.34	-0.18	0.6476	0.0370	-2.3	1.0	-0.3	1.0
Reading	4	1951	A.1.3.1	2	3710	0.31	0.15	0.36	0.19	0.31	0.00	0.18	-0.15	0.08	-0.17	0.18	0.9851	0.0386	5.5	1.1	6.8	1.2
Reading	4	2589	A.1.4.1	1	3710	0.58	0.20	0.11	0.58	0.11	0.01	0.46	-0.21	-0.25	0.46	-0.19	-0.3239	0.0363	-9.5	0.9	-9.1	0.8
Reading	4	3051	A.2.2.1	1	3710	0.67	0.67	0.13	0.09	0.11	0.00	0.49	0.49	-0.21	-0.26	-0.26	-0.7411	0.0377	-9.9	0.8	-9.9	0.8
Reading	4	3445	A.1.2.1	1	3710	0.60	0.13	0.60	0.17	0.10	0.00	0.38	-0.18	0.38	-0.19	-0.17	-0.3918	0.0364	-4.6	0.9	-4.6	0.9
Reading	4	3783	B.1.1.1	1	3710	0.54	0.22	0.54	0.12	0.12	0.00	0.50	-0.24	0.50	-0.20	-0.25	-0.1120	0.0359	-9.9	0.8	-9.9	0.8
Reading	4	4174	A.2.2.2	2	3710	0.71	0.10	0.09	0.11	0.71	0.00	0.45	-0.27	-0.22	-0.19	0.45	-0.9301	0.0387	-9.0	0.9	-9.4	0.8
Reading	4	4622	B.1.1.1	1	3710	0.43	0.23	0.23	0.10	0.43	0.01	0.28	0.05	-0.19	-0.26	0.28	0.3568	0.0362	3.0	1.0	3.2	1.1
Reading	4	6028	B.3.3.2	2	3710	0.35	0.15	0.35	0.35	0.14	0.00	0.24	-0.07	-0.09	0.24	-0.12	0.7871	0.0375	3.4	1.1	4.3	1.1
Reading	4	6145	A.2.4.1	1	3710	0.31	0.31	0.30	0.14	0.25	0.00	0.28	0.28	-0.07	-0.16	-0.10	0.9575	0.0384	0.5	1.0	1.4	1.0
Reading	4	6881	B.1.1.1	1	3710	0.41	0.19	0.41	0.20	0.19	0.00	0.22	-0.20	0.22	-0.03	-0.04	0.4953	0.0365	5.5	1.1	6.8	1.1
Reading	4	6898	A.2.4.1	1	3710	0.56	0.56	0.10	0.15	0.18	0.00	0.40	0.40	-0.23	-0.25	-0.09	-0.2150	0.0361	-6.1	0.9	-5.0	0.9
Reading	4	6947	A.1.4.1	1	3710	0.70	0.70	0.09	0.12	0.09	0.00	0.38	0.38	-0.24	-0.14	-0.21	-0.8779	0.0384	-6.2	0.9	-5.6	0.9
Reading	4	7073	A.1.4.1	1	3710	0.58	0.16	0.11	0.58	0.14	0.01	0.45	-0.23	-0.16	0.45	-0.24	-0.3278	0.0363	-9.2	0.9	-8.3	0.9
Reading	4	7455	A.1.3.1	2	3710	0.52	0.52	0.23	0.13	0.11	0.00	0.39	0.39	-0.12	-0.23	-0.21	-0.0508	0.0359	-5.5	0.9	-4.4	0.9
Reading	4	7624	A.2.3.1	2	3710	0.46	0.46	0.24	0.12	0.18	0.00	0.36	0.36	-0.15	-0.20	-0.12	0.2405	0.0360	-2.7	1.0	-2.5	1.0
Reading	4	7648	B.2.1.3	1	3710	0.42	0.21	0.19	0.42	0.17	0.00	0.29	-0.14	-0.15	0.29	-0.06	0.4231	0.0363	1.9	1.0	2.1	1.0
Reading	4	7950	B.2.1.2	1	3710	0.43	0.14	0.43	0.17	0.26	0.00	0.16	-0.15	0.16	-0.08	0.01	0.3593	0.0362	9.9	1.1	8.6	1.2
Reading	4	7956	B.2.1.1	1	3710	0.39	0.30	0.39	0.17	0.14	0.00	0.26	-0.11	0.26	-0.11	-0.11	0.5709	0.0367	2.9	1.0	2.7	1.1
Reading	4	8101	A.1.3.1	2	3710	0.31	0.14	0.31	0.28	0.27	0.01	0.15	-0.23	0.15	-0.01	0.03	0.9895	0.0386	6.7	1.1	8.5	1.2
Reading	4	8262	A.2.6.1	2	3710	0.56	0.56	0.16	0.14	0.14	0.00	0.31	0.31	-0.13	-0.16	-0.14	-0.2112	0.0361	-0.3	1.0	-0.1	1.0

Item Information					Classical												Rasch		Infit		Outfit	
Cont	Grade	PubID	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
Reading	4	8319	B.1.1.1	2	3710	0.41	0.12	0.22	0.41	0.24	0.01	0.35	-0.15	-0.28	0.35	-0.02	0.4488	0.0364	-2.1	1.0	-1.6	1.0
Reading	4	8374	A.1.3.1	2	3710	0.41	0.41	0.16	0.13	0.29	0.00	0.13	0.13	-0.02	-0.15	-0.01	0.4914	0.0365	9.9	1.2	9.9	1.2
Reading	4	8780	B.3.3.2	2	3710	0.54	0.12	0.16	0.17	0.54	0.00	0.34	-0.21	-0.17	-0.10	0.34	-0.1446	0.0360	-2.3	1.0	-2.2	1.0
Reading	4	8807	A.1.6.1	2	3710	0.45	0.45	0.20	0.18	0.17	0.00	0.23	0.23	-0.10	-0.10	-0.09	0.2669	0.0360	6.1	1.1	6.1	1.1
Reading	4	9002	A.1.4.1	2	3710	0.63	0.63	0.20	0.10	0.08	0.00	0.21	0.21	-0.09	-0.15	-0.07	-0.5191	0.0368	5.0	1.1	4.8	1.1
Reading	5	0175	A.2.3.1	2	4669	0.42	0.42	0.29	0.19	0.10	0.00	0.38	0.38	-0.26	-0.13	-0.07	0.8920	0.0332	-1.3	1.0	0.0	1.0
Reading	5	0650	B.1.1.1	2	4669	0.66	0.13	0.12	0.09	0.66	0.00	0.51	-0.22	-0.28	-0.25	0.51	-0.2958	0.0344	-9.9	0.9	-9.9	0.8
Reading	5	0844	B.2.1.4	1	4669	0.37	0.33	0.18	0.37	0.12	0.00	0.22	-0.07	-0.08	0.22	-0.13	1.1077	0.0337	9.6	1.1	9.9	1.3
Reading	5	0875	A.1.2.1	1	4669	0.52	0.20	0.10	0.52	0.17	0.01	0.30	-0.09	-0.20	0.30	-0.12	0.4035	0.0329	6.3	1.1	5.3	1.1
Reading	5	1831	A.1.1.2	1	4669	0.73	0.73	0.09	0.14	0.04	0.00	0.45	0.45	-0.32	-0.21	-0.17	-0.6822	0.0363	-6.9	0.9	-5.6	0.8
Reading	5	2574	A.2.6.1	1	4669	0.45	0.15	0.19	0.21	0.45	0.00	0.28	-0.02	-0.15	-0.18	0.28	0.7550	0.0330	6.6	1.1	6.8	1.1
Reading	5	2670	B.2.1.2	1	4669	0.64	0.64	0.12	0.12	0.12	0.00	0.40	0.40	-0.22	-0.22	-0.14	-0.1942	0.0340	-2.2	1.0	-2.2	1.0
Reading	5	3334	A.1.6.1	2	4669	0.38	0.38	0.17	0.18	0.26	0.01	0.26	0.26	-0.15	-0.13	-0.03	1.1121	0.0337	6.4	1.1	7.9	1.2
Reading	5	3416	A.1.4.1	2	4669	0.58	0.24	0.08	0.58	0.09	0.00	0.32	-0.11	-0.21	0.32	-0.19	0.0844	0.0333	4.0	1.1	4.7	1.1
Reading	5	3514	A.2.4.1	1	4669	0.56	0.12	0.14	0.18	0.56	0.00	0.46	-0.21	-0.24	-0.19	0.46	0.1938	0.0331	-6.3	0.9	-5.6	0.9
Reading	5	3830	A.2.2.1	1	4669	0.71	0.12	0.10	0.07	0.71	0.01	0.49	-0.30	-0.20	-0.26	0.49	-0.5757	0.0357	-9.6	0.9	-8.8	0.8
Reading	5	4468	A.2.1.2	2	4669	0.77	0.77	0.06	0.08	0.09	0.00	0.44	0.44	-0.20	-0.18	-0.31	-0.9434	0.0381	-6.5	0.9	-5.9	0.8
Reading	5	4685	B.1.1.1	2	4669	0.79	0.08	0.08	0.06	0.79	0.00	0.41	-0.18	-0.26	-0.20	0.41	-1.0785	0.0392	-5.0	0.9	-4.1	0.9
Reading	5	5125	A.1.6.1	2	4669	0.61	0.22	0.11	0.61	0.06	0.00	0.40	-0.12	-0.30	0.40	-0.21	-0.0451	0.0336	-2.2	1.0	-2.0	1.0
Reading	5	5697	B.1.1.1	2	4669	0.47	0.25	0.11	0.47	0.17	0.00	0.30	-0.09	-0.23	0.30	-0.10	0.6257	0.0329	6.3	1.1	6.3	1.1
Reading	5	5843	B.3.1.1	1	4669	0.52	0.21	0.11	0.52	0.16	0.00	0.36	-0.20	-0.16	0.36	-0.13	0.3929	0.0329	1.6	1.0	1.4	1.0
Reading	5	6223	A.2.4.1	2	4669	0.50	0.16	0.50	0.13	0.20	0.00	0.42	-0.26	0.42	-0.21	-0.10	0.4793	0.0329	-3.3	1.0	-2.3	1.0
Reading	5	6305	B.2.1.2	1	4669	0.58	0.14	0.12	0.15	0.58	0.01	0.47	-0.24	-0.22	-0.19	0.47	0.0887	0.0333	-7.6	0.9	-7.4	0.9
Reading	5	6483	A.2.4.1	1	4669	0.58	0.11	0.14	0.17	0.58	0.00	0.41	-0.30	-0.04	-0.25	0.41	0.0973	0.0333	-2.7	1.0	-2.6	1.0
Reading	5	7285	A.1.3.1	2	4669	0.67	0.67	0.08	0.13	0.12	0.01	0.44	0.44	-0.28	-0.23	-0.15	-0.3620	0.0347	-5.7	0.9	-4.3	0.9
Reading	5	7329	B.1.1.1	2	4669	0.65	0.08	0.65	0.13	0.13	0.00	0.49	-0.25	0.49	-0.27	-0.21	-0.2808	0.0343	-8.9	0.9	-8.7	0.8
Reading	5	7500	A.1.2.2	2	4669	0.48	0.29	0.14	0.48	0.09	0.00	0.35	-0.06	-0.23	0.35	-0.24	0.5983	0.0329	2.1	1.0	2.0	1.0
Reading	5	7869	B.2.2.1	2	4669	0.56	0.56	0.10	0.14	0.19	0.01	0.44	0.44	-0.17	-0.23	-0.21	0.1842	0.0331	-5.0	0.9	-4.4	0.9
Reading	5	7971	A.1.3.1	2	4669	0.41	0.21	0.30	0.41	0.08	0.00	0.22	-0.19	0.03	0.22	-0.16	0.9352	0.0333	9.9	1.2	9.9	1.2
Reading	5	8492	A.2.3.1	2	4669	0.60	0.11	0.14	0.15	0.60	0.00	0.28	-0.07	-0.16	-0.16	0.28	0.0183	0.0334	7.2	1.1	5.8	1.1
Reading	5	8573	A.1.4.1	2	4669	0.63	0.63	0.20	0.09	0.08	0.00	0.34	0.34	-0.12	-0.18	-0.23	-0.1538	0.0339	2.0	1.0	3.2	1.1
Reading	5	8647	A.2.4.1	1	4669	0.48	0.14	0.19	0.19	0.48	0.00	0.28	-0.12	-0.13	-0.11	0.28	0.5909	0.0329	8.1	1.1	7.0	1.1
Reading	5	8988	A.1.3.1	2	4669	0.42	0.24	0.20	0.42	0.13	0.01	0.34	-0.14	-0.10	0.34	-0.18	0.8737	0.0332	1.3	1.0	2.4	1.1
Reading	5	9380	A.2.4.1	1	4669	0.50	0.17	0.50	0.17	0.16	0.00	0.37	-0.25	0.37	-0.16	-0.08	0.5025	0.0329	0.7	1.0	1.5	1.0
Reading	5	9853	A.1.3.1	2	4669	0.47	0.25	0.13	0.14	0.47	0.01	0.36	-0.10	-0.19	-0.20	0.36	0.6490	0.0329	1.2	1.0	0.8	1.0
Reading	6	0030	A.2.4.1	2	4534	0.53	0.27	0.13	0.53	0.07	0.00	0.13	0.06	-0.17	0.13	-0.12	0.4733	0.0332	9.9	1.2	9.9	1.3
Reading	6	0080	A.2.3.1	2	4534	0.59	0.19	0.11	0.11	0.59	0.00	0.44	-0.19	-0.20	-0.25	0.44	0.2038	0.0336	-6.7	0.9	-6.3	0.9
Reading	6	0250	A.1.2.2	2	4534	0.77	0.14	0.77	0.08	0.01	0.00	0.41	-0.28	0.41	-0.24	-0.14	-0.7711	0.0382	-5.5	0.9	-6.0	0.8
Reading	6	0785	B.2.1.3	1	4534	0.55	0.55	0.18	0.19	0.08	0.00	0.32	0.32	-0.16	-0.15	-0.14	0.3686	0.0333	3.0	1.0	2.5	1.0
Reading	6	0807	B.1.1.1	2	4534	0.47	0.12	0.16	0.25	0.47	0.00	0.38	-0.14	-0.11	-0.24	0.38	0.7527	0.0331	-2.6	1.0	-1.4	1.0
Reading	6	0989	A.2.3.2	2	4534	0.51	0.27	0.51	0.11	0.10	0.01	0.31	-0.15	0.31	-0.18	-0.09	0.5539	0.0331	3.2	1.0	3.4	1.1

Item Information					Classical												Rasch		Infit		Outfit	
Cont	Grade	PubID	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
Reading	6	1088	A.2.4.1	2	4534	0.40	0.40	0.17	0.34	0.08	0.01	0.26	0.26	-0.12	-0.05	-0.21	1.0920	0.0336	5.9	1.1	6.9	1.1
Reading	6	1151	B.2.1.2	1	4534	0.64	0.64	0.11	0.14	0.11	0.01	0.45	0.45	-0.22	-0.24	-0.19	-0.0740	0.0344	-6.6	0.9	-6.6	0.9
Reading	6	1306	B.1.2.1	2	4534	0.38	0.14	0.38	0.23	0.23	0.01	0.30	-0.19	0.30	-0.23	0.06	1.1816	0.0338	1.9	1.0	4.6	1.1
Reading	6	1797	B.2.1.2	1	4534	0.73	0.09	0.73	0.13	0.05	0.00	0.45	-0.18	0.45	-0.34	-0.16	-0.5834	0.0369	-7.3	0.9	-7.3	0.8
Reading	6	2257	B.1.1.1	1	4534	0.58	0.24	0.58	0.09	0.08	0.00	0.34	-0.23	0.34	-0.11	-0.13	0.2170	0.0335	1.8	1.0	0.7	1.0
Reading	6	2426	A.2.6.1	1	4534	0.47	0.18	0.17	0.47	0.18	0.00	0.27	-0.18	-0.09	0.27	-0.08	0.7742	0.0331	6.4	1.1	6.5	1.1
Reading	6	2570	A.2.2.2	2	4534	0.74	0.74	0.09	0.09	0.08	0.01	0.42	0.42	-0.25	-0.21	-0.18	-0.6197	0.0371	-5.2	0.9	-5.5	0.8
Reading	6	2811	B.3.3.1	2	4534	0.33	0.33	0.33	0.17	0.15	0.01	0.28	-0.01	0.28	-0.23	-0.10	1.4265	0.0346	1.9	1.0	5.1	1.1
Reading	6	3208	A.1.4.1	1	4534	0.65	0.16	0.07	0.12	0.65	0.00	0.37	-0.16	-0.21	-0.21	0.37	-0.1378	0.0346	-1.1	1.0	-2.3	1.0
Reading	6	3499	B.3.1.1	1	4534	0.44	0.44	0.25	0.17	0.14	0.00	0.26	0.26	-0.06	-0.13	-0.15	0.8954	0.0333	6.5	1.1	7.8	1.1
Reading	6	3793	B.1.1.1	2	4534	0.59	0.12	0.10	0.59	0.19	0.00	0.33	-0.19	-0.24	0.33	-0.07	0.1928	0.0336	2.0	1.0	1.3	1.0
Reading	6	3807	A.1.1.2	1	4534	0.70	0.19	0.05	0.06	0.70	0.00	0.34	-0.14	-0.22	-0.21	0.34	-0.4026	0.0358	-0.2	1.0	0.8	1.0
Reading	6	3926	A.2.4.1	1	4534	0.79	0.79	0.07	0.04	0.10	0.00	0.42	0.42	-0.16	-0.24	-0.28	-0.9068	0.0393	-5.7	0.9	-7.0	0.8
Reading	6	6745	A.2.4.1	1	4534	0.47	0.24	0.17	0.47	0.11	0.01	0.31	-0.25	-0.04	0.31	-0.09	0.7365	0.0331	3.0	1.0	2.6	1.1
Reading	6	6826	B.3.1.1	1	4534	0.66	0.66	0.13	0.12	0.09	0.01	0.47	0.47	-0.27	-0.22	-0.19	-0.1707	0.0347	-8.4	0.9	-7.7	0.8
Reading	6	7171	A.2.2.2	2	4534	0.73	0.11	0.73	0.08	0.08	0.00	0.47	-0.30	0.47	-0.23	-0.19	-0.5398	0.0366	-8.1	0.9	-8.7	0.8
Reading	6	7305	B.3.2.1	2	4534	0.35	0.17	0.35	0.27	0.20	0.01	0.14	0.07	0.14	-0.15	-0.04	1.3524	0.0344	9.9	1.2	9.9	1.3
Reading	6	7535	A.1.2.1	1	4534	0.69	0.69	0.06	0.12	0.13	0.01	0.34	0.34	-0.22	-0.14	-0.17	-0.3330	0.0355	-0.5	1.0	0.5	1.0
Reading	6	8139	A.1.3.1	2	4534	0.77	0.07	0.11	0.04	0.77	0.00	0.43	-0.23	-0.24	-0.23	0.43	-0.8115	0.0385	-5.6	0.9	-6.6	0.8
Reading	6	8297	A.2.4.1	1	4534	0.55	0.17	0.19	0.08	0.55	0.01	0.32	-0.12	-0.13	-0.21	0.32	0.3707	0.0333	2.9	1.0	1.8	1.0
Reading	6	8316	A.2.4.1	1	4534	0.50	0.50	0.11	0.33	0.06	0.00	0.36	0.36	-0.23	-0.13	-0.20	0.5905	0.0331	-1.2	1.0	-1.4	1.0
Reading	6	8926	A.2.2.2	2	4534	0.68	0.07	0.14	0.68	0.09	0.01	0.50	-0.21	-0.33	0.50	-0.19	-0.2867	0.0352	-9.9	0.9	-9.9	0.8
Reading	6	9402	A.1.2.1	1	4534	0.67	0.67	0.12	0.11	0.09	0.00	0.39	0.39	-0.20	-0.26	-0.12	-0.2300	0.0350	-3.0	1.0	-2.8	0.9
Reading	6	9995	A.2.4.1	1	4534	0.69	0.12	0.12	0.69	0.05	0.00	0.37	-0.16	-0.21	0.37	-0.21	-0.3739	0.0357	-2.0	1.0	-1.8	1.0
Reading	7	0399	A.1.2.1	1	4558	0.67	0.67	0.07	0.16	0.09	0.00	0.32	0.32	-0.22	-0.17	-0.10	-0.4622	0.0344	-0.6	1.0	-0.3	1.0
Reading	7	0848	A.1.3.1	2	4558	0.56	0.18	0.12	0.14	0.56	0.01	0.41	-0.15	-0.17	-0.25	0.41	0.0475	0.0329	-5.5	0.9	-5.5	0.9
Reading	7	1064	A.1.3.1	2	4558	0.84	0.04	0.09	0.84	0.03	0.00	0.36	-0.20	-0.21	0.36	-0.19	-1.5302	0.0426	-4.8	0.9	-5.0	0.8
Reading	7	1344	A.2.3.1	2	4558	0.56	0.56	0.20	0.15	0.09	0.00	0.29	0.29	-0.02	-0.22	-0.20	0.0528	0.0329	2.8	1.0	3.7	1.1
Reading	7	1714	B.1.1.1	2	4558	0.48	0.23	0.13	0.15	0.48	0.00	0.39	-0.06	-0.18	-0.30	0.39	0.4330	0.0328	-4.1	1.0	-3.6	0.9
Reading	7	1877	A.1.4.1	2	4558	0.55	0.55	0.12	0.14	0.18	0.01	0.31	0.31	-0.17	-0.16	-0.10	0.0928	0.0329	2.2	1.0	1.8	1.0
Reading	7	1993	A.2.4.1	1	4558	0.54	0.21	0.20	0.04	0.54	0.00	0.29	-0.04	-0.22	-0.17	0.29	0.1463	0.0328	4.1	1.1	2.5	1.0
Reading	7	1995	B.2.1.1	1	4558	0.53	0.53	0.13	0.17	0.16	0.00	0.23	0.23	-0.16	-0.05	-0.10	0.1557	0.0328	8.6	1.1	7.2	1.1
Reading	7	2114	B.1.1.1	2	4558	0.45	0.13	0.07	0.45	0.34	0.00	0.18	-0.20	-0.24	0.18	0.09	0.5608	0.0329	9.9	1.2	9.9	1.2
Reading	7	2401	B.1.1.1	2	4558	0.59	0.59	0.16	0.15	0.09	0.00	0.44	0.44	-0.31	-0.21	-0.09	-0.0991	0.0332	-8.1	0.9	-7.6	0.9
Reading	7	3096	B.1.1.1	2	4558	0.60	0.09	0.60	0.08	0.22	0.00	0.37	-0.19	0.37	-0.24	-0.14	-0.1142	0.0332	-3.0	1.0	-3.2	0.9
Reading	7	3706	B.1.1.1	2	4558	0.47	0.21	0.13	0.19	0.47	0.00	0.20	-0.15	-0.02	-0.08	0.20	0.4571	0.0328	9.9	1.1	9.9	1.2
Reading	7	3728	B.1.1.1	2	4558	0.45	0.45	0.25	0.22	0.07	0.00	0.29	0.29	-0.12	-0.09	-0.19	0.5692	0.0329	3.3	1.0	3.2	1.1
Reading	7	4439	A.2.3.1	2	4558	0.46	0.46	0.14	0.17	0.22	0.00	0.33	0.33	-0.23	-0.11	-0.09	0.5125	0.0328	0.5	1.0	0.8	1.0
Reading	7	4587	B.1.1.1	2	4558	0.63	0.15	0.14	0.63	0.08	0.00	0.45	-0.21	-0.22	0.45	-0.25	-0.2974	0.0337	-8.5	0.9	-8.2	0.8
Reading	7	4826	B.2.1.2	2	4558	0.76	0.76	0.08	0.12	0.05	0.00	0.45	0.45	-0.29	-0.23	-0.19	-0.9647	0.0372	-8.5	0.9	-8.7	0.8
Reading	7	5498	A.2.4.1	1	4558	0.48	0.12	0.09	0.48	0.31	0.00	0.34	-0.11	-0.24	0.34	-0.13	0.4571	0.0328	-0.5	1.0	0.0	1.0

Item Information					Classical												Rasch		Infit		Outfit	
Cont	Grade	PubID	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
Reading	7	6110	B.1.1.1	2	4558	0.51	0.12	0.22	0.15	0.51	0.00	0.42	-0.21	-0.19	-0.15	0.42	0.2882	0.0327	-6.4	0.9	-5.7	0.9
Reading	7	6143	A.1.3.1	2	4558	0.52	0.25	0.52	0.15	0.08	0.00	0.35	-0.20	0.35	-0.15	-0.14	0.2298	0.0328	-1.2	1.0	-1.2	1.0
Reading	7	6981	A.2.4.1	2	4558	0.60	0.12	0.18	0.10	0.60	0.00	0.42	-0.24	-0.13	-0.24	0.42	-0.1367	0.0333	-6.5	0.9	-5.0	0.9
Reading	7	7084	A.1.3.1	2	4558	0.51	0.07	0.30	0.11	0.51	0.00	0.42	-0.23	-0.18	-0.21	0.42	0.2694	0.0327	-6.9	0.9	-7.0	0.9
Reading	7	7340	A.1.1.1	2	4558	0.45	0.36	0.45	0.11	0.08	0.00	0.37	-0.18	0.37	-0.17	-0.17	0.5787	0.0329	-2.9	1.0	-2.4	1.0
Reading	7	7353	B.1.1.1	2	4558	0.54	0.27	0.08	0.54	0.11	0.00	0.35	-0.15	-0.20	0.35	-0.16	0.1347	0.0328	-0.9	1.0	-1.2	1.0
Reading	7	7484	A.2.6.1	2	4558	0.39	0.34	0.15	0.12	0.39	0.00	0.24	-0.04	-0.07	-0.23	0.24	0.8601	0.0334	6.0	1.1	6.6	1.1
Reading	7	7487	A.1.4.1	2	4558	0.64	0.13	0.64	0.09	0.14	0.00	0.31	-0.19	0.31	-0.19	-0.08	-0.3319	0.0339	1.2	1.0	0.1	1.0
Reading	7	7490	A.2.4.1	1	4558	0.40	0.40	0.21	0.16	0.22	0.00	0.19	0.19	-0.07	-0.15	-0.02	0.7971	0.0333	9.5	1.1	8.4	1.2
Reading	7	8870	B.1.1.1	2	4558	0.64	0.64	0.17	0.14	0.04	0.00	0.45	0.45	-0.25	-0.23	-0.20	-0.3374	0.0339	-9.2	0.9	-7.9	0.8
Reading	7	9503	B.3.3.3	2	4558	0.61	0.61	0.19	0.05	0.15	0.00	0.17	0.17	-0.04	-0.16	-0.09	-0.2007	0.0335	9.9	1.1	9.9	1.2
Reading	7	9692	B.1.1.1	2	4558	0.67	0.18	0.67	0.11	0.04	0.00	0.33	-0.18	0.33	-0.18	-0.14	-0.5086	0.0346	-1.3	1.0	-1.6	1.0
Reading	7	9831	A.2.4.1	1	4558	0.46	0.29	0.46	0.14	0.12	0.00	0.28	-0.11	0.28	-0.10	-0.18	0.5514	0.0329	3.6	1.0	3.6	1.1
Reading	8	0027	A.2.4.1	2	4304	0.75	0.08	0.75	0.05	0.11	0.00	0.33	-0.20	0.33	-0.19	-0.14	-0.8530	0.0379	-3.4	0.9	-3.8	0.9
Reading	8	0337	A.2.2.1	1	4304	0.83	0.07	0.83	0.06	0.03	0.00	0.36	-0.17	0.36	-0.25	-0.17	-1.4121	0.0434	-4.7	0.9	-5.8	0.8
Reading	8	0577	B.2.1.1	1	4304	0.51	0.24	0.51	0.14	0.11	0.00	0.24	-0.10	0.24	-0.10	-0.12	0.3301	0.0334	4.9	1.1	4.9	1.1
Reading	8	0649	B.1.1.1	2	4304	0.39	0.10	0.39	0.40	0.11	0.00	0.21	-0.25	0.21	0.01	-0.10	0.9053	0.0341	4.2	1.1	5.3	1.1
Reading	8	0695	A.1.3.1	2	4304	0.49	0.12	0.24	0.15	0.49	0.00	0.31	-0.16	-0.06	-0.21	0.31	0.4010	0.0334	-0.2	1.0	-0.2	1.0
Reading	8	0817	B.2.1.2	2	4304	0.56	0.18	0.56	0.13	0.12	0.01	0.17	-0.05	0.17	-0.12	-0.06	0.1121	0.0336	9.4	1.1	8.9	1.2
Reading	8	1692	B.1.2.1	3	4304	0.52	0.15	0.52	0.21	0.11	0.01	0.29	-0.08	0.29	-0.15	-0.18	0.2893	0.0334	0.6	1.0	0.2	1.0
Reading	8	1710	B.1.2.1	3	4304	0.35	0.16	0.28	0.22	0.35	0.00	0.25	-0.12	-0.12	-0.05	0.25	1.0903	0.0347	1.0	1.0	2.1	1.0
Reading	8	1914	A.2.2.2	2	4304	0.66	0.13	0.15	0.66	0.06	0.00	0.39	-0.19	-0.22	0.39	-0.16	-0.3725	0.0350	-5.4	0.9	-5.7	0.9
Reading	8	2420	A.1.1.2	1	4304	0.67	0.67	0.14	0.09	0.11	0.00	0.31	0.31	-0.21	-0.14	-0.10	-0.3928	0.0351	-1.6	1.0	-1.5	1.0
Reading	8	2539	B.3.1.1	2	4304	0.61	0.61	0.11	0.13	0.15	0.00	0.36	0.36	-0.17	-0.28	-0.08	-0.1321	0.0341	-4.1	1.0	-4.3	0.9
Reading	8	2660	A.2.6.1	2	4304	0.46	0.46	0.32	0.10	0.12	0.00	0.26	0.26	0.00	-0.24	-0.18	0.5689	0.0334	1.9	1.0	2.0	1.0
Reading	8	3323	B.3.1.1	2	4304	0.44	0.11	0.28	0.17	0.44	0.01	0.32	-0.16	-0.14	-0.12	0.32	0.6664	0.0336	-2.1	1.0	-1.9	1.0
Reading	8	4361	A.1.1.1	2	4304	0.49	0.49	0.17	0.25	0.08	0.00	0.14	0.14	-0.03	-0.11	-0.05	0.4096	0.0334	9.9	1.1	9.9	1.2
Reading	8	4421	B.2.1.2	2	4304	0.73	0.08	0.05	0.14	0.73	0.00	0.41	-0.21	-0.17	-0.25	0.41	-0.7001	0.0368	-7.2	0.9	-7.1	0.8
Reading	8	4917	B.3.1.1	2	4304	0.45	0.11	0.28	0.16	0.45	0.00	0.27	-0.20	-0.02	-0.17	0.27	0.5970	0.0335	1.5	1.0	2.1	1.0
Reading	8	5063	B.1.1.1	2	4304	0.70	0.70	0.09	0.06	0.15	0.00	0.31	0.31	-0.20	-0.21	-0.09	-0.5520	0.0359	-1.7	1.0	-1.3	1.0
Reading	8	6299	A.1.3.1	2	4304	0.67	0.08	0.09	0.67	0.16	0.00	0.30	-0.16	-0.24	0.30	-0.07	-0.4023	0.0352	-1.2	1.0	-0.2	1.0
Reading	8	6316	B.3.3.2	2	4304	0.30	0.23	0.26	0.20	0.30	0.01	0.21	-0.01	-0.06	-0.16	0.21	1.3569	0.0360	2.3	1.0	4.0	1.1
Reading	8	6414	B.3.3.2	1	4304	0.50	0.13	0.50	0.16	0.21	0.01	0.22	-0.11	0.22	-0.16	-0.03	0.4053	0.0334	6.1	1.1	6.2	1.1
Reading	8	6586	A.2.3.2	2	4304	0.39	0.12	0.24	0.39	0.25	0.01	0.20	-0.09	-0.15	0.20	0.00	0.9121	0.0341	4.7	1.1	6.6	1.1
Reading	8	6899	B.1.1.1	1	4304	0.54	0.03	0.07	0.54	0.36	0.00	0.26	-0.18	-0.14	0.26	-0.13	0.1956	0.0335	3.1	1.0	2.2	1.0
Reading	8	6905	A.2.4.1	2	4304	0.54	0.21	0.14	0.11	0.54	0.00	0.39	-0.18	-0.21	-0.14	0.39	0.1945	0.0335	-6.2	0.9	-5.3	0.9
Reading	8	7212	A.1.3.1	2	4304	0.73	0.73	0.06	0.14	0.07	0.00	0.33	0.33	-0.22	-0.15	-0.16	-0.7308	0.0370	-3.2	1.0	-2.1	0.9
Reading	8	7232	A.2.6.1	1	4304	0.41	0.07	0.41	0.21	0.31	0.00	0.16	-0.13	0.16	-0.03	-0.07	0.7904	0.0338	9.0	1.1	9.6	1.2
Reading	8	7336	A.1.4.1	1	4304	0.72	0.12	0.72	0.09	0.07	0.00	0.46	-0.28	0.46	-0.23	-0.19	-0.6988	0.0368	-9.4	0.9	-9.9	0.8
Reading	8	7600	B.2.1.1	3	4304	0.56	0.21	0.10	0.56	0.14	0.00	0.33	-0.15	-0.19	0.33	-0.14	0.1186	0.0336	-1.7	1.0	-1.7	1.0
Reading	8	8117	B.3.3.1	2	4304	0.39	0.16	0.39	0.27	0.17	0.01	0.21	-0.13	0.21	-0.05	-0.09	0.8750	0.0340	4.7	1.1	6.4	1.1

Item Information					Classical												Rasch		Infit		Outfit	
Cont	Grade	PubID	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
Reading	8	9338	A.2.1.2	1	4304	0.70	0.07	0.70	0.18	0.05	0.00	0.29	-0.22	0.29	-0.07	-0.22	-0.5975	0.0362	-1.0	1.0	-0.8	1.0
Reading	8	9551	A.2.3.1	2	4304	0.57	0.16	0.08	0.57	0.19	0.00	0.35	-0.12	-0.23	0.35	-0.16	0.0575	0.0337	-3.2	1.0	-3.8	0.9
Reading	11	0168	A.1.3.1	2	4252	0.76	0.07	0.10	0.07	0.76	0.00	0.48	-0.25	-0.28	-0.22	0.48	-0.6007	0.0393	-8.1	0.8	-8.9	0.7
Reading	11	1076	A.2.4.1	3	4252	0.30	0.30	0.32	0.22	0.15	0.01	0.18	0.18	-0.02	-0.13	-0.03	1.7059	0.0363	4.3	1.1	8.8	1.2
Reading	11	2036	A.2.4.1	1	4252	0.64	0.64	0.09	0.15	0.10	0.01	0.42	0.42	-0.20	-0.20	-0.20	0.0471	0.0355	-5.3	0.9	-5.5	0.9
Reading	11	2201	A.1.3.1	2	4252	0.55	0.05	0.29	0.11	0.55	0.00	0.29	-0.20	-0.05	-0.23	0.29	0.5143	0.0342	3.7	1.1	3.3	1.1
Reading	11	2850	A.1.1.2	1	4252	0.76	0.76	0.11	0.07	0.06	0.00	0.42	0.42	-0.23	-0.25	-0.17	-0.5826	0.0392	-5.3	0.9	-4.4	0.9
Reading	11	2953	A.1.3.1	2	4252	0.68	0.12	0.68	0.11	0.08	0.00	0.39	-0.21	0.39	-0.26	-0.11	-0.1786	0.0366	-3.8	0.9	-3.9	0.9
Reading	11	3226	B.3.3.4	2	4252	0.72	0.08	0.10	0.09	0.72	0.00	0.50	-0.23	-0.23	-0.29	0.50	-0.3733	0.0377	-9.2	0.8	-9.2	0.8
Reading	11	4009	A.2.4.1	1	4252	0.65	0.06	0.05	0.23	0.65	0.02	0.27	-0.25	-0.31	0.01	0.27	0.0312	0.0356	3.7	1.1	4.4	1.1
Reading	11	5110	B.1.1.1	2	4252	0.53	0.05	0.53	0.07	0.35	0.00	0.23	-0.15	0.23	-0.13	-0.10	0.6208	0.0341	7.5	1.1	6.7	1.1
Reading	11	5127	B.2.1.1	2	4252	0.68	0.68	0.07	0.13	0.12	0.00	0.31	0.31	-0.26	-0.04	-0.20	-0.1501	0.0364	0.8	1.0	0.5	1.0
Reading	11	5271	A.2.2.1	1	4252	0.84	0.04	0.08	0.04	0.84	0.00	0.48	-0.23	-0.29	-0.25	0.48	-1.1539	0.0449	-7.3	0.8	-8.3	0.7
Reading	11	5438	A.2.4.1	1	4252	0.57	0.09	0.28	0.57	0.05	0.01	0.28	-0.13	-0.13	0.28	-0.18	0.3930	0.0344	4.0	1.1	2.9	1.1
Reading	11	5514	B.1.1.1	2	4252	0.56	0.12	0.56	0.05	0.27	0.00	0.34	-0.20	0.34	-0.17	-0.15	0.4217	0.0344	-0.4	1.0	-0.2	1.0
Reading	11	5565	B.2.1.2	2	4252	0.78	0.05	0.08	0.78	0.08	0.00	0.41	-0.19	-0.28	0.41	-0.18	-0.7222	0.0404	-4.5	0.9	-6.5	0.8
Reading	11	5696	B.1.2.1	3	4252	0.68	0.12	0.68	0.12	0.08	0.00	0.22	-0.13	0.22	-0.11	-0.07	-0.1346	0.0363	5.7	1.1	6.2	1.2
Reading	11	5889	B.1.2.1	3	4252	0.47	0.23	0.47	0.13	0.17	0.00	0.27	-0.17	0.27	-0.20	0.02	0.8630	0.0340	4.6	1.1	4.9	1.1
Reading	11	6643	A.2.1.2	2	4252	0.85	0.03	0.85	0.06	0.06	0.00	0.29	-0.15	0.29	-0.20	-0.13	-1.2526	0.0461	-1.0	1.0	-1.6	0.9
Reading	11	6677	B.2.1.2	2	4252	0.75	0.06	0.10	0.75	0.10	0.00	0.35	-0.17	-0.19	0.35	-0.20	-0.5438	0.0389	-1.8	1.0	-3.5	0.9
Reading	11	7354	A.1.4.1	2	4252	0.91	0.91	0.04	0.03	0.02	0.00	0.38	0.38	-0.25	-0.22	-0.16	-1.8939	0.0565	-4.1	0.8	-7.0	0.6
Reading	11	7375	A.2.6.1	2	4252	0.58	0.58	0.14	0.10	0.17	0.01	0.20	0.20	-0.17	-0.14	0.02	0.3618	0.0345	9.6	1.1	9.7	1.2
Reading	11	7456	B.3.3.2	2	4252	0.47	0.18	0.16	0.19	0.47	0.00	0.31	-0.09	-0.18	-0.12	0.31	0.8777	0.0340	1.6	1.0	2.2	1.0
Reading	11	7522	B.1.1.1	2	4252	0.50	0.17	0.14	0.19	0.50	0.00	0.33	-0.20	-0.25	0.00	0.33	0.7493	0.0340	-0.1	1.0	-0.4	1.0
Reading	11	7853	B.3.3.3	2	4252	0.62	0.06	0.27	0.05	0.62	0.01	0.34	-0.24	-0.13	-0.21	0.34	0.1669	0.0351	0.2	1.0	0.7	1.0
Reading	11	8427	B.3.2.2	2	4252	0.52	0.52	0.26	0.12	0.10	0.00	0.43	0.43	-0.15	-0.28	-0.19	0.6140	0.0341	-7.7	0.9	-7.3	0.9
Reading	11	9077	A.2.2.2	2	4252	0.81	0.81	0.09	0.07	0.02	0.01	0.40	0.40	-0.21	-0.26	-0.14	-0.9573	0.0426	-4.2	0.9	-5.3	0.8
Reading	11	9204	A.2.4.1	2	4252	0.52	0.18	0.16	0.52	0.14	0.00	0.17	-0.01	-0.15	0.17	-0.07	0.6547	0.0341	9.9	1.2	9.9	1.2
Reading	11	9532	A.2.4.1	1	4252	0.57	0.11	0.57	0.21	0.10	0.00	0.28	-0.25	0.28	-0.08	-0.08	0.3930	0.0344	4.6	1.1	3.7	1.1
Reading	11	9575	A.2.4.1	1	4252	0.53	0.53	0.09	0.17	0.21	0.00	0.23	0.23	-0.15	-0.16	-0.02	0.6038	0.0341	7.3	1.1	6.6	1.1
Reading	11	9740	A.2.3.2	1	4252	0.60	0.05	0.11	0.23	0.60	0.00	0.23	-0.20	-0.18	-0.03	0.23	0.2698	0.0347	6.9	1.1	7.6	1.2
Reading	11	9896	B.2.1.1	2	4252	0.66	0.08	0.19	0.66	0.06	0.00	0.43	-0.17	-0.31	0.43	-0.12	-0.0571	0.0360	-5.3	0.9	-5.4	0.9
Science	8	0482	D.1.3.2	2	3554	0.58	0.15	0.58	0.20	0.07	0.00	0.35	-0.25	0.35	-0.13	-0.12	0.1965	0.0374	-2.8	1.0	-3.1	0.9
Science	8	1124	A.3.1.2	2	3554	0.49	0.06	0.11	0.33	0.49	0.00	0.33	-0.20	-0.23	-0.09	0.33	0.6386	0.0368	-1.5	1.0	-1.0	1.0
Science	8	1516	C.2.1.2	2	3554	0.42	0.11	0.34	0.42	0.12	0.00	0.18	-0.09	-0.01	0.18	-0.17	0.9490	0.0371	7.3	1.1	7.9	1.2
Science	8	1850	C.3.1.1	3	3554	0.68	0.15	0.07	0.68	0.09	0.00	0.37	-0.20	-0.23	0.37	-0.12	-0.2698	0.0393	-3.6	0.9	-4.9	0.9
Science	8	2117	A.1.1.4	2	3554	0.59	0.59	0.12	0.15	0.14	0.00	0.26	0.26	-0.17	-0.11	-0.09	0.2088	0.0373	2.8	1.0	3.5	1.1
Science	8	2346	C.2.2.3	1	3554	0.65	0.05	0.10	0.65	0.20	0.00	0.39	-0.22	-0.24	0.39	-0.16	-0.0728	0.0383	-5.5	0.9	-5.9	0.9
Science	8	2382	A.1.2.3	2	3554	0.48	0.18	0.20	0.14	0.48	0.00	0.34	-0.15	-0.15	-0.16	0.34	0.6796	0.0368	-3.2	1.0	-3.1	1.0
Science	8	2854	C.3.1.3	2	3554	0.50	0.21	0.17	0.12	0.50	0.00	0.38	-0.11	-0.19	-0.23	0.38	0.6002	0.0368	-5.9	0.9	-5.3	0.9
Science	8	2978	A.2.1.2	2	3554	0.75	0.11	0.75	0.04	0.10	0.00	0.38	-0.15	0.38	-0.17	-0.28	-0.6532	0.0420	-4.6	0.9	-3.9	0.9

Item Information					Classical												Rasch		Infit		Outfit	
Cont	Grade	PubID	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
Science	8	3384	B.1.1.4	1	3554	0.42	0.24	0.23	0.42	0.10	0.00	0.22	-0.08	-0.09	0.22	-0.12	0.9706	0.0372	3.5	1.1	5.0	1.1
Science	8	3472	A.1.3.4	2	3554	0.76	0.11	0.76	0.08	0.05	0.00	0.45	-0.25	0.45	-0.25	-0.22	-0.7182	0.0425	-7.3	0.9	-7.9	0.8
Science	8	3850	D.1.2.1	1	3554	0.71	0.07	0.13	0.08	0.71	0.01	0.40	-0.25	-0.19	-0.20	0.40	-0.4325	0.0403	-5.2	0.9	-5.9	0.8
Science	8	4524	D.2.1.2	2	3554	0.52	0.52	0.14	0.11	0.23	0.00	0.35	0.35	-0.23	-0.22	-0.07	0.5194	0.0369	-3.8	1.0	-3.7	0.9
Science	8	4748	D.1.3.1	2	3554	0.68	0.68	0.11	0.11	0.10	0.00	0.41	0.41	-0.16	-0.24	-0.22	-0.2547	0.0392	-5.9	0.9	-5.9	0.9
Science	8	5066	A.2.2.1	2	3554	0.70	0.70	0.10	0.06	0.14	0.00	0.20	0.20	-0.05	-0.13	-0.12	-0.3539	0.0398	3.6	1.1	3.5	1.1
Science	8	5299	A.3.3.1	1	3554	0.43	0.22	0.43	0.14	0.21	0.01	0.28	-0.11	0.28	-0.19	-0.07	0.9382	0.0371	1.1	1.0	1.8	1.0
Science	8	5867	A.1.2.2	2	3554	0.29	0.19	0.29	0.32	0.20	0.00	0.15	0.03	0.15	-0.07	-0.11	1.6469	0.0401	3.7	1.1	6.9	1.2
Science	8	6013	A.3.1.3	1	3554	0.38	0.38	0.41	0.13	0.08	0.00	0.29	0.29	-0.02	-0.21	-0.22	1.1933	0.0378	-1.3	1.0	0.5	1.0
Science	8	6352	A.2.2.1	2	3554	0.62	0.18	0.13	0.07	0.62	0.00	0.30	-0.13	-0.13	-0.19	0.30	0.0475	0.0378	-0.2	1.0	-0.3	1.0
Science	8	6846	A.1.3.3	2	3554	0.67	0.67	0.10	0.13	0.10	0.00	0.40	0.40	-0.12	-0.24	-0.24	-0.1891	0.0389	-6.0	0.9	-4.9	0.9
Science	8	7112	A.1.3.2	2	3554	0.52	0.05	0.07	0.52	0.36	0.00	-0.19	-0.13	-0.19	-0.19	0.36	0.5512	0.0368	9.9	1.4	9.9	1.6
Science	8	7210	B.2.1.4	2	3554	0.60	0.60	0.15	0.14	0.11	0.00	0.34	0.34	-0.17	-0.17	-0.15	0.1404	0.0375	-2.5	1.0	-2.8	1.0
Science	8	7373	C.2.2.1	1	3554	0.85	0.04	0.07	0.85	0.04	0.00	0.28	-0.13	-0.18	0.28	-0.14	-1.3768	0.0503	-1.6	1.0	-2.1	0.9
Science	8	7422	B.2.2.1	2	3554	0.53	0.25	0.10	0.12	0.53	0.00	0.25	-0.12	-0.12	-0.11	0.25	0.4783	0.0369	3.1	1.0	2.8	1.1
Science	8	7749	D.3.1.2	2	3554	0.66	0.66	0.14	0.05	0.15	0.00	0.18	0.18	-0.09	-0.26	0.01	-0.1641	0.0387	5.8	1.1	5.8	1.2
Science	8	8415	B.3.1.3	2	3554	0.73	0.73	0.09	0.10	0.08	0.00	0.34	0.34	-0.25	-0.10	-0.19	-0.5199	0.0409	-2.6	1.0	-2.8	0.9
Science	8	8651	A.3.1.2	2	3554	0.71	0.71	0.07	0.15	0.07	0.00	0.33	0.33	-0.22	-0.13	-0.18	-0.4246	0.0403	-2.2	1.0	-2.1	0.9
Science	8	8923	B.1.1.2	2	3554	0.86	0.07	0.86	0.04	0.03	0.00	0.33	-0.19	0.33	-0.19	-0.16	-1.4704	0.0518	-3.0	0.9	-4.2	0.8
Science	8	9352	A.2.2.2	1	3554	0.83	0.04	0.83	0.09	0.03	0.00	0.38	-0.18	0.38	-0.25	-0.20	-1.1860	0.0477	-4.5	0.9	-6.1	0.7
Science	8	9655	A.1.1.2	2	3554	0.67	0.08	0.67	0.17	0.08	0.00	0.29	-0.07	0.29	-0.28	-0.05	-0.1965	0.0389	0.2	1.0	0.4	1.0
Science	11	1007	A.2.1.4	2	3739	0.55	0.08	0.55	0.20	0.18	0.00	0.32	-0.12	0.32	-0.20	-0.12	-0.0911	0.0366	1.9	1.0	0.9	1.0
Science	11	1335	B.2.1.2	2	3739	0.56	0.17	0.56	0.17	0.11	0.00	0.26	-0.03	0.26	-0.22	-0.10	-0.1408	0.0367	6.2	1.1	6.3	1.1
Science	11	1828	D.3.1.2	2	3739	0.32	0.32	0.20	0.32	0.16	0.01	0.24	0.24	-0.14	-0.06	-0.06	1.0077	0.0388	4.9	1.1	5.4	1.2
Science	11	2495	D.2.1.2	2	3739	0.33	0.18	0.29	0.19	0.33	0.00	0.29	-0.15	0.01	-0.20	0.29	0.9650	0.0386	2.3	1.0	4.2	1.1
Science	11	2745	B.3.3.3	3	3739	0.30	0.30	0.30	0.22	0.19	0.00	0.29	0.29	0.03	-0.21	-0.15	1.1543	0.0396	1.6	1.0	3.2	1.1
Science	11	2995	D.1.2.2	2	3739	0.58	0.58	0.12	0.16	0.14	0.00	0.50	0.50	-0.28	-0.22	-0.20	-0.2672	0.0369	-9.9	0.9	-9.9	0.8
Science	11	3055	A.2.1.3	2	3739	0.63	0.13	0.09	0.15	0.63	0.00	0.49	-0.22	-0.23	-0.26	0.49	-0.4849	0.0375	-9.9	0.9	-9.5	0.8
Science	11	3210	A.2.1.2	2	3739	0.72	0.12	0.10	0.72	0.05	0.00	0.34	-0.15	-0.23	0.34	-0.15	-0.9695	0.0398	-2.5	1.0	-1.7	1.0
Science	11	3520	C.2.2.3	1	3739	0.46	0.46	0.15	0.14	0.25	0.00	0.42	0.42	-0.23	-0.24	-0.10	0.3438	0.0367	-5.5	0.9	-4.6	0.9
Science	11	3840	A.1.1.1		3739	0.51	0.51	0.06	0.34	0.08	0.00	0.40	0.40	-0.16	-0.20	-0.23	0.0727	0.0365	-2.9	1.0	-3.0	0.9
Science	11	3927	B.3.1.3	2	3739	0.49	0.49	0.06	0.15	0.30	0.00	0.37	0.37	-0.24	-0.09	-0.21	0.1884	0.0366	-1.3	1.0	-1.0	1.0
Science	11	4137	B.3.2.2	3	3739	0.39	0.17	0.39	0.30	0.13	0.00	0.35	-0.10	0.35	-0.20	-0.12	0.6494	0.0374	-0.5	1.0	0.9	1.0
Science	11	4514	C.1.1.1	2	3739	0.68	0.05	0.11	0.68	0.16	0.00	0.32	-0.14	-0.19	0.32	-0.16	-0.7391	0.0385	-1.0	1.0	0.2	1.0
Science	11	4743	C.1.1.6	2	3739	0.52	0.09	0.21	0.52	0.18	0.00	0.37	-0.17	-0.16	0.37	-0.17	0.0221	0.0365	-1.3	1.0	-1.4	1.0
Science	11	5261	D.1.1.2	2	3739	0.49	0.18	0.49	0.12	0.21	0.00	0.29	-0.09	0.29	-0.24	-0.09	0.1936	0.0366	4.3	1.1	3.5	1.1
Science	11	5497	A.1.1.2	2	3739	0.34	0.17	0.10	0.39	0.34	0.00	0.17	-0.04	-0.21	-0.01	0.17	0.9243	0.0384	9.5	1.2	9.2	1.2
Science	11	5757	A.3.2.3	2	3739	0.35	0.14	0.35	0.31	0.20	0.00	0.27	-0.01	0.27	-0.21	-0.07	0.8954	0.0383	3.3	1.1	5.4	1.1
Science	11	6041	A.1.1.3	2	3739	0.56	0.08	0.08	0.27	0.56	0.00	0.12	-0.01	-0.15	-0.04	0.12	-0.1591	0.0367	9.9	1.2	9.9	1.3
Science	11	6229	A.3.3.3	2	3739	0.55	0.18	0.12	0.15	0.55	0.00	0.45	-0.17	-0.25	-0.21	0.45	-0.1199	0.0367	-7.4	0.9	-6.8	0.9
Science	11	6402	A.2.1.4	2	3739	0.76	0.06	0.14	0.76	0.04	0.00	0.44	-0.20	-0.29	0.44	-0.20	-1.2384	0.0418	-7.8	0.9	-7.2	0.8

Item Information					Classical												Rasch		Infit		Outfit	
Cont	**Grade**	**PubID**	**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**
Science	11	7135	A.3.1.2	2	3739	0.56	0.10	0.27	0.56	0.08	0.00	0.43	-0.15	-0.34	0.43	-0.07	-0.1526	0.0367	-6.0	0.9	-4.4	0.9
Science	11	7317	D.3.1.3	2	3739	0.68	0.68	0.16	0.05	0.10	0.00	0.33	0.33	-0.22	-0.16	-0.12	-0.7682	0.0386	-0.9	1.0	-0.9	1.0
Science	11	8026	A.3.3.1	2	3739	0.58	0.13	0.58	0.15	0.13	0.00	0.29	-0.25	0.29	-0.12	-0.05	-0.2658	0.0369	3.5	1.1	1.9	1.0
Science	11	8097	A.2.2.1	2	3739	0.63	0.06	0.13	0.17	0.63	0.00	0.46	-0.17	-0.27	-0.23	0.46	-0.5205	0.0376	-8.6	0.9	-6.9	0.8
Science	11	8304	B.3.2.3	2	3739	0.55	0.20	0.12	0.55	0.13	0.00	0.43	-0.19	-0.24	0.43	-0.17	-0.1251	0.0367	-5.7	0.9	-4.9	0.9
Science	11	8724	D.1.3.1	2	3739	0.42	0.10	0.14	0.33	0.42	0.00	0.42	-0.24	-0.18	-0.14	0.42	0.4984	0.0370	-4.7	0.9	-4.1	0.9
Science	11	8774	A.3.1.1	3	3739	0.73	0.08	0.09	0.10	0.73	0.00	0.39	-0.20	-0.21	-0.21	0.39	-1.0658	0.0404	-5.1	0.9	-4.7	0.9
Science	11	9528	C.3.1.3	2	3739	0.36	0.15	0.09	0.36	0.40	0.00	0.22	-0.01	-0.09	0.22	-0.15	0.8157	0.0380	7.3	1.1	7.6	1.2
Science	11	9753	A.2.1.5	2	3739	0.76	0.04	0.04	0.76	0.17	0.00	0.29	-0.21	-0.20	0.29	-0.13	-1.1942	0.0414	-0.8	1.0	0.1	1.0
Science	11	9919	A.1.2.1	3	3739	0.27	0.27	0.32	0.15	0.25	0.00	0.31	0.31	-0.17	-0.07	-0.08	1.3425	0.0409	-0.7	1.0	1.7	1.1

Item Information					Classical														Rasch		Infit		Outfit	
Cont	Grade	PubID	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
Math	4	2541	B.1	2	2707	0.99	0.42	0.31	0.19	0.05	0.04	0.00	0.51	-0.45	0.05	0.28	0.21	0.21	1.7937	0.0239	-1.2	1.0	-1.9	0.9
Math	4	7961	A.2	3	2707	1.00	0.45	0.32	0.08	0.07	0.08	0.00	0.52	-0.51	0.16	0.18	0.21	0.29	1.5309	0.0209	0.4	1.0	1.0	1.0
Math	5	2118	D.1		3724	1.32	0.39	0.27	0.10	0.10	0.14	0.00	0.53	-0.49	0.09	0.07	0.15	0.39	1.0408	0.0180	0.5	1.0	0.4	1.0
Math	5	7194	A.2		3724	0.49	0.69	0.20	0.07	0.03	0.01	0.00	0.38	-0.31	0.07	0.24	0.20	0.17	2.4570	0.0252	0.7	1.0	4.6	1.2
Math	6	2808	A.3		4052	0.67	0.48	0.41	0.08	0.02	0.01	0.00	0.41	-0.35	0.15	0.23	0.16	0.14	1.4602	0.0243	-1.3	1.0	-1.9	0.9
Math	6	5349	E.2		4052	1.10	0.19	0.57	0.19	0.04	0.01	0.00	0.52	-0.35	-0.11	0.33	0.25	0.15	1.3380	0.0270	-3.7	0.9	-4.2	0.9
Math	7	9565	D.3	2	4276	0.57	0.78	0.05	0.04	0.07	0.06	0.01	0.44	-0.43	0.10	0.14	0.26	0.27	1.4389	0.0196	5.3	1.2	4.5	1.6
Math	7	9637	A.2	2	4276	1.37	0.29	0.34	0.14	0.15	0.08	0.00	0.61	-0.50	-0.05	0.17	0.30	0.32	0.7503	0.0188	-4.5	0.9	-4.6	0.9
Math	8	0859	D.2	2	4440	0.94	0.39	0.39	0.13	0.08	0.01	0.01	0.55	-0.53	0.17	0.29	0.24	0.13	1.3549	0.0215	-2.7	0.9	-3.3	0.9
Math	8	5551	A.2	2	4440	1.02	0.32	0.42	0.20	0.04	0.02	0.00	0.49	-0.44	0.09	0.24	0.22	0.17	1.1307	0.0221	-0.2	1.0	0.0	1.0
Math	11	7244	B.2		4603	0.61	0.55	0.35	0.06	0.01	0.03	0.03	0.54	-0.49	0.24	0.29	0.14	0.26	1.4930	0.0227	-3.8	0.9	-4.2	0.9
Math	11	8130	D.1		4603	0.63	0.47	0.47	0.04	0.03	0.00	0.03	0.53	-0.48	0.32	0.21	0.25	0.07	2.0356	0.0254	-3.0	0.9	-3.6	0.9
Reading	4	2295	B.1.1.1	3	3710	1.39	0.18	0.35	0.37	0.10		0.02	0.49	-0.36	-0.17	0.29	0.27		0.2830	0.0224	-2.8	0.9	-3.0	0.9
Reading	4	7374	A.2.4.1	1	3710	1.41	0.27	0.29	0.20	0.24		0.01	0.51	-0.41	-0.08	0.13	0.39		0.1229	0.0189	0.3	1.0	0.7	1.0
Reading	5	0170	A.2.4.1	3	4669	1.56	0.22	0.24	0.29	0.25		0.01	0.62	-0.49	-0.17	0.18	0.45		0.3976	0.0182	-4.7	0.9	-4.4	0.9
Reading	5	7637	B.1.1.1	3	4669	1.53	0.08	0.42	0.39	0.11		0.01	0.44	-0.30	-0.23	0.25	0.23		0.3609	0.0227	4.3	1.1	4.4	1.1
Reading	6	1061	A.2.4.1	2	4534	1.53	0.14	0.34	0.36	0.16		0.01	0.55	-0.43	-0.19	0.25	0.33		0.5328	0.0205	-3.8	0.9	-3.9	0.9
Reading	6	1340	B.1.1.1	3	4534	1.21	0.19	0.48	0.28	0.06		0.01	0.36	-0.34	0.02	0.19	0.16		1.1649	0.0225	8.2	1.2	8.0	1.2
Reading	7	6730	B.1.1.1	3	4558	1.56	0.17	0.31	0.31	0.21		0.01	0.55	-0.38	-0.21	0.16	0.41		0.2314	0.0188	-3.5	0.9	-3.8	0.9
Reading	7	8855	A.2.3.1	3	4558	1.13	0.21	0.51	0.23	0.06		0.01	0.43	-0.37	0.00	0.24	0.21		0.9717	0.0222	1.4	1.0	1.5	1.0
Reading	8	3649	A.2.4.1	3	4304	1.57	0.14	0.30	0.40	0.15		0.01	0.50	-0.37	-0.21	0.24	0.30		0.3076	0.0204	-4.2	0.9	-4.3	0.9
Reading	8	9491	A.1.5.1	3	4304	1.83	0.08	0.26	0.41	0.25		0.01	0.55	-0.31	-0.33	0.10	0.42		-0.1832	0.0208	-8.1	0.9	-8.1	0.8
Reading	11	2929	B.1.1.1	2	4252	1.65	0.09	0.36	0.36	0.19		0.02	0.51	-0.34	-0.27	0.21	0.32		0.3314	0.0217	-2.4	1.0	-2.4	1.0
Reading	11	4644	A.2.3.1	2	4252	1.53	0.12	0.41	0.30	0.18		0.02	0.49	-0.35	-0.22	0.23	0.31		0.5595	0.0209	-1.5	1.0	-1.5	1.0
Science	8	0051	B.1.1.2	2	3554	0.92	0.27	0.54	0.19			0.01	0.39	-0.35	0.11	0.26			0.7988	0.0287	-0.2	1.0	-0.3	1.0
Science	8	1617	A.2.1.1	3	3554	0.94	0.31	0.45	0.24			0.01	0.32	-0.24	-0.04	0.30			0.7382	0.0266	3.7	1.1	3.7	1.1
Science	11	4597	A.1.1.4	3	3739	1.12	0.22	0.44	0.34			0.05	0.38	-0.32	-0.04	0.32			-0.1759	0.0265	4.0	1.1	5.6	1.1
Science	11	9301	D.1.1.3	3	3739	0.38	0.67	0.27	0.06			0.04	0.45	-0.45	0.35	0.24			1.8211	0.0319	-3.9	0.9	-3.1	0.9

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

Reading Grade 4

ID	Type	Form	Seq	Prev Form	Prev Seq	Prev P-Val	P-Val	Prev Meas	Meas
598532	MC	0	8	0	8	0.49	0.45	0.1931	0.3086
598583	MC	0	9	0	9	0.72	0.71	-0.8839	-0.9301
599427	MC	0	10	0	10	0.57	0.54	-0.1695	-0.1120
598575	MC	0	11	0	11	0.49	0.46	0.2258	0.2405
598373	MC	0	12	0	12	0.59	0.56	-0.2712	-0.2112
598574	MC	0	13	0	13	0.36	0.35	0.8112	0.7871
598529	MC	0	20	0	20	0.63	0.63	-0.4502	-0.5191
598519	MC	0	21	0	21	0.64	0.60	-0.4909	-0.3918
598514	MC	0	22	0	22	0.41	0.41	0.5959	0.4914
598508	MC	0	23	0	23	0.32	0.31	1.0465	0.9851
598412	MC	0	24	0	24	0.41	0.39	0.6058	0.5709
598538	MC	0	25	0	25	0.48	0.45	0.2736	0.2669
					Mean	0.51	0.49	0.12	0.12

Reading Grade 5

ID	Type	Form	Seq	Prev Form	Prev Seq	Prev P-Val	P-Val	Prev Meas	Meas
599575	MC	0	1	0	8	0.75	0.77	-0.9049	-0.9434
599214	MC	0	2	0	9	0.55	0.60	0.1682	0.0183
592371	MC	0	3	0	10	0.47	0.50	0.5718	0.5025
599217	MC	0	4	0	11	0.54	0.58	0.2411	0.0973
565177	MC	0	5	0	12	0.49	0.52	0.4832	0.3929
561547	MC	0	6	0	13	0.41	0.45	0.8913	0.7550
598411	MC	0	20	0	20	0.41	0.41	0.8635	0.9352
598510	MC	0	21	0	21	0.62	0.64	-0.1852	-0.1942
598399	MC	0	22	0	22	0.80	0.79	-1.2316	-1.0785
598415	MC	0	23	0	23	0.64	0.63	-0.2647	-0.1538
598491	MC	0	24	0	24	0.49	0.47	0.4955	0.6257
598423	MC	0	25	0	25	0.61	0.58	-0.0863	0.0844
					Mean	0.57	0.58	0.09	0.09

Reading Grade 6

ID	Type	Form	Seq	Prev Form	Prev Seq	Prev P-Val	P-Val	Prev Meas	Meas
598543	MC	0	8	0	8	0.51	0.51	0.6164	0.5539
599244	MC	0	9	0	9	0.73	0.73	-0.5373	-0.5398
599248	MC	0	10	0	10	0.77	0.74	-0.7566	-0.6197
598545	MC	0	11	0	11	0.42	0.40	1.0743	1.0920
599247	MC	0	12	0	12	0.67	0.66	-0.1716	-0.1707
598557	MC	0	13	0	13	0.36	0.35	1.3832	1.3524
598548	MC	0	14	0	14	0.42	0.38	1.0368	1.1816
598444	MC	0	21	0	21	0.67	0.67	-0.2056	-0.2300
598464	MC	0	22	0	22	0.71	0.73	-0.4003	-0.5834
598443	MC	0	23	0	23	0.72	0.70	-0.4643	-0.4026
598452	MC	0	24	0	24	0.48	0.47	0.7803	0.7527
598457	MC	0	25	0	25	0.56	0.55	0.3992	0.3686
					Mean	0.58	0.57	0.23	0.23

Reading Grade 7

ID	Type	Form	Seq	Prev Form	Prev Seq	Prev P-Val	P-Val	Prev Meas	Meas
598240	MC	0	8	0	8	0.65	0.61	-0.3222	-0.2007
598216	MC	0	9	0	9	0.55	0.54	0.1862	0.1463
598234	MC	0	10	0	10	0.61	0.60	-0.0990	-0.1367
598212	MC	0	11	0	11	0.52	0.48	0.3109	0.4571
598231	MC	0	12	0	12	0.48	0.45	0.4973	0.5608
598219	MC	0	13	0	13	0.38	0.39	0.9858	0.8601
560867	MC	0	20	0	20	0.66	0.67	-0.3839	-0.5086
560874	MC	0	21	0	21	0.56	0.52	0.1365	0.2298
599287	MC	0	22	0	22	0.75	0.76	-0.8796	-0.9647
599288	MC	0	23	0	23	0.56	0.56	0.1401	0.0475
560886	MC	0	24	0	24	0.58	0.53	0.0160	0.1557
560885	MC	0	25	0	25	0.45	0.45	0.6279	0.5692
					Mean	0.56	0.55	0.10	0.10

Reading Grade 8

ID	Type	Form	Seq	Prev Form	Prev Seq	Prev P-Val	P-Val	Prev Meas	Meas
561421	MC	0	8	0	8	0.76	0.73	-0.8670	-0.7308
561416	MC	0	9	0	9	0.75	0.73	-0.7903	-0.7001
561424	MC	0	10	0	10	0.50	0.51	0.4811	0.3301
599095	MC	0	11	0	11	0.59	0.56	0.0594	0.1121
562056	MC	0	12	0	12	0.68	0.67	-0.3766	-0.3928
599096	MC	0	13	0	13	0.68	0.67	-0.3866	-0.4023
599098	MC	0	14	0	14	0.50	0.52	0.4633	0.2893
561470	MC	0	21	0	20	0.85	0.83	-1.4457	-1.4121
599111	MC	0	22	0	21	0.47	0.45	0.6245	0.5970
599110	MC	0	23	0	22	0.48	0.46	0.5800	0.5689
561458	MC	0	24	0	23	0.61	0.57	-0.0390	0.0575
561463	MC	0	25	0	24	0.37	0.35	1.1036	1.0903
					Mean	0.60	0.59	-0.05	-0.05

Reading Grade 11

ID	Type	Form	Seq	Prev Form	Prev Seq	Prev P-Val	P-Val	Prev Meas	Meas
599164	MC	0	8	0	8	0.57	0.58	0.4613	0.3618
599165	MC	0	9	0	9	0.86	0.84	-1.2596	-1.1539
561673	MC	0	10	0	10	0.80	0.78	-0.7839	-0.7222
561683	MC	0	11	0	11	0.65	0.65	0.0696	0.0312
561687	MC	0	12	0	12	0.52	0.52	0.6744	0.6140
561697	MC	0	13	0	13	0.67	0.68	-0.0624	-0.1346
561660	MC	0	20	0	20	0.71	0.68	-0.2374	-0.1501
599155	MC	0	21	0	21	0.55	0.55	0.5371	0.5143
561658	MC	0	22	0	22	0.57	0.53	0.4770	0.6208
599152	MC	0	23	0	23	0.77	0.75	-0.6401	-0.5438
562079	MC	0	24	0	24	0.91	0.91	-1.8238	-1.8939
561669	MC	0	25	0	25	0.45	0.47	0.9947	0.8630
					Mean	0.67	0.66	-0.13	-0.13

Science Grade 8

ID	Type	Form	Seq	Prev Form	Prev Seq	Prev P-Val	P-Val	Prev Meas	Meas
597847	MC	0	4	0	4	0.50	0.48	0.6558	0.6796
561623	MC	0	7	0	5	0.76	0.76	-0.6556	-0.7182
597794	MC	0	9	0	7	0.62	0.62	0.0779	0.0475
597725	MC	0	12	0	10	0.73	0.71	-0.4600	-0.4246
561625	MC	0	14	0	13	0.43	0.38	0.9561	1.1933
597857	MC	0	17	0	18	0.89	0.86	-1.6581	-1.4704
561624	MC	0	19	0	20	0.62	0.60	0.0824	0.1404
597874	MC	0	23	0	25	0.82	0.85	-1.0426	-1.3768
561633	MC	0	25	0	26	0.49	0.50	0.7084	0.6002
597929	MC	0	27	0	27	0.72	0.71	-0.4497	-0.4325
560796	MC	0	28	0	28	0.69	0.68	-0.2725	-0.2547
597896	MC	0	29	0	29	0.59	0.58	0.2384	0.1965
					Mean	0.65	0.65	-0.15	-0.15

Science Grade 11

ID	Type	Form	Seq	Prev Form	Prev Seq	Prev P-Val	P-Val	Prev Meas	Meas
561202	MC	0	8	0	9	0.53	0.55	0.0485	-0.0911
560903	MC	0	10	0	10	0.66	0.63	-0.5841	-0.5205
597968	MC	0	11	0	12	0.74	0.73	-0.9900	-1.0658
598783	MC	0	12	0	13	0.59	0.56	-0.2141	-0.1526
560814	MC	0	13	0	15	0.37	0.35	0.7990	0.8954
561246	MC	0	18	0	18	0.49	0.49	0.2314	0.1884
598020	MC	0	21	0	22	0.29	0.30	1.1909	1.1543
597952	MC	0	22	0	23	0.67	0.68	-0.6325	-0.7391
597954	MC	0	24	0	25	0.48	0.46	0.2634	0.3438
597972	MC	0	26	0	27	0.50	0.49	0.1956	0.1936
597948	MC	0	30	0	31	0.35	0.32	0.9057	1.0077
					Mean	0.52	0.50	0.11	0.11

Appendix K:

Reliabilities

Column Heading	Definition
Strand	Strand (Tot.=total)
Group	Subgroup
Pts.	Points possible
Len.	Length
N	N
Mean	Mean
SD	Standard deviation
r	Reliability coefficient
SEM	Standard error of measurement
Items	Item types present

Mathematics Grade 4

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Overall	Tot.	All	38	32	2708	21.0	6.51	0.82	2.7	MC/OE
	A	All	18	15	2708	8.3	3.68	0.70	2.0	MC/OE
	B	All	5	2	2708	1.5	1.26	0.22	1.1	MC/OE
	C	All	5	5	2708	3.6	1.21	0.44	0.9	MC
	D	All	5	5	2708	3.6	1.09	0.43	0.8	MC
	E	All	5	5	2708	4.0	1.20	0.61	0.8	MC

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Gender	Tot.	Male	38	32	1625	21.2	6.64	0.83	2.8	MC/OE
		Female	38	32	1081	20.8	6.31	0.82	2.7	MC/OE
	A	Male	18	15	1625	8.4	3.73	0.70	2.0	MC/OE
		Female	18	15	1081	8.2	3.59	0.68	2.0	MC/OE
	B	Male	5	2	1625	1.6	1.30	0.23	1.1	MC/OE
		Female	5	2	1081	1.3	1.19	0.19	1.1	MC/OE
	C	Male	5	5	1625	3.5	1.23	0.44	0.9	MC
		Female	5	5	1081	3.7	1.18	0.43	0.9	MC
	D	Male	5	5	1625	3.7	1.07	0.42	0.8	MC
		Female	5	5	1081	3.5	1.11	0.43	0.8	MC
	E	Male	5	5	1625	3.9	1.23	0.61	0.8	MC
		Female	5	5	1081	4.0	1.16	0.60	0.7	MC

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Ethnicity	Tot.	White	38	32	1655	22.0	6.40	0.82	2.7	MC/OE
		Af. Amer.	38	32	645	18.8	6.50	0.82	2.7	MC/OE
		Hispanic	38	32	298	20.6	6.00	0.80	2.7	MC/OE
		Asian	38	32	30	21.2	6.03	0.82	2.5	MC/OE
		Am. Indian	38	32	5	21.8	8.07	0.90	2.6	MC/OE
		Multi	38	32	71	19.7	6.38	0.81	2.8	MC/OE
	A	White	18	15	1655	8.8	3.72	0.70	2.0	MC/OE
		Af. Amer.	18	15	645	7.3	3.48	0.67	2.0	MC/OE
		Hispanic	18	15	298	8.2	3.35	0.65	2.0	MC/OE
		Asian	18	15	30	8.5	3.64	0.75	1.8	MC/OE
		Am. Indian	18	15	5	8.8	4.15	0.83	1.7	MC/OE
		Multi	18	15	71	7.5	3.69	0.69	2.0	MC/OE
	B	White	5	2	1655	1.6	1.28	0.21	1.1	MC/OE
		Af. Amer.	5	2	645	1.2	1.18	0.22	1.0	MC/OE
		Hispanic	5	2	298	1.3	1.21	0.12	1.1	MC/OE
		Asian	5	2	30	1.3	0.99	0.12	0.9	MC/OE
		Am. Indian	5	2	5	1.6	1.52	0.43	1.1	MC/OE
		Multi	5	2	71	1.3	1.25	0.45	0.9	MC/OE
	C	White	5	5	1655	3.7	1.16	0.42	0.9	MC
		Af. Amer.	5	5	645	3.3	1.28	0.43	1.0	MC
		Hispanic	5	5	298	3.5	1.22	0.44	0.9	MC
		Asian	5	5	30	3.5	1.22	0.41	0.9	MC
		Am. Indian	5	5	5	4.2	0.45	-3.13	0.9	MC
		Multi	5	5	71	3.4	1.13	0.24	1.0	MC

D	White	5	5	1655	3.7	1.06	0.41	0.8	MC
	Af. Amer.	5	5	645	3.4	1.16	0.46	0.9	MC
	Hispanic	5	5	298	3.6	1.02	0.37	0.8	MC
	Asian	5	5	30	3.5	1.07	0.35	0.9	MC
	Am. Indian	5	5	5	3.4	1.14	0.19	1.0	MC
	Multi	5	5	71	3.5	1.24	0.50	0.9	MC
E	White	5	5	1655	4.1	1.12	0.58	0.7	MC
	Af. Amer.	5	5	645	3.6	1.33	0.62	0.8	MC
	Hispanic	5	5	298	3.9	1.18	0.57	0.8	MC
	Asian	5	5	30	4.3	1.01	0.53	0.7	MC
	Am. Indian	5	5	5	3.8	1.79	0.86	0.7	MC
	Multi	5	5	71	4.0	1.18	0.63	0.7	MC

	Strand	**Group**	**Pts.**	**Len.**	**N**	**Mean**	***SD***	**r**	***SEM***	**Items**
ELL	Tot.	All	38	32	140	20.1	5.59	0.78	2.6	MC/OE
	A	All	18	15	140	8.0	3.15	0.62	1.9	MC/OE
	B	All	5	2	140	1.1	1.03	0.19	0.9	MC/OE
	C	All	5	5	140	3.5	1.22	0.42	0.9	MC
	D	All	5	5	140	3.6	1.03	0.32	0.8	MC
	E	All	5	5	140	3.9	1.14	0.55	0.8	MC

	Strand	**Group**	**Pts.**	**Len.**	**N**	**Mean**	***SD***	**r**	***SEM***	**Items**
Eco. Disadv.	Tot.	All	38	32	1747	20.6	6.47	0.82	2.7	MC/OE
	A	All	18	15	1747	8.1	3.61	0.69	2.0	MC/OE
	B	All	5	2	1747	1.4	1.25	0.22	1.1	MC/OE
	C	All	5	5	1747	3.5	1.22	0.42	0.9	MC
	D	All	5	5	1747	3.6	1.11	0.44	0.8	MC
	E	All	5	5	1747	3.9	1.22	0.60	0.8	MC

Mathematics Grade 5

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Overall	Tot.	All	38	32	3726	20.2	6.34	0.80	2.8	MC/OE
	A	All	17	14	3726	7.9	2.79	0.61	1.8	MC/OE
	B	All	5	5	3726	3.0	1.29	0.40	1.0	MC
	C	All	5	5	3726	3.3	1.31	0.49	0.9	MC
	D	All	6	3	3726	2.7	1.78	0.33	1.5	MC/OE
	E	All	5	5	3726	3.3	1.24	0.47	0.9	MC

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Gender	Tot.	Male	38	32	2240	20.2	6.39	0.81	2.8	MC/OE
		Female	38	32	1484	20.2	6.25	0.79	2.8	MC/OE
	A	Male	17	14	2240	8.0	2.81	0.62	1.7	MC/OE
		Female	17	14	1484	7.8	2.76	0.59	1.8	MC/OE
	B	Male	5	5	2240	3.1	1.28	0.39	1.0	MC
		Female	5	5	1484	3.0	1.31	0.40	1.0	MC
	C	Male	5	5	2240	3.2	1.33	0.51	0.9	MC
		Female	5	5	1484	3.4	1.27	0.45	0.9	MC
	D	Male	6	3	2240	2.7	1.79	0.35	1.4	MC/OE
		Female	6	3	1484	2.7	1.76	0.30	1.5	MC/OE
	E	Male	5	5	2240	3.2	1.26	0.47	0.9	MC
		Female	5	5	1484	3.4	1.21	0.44	0.9	MC

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Ethnicity	Tot.	White	38	32	2317	21.1	6.12	0.79	2.8	MC/OE
		Af. Amer.	38	32	890	18.5	6.32	0.80	2.8	MC/OE
		Hispanic	38	32	397	19.1	6.53	0.80	2.9	MC/OE
		Asian	38	32	33	19.2	7.47	0.84	3.0	MC/OE
		Am. Indian	38	32	6	22.8	3.92	0.56	2.6	MC/OE
		Multi	38	32	80	20.9	6.46	0.81	2.8	MC/OE
	A	White	17	14	2317	8.1	2.78	0.60	1.8	MC/OE
		Af. Amer.	17	14	890	7.4	2.75	0.59	1.8	MC/OE
		Hispanic	17	14	397	7.6	2.79	0.60	1.8	MC/OE
		Asian	17	14	33	7.8	3.16	0.67	1.8	MC/OE
		Am. Indian	17	14	6	8.7	2.42	0.53	1.7	MC/OE
		Multi	17	14	80	7.9	2.68	0.60	1.7	MC/OE
	B	White	5	5	2317	3.2	1.26	0.38	1.0	MC
		Af. Amer.	5	5	890	2.7	1.31	0.38	1.0	MC
		Hispanic	5	5	397	2.9	1.29	0.37	1.0	MC
		Asian	5	5	33	2.8	1.36	0.43	1.0	MC
		Am. Indian	5	5	6	3.5	0.55	-3.33	1.1	MC
		Multi	5	5	80	3.1	1.24	0.31	1.0	MC
	C	White	5	5	2317	3.4	1.23	0.44	0.9	MC
		Af. Amer.	5	5	890	3.0	1.36	0.50	1.0	MC
		Hispanic	5	5	397	3.0	1.42	0.55	1.0	MC
		Asian	5	5	33	2.6	1.52	0.60	1.0	MC
		Am. Indian	5	5	6	3.3	1.63	0.66	1.0	MC
		Multi	5	5	80	3.3	1.33	0.52	0.9	MC

D	White	6	3	2317	2.8	1.78	0.32	1.5	MC/OE
	Af. Amer.	6	3	890	2.4	1.70	0.35	1.4	MC/OE
	Hispanic	6	3	397	2.6	1.83	0.31	1.5	MC/OE
	Asian	6	3	33	3.1	2.05	0.39	1.6	MC/OE
	Am. Indian	6	3	6	3.5	1.05	0.36	0.8	MC/OE
	Multi	6	3	80	3.0	1.81	0.36	1.5	MC/OE
E	White	5	5	2317	3.4	1.15	0.42	0.9	MC
	Af. Amer.	5	5	890	2.9	1.29	0.45	1.0	MC
	Hispanic	5	5	397	3.0	1.34	0.50	0.9	MC
	Asian	5	5	33	2.9	1.51	0.61	0.9	MC
	Am. Indian	5	5	6	3.8	0.75	-0.44	0.9	MC
	Multi	5	5	80	3.5	1.27	0.54	0.9	MC

	Strand	**Group**	**Pts.**	**Len.**	**N**	**Mean**	***SD***	**r**	***SEM***	**Items**
ELL	Tot.	All	38	32	180	18.2	6.63	0.81	2.9	MC/OE
	A	All	17	14	180	7.5	2.75	0.59	1.8	MC/OE
	B	All	5	5	180	2.8	1.28	0.34	1.0	MC
	C	All	5	5	180	2.7	1.45	0.55	1.0	MC
	D	All	6	3	180	2.4	1.79	0.35	1.4	MC/OE
	E	All	5	5	180	2.7	1.39	0.51	1.0	MC

	Strand	**Group**	**Pts.**	**Len.**	**N**	**Mean**	***SD***	**r**	***SEM***	**Items**
Eco. Disadv.	Tot.	All	38	32	2421	19.8	6.35	0.80	2.8	MC/OE
	A	All	17	14	2421	7.7	2.80	0.61	1.8	MC/OE
	B	All	5	5	2421	3.0	1.30	0.39	1.0	MC
	C	All	5	5	2421	3.2	1.31	0.48	0.9	MC
	D	All	6	3	2421	2.6	1.77	0.33	1.4	MC/OE
	E	All	5	5	2421	3.2	1.25	0.45	0.9	MC

Mathematics Grade 6

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Overall	Tot.	All	38	32	4061	17.2	5.72	0.78	2.7	MC/OE
	A	All	12	9	4061	4.8	2.32	0.60	1.5	MC/OE
	B	All	5	5	4061	3.0	1.14	0.29	1.0	MC
	C	All	7	7	4061	3.7	1.54	0.39	1.2	MC
	D	All	7	7	4061	3.0	1.54	0.40	1.2	MC
	E	All	7	4	4061	2.7	1.38	0.47	1.0	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Gender	Tot.	Male	38	32	2391	17.1	5.79	0.79	2.7	MC/OE
		Female	38	32	1667	17.2	5.63	0.78	2.6	MC/OE
	A	Male	12	9	2391	4.8	2.33	0.59	1.5	MC/OE
		Female	12	9	1667	4.9	2.31	0.61	1.4	MC/OE
	B	Male	5	5	2391	3.0	1.16	0.31	1.0	MC
		Female	5	5	1667	2.9	1.10	0.26	0.9	MC
	C	Male	7	7	2391	3.7	1.53	0.39	1.2	MC
		Female	7	7	1667	3.7	1.54	0.40	1.2	MC
	D	Male	7	7	2391	3.0	1.55	0.41	1.2	MC
		Female	7	7	1667	3.0	1.53	0.39	1.2	MC
	E	Male	7	4	2391	2.6	1.36	0.45	1.0	MC/OE
		Female	7	4	1667	2.8	1.40	0.48	1.0	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Ethnicity	Tot.	White	38	32	2549	17.6	5.74	0.79	2.7	MC/OE
		Af. Amer.	38	32	962	15.9	5.49	0.76	2.7	MC/OE
		Hispanic	38	32	419	17.1	5.82	0.79	2.7	MC/OE
		Asian	38	32	48	17.7	5.22	0.73	2.7	MC/OE
		Am. Indian	38	32	11	17.3	3.77	0.52	2.6	MC/OE
		Multi	38	32	68	17.6	5.98	0.80	2.7	MC/OE
	A	White	12	9	2549	4.9	2.35	0.60	1.5	MC/OE
		Af. Amer.	12	9	962	4.5	2.20	0.56	1.5	MC/OE
		Hispanic	12	9	419	4.9	2.32	0.62	1.4	MC/OE
		Asian	12	9	48	5.0	2.24	0.58	1.4	MC/OE
		Am. Indian	12	9	11	4.5	1.37	-0.28	1.6	MC/OE
		Multi	12	9	68	5.0	2.54	0.64	1.5	MC/OE
	B	White	5	5	2549	3.0	1.13	0.29	0.9	MC
		Af. Amer.	5	5	962	2.8	1.15	0.28	1.0	MC
		Hispanic	5	5	419	3.0	1.11	0.23	1.0	MC
		Asian	5	5	48	3.1	1.16	0.38	0.9	MC
		Am. Indian	5	5	11	3.1	0.70	-0.60	0.9	MC
		Multi	5	5	68	3.0	1.16	0.34	0.9	MC
	C	White	7	7	2549	3.9	1.52	0.39	1.2	MC
		Af. Amer.	7	7	962	3.4	1.52	0.35	1.2	MC
		Hispanic	7	7	419	3.4	1.54	0.38	1.2	MC
		Asian	7	7	48	3.9	1.49	0.30	1.3	MC
		Am. Indian	7	7	11	3.9	1.45	0.44	1.1	MC
		Multi	7	7	68	3.8	1.53	0.40	1.2	MC

D	White	7	7	2549	3.0	1.55	0.40	1.2	MC
	Af. Amer.	7	7	962	2.9	1.51	0.37	1.2	MC
	Hispanic	7	7	419	3.0	1.60	0.46	1.2	MC
	Asian	7	7	48	2.8	1.42	0.29	1.2	MC
	Am. Indian	7	7	11	2.8	1.40	0.23	1.2	MC
	Multi	7	7	68	3.1	1.59	0.45	1.2	MC
E	White	7	4	2549	2.8	1.37	0.47	1.0	MC/OE
	Af. Amer.	7	4	962	2.4	1.35	0.45	1.0	MC/OE
	Hispanic	7	4	419	2.7	1.44	0.48	1.0	MC/OE
	Asian	7	4	48	2.9	1.45	0.44	1.1	MC/OE
	Am. Indian	7	4	11	3.0	0.77	-1.05	1.1	MC/OE
	Multi	7	4	68	2.8	1.35	0.38	1.1	MC/OE

	Strand	**Group**	**Pts.**	**Len.**	**N**	**Mean**	***SD***	**r**	***SEM***	**Items**
ELL	Tot.	All	38	32	163	16.4	5.67	0.78	2.7	MC/OE
	A	All	12	9	163	4.7	2.20	0.58	1.4	MC/OE
	B	All	5	5	163	2.8	1.10	0.22	1.0	MC
	C	All	7	7	163	3.4	1.63	0.45	1.2	MC
	D	All	7	7	163	3.0	1.65	0.49	1.2	MC
	E	All	7	4	163	2.5	1.48	0.54	1.0	MC/OE

	Strand	**Group**	**Pts.**	**Len.**	**N**	**Mean**	***SD***	**r**	***SEM***	**Items**
Eco. Disadv.	Tot.	All	38	32	2542	16.9	5.73	0.78	2.7	MC/OE
	A	All	12	9	2542	4.7	2.31	0.59	1.5	MC/OE
	B	All	5	5	2542	2.9	1.14	0.30	1.0	MC
	C	All	7	7	2542	3.6	1.55	0.39	1.2	MC
	D	All	7	7	2542	3.0	1.56	0.42	1.2	MC
	E	All	7	4	2542	2.6	1.37	0.47	1.0	MC/OE

Mathematics Grade 7

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Overall	Tot.	All	38	32	4283	18.0	6.78	0.81	2.9	MC/OE
	A	All	9	6	4283	4.2	2.20	0.53	1.5	MC/OE
	B	All	5	5	4283	2.2	1.31	0.41	1.0	MC
	C	All	7	7	4283	3.8	1.68	0.51	1.2	MC
	D	All	11	8	4283	4.2	2.38	0.52	1.7	MC/OE
	E	All	6	6	4283	3.7	1.47	0.50	1.0	MC

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Gender	Tot.	Male	38	32	2562	17.9	6.84	0.82	2.9	MC/OE
		Female	38	32	1719	18.1	6.70	0.81	2.9	MC/OE
	A	Male	9	6	2562	4.3	2.22	0.55	1.5	MC/OE
		Female	9	6	1719	4.1	2.16	0.50	1.5	MC/OE
	B	Male	5	5	2562	2.1	1.32	0.42	1.0	MC
		Female	5	5	1719	2.2	1.29	0.39	1.0	MC
	C	Male	7	7	2562	3.8	1.69	0.52	1.2	MC
		Female	7	7	1719	3.8	1.66	0.50	1.2	MC
	D	Male	11	8	2562	4.1	2.38	0.52	1.6	MC/OE
		Female	11	8	1719	4.4	2.37	0.50	1.7	MC/OE
	E	Male	6	6	2562	3.6	1.49	0.50	1.1	MC
		Female	6	6	1719	3.8	1.43	0.49	1.0	MC

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Ethnicity	Tot.	White	38	32	2808	18.4	6.84	0.82	2.9	MC/OE
		Af. Amer.	38	32	896	16.7	6.50	0.79	2.9	MC/OE
		Hispanic	38	32	448	17.6	6.61	0.80	2.9	MC/OE
		Asian	38	32	49	19.0	6.32	0.78	2.9	MC/OE
		Am. Indian	38	32	8	23.5	6.07	0.74	3.1	MC/OE
		Multi	38	32	68	18.9	6.66	0.82	2.9	MC/OE
	A	White	9	6	2808	4.4	2.22	0.54	1.5	MC/OE
		Af. Amer.	9	6	896	3.9	2.10	0.49	1.5	MC/OE
		Hispanic	9	6	448	4.1	2.20	0.55	1.5	MC/OE
		Asian	9	6	49	4.2	2.02	0.48	1.5	MC/OE
		Am. Indian	9	6	8	6.0	1.41	0.19	1.3	MC/OE
		Multi	9	6	68	4.7	2.11	0.50	1.5	MC/OE
	B	White	5	5	2808	2.2	1.33	0.42	1.0	MC
		Af. Amer.	5	5	896	1.9	1.21	0.30	1.0	MC
		Hispanic	5	5	448	2.1	1.28	0.39	1.0	MC
		Asian	5	5	49	2.2	1.34	0.46	1.0	MC
		Am. Indian	5	5	8	2.5	1.20	0.19	1.1	MC
		Multi	5	5	68	2.3	1.41	0.49	1.0	MC
	C	White	7	7	2808	3.9	1.68	0.52	1.2	MC
		Af. Amer.	7	7	896	3.4	1.64	0.46	1.2	MC
		Hispanic	7	7	448	3.7	1.67	0.49	1.2	MC
		Asian	7	7	49	3.9	1.60	0.45	1.2	MC
		Am. Indian	7	7	8	4.9	1.46	0.45	1.1	MC
		Multi	7	7	68	3.9	1.70	0.56	1.1	MC

D	White	11	8	2808	4.2	2.39	0.52	1.7	MC/OE
	Af. Amer.	11	8	896	4.1	2.38	0.53	1.6	MC/OE
	Hispanic	11	8	448	4.2	2.29	0.47	1.7	MC/OE
	Asian	11	8	49	5.0	2.40	0.51	1.7	MC/OE
	Am. Indian	11	8	8	5.9	3.27	0.58	2.1	MC/OE
	Multi	11	8	68	4.3	2.35	0.58	1.5	MC/OE
E	White	6	6	2808	3.8	1.45	0.49	1.0	MC
	Af. Amer.	6	6	896	3.4	1.50	0.48	1.1	MC
	Hispanic	6	6	448	3.6	1.46	0.48	1.1	MC
	Asian	6	6	49	3.8	1.43	0.46	1.1	MC
	Am. Indian	6	6	8	4.3	1.49	0.64	0.9	MC
	Multi	6	6	68	3.8	1.52	0.54	1.0	MC

	Strand	**Group**	**Pts.**	**Len.**	**N**	**Mean**	***SD***	**r**	***SEM***	**Items**
ELL	Tot.	All	38	32	178	18.0	6.45	0.80	2.9	MC/OE
	A	All	9	6	178	4.1	2.08	0.56	1.4	MC/OE
	B	All	5	5	178	2.2	1.29	0.42	1.0	MC
	C	All	7	7	178	3.7	1.67	0.50	1.2	MC
	D	All	11	8	178	4.5	2.37	0.50	1.7	MC/OE
	E	All	6	6	178	3.5	1.52	0.52	1.1	MC

	Strand	**Group**	**Pts.**	**Len.**	**N**	**Mean**	***SD***	**r**	***SEM***	**Items**
Eco. Disadv.	Tot.	All	38	32	2595	17.5	6.70	0.81	2.9	MC/OE
	A	All	9	6	2595	4.1	2.19	0.53	1.5	MC/OE
	B	All	5	5	2595	2.1	1.29	0.39	1.0	MC
	C	All	7	7	2595	3.7	1.66	0.49	1.2	MC
	D	All	11	8	2595	4.1	2.34	0.51	1.6	MC/OE
	E	All	6	6	2595	3.6	1.48	0.49	1.1	MC

Mathematics Grade 8

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Overall	Tot.	All	38	32	4444	18.3	6.34	0.81	2.7	MC/OE
	A	All	8	5	4444	3.3	1.67	0.48	1.2	MC/OE
	B	All	5	5	4444	2.9	1.26	0.38	1.0	MC
	C	All	7	7	4444	3.5	1.68	0.50	1.2	MC
	D	All	11	8	4444	4.3	2.22	0.55	1.5	MC/OE
	E	All	7	7	4444	4.3	1.69	0.53	1.2	MC

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Gender	Tot.	Male	38	32	2746	18.3	6.36	0.81	2.7	MC/OE
		Female	38	32	1693	18.5	6.31	0.81	2.7	MC/OE
	A	Male	8	5	2746	3.3	1.70	0.51	1.2	MC/OE
		Female	8	5	1693	3.4	1.61	0.44	1.2	MC/OE
	B	Male	5	5	2746	2.9	1.29	0.40	1.0	MC
		Female	5	5	1693	2.9	1.23	0.35	1.0	MC
	C	Male	7	7	2746	3.5	1.66	0.48	1.2	MC
		Female	7	7	1693	3.5	1.71	0.52	1.2	MC
	D	Male	11	8	2746	4.3	2.19	0.53	1.5	MC/OE
		Female	11	8	1693	4.3	2.28	0.57	1.5	MC/OE
	E	Male	7	7	2746	4.3	1.71	0.54	1.2	MC
		Female	7	7	1693	4.4	1.64	0.51	1.1	MC

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Ethnicity	Tot.	White	38	32	2944	19.0	6.27	0.81	2.7	MC/OE
		Af. Amer.	38	32	934	16.4	6.23	0.81	2.7	MC/OE
		Hispanic	38	32	434	17.7	6.14	0.80	2.8	MC/OE
		Asian	38	32	41	20.3	6.87	0.85	2.7	MC/OE
		Am. Indian	38	32	10	19.1	4.20	0.60	2.7	MC/OE
		Multi	38	32	76	18.8	6.25	0.81	2.7	MC/OE
	A	White	8	5	2944	3.4	1.66	0.48	1.2	MC/OE
		Af. Amer.	8	5	934	3.0	1.65	0.50	1.2	MC/OE
		Hispanic	8	5	434	3.4	1.64	0.48	1.2	MC/OE
		Asian	8	5	41	3.6	1.50	0.37	1.2	MC/OE
		Am. Indian	8	5	10	3.4	1.51	0.55	1.0	MC/OE
		Multi	8	5	76	3.6	1.68	0.52	1.2	MC/OE
	B	White	5	5	2944	3.0	1.27	0.39	1.0	MC
		Af. Amer.	5	5	934	2.7	1.24	0.35	1.0	MC
		Hispanic	5	5	434	2.8	1.21	0.31	1.0	MC
		Asian	5	5	41	3.2	1.32	0.51	0.9	MC
		Am. Indian	5	5	10	2.5	1.51	0.71	0.8	MC
		Multi	5	5	76	2.9	1.23	0.33	1.0	MC
	C	White	7	7	2944	3.6	1.68	0.50	1.2	MC
		Af. Amer.	7	7	934	3.1	1.64	0.47	1.2	MC
		Hispanic	7	7	434	3.5	1.58	0.41	1.2	MC
		Asian	7	7	41	3.7	1.92	0.66	1.1	MC
		Am. Indian	7	7	10	3.9	1.37	0.06	1.3	MC
		Multi	7	7	76	3.6	1.76	0.55	1.2	MC

	D	White	11	8	2944	4.5	2.22	0.54	1.5	MC/OE
	D	Af. Amer.	11	8	934	3.8	2.17	0.56	1.4	MC/OE
	D	Hispanic	11	8	434	4.0	2.18	0.53	1.5	MC/OE
	D	Asian	11	8	41	5.0	2.45	0.61	1.5	MC/OE
	D	Am. Indian	11	8	10	4.8	2.04	0.61	1.3	MC/OE
	D	Multi	11	8	76	4.4	2.02	0.47	1.5	MC/OE
	E	White	7	7	2944	4.5	1.65	0.52	1.1	MC
	E	Af. Amer.	7	7	934	3.8	1.67	0.50	1.2	MC
	E	Hispanic	7	7	434	4.1	1.70	0.52	1.2	MC
	E	Asian	7	7	41	4.8	1.52	0.44	1.1	MC
	E	Am. Indian	7	7	10	4.5	1.08	-0.29	1.2	MC
	E	Multi	7	7	76	4.4	1.85	0.64	1.1	MC

	Strand	**Group**	**Pts.**	**Len.**	**N**	**Mean**	***SD***	**r**	***SEM***	**Items**
ELL	Tot.	All	38	32	144	17.6	5.99	0.79	2.7	MC/OE
	A	All	8	5	144	3.4	1.51	0.39	1.2	MC/OE
	B	All	5	5	144	2.7	1.23	0.36	1.0	MC
	C	All	7	7	144	3.5	1.54	0.39	1.2	MC
	D	All	11	8	144	4.0	2.06	0.49	1.5	MC/OE
	E	All	7	7	144	4.0	1.71	0.53	1.2	MC

	Strand	**Group**	**Pts.**	**Len.**	**N**	**Mean**	***SD***	**r**	***SEM***	**Items**
Eco. Disadv.	Tot.	All	38	32	2610	17.8	6.31	0.81	2.7	MC/OE
	A	All	8	5	2610	3.3	1.68	0.50	1.2	MC/OE
	B	All	5	5	2610	2.8	1.26	0.37	1.0	MC
	C	All	7	7	2610	3.4	1.66	0.49	1.2	MC
	D	All	11	8	2610	4.1	2.20	0.54	1.5	MC/OE
	E	All	7	7	2610	4.2	1.70	0.53	1.2	MC

Mathematics Grade 11

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Overall	Tot.	All	38	32	4606	16.6	6.29	0.82	2.7	MC/OE
	A	All	5	5	4606	2.9	1.29	0.42	1.0	MC
	B	All	5	2	4606	1.3	1.05	0.22	0.9	MC/OE
	C	All	6	6	4606	3.2	1.41	0.38	1.1	MC
	D	All	16	13	4606	6.2	3.06	0.69	1.7	MC/OE
	E	All	6	6	4606	2.9	1.46	0.45	1.1	MC

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Gender	Tot.	Male	38	32	2750	16.8	6.32	0.82	2.7	MC/OE
		Female	38	32	1851	16.2	6.23	0.82	2.7	MC/OE
	A	Male	5	5	2750	3.0	1.30	0.43	1.0	MC
		Female	5	5	1851	2.8	1.26	0.41	1.0	MC
	B	Male	5	2	2750	1.3	1.06	0.20	1.0	MC/OE
		Female	5	2	1851	1.3	1.02	0.25	0.9	MC/OE
	C	Male	6	6	2750	3.3	1.42	0.38	1.1	MC
		Female	6	6	1851	3.1	1.39	0.37	1.1	MC
	D	Male	16	13	2750	6.2	3.04	0.69	1.7	MC/OE
		Female	16	13	1851	6.3	3.09	0.70	1.7	MC/OE
	E	Male	6	6	2750	3.0	1.45	0.44	1.1	MC
		Female	6	6	1851	2.7	1.45	0.45	1.1	MC

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Ethnicity	Tot.	White	38	32	3074	17.3	6.30	0.82	2.7	MC/OE
		Af. Amer.	38	32	1031	14.6	5.76	0.79	2.6	MC/OE
		Hispanic	38	32	397	16.0	6.39	0.83	2.6	MC/OE
		Asian	38	32	51	17.6	6.31	0.82	2.7	MC/OE
		Am. Indian	38	32	8	20.1	6.51	0.83	2.7	MC/OE
		Multi	38	32	37	16.7	6.09	0.81	2.6	MC/OE
	A	White	5	5	3074	3.0	1.29	0.44	1.0	MC
		Af. Amer.	5	5	1031	2.6	1.22	0.31	1.0	MC
		Hispanic	5	5	397	2.8	1.26	0.41	1.0	MC
		Asian	5	5	51	3.2	1.34	0.51	0.9	MC
		Am. Indian	5	5	8	3.5	0.93	0.16	0.9	MC
		Multi	5	5	37	3.2	1.21	0.36	1.0	MC
	B	White	5	2	3074	1.4	1.10	0.23	1.0	MC/OE
		Af. Amer.	5	2	1031	1.1	0.87	0.16	0.8	MC/OE
		Hispanic	5	2	397	1.2	0.97	0.21	0.9	MC/OE
		Asian	5	2	51	1.4	0.94	-0.01	0.9	MC/OE
		Am. Indian	5	2	8	2.0	1.07	0.25	0.9	MC/OE
		Multi	5	2	37	1.2	1.06	0.27	0.9	MC/OE
	C	White	6	6	3074	3.4	1.41	0.38	1.1	MC
		Af. Amer.	6	6	1031	2.9	1.34	0.29	1.1	MC
		Hispanic	6	6	397	3.0	1.46	0.41	1.1	MC
		Asian	6	6	51	3.2	1.42	0.35	1.1	MC
		Am. Indian	6	6	8	2.6	1.06	-0.27	1.2	MC
		Multi	6	6	37	3.0	1.46	0.40	1.1	MC

	D	White	16	13	3074	6.5	3.06	0.69	1.7	MC/OE
		Af. Amer.	16	13	1031	5.6	2.94	0.67	1.7	MC/OE
		Hispanic	16	13	397	6.2	3.16	0.71	1.7	MC/OE
		Asian	16	13	51	6.9	3.05	0.68	1.7	MC/OE
		Am. Indian	16	13	8	8.1	3.83	0.79	1.8	MC/OE
		Multi	16	13	37	6.1	3.16	0.74	1.6	MC/OE
	E	White	6	6	3074	3.0	1.45	0.44	1.1	MC
		Af. Amer.	6	6	1031	2.5	1.39	0.40	1.1	MC
		Hispanic	6	6	397	2.7	1.44	0.44	1.1	MC
		Asian	6	6	51	2.9	1.59	0.56	1.1	MC
		Am. Indian	6	6	8	3.9	0.83	-0.86	1.1	MC
		Multi	6	6	37	3.1	1.31	0.25	1.1	MC

	Strand	**Group**	**Pts.**	**Len.**	**N**	**Mean**	***SD***	**r**	***SEM***	**Items**
ELL	Tot.	All	38	32	102	13.7	5.57	0.78	2.6	MC/OE
	A	All	5	5	102	2.6	1.30	0.47	1.0	MC
	B	All	5	2	102	0.8	0.70	0.08	0.7	MC/OE
	C	All	6	6	102	2.6	1.36	0.34	1.1	MC
	D	All	16	13	102	5.3	2.99	0.68	1.7	MC/OE
	E	All	6	6	102	2.2	1.32	0.31	1.1	MC

	Strand	**Group**	**Pts.**	**Len.**	**N**	**Mean**	***SD***	**r**	***SEM***	**Items**
Eco. Disadv.	Tot.	All	38	32	2397	15.6	6.03	0.81	2.7	MC/OE
	A	All	5	5	2397	2.8	1.29	0.41	1.0	MC
	B	All	5	2	2397	1.2	0.97	0.22	0.9	MC/OE
	C	All	6	6	2397	3.1	1.39	0.35	1.1	MC
	D	All	16	13	2397	5.9	2.94	0.67	1.7	MC/OE
	E	All	6	6	2397	2.7	1.43	0.43	1.1	MC

Reading Grade 4

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Overall	Tot.	All	36	32	3711	17.4	6.71	0.82	2.8	MC/OE
	A	All	22	20	3711	11.1	4.46	0.75	2.2	MC/OE
	B	All	14	12	3711	6.2	2.84	0.62	1.7	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Gender	Tot.	Male	36	32	2379	17.1	6.76	0.82	2.8	MC/OE
		Female	36	32	1328	17.9	6.61	0.82	2.8	MC/OE
	A	Male	22	20	2379	11.0	4.51	0.76	2.2	MC/OE
		Female	22	20	1328	11.4	4.37	0.74	2.2	MC/OE
	B	Male	14	12	2379	6.1	2.86	0.63	1.7	MC/OE
		Female	14	12	1328	6.5	2.80	0.61	1.7	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Ethnicity	Tot.	White	36	32	2427	18.3	6.64	0.82	2.8	MC/OE
		Af. Amer.	36	32	773	15.5	6.55	0.81	2.8	MC/OE
		Hispanic	36	32	372	15.6	6.32	0.80	2.8	MC/OE
		Asian	36	32	43	15.6	6.07	0.78	2.9	MC/OE
		Am. Indian	36	32	7	11.6	2.88	0.08	2.8	MC/OE
		Multi	36	32	85	16.7	6.95	0.83	2.8	MC/OE
	A	White	22	20	2427	11.8	4.42	0.75	2.2	MC/OE
		Af. Amer.	22	20	773	9.9	4.35	0.74	2.2	MC/OE
		Hispanic	22	20	372	10.0	4.21	0.72	2.2	MC/OE
		Asian	22	20	43	10.0	3.92	0.66	2.3	MC/OE
		Am. Indian	22	20	7	7.6	1.90	-0.43	2.3	MC/OE
		Multi	22	20	85	10.9	4.51	0.75	2.3	MC/OE
	B	White	14	12	2427	6.6	2.81	0.62	1.7	MC/OE
		Af. Amer.	14	12	773	5.6	2.85	0.63	1.7	MC/OE
		Hispanic	14	12	372	5.6	2.68	0.58	1.7	MC/OE
		Asian	14	12	43	5.6	2.77	0.62	1.7	MC/OE
		Am. Indian	14	12	7	4.0	2.45	0.62	1.5	MC/OE
		Multi	14	12	85	5.8	2.93	0.65	1.7	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
ELL	Tot.	All	36	32	184	14.8	5.74	0.75	2.9	MC/OE
	A	All	22	20	184	9.5	3.88	0.66	2.3	MC/OE
	B	All	14	12	184	5.2	2.52	0.50	1.8	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Eco. Dis.	Tot.	All	36	32	2266	16.5	6.62	0.82	2.8	MC/OE
	A	All	22	20	2266	10.6	4.40	0.74	2.2	MC/OE
	B	All	14	12	2266	6.0	2.82	0.62	1.7	MC/OE

Reading Grade 5

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Overall	Tot.	All	36	32	4672	19.8	7.37	0.86	2.7	MC/OE
	A	All	24	22	4672	13.0	5.16	0.81	2.3	MC/OE
	B	All	12	10	4672	6.8	2.68	0.69	1.5	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Gender	Tot.	Male	36	32	3024	19.3	7.43	0.87	2.7	MC/OE
		Female	36	32	1645	20.6	7.20	0.86	2.7	MC/OE
	A	Male	24	22	3024	12.8	5.20	0.81	2.3	MC/OE
		Female	24	22	1645	13.4	5.08	0.80	2.3	MC/OE
	B	Male	12	10	3024	6.6	2.70	0.69	1.5	MC/OE
		Female	12	10	1645	7.1	2.61	0.68	1.5	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Ethnicity	Tot.	White	36	32	3069	20.7	7.23	0.86	2.7	MC/OE
		Af. Amer.	36	32	993	17.6	7.22	0.86	2.7	MC/OE
		Hispanic	36	32	471	18.4	7.33	0.86	2.8	MC/OE
		Asian	36	32	54	19.0	7.71	0.87	2.7	MC/OE
		Am. Indian	36	32	6	21.2	6.91	0.85	2.7	MC/OE
		Multi	36	32	75	19.8	7.93	0.88	2.7	MC/OE
	A	White	24	22	3069	13.7	5.09	0.80	2.3	MC/OE
		Af. Amer.	24	22	993	11.5	5.03	0.79	2.3	MC/OE
		Hispanic	24	22	471	12.0	5.06	0.79	2.3	MC/OE
		Asian	24	22	54	12.3	5.18	0.81	2.3	MC/OE
		Am. Indian	24	22	6	15.0	4.65	0.73	2.4	MC/OE
		Multi	24	22	75	12.8	5.71	0.85	2.2	MC/OE
	B	White	12	10	3069	7.1	2.62	0.68	1.5	MC/OE
		Af. Amer.	12	10	993	6.1	2.70	0.69	1.5	MC/OE
		Hispanic	12	10	471	6.4	2.76	0.70	1.5	MC/OE
		Asian	12	10	54	6.6	2.91	0.73	1.5	MC/OE
		Am. Indian	12	10	6	6.2	2.48	0.73	1.3	MC/OE
		Multi	12	10	75	7.0	2.60	0.67	1.5	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
ELL	Tot.	All	36	32	209	16.3	7.10	0.85	2.8	MC/OE
	A	All	24	22	209	10.5	4.78	0.77	2.3	MC/OE
	B	All	12	10	209	5.8	2.85	0.72	1.5	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Eco. Dis.	Tot.	All	36	32	2900	18.8	7.27	0.86	2.7	MC/OE
	A	All	24	22	2900	12.3	5.08	0.80	2.3	MC/OE
	B	All	12	10	2900	6.5	2.68	0.68	1.5	MC/OE

Reading Grade 6

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Overall	Tot.	All	36	32	4543	20.3	6.82	0.85	2.7	MC/OE
	A	All	22	20	4543	13.4	4.53	0.79	2.1	MC/OE
	B	All	14	12	4543	6.9	2.84	0.65	1.7	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Gender	Tot.	Male	36	32	2827	20.0	6.94	0.85	2.7	MC/OE
		Female	36	32	1714	20.9	6.58	0.84	2.6	MC/OE
	A	Male	22	20	2827	13.3	4.60	0.80	2.1	MC/OE
		Female	22	20	1714	13.6	4.41	0.78	2.0	MC/OE
	B	Male	14	12	2827	6.7	2.88	0.66	1.7	MC/OE
		Female	14	12	1714	7.3	2.74	0.63	1.7	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Ethnicity	Tot.	White	36	32	2970	21.2	6.65	0.84	2.6	MC/OE
		Af. Amer.	36	32	993	18.4	6.69	0.84	2.7	MC/OE
		Hispanic	36	32	436	19.0	7.17	0.86	2.7	MC/OE
		Asian	36	32	54	21.5	6.28	0.82	2.7	MC/OE
		Am. Indian	36	32	15	23.3	6.58	0.84	2.6	MC/OE
		Multi	36	32	73	19.6	7.15	0.86	2.7	MC/OE
	A	White	22	20	2970	14.0	4.41	0.79	2.0	MC/OE
		Af. Amer.	22	20	993	12.2	4.48	0.78	2.1	MC/OE
		Hispanic	22	20	436	12.4	4.78	0.81	2.1	MC/OE
		Asian	22	20	54	14.1	4.12	0.74	2.1	MC/OE
		Am. Indian	22	20	15	15.2	4.07	0.76	2.0	MC/OE
		Multi	22	20	73	12.7	4.57	0.78	2.1	MC/OE
	B	White	14	12	2970	7.2	2.80	0.65	1.7	MC/OE
		Af. Amer.	14	12	993	6.2	2.76	0.63	1.7	MC/OE
		Hispanic	14	12	436	6.6	2.90	0.67	1.7	MC/OE
		Asian	14	12	54	7.3	2.66	0.60	1.7	MC/OE
		Am. Indian	14	12	15	8.1	3.07	0.71	1.7	MC/OE
		Multi	14	12	73	7.0	3.05	0.69	1.7	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
ELL	Tot.	All	36	32	179	17.3	6.50	0.82	2.7	MC/OE
	A	All	22	20	179	11.4	4.41	0.77	2.1	MC/OE
	B	All	14	12	179	5.9	2.65	0.59	1.7	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Eco. Dis.	Tot.	All	36	32	2783	19.5	6.86	0.85	2.7	MC/OE
	A	All	22	20	2783	12.9	4.58	0.79	2.1	MC/OE
	B	All	14	12	2783	6.6	2.82	0.65	1.7	MC/OE

Reading Grade 7

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Overall	Tot.	All	36	32	4570	19.2	6.82	0.84	2.8	MC/OE
	A	All	19	17	4570	9.7	3.71	0.72	2.0	MC/OE
	B	All	17	15	4570	9.5	3.61	0.71	1.9	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Gender	Tot.	Male	36	32	2840	18.8	6.93	0.84	2.7	MC/OE
		Female	36	32	1728	19.9	6.57	0.82	2.8	MC/OE
	A	Male	19	17	2840	9.5	3.76	0.73	2.0	MC/OE
		Female	19	17	1728	10.1	3.60	0.70	2.0	MC/OE
	B	Male	17	15	2840	9.3	3.67	0.72	1.9	MC/OE
		Female	17	15	1728	9.8	3.48	0.69	1.9	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Ethnicity	Tot.	White	36	32	3051	20.1	6.74	0.84	2.7	MC/OE
		Af. Amer.	36	32	900	17.2	6.65	0.82	2.8	MC/OE
		Hispanic	36	32	495	17.4	6.36	0.81	2.8	MC/OE
		Asian	36	32	47	19.7	6.93	0.85	2.7	MC/OE
		Am. Indian	36	32	8	21.5	8.59	0.91	2.6	MC/OE
		Multi	36	32	63	19.9	6.90	0.84	2.8	MC/OE
	A	White	19	17	3051	10.2	3.69	0.72	2.0	MC/OE
		Af. Amer.	19	17	900	8.7	3.56	0.68	2.0	MC/OE
		Hispanic	19	17	495	8.7	3.50	0.68	2.0	MC/OE
		Asian	19	17	47	10.0	3.50	0.69	2.0	MC/OE
		Am. Indian	19	17	8	10.9	3.98	0.76	1.9	MC/OE
		Multi	19	17	63	9.6	3.86	0.75	1.9	MC/OE
	B	White	17	15	3051	9.9	3.56	0.71	1.9	MC/OE
		Af. Amer.	17	15	900	8.5	3.62	0.71	1.9	MC/OE
		Hispanic	17	15	495	8.7	3.32	0.64	2.0	MC/OE
		Asian	17	15	47	9.7	3.86	0.76	1.9	MC/OE
		Am. Indian	17	15	8	10.6	4.75	0.86	1.8	MC/OE
		Multi	17	15	63	10.2	3.51	0.68	2.0	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
ELL	Tot.	All	36	32	206	16.7	6.42	0.81	2.8	MC/OE
	A	All	19	17	206	8.5	3.45	0.67	2.0	MC/OE
	B	All	17	15	206	8.3	3.41	0.67	2.0	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Eco. Dis.	Tot.	All	36	32	2734	18.3	6.67	0.83	2.8	MC/OE
	A	All	19	17	2734	9.3	3.60	0.70	2.0	MC/OE
	B	All	17	15	2734	9.0	3.57	0.70	1.9	MC/OE

Reading Grade 8

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Overall	Tot.	All	36	32	4308	20.0	6.21	0.81	2.7	MC/OE
	A	All	21	17	4308	12.5	3.97	0.73	2.1	MC/OE
	B	All	15	15	4308	7.5	2.82	0.59	1.8	MC

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Gender	Tot.	Male	36	32	2777	19.8	6.34	0.81	2.7	MC/OE
		Female	36	32	1529	20.4	5.96	0.79	2.7	MC/OE
	A	Male	21	17	2777	12.4	4.08	0.74	2.1	MC/OE
		Female	21	17	1529	12.6	3.76	0.70	2.1	MC/OE
	B	Male	15	15	2777	7.4	2.83	0.60	1.8	MC
		Female	15	15	1529	7.8	2.79	0.58	1.8	MC

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Ethnicity	Tot.	White	36	32	2867	20.9	6.01	0.80	2.7	MC/OE
		Af. Amer.	36	32	881	18.0	6.14	0.79	2.8	MC/OE
		Hispanic	36	32	429	18.1	6.39	0.81	2.8	MC/OE
		Asian	36	32	48	22.7	5.68	0.77	2.7	MC/OE
		Am. Indian	36	32	9	20.6	6.86	0.86	2.6	MC/OE
		Multi	36	32	71	20.6	6.32	0.82	2.7	MC/OE
	A	White	21	17	2867	13.0	3.82	0.71	2.0	MC/OE
		Af. Amer.	21	17	881	11.2	4.03	0.72	2.1	MC/OE
		Hispanic	21	17	429	11.4	4.15	0.74	2.1	MC/OE
		Asian	21	17	48	14.5	3.25	0.62	2.0	MC/OE
		Am. Indian	21	17	9	13.6	4.64	0.85	1.8	MC/OE
		Multi	21	17	71	13.0	3.71	0.70	2.0	MC/OE
	B	White	15	15	2867	7.9	2.78	0.58	1.8	MC
		Af. Amer.	15	15	881	6.7	2.66	0.54	1.8	MC
		Hispanic	15	15	429	6.8	2.87	0.61	1.8	MC
		Asian	15	15	48	8.3	3.01	0.64	1.8	MC
		Am. Indian	15	15	9	7.0	2.69	0.56	1.8	MC
		Multi	15	15	71	7.6	3.00	0.65	1.8	MC

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
ELL	Tot.	All	36	32	163	17.2	6.18	0.80	2.8	MC/OE
	A	All	21	17	163	11.0	3.89	0.71	2.1	MC/OE
	B	All	15	15	163	6.2	2.85	0.60	1.8	MC

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Eco. Dis.	Tot.	All	36	32	2528	19.2	6.16	0.80	2.8	MC/OE
	A	All	21	17	2528	12.0	3.98	0.72	2.1	MC/OE
	B	All	15	15	2528	7.2	2.77	0.58	1.8	MC

Reading Grade 11

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Overall	Tot.	All	36	32	4255	22.2	6.44	0.83	2.6	MC/OE
	A	All	20	18	4255	12.6	3.63	0.71	1.9	MC/OE
	B	All	16	14	4255	9.6	3.31	0.71	1.8	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Gender	Tot.	Male	36	32	2674	22.1	6.57	0.84	2.6	MC/OE
		Female	36	32	1577	22.5	6.20	0.82	2.6	MC/OE
	A	Male	20	18	2674	12.7	3.73	0.73	1.9	MC/OE
		Female	20	18	1577	12.6	3.46	0.68	1.9	MC/OE
	B	Male	16	14	2674	9.4	3.32	0.71	1.8	MC/OE
		Female	16	14	1577	9.9	3.27	0.71	1.8	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Ethnicity	Tot.	White	36	32	2782	23.3	6.03	0.81	2.6	MC/OE
		Af. Amer.	36	32	989	19.8	6.65	0.83	2.7	MC/OE
		Hispanic	36	32	385	20.9	6.80	0.84	2.7	MC/OE
		Asian	36	32	50	22.5	6.38	0.83	2.6	MC/OE
		Am. Indian	36	32	6	24.2	5.67	0.79	2.6	MC/OE
		Multi	36	32	38	20.9	6.34	0.81	2.8	MC/OE
	A	White	20	18	2782	13.2	3.41	0.68	1.9	MC/OE
		Af. Amer.	20	18	989	11.3	3.69	0.71	2.0	MC/OE
		Hispanic	20	18	385	11.8	3.98	0.76	2.0	MC/OE
		Asian	20	18	50	12.8	3.44	0.69	1.9	MC/OE
		Am. Indian	20	18	6	12.8	3.66	0.72	1.9	MC/OE
		Multi	20	18	38	11.8	3.68	0.69	2.0	MC/OE
	B	White	16	14	2782	10.1	3.15	0.69	1.8	MC/OE
		Af. Amer.	16	14	989	8.5	3.42	0.72	1.8	MC/OE
		Hispanic	16	14	385	9.1	3.36	0.70	1.8	MC/OE
		Asian	16	14	50	9.8	3.49	0.75	1.8	MC/OE
		Am. Indian	16	14	6	11.3	2.73	0.60	1.7	MC/OE
		Multi	16	14	38	9.1	3.35	0.71	1.8	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
ELL	Tot.	All	36	32	102	17.9	6.23	0.80	2.8	MC/OE
	A	All	20	18	102	10.1	3.88	0.72	2.0	MC/OE
	B	All	16	14	102	7.9	3.00	0.60	1.9	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Eco. Dis.	Tot.	All	36	32	2314	21.2	6.53	0.83	2.7	MC/OE
	A	All	20	18	2314	12.0	3.66	0.71	2.0	MC/OE
	B	All	16	14	2314	9.1	3.38	0.72	1.8	MC/OE

Science Grade 4

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Overall	Tot.	All	34	32	3554	20.1	5.78	0.80	2.6	MC/OE
	A	All	17	16	3554	9.8	3.07	0.63	1.9	MC/OE
	B	All	7	6	3554	4.1	1.55	0.45	1.2	MC/OE
	C	All	5	5	3554	3.1	1.27	0.42	1.0	MC
	D	All	5	5	3554	3.1	1.36	0.48	1.0	MC

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Gender	Tot.	Male	34	32	2243	20.5	5.89	0.81	2.6	MC/OE
		Female	34	32	1310	19.6	5.54	0.77	2.6	MC/OE
	A	Male	17	16	2243	9.9	3.12	0.65	1.8	MC/OE
		Female	17	16	1310	9.7	2.99	0.61	1.9	MC/OE
	B	Male	7	6	2243	4.1	1.53	0.45	1.1	MC/OE
		Female	7	6	1310	4.0	1.58	0.45	1.2	MC/OE
	C	Male	5	5	2243	3.2	1.28	0.46	0.9	MC
		Female	5	5	1310	2.9	1.22	0.33	1.0	MC
	D	Male	5	5	2243	3.2	1.38	0.51	1.0	MC
		Female	5	5	1310	3.0	1.32	0.41	1.0	MC

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Ethnicity	Tot.	White	34	32	2400	21.3	5.44	0.78	2.6	MC/OE
		Af. Amer.	34	32	697	17.5	5.77	0.79	2.6	MC/OE
		Hispanic	34	32	356	17.6	5.77	0.79	2.7	MC/OE
		Asian	34	32	33	20.5	3.90	0.52	2.7	MC/OE
		Am. Indian	34	32	7	19.9	6.09	0.82	2.6	MC/OE
		Multi	34	32	61	19.7	5.84	0.80	2.6	MC/OE
	A	White	17	16	2400	10.3	2.91	0.60	1.8	MC/OE
		Af. Amer.	17	16	697	8.7	3.15	0.64	1.9	MC/OE
		Hispanic	17	16	356	8.7	3.14	0.64	1.9	MC/OE
		Asian	17	16	33	10.5	2.55	0.43	1.9	MC/OE
		Am. Indian	17	16	7	9.3	3.20	0.66	1.9	MC/OE
		Multi	17	16	61	9.6	3.21	0.67	1.9	MC/OE
	B	White	7	6	2400	4.3	1.50	0.42	1.1	MC/OE
		Af. Amer.	7	6	697	3.5	1.56	0.45	1.2	MC/OE
		Hispanic	7	6	356	3.6	1.54	0.40	1.2	MC/OE
		Asian	7	6	33	3.8	1.40	0.32	1.2	MC/OE
		Am. Indian	7	6	7	4.3	1.80	0.64	1.1	MC/OE
		Multi	7	6	61	4.0	1.45	0.33	1.2	MC/OE
	C	White	5	5	2400	3.3	1.22	0.41	0.9	MC
		Af. Amer.	5	5	697	2.7	1.30	0.40	1.0	MC
		Hispanic	5	5	356	2.6	1.25	0.32	1.0	MC
		Asian	5	5	33	2.9	1.09	0.16	1.0	MC
		Am. Indian	5	5	7	2.9	1.35	0.43	1.0	MC
		Multi	5	5	61	3.0	1.31	0.42	1.0	MC
	D	White	5	5	2400	3.4	1.30	0.46	1.0	MC
		Af. Amer.	5	5	697	2.6	1.34	0.40	1.0	MC
		Hispanic	5	5	356	2.6	1.39	0.46	1.0	MC
		Asian	5	5	33	3.2	1.08	0.06	1.0	MC
		Am. Indian	5	5	7	3.4	1.27	0.37	1.0	MC
		Multi	5	5	61	3.0	1.26	0.31	1.1	MC

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
ELL	Tot.	All	34	32	143	16.8	5.63	0.77	2.7	MC/OE
	A	All	17	16	143	8.3	3.20	0.65	1.9	MC/OE
	B	All	7	6	143	3.4	1.49	0.30	1.2	MC/OE
	C	All	5	5	143	2.5	1.18	0.21	1.0	MC
	D	All	5	5	143	2.6	1.41	0.48	1.0	MC

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Eco. Disadv.	Tot.	All	34	32	2074	19.3	5.88	0.80	2.6	MC/OE
	A	All	17	16	2074	9.4	3.13	0.64	1.9	MC/OE
	B	All	7	6	2074	3.9	1.57	0.45	1.2	MC/OE
	C	All	5	5	2074	2.9	1.28	0.40	1.0	MC
	D	All	5	5	2074	3.0	1.39	0.49	1.0	MC

Science Grade 11

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Overall	Tot.	All	34	32	3742	17.1	6.50	0.84	2.6	MC/OE
	A	All	17	16	3742	9.6	3.54	0.73	1.8	MC/OE
	B	All	5	5	3742	2.3	1.36	0.45	1.0	MC
	C	All	4	4	3742	2.0	1.15	0.37	0.9	MC
	D	All	8	7	3742	3.2	1.86	0.58	1.2	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Gender	Tot.	Male	34	32	2327	17.8	6.69	0.85	2.6	MC/OE
		Female	34	32	1412	15.9	6.00	0.82	2.6	MC/OE
	A	Male	17	16	2327	9.8	3.65	0.75	1.8	MC/OE
		Female	17	16	1412	9.3	3.34	0.70	1.8	MC/OE
	B	Male	5	5	2327	2.4	1.35	0.43	1.0	MC
		Female	5	5	1412	2.0	1.35	0.46	1.0	MC
	C	Male	4	4	2327	2.1	1.17	0.41	0.9	MC
		Female	4	4	1412	1.9	1.10	0.31	0.9	MC
	D	Male	8	7	2327	3.5	1.90	0.59	1.2	MC/OE
		Female	8	7	1412	2.7	1.70	0.51	1.2	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Ethnicity	Tot.	White	34	32	2478	18.7	6.25	0.83	2.6	MC/OE
		Af. Amer.	34	32	847	13.8	5.74	0.80	2.6	MC/OE
		Hispanic	34	32	331	14.5	6.17	0.83	2.6	MC/OE
		Asian	34	32	39	15.0	5.88	0.81	2.6	MC/OE
		Am. Indian	34	32	6	16.2	5.91	0.81	2.6	MC/OE
		Multi	34	32	37	14.7	5.76	0.79	2.6	MC/OE
	A	White	17	16	2478	10.3	3.38	0.71	1.8	MC/OE
		Af. Amer.	17	16	847	8.1	3.42	0.70	1.9	MC/OE
		Hispanic	17	16	331	8.5	3.59	0.74	1.8	MC/OE
		Asian	17	16	39	8.7	3.17	0.65	1.9	MC/OE
		Am. Indian	17	16	6	8.8	3.06	0.61	1.9	MC/OE
		Multi	17	16	37	8.4	3.35	0.67	1.9	MC/OE
	B	White	5	5	2478	2.5	1.36	0.45	1.0	MC
		Af. Amer.	5	5	847	1.8	1.22	0.33	1.0	MC
		Hispanic	5	5	331	1.8	1.22	0.32	1.0	MC
		Asian	5	5	39	1.8	1.25	0.34	1.0	MC
		Am. Indian	5	5	6	2.5	1.22	0.50	0.9	MC
		Multi	5	5	37	1.9	1.25	0.33	1.0	MC
	C	White	4	4	2478	2.2	1.13	0.36	0.9	MC
		Af. Amer.	4	4	847	1.6	1.08	0.30	0.9	MC
		Hispanic	4	4	331	1.7	1.12	0.35	0.9	MC
		Asian	4	4	39	1.9	1.10	0.33	0.9	MC
		Am. Indian	4	4	6	2.2	0.98	0.37	0.8	MC
		Multi	4	4	37	1.9	1.10	0.23	1.0	MC
	D	White	8	7	2478	3.6	1.84	0.55	1.2	MC/OE
		Af. Amer.	8	7	847	2.4	1.59	0.48	1.1	MC/OE
		Hispanic	8	7	331	2.5	1.74	0.57	1.1	MC/OE
		Asian	8	7	39	2.5	1.65	0.48	1.2	MC/OE
		Am. Indian	8	7	6	2.7	1.03	-0.95	1.4	MC/OE
		Multi	8	7	37	2.4	1.72	0.59	1.1	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
ELL	Tot.	All	34	32	85	11.1	4.68	0.71	2.5	MC/OE
	A	All	17	16	85	7.0	3.10	0.64	1.9	MC/OE
	B	All	5	5	85	1.2	1.15	0.44	0.9	MC
	C	All	4	4	85	1.2	0.90	0.02	0.9	MC
	D	All	8	7	85	1.7	1.56	0.53	1.1	MC/OE

	Strand	Group	Pts.	Len.	N	Mean	*SD*	r	*SEM*	Items
Eco. Disadv.	Tot.	All	34	32	1999	15.7	6.29	0.83	2.6	MC/OE
	A	All	17	16	1999	8.9	3.51	0.72	1.8	MC/OE
	B	All	5	5	1999	2.1	1.33	0.43	1.0	MC
	C	All	4	4	1999	1.8	1.13	0.36	0.9	MC
	D	All	8	7	1999	2.9	1.79	0.56	1.2	MC/OE

Appendix L:

Cut Scores and Scale Transformations

Column Heading	Definition
LOSS	Lowest Obtainable Scaled Score

	Grade	Scaling	LOSS	True Scaled Score Cuts			True Logit Cuts		
				Basic	**Prof.**	**Adv.**	**Basic**	**Prof.**	**Adv.**
Mathematics	**4**	84.31X + 1199.67	1075	1150	1275	1356	-0.5891	0.8935	1.8540
	5	89.34X + 1197.81	1075	1150	1275	1374	-0.5352	0.8640	1.9734
	6	95.81X + 1242.03	1075	1150	1275	1381	-0.9606	0.3441	1.4543
	7	87.29X + 1223.69	1075	1150	1275	1364	-0.8442	0.5878	1.6086
	8	94.23X + 1224.05	1075	1150	1275	1395	-0.7858	0.5407	1.8139
	11	115.64X + 1213.51	1075	1150	1275	1403	-0.5492	0.5317	1.6389
Reading	**4**	106.00X + 1286.67	1075	1150	1275	1363	-1.2893	-0.1101	0.7217
	5	103.97X + 1255.27	1075	1150	1275	1391	-1.0125	0.1898	1.3018
	6	95.72X + 1216.58	1075	1150	1275	1381	-0.6956	0.6103	1.7201
	7	107.79X + 1223.17	1075	1150	1275	1385	-0.6788	0.4809	1.5026
	8	109.97X + 1203.43	1050	1150	1275	1399	-0.4859	0.6508	1.7754
	11	117.92X + 1155.25	1000	1150	1275	1433	-0.0445	1.0155	2.3512
Sci.	**8**	116.16X + 1188.19	1050	1150	1275	1419	-0.3288	0.7473	1.9833
	11	90.16X + 1245.16	1100	1150	1275	1401	-1.0555	0.3310	1.7325

Appendix M:

PSSA-M Historical Statistics

		Mathematics-M Grade 4			Mathematics-M Grade 5			Mathematics-M Grade 6		
		2010	**2011**	**2012**	**2010**	**2011**	**2012**	**2010**	**2011**	**2012**
Raw Score	**Mean**	22.89	22.68	21.00	21.89	21.18	20.21	18.27	17.56	17.16
	SD	6.55	6.95	6.51	6.43	7.12	6.34	6.01	6.54	5.72
	Max	38	38	38	38	38	38	38	38	38
Scaled Score	**Mean**	1286.2	1277.8	1262.1	1275.5	1261.2	1253.5	1264.6	1260.6	1249.4
	SD	83.8	83.9	81.7	84.7	85.5	81.7	83.5	89.5	79.6
	Max	1655	1666	1655	1712	1691	1712	1772	1770	1772
Raw Cuts	**Bel. Basic/Basic**	12	11	12	12	12	12	10	10	10
	Basic/Prof.	22	23	22	22	23	22	19	19	19
	Prof./Adv.	29	30	29	30	31	30	27	27	27
Theta Cuts	**Bel. Basic/Basic**	-0.5891	-0.5898	-0.5891	-0.5352	-0.4198	-0.5352	-0.9606	-0.8620	-0.9606
	Basic/Prof.	0.8935	0.8911	0.8935	0.8640	0.8636	0.8640	0.3441	0.3944	0.3441
	Prof./Adv.	1.8540	1.8538	1.8540	1.9734	2.0164	1.9734	1.4543	1.4781	1.4543
Impact %	**Bel. Basic**	4.8	5.8	8.3	5.5	10.4	9.0	7.3	11.4	8.4
	Basic	35.8	40.5	44.1	43.4	44.4	48.7	44.6	45.8	52.3
	Proficient	38.3	36.2	34.9	38.0	35.7	34.9	38.9	33.2	33.0
	Advanced	21.2	17.5	12.8	13.0	9.5	7.4	9.2	9.7	6.2
	Prof. + Adv.	59.4	53.7	47.7	51.1	45.2	42.2	48.1	42.8	39.3
Demographic	**N Count**	2169	2375	2708	2552	3366	3726	2700	3600	4061
	% City	6.4	11.2	15.4	6.0	9.0	13.7	6.9	7.7	11.3
	% White	68.8	62.2	61.1	69.9	64.1	62.2	69.4	66.7	62.8
	% Black	18.9	23.7	23.8	18.5	23.0	23.9	18.9	20.7	23.7
	% Hispanic	9.1	11.1	11.0	8.5	10.5	10.7	8.6	10.2	10.3

		Mathematics-M Grade 7			Mathematics-M Grade 8			Mathematics-M Grade 11		
		2010	**2011**	**2012**	**2010**	**2011**	**2012**	**2010**	**2011**	**2012**
Raw Score	**Mean**	19.05	19.88	18.00	18.91	18.49	18.34	16.95	16.41	16.56
	SD	7.00	6.74	6.78	6.41	6.87	6.34	6.27	7.28	6.29
	Max	38	38	38	38	38	38	38	38	38
Scaled Score	**Mean**	1252.0	1256.0	1240.2	1250.3	1250.8	1242.7	1228.3	1227.8	1222.1
	SD	79.2	74.5	76.5	83.5	87.0	82.1	99.6	107.2	99.8
	Max	1663	1662	1663	1730	1722	1730	1890	2041	1890
Raw Cuts	**Bel. Basic/Basic**	10	10	10	11	11	11	12	11	12
	Basic/Prof.	21	22	21	21	21	21	20	20	20
	Prof./Adv.	30	30	30	30	30	30	28	29	28
Theta Cuts	**Bel. Basic/Basic**	-0.8442	-0.8393	-0.8442	-0.7858	-0.6649	-0.7858	-0.5492	-0.5395	-0.5492
	Basic/Prof.	0.5878	0.5948	0.5878	0.5407	0.5752	0.5407	0.5317	0.5465	0.5317
	Prof./Adv.	1.6086	1.5970	1.6086	1.8139	1.8116	1.8139	1.6389	1.6829	1.6389
Impact %	**Bel. Basic**	8.3	5.5	10.6	10.0	13.0	11.9	21.6	24.4	24.0
	Basic	50.4	53.5	54.5	49.2	48.7	51.0	45.3	43.1	44.3
	Proficient	33.2	32.5	29.2	35.2	31.7	33.1	27.6	25.4	26.0
	Advanced	8.1	8.5	5.7	5.6	6.7	4.0	5.6	7.0	5.7
	Prof. + Adv.	41.2	41.0	34.9	40.8	38.3	37.1	33.2	32.4	31.7
Demographic	**N Count**	2818	3972	4283	3019	4114	4444	3539	4269	4606
	% City	7.1	8.8	10.0	6.1	9.2	10.2	6.9	7.8	11.0
	% White	70.5	66.9	65.6	70.9	67.1	66.2	70.7	70.1	66.7
	% Black	18.1	21.7	20.9	18.4	21.0	21.0	19.9	20.2	22.4
	% Hispanic	8.4	8.5	10.5	8.3	9.6	9.8	6.4	7.6	8.6

		Reading-M Grade 4		Reading-M Grade 5		Reading-M Grade 6	
		2011	2012	2011	2012	2011	2012
Raw Score	Mean	19.21	17.39	20.50	19.78	21.80	20.33
	SD	6.87	6.71	7.19	7.37	6.98	6.82
	Max	36	36	36	36	36	36
Scaled Score	Mean	1305.6	1293.4	1301.8	1307.3	1281.9	1275.2
	SD	98.2	94.6	110.8	109.7	101.5	95.8
	Max	1808	1822	1791	1801	1724	1741
Raw Cuts	Bel. Basic/Basic	8	8	10	9	12	11
	Basic/Prof.	17	16	19	18	22	21
	Prof./Adv.	24	23	27	27	29	29
Theta Cuts	Bel. Basic/Basic	-1.2893	-1.1753	-1.0125	-0.9651	-0.6956	-0.6795
	Basic/Prof.	-0.1101	-0.0967	0.1898	0.2356	0.6103	0.6419
	Prof./Adv.	0.7217	0.7305	1.3018	1.4262	1.7201	1.8937
Impact %	Bel. Basic	3.8	5.7	7.9	7.2	10.1	10.1
	Basic	32.3	36.5	30.7	31.7	33.6	37.9
	Proficient	33.7	33.3	37.1	39.5	37.8	40.4
	Advanced	30.2	24.5	24.3	21.6	18.4	11.6
	Prof. + Adv.	63.9	57.8	61.4	61.1	56.2	52.1
Demographics	N Count	3388	3711	3947	4672	3983	4543
	% City	9.9	13.6	9.6	12.2	7.9	11.4
	% White	67.7	65.4	66.8	65.7	68.8	65.4
	% Black	19.9	20.8	21.0	21.3	19.0	21.9
	% Hispanic	9.9	10.0	9.5	10.1	9.9	9.6

		Reading-M Grade 7		Reading-M Grade 8		Reading-M Grade 11	
		2011	2012	2011	2012	2011	2012
Raw Score	Mean	20.14	19.24	21.27	20.02	22.87	22.22
	SD	6.54	6.82	6.46	6.21	6.34	6.44
	Max	36	36	36	36	36	36
Scaled Score	Mean	1268.3	1260.6	1257.4	1246.5	1249.1	1242.2
	SD	99.3	101.2	101.5	95.0	110.4	112.4
	Max	1788	1778	1756	1767	1753	1763
Raw Cuts	Bel. Basic/Basic	12	12	14	14	17	17
	Basic/Prof.	21	21	23	23	25	25
	Prof./Adv.	28	28	30	30	32	32
Theta Cuts	Bel. Basic/Basic	-0.6788	-0.5921	-0.4859	-0.3991	-0.0445	-0.0157
	Basic/Prof.	0.4809	0.5248	0.6508	0.7366	1.0155	1.0544
	Prof./Adv.	1.5026	1.5162	1.7754	1.8690	2.3512	2.4119
Impact %	Bel. Basic	11.7	15.4	13.9	16.8	17.4	19.8
	Basic	37.7	40.2	40.0	46.0	37.1	38.4
	Proficient	36.9	31.4	36.3	31.5	40.2	37.3
	Advanced	13.7	13.0	9.8	5.7	5.3	4.5
	Prof. + Adv.	50.6	44.4	46.1	37.2	45.5	41.8
Demographics	N Count	3974	4570	3647	4308	3919	4255
	% City	8.6	10.3	9.0	10.8	8.5	11.5
	% White	68.2	66.8	67.4	66.6	68.7	65.4
	% Black	19.4	19.7	20.5	20.5	21.0	23.2
	% Hispanic	9.4	10.8	9.9	10.0	8.0	9.0

		Science-M Grade 8 2011	Science-M Grade 8 2012	Science-M Grade 11 2011	Science-M Grade 11 2012
Raw Score	**Mean**	20.89	20.14	17.84	17.10
	SD	5.82	5.78	5.99	6.50
	Max	34	34	34	34
Scaled Score	**Mean**	1266.6	1260.1	1263.5	1258.6
	SD	107.4	103.0	79.2	89.6
	Max	1769	1787	1694	1712
Raw Cuts	**Bel. Basic/Basic**	14	14	9	9
	Basic/Prof.	22	22	19	19
	Prof./Adv.	29	29	28	28
Theta Cuts	**Bel. Basic/Basic**	-0.3288	-0.2745	-1.0555	-1.0478
	Basic/Prof.	0.7473	0.8197	0.3310	0.3790
	Prof./Adv.	1.9833	2.0973	1.7325	1.8583
Impact %	**Bel. Basic**	12.0	14.6	5.8	9.3
	Basic	40.1	41.4	47.7	49.5
	Proficient	38.2	37.8	40.7	34.9
	Advanced	9.7	6.1	5.8	6.3
	Prof. + Adv.	47.8	44.0	46.6	41.2
Demographics	**N Count**	3252	3554	3540	3742
	% City	7.4	9.4	7.4	10.7
	% White	67.9	67.5	69.7	66.2
	% Black	19.1	19.6	19.7	22.6
	% Hispanic	10.4	10.0	8.3	8.8

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

Mathematics Grade 4

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.1572	1.8441	1075	155	0	0.0	0	0.0	0
1	-3.9059	1.0335	1075	87	0	0.0	0	0.0	0
2	-3.1438	0.7548	1075	64	0	0.0	0	0.0	0
3	-2.6680	0.6360	1075	54	2	0.1	2	0.1	1
4	-2.3084	0.5679	1075	48	5	0.2	7	0.3	1
5	-2.0121	0.5233	1075	44	5	0.2	12	0.4	1
6	-1.7552	0.4918	1075	41	8	0.3	20	0.7	1
7	-1.5252	0.4683	1075	39	11	0.4	31	1.1	1
8	-1.3146	0.4502	1089	38	33	1.2	64	2.4	2
9	-1.1185	0.4359	1105	37	49	1.8	113	4.2	3
10	-0.9337	0.4243	1121	36	48	1.8	161	5.9	5
11	-0.7579	0.4148	1136	35	63	2.3	224	8.3	7
12	-0.5891	0.4069	1150	34	69	2.5	293	10.8	10
13	-0.4263	0.4003	1164	34	87	3.2	380	14.0	12
14	-0.2684	0.3948	1177	33	95	3.5	475	17.5	16
15	-0.1143	0.3902	1190	33	106	3.9	581	21.5	19
16	0.0363	0.3863	1203	33	118	4.4	699	25.8	24
17	0.1842	0.3829	1215	32	118	4.4	817	30.2	28
18	0.3297	0.3801	1227	32	150	5.5	967	35.7	33
19	0.4732	0.3776	1240	32	148	5.5	1115	41.2	38
20	0.6149	0.3753	1252	32	157	5.8	1272	47.0	44
21	0.7550	0.3732	1263	31	145	5.4	1417	52.3	50
22	0.8935	0.3712	1275	31	139	5.1	1556	57.5	55
23	1.0306	0.3693	1287	31	140	5.2	1696	62.6	60
24	1.1664	0.3678	1298	31	174	6.4	1870	69.1	66
25	1.3014	0.3671	1309	31	126	4.7	1996	73.7	71
26	1.4363	0.3676	1321	31	112	4.1	2108	77.8	76
27	1.5721	0.3700	1332	31	129	4.8	2237	82.6	80
28	1.7107	0.3749	1344	32	125	4.6	2362	87.2	85
29	1.8540	0.3829	1356	32	86	3.2	2448	90.4	89
30	2.0050	0.3951	1369	33	63	2.3	2511	92.7	92
31	2.1676	0.4122	1382	35	55	2.0	2566	94.8	94
32	2.3470	0.4359	1398	37	50	1.8	2616	96.6	96
33	2.5508	0.4687	1415	40	27	1.0	2643	97.6	97
34	2.7916	0.5154	1435	43	35	1.3	2678	98.9	98
35	3.0926	0.5867	1460	49	18	0.7	2696	99.6	99
36	3.5062	0.7109	1495	60	6	0.2	2702	99.8	99
37	4.2018	0.9998	1554	84	5	0.2	2707	100.0	99
38	5.4042	1.8247	1655	154	1	0.0	2708	100.0	99

Mathematics Grade 5

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.3945	1.8838	1075	168	0	0.0	0	0.0	0
1	-4.0515	1.0871	1075	97	0	0.0	0	0.0	0
2	-3.1983	0.8004	1075	72	1	0.0	1	0.0	1
3	-2.6665	0.6689	1075	60	2	0.1	3	0.1	1
4	-2.2733	0.5901	1075	53	3	0.1	6	0.2	1
5	-1.9571	0.5372	1075	48	6	0.2	12	0.3	1
6	-1.6895	0.4993	1075	45	19	0.5	31	0.8	1
7	-1.4546	0.4711	1075	42	27	0.7	58	1.6	1
8	-1.2432	0.4493	1087	40	40	1.1	98	2.6	2
9	-1.0491	0.4323	1104	39	65	1.7	163	4.4	4
10	-0.8683	0.4187	1120	37	81	2.2	244	6.5	5
11	-0.6977	0.4078	1135	36	92	2.5	336	9.0	8
12	-0.5352	0.3989	1150	36	138	3.7	474	12.7	11
13	-0.3790	0.3917	1164	35	131	3.5	605	16.2	14
14	-0.2280	0.3857	1177	34	137	3.7	742	19.9	18
15	-0.0813	0.3806	1191	34	175	4.7	917	24.6	22
16	0.0619	0.3762	1203	34	183	4.9	1100	29.5	27
17	0.2019	0.3722	1216	33	180	4.8	1280	34.4	32
18	0.3391	0.3686	1228	33	200	5.4	1480	39.7	37
19	0.4737	0.3651	1240	33	203	5.4	1683	45.2	42
20	0.6058	0.3619	1252	32	214	5.7	1897	50.9	48
21	0.7357	0.3592	1264	32	255	6.8	2152	57.8	54
22	0.8640	0.3573	1275	32	224	6.0	2376	63.8	61
23	0.9914	0.3567	1286	32	192	5.2	2568	68.9	66
24	1.1188	0.3576	1298	32	182	4.9	2750	73.8	71
25	1.2476	0.3606	1309	32	177	4.8	2927	78.6	76
26	1.3794	0.3658	1321	33	158	4.2	3085	82.8	81
27	1.5159	0.3734	1333	33	156	4.2	3241	87.0	85
28	1.6589	0.3834	1346	34	100	2.7	3341	89.7	88
29	1.8106	0.3960	1360	35	110	3.0	3451	92.6	91
30	1.9734	0.4116	1374	37	79	2.1	3530	94.7	94
31	2.1508	0.4314	1390	39	65	1.7	3595	96.5	96
32	2.3478	0.4575	1408	41	35	0.9	3630	97.4	97
33	2.5731	0.4937	1428	44	38	1.0	3668	98.4	98
34	2.8419	0.5464	1452	49	23	0.6	3691	99.1	99
35	3.1832	0.6274	1482	56	21	0.6	3712	99.6	99
36	3.6594	0.7639	1525	68	7	0.2	3719	99.8	99
37	4.4539	1.0590	1596	95	6	0.2	3725	100.0	99
38	5.7542	1.8676	1712	167	1	0.0	3726	100.0	99

Mathematics Grade 6

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.1975	1.8528	1075	178	0	0.0	0	0.0	0
1	-3.9264	1.0451	1075	100	0	0.0	0	0.0	0
2	-3.1453	0.7642	1075	73	2	0.0	2	0.0	1
3	-2.6589	0.6415	1075	61	2	0.0	4	0.1	1
4	-2.2952	0.5694	1075	55	7	0.2	11	0.3	1
5	-1.9992	0.5212	1075	50	20	0.5	31	0.8	1
6	-1.7462	0.4864	1075	47	38	0.9	69	1.7	1
7	-1.5227	0.4602	1096	44	50	1.2	119	2.9	2
8	-1.3205	0.4398	1116	42	92	2.3	211	5.2	4
9	-1.1344	0.4236	1133	41	131	3.2	342	8.4	7
10	-0.9606	0.4106	1150	39	146	3.6	488	12.0	10
11	-0.7964	0.4000	1166	38	200	4.9	688	16.9	14
12	-0.6399	0.3915	1181	38	212	5.2	900	22.2	20
13	-0.4895	0.3845	1195	37	238	5.9	1138	28.0	25
14	-0.3438	0.3789	1209	36	281	6.9	1419	34.9	31
15	-0.2020	0.3746	1223	36	274	6.7	1693	41.7	38
16	-0.0629	0.3713	1236	36	253	6.2	1946	47.9	45
17	0.0740	0.3689	1249	35	255	6.3	2201	54.2	51
18	0.2095	0.3674	1262	35	266	6.6	2467	60.7	57
19	0.3441	0.3667	1275	35	263	6.5	2730	67.2	64
20	0.4785	0.3667	1288	35	221	5.4	2951	72.7	70
21	0.6132	0.3674	1301	35	204	5.0	3155	77.7	75
22	0.7486	0.3687	1314	35	196	4.8	3351	82.5	80
23	0.8852	0.3707	1327	36	136	3.3	3487	85.9	84
24	1.0235	0.3733	1340	36	126	3.1	3613	89.0	87
25	1.1641	0.3766	1354	36	113	2.8	3726	91.8	90
26	1.3074	0.3807	1367	36	83	2.0	3809	93.8	93
27	1.4543	0.3860	1381	37	61	1.5	3870	95.3	95
28	1.6057	0.3928	1396	38	39	1.0	3909	96.3	96
29	1.7634	0.4017	1411	38	52	1.3	3961	97.5	97
30	1.9295	0.4139	1427	40	40	1.0	4001	98.5	98
31	2.1075	0.4307	1444	41	28	0.7	4029	99.2	99
32	2.3026	0.4540	1463	43	14	0.3	4043	99.6	99
33	2.5232	0.4872	1484	47	9	0.2	4052	99.8	99
34	2.7832	0.5354	1509	51	4	0.1	4056	99.9	99
35	3.1080	0.6094	1540	58	2	0.0	4058	99.9	99
36	3.5534	0.7364	1582	71	2	0.0	4060	100.0	99
37	4.2925	1.0248	1653	98	0	0.0	4060	100.0	99
38	5.5343	1.8417	1772	176	1	0.0	4061	100.0	99

Mathematics Grade 7

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-4.9183	1.8423	1075	161	0	0.0	0	0.0	0
1	-3.6721	1.0296	1075	90	0	0.0	0	0.0	0
2	-2.9193	0.7479	1075	65	1	0.0	1	0.0	1
3	-2.4548	0.6261	1075	55	5	0.1	6	0.1	1
4	-2.1086	0.5552	1075	48	10	0.2	16	0.4	1
5	-1.8274	0.5079	1075	44	25	0.6	41	1.0	1
6	-1.5872	0.4737	1085	41	45	1.1	86	2.0	1
7	-1.3754	0.4479	1104	39	104	2.4	190	4.4	3
8	-1.1840	0.4277	1120	37	129	3.0	319	7.4	6
9	-1.0081	0.4116	1136	36	134	3.1	453	10.6	9
10	-0.8442	0.3985	1150	35	173	4.0	626	14.6	13
11	-0.6898	0.3876	1163	34	172	4.0	798	18.6	17
12	-0.5431	0.3787	1176	33	219	5.1	1017	23.7	21
13	-0.4026	0.3711	1189	32	213	5.0	1230	28.7	26
14	-0.2673	0.3648	1200	32	217	5.1	1447	33.8	31
15	-0.1363	0.3594	1212	31	244	5.7	1691	39.5	37
16	-0.0088	0.3547	1223	31	207	4.8	1898	44.3	42
17	0.1155	0.3506	1234	31	230	5.4	2128	49.7	47
18	0.2371	0.3469	1244	30	217	5.1	2345	54.8	52
19	0.3562	0.3435	1255	30	227	5.3	2572	60.1	57
20	0.4731	0.3403	1265	30	215	5.0	2787	65.1	63
21	0.5878	0.3372	1275	29	197	4.6	2984	69.7	67
22	0.7006	0.3344	1285	29	176	4.1	3160	73.8	72
23	0.8115	0.3318	1295	29	199	4.6	3359	78.4	76
24	0.9210	0.3300	1304	29	152	3.5	3511	82.0	80
25	1.0296	0.3292	1314	29	125	2.9	3636	84.9	83
26	1.1381	0.3301	1323	29	120	2.8	3756	87.7	86
27	1.2481	0.3335	1333	29	121	2.8	3877	90.5	89
28	1.3613	0.3400	1343	30	82	1.9	3959	92.4	91
29	1.4803	0.3507	1353	31	79	1.8	4038	94.3	93
30	1.6086	0.3666	1364	32	60	1.4	4098	95.7	95
31	1.7509	0.3890	1377	34	53	1.2	4151	96.9	96
32	1.9138	0.4197	1391	37	45	1.1	4196	98.0	97
33	2.1070	0.4610	1408	40	33	0.8	4229	98.7	98
34	2.3450	0.5170	1428	45	22	0.5	4251	99.3	99
35	2.6528	0.5969	1455	52	15	0.4	4266	99.6	99
36	3.0838	0.7267	1493	63	10	0.2	4276	99.8	99
37	3.8072	1.0159	1556	89	7	0.2	4283	100.0	99
38	5.0341	1.8350	1663	160	0	0.0	4283	100.0	100

Mathematics Grade 8

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-4.9775	1.8405	1075	173	0	0.0	0	0.0	0
1	-3.7357	1.0266	1075	97	2	0.0	2	0.0	1
2	-2.9888	0.7441	1075	70	0	0.0	2	0.0	1
3	-2.5296	0.6221	1075	59	3	0.1	5	0.1	1
4	-2.1882	0.5512	1075	52	3	0.1	8	0.2	1
5	-1.9112	0.5041	1075	48	13	0.3	21	0.5	1
6	-1.6745	0.4703	1075	44	43	1.0	64	1.4	1
7	-1.4655	0.4450	1086	42	72	1.6	136	3.1	2
8	-1.2764	0.4253	1104	40	87	2.0	223	5.0	4
9	-1.1023	0.4098	1120	39	123	2.8	346	7.8	6
10	-0.9396	0.3973	1136	37	183	4.1	529	11.9	10
11	-0.7858	0.3872	1150	36	184	4.1	713	16.0	14
12	-0.6391	0.3791	1164	36	195	4.4	908	20.4	18
13	-0.4980	0.3725	1177	35	209	4.7	1117	25.1	23
14	-0.3612	0.3673	1190	35	234	5.3	1351	30.4	28
15	-0.2279	0.3632	1203	34	238	5.4	1589	35.8	33
16	-0.0971	0.3602	1215	34	252	5.7	1841	41.4	39
17	0.0318	0.3580	1227	34	219	4.9	2060	46.4	44
18	0.1594	0.3567	1239	34	253	5.7	2313	52.0	49
19	0.2865	0.3562	1251	34	232	5.2	2545	57.3	55
20	0.4133	0.3564	1263	34	250	5.6	2795	62.9	60
21	0.5407	0.3573	1275	34	233	5.2	3028	68.1	66
22	0.6689	0.3590	1287	34	199	4.5	3227	72.6	70
23	0.7987	0.3615	1299	34	213	4.8	3440	77.4	75
24	0.9305	0.3648	1312	34	178	4.0	3618	81.4	79
25	1.0650	0.3690	1324	35	157	3.5	3775	84.9	83
26	1.2030	0.3743	1337	35	154	3.5	3929	88.4	87
27	1.3456	0.3809	1351	36	131	2.9	4060	91.4	90
28	1.4937	0.3892	1365	37	110	2.5	4170	93.8	93
29	1.6491	0.3996	1379	38	97	2.2	4267	96.0	95
30	1.8139	0.4128	1395	39	69	1.6	4336	97.6	97
31	1.9911	0.4300	1412	41	45	1.0	4381	98.6	98
32	2.1855	0.4529	1430	43	25	0.6	4406	99.1	99
33	2.4045	0.4847	1451	46	15	0.3	4421	99.5	99
34	2.6610	0.5307	1475	50	13	0.3	4434	99.8	99
35	2.9790	0.6022	1505	57	6	0.1	4440	99.9	99
36	3.4134	0.7272	1546	69	1	0.0	4441	99.9	99
37	4.1366	1.0159	1614	96	2	0.0	4443	100.0	99
38	5.3649	1.8361	1730	173	1	0.0	4444	100.0	99

Mathematics Grade 11

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-4.9393	1.8430	1075	213	0	0.0	0	0.0	0
1	-3.6912	1.0307	1075	119	1	0.0	1	0.0	1
2	-2.9364	0.7490	1075	87	2	0.0	3	0.1	1
3	-2.4705	0.6271	1075	73	4	0.1	7	0.2	1
4	-2.1233	0.5560	1075	64	20	0.4	27	0.6	1
5	-1.8414	0.5085	1075	59	24	0.5	51	1.1	1
6	-1.6006	0.4744	1075	55	69	1.5	120	2.6	2
7	-1.3881	0.4486	1075	52	112	2.4	232	5.0	4
8	-1.1960	0.4287	1075	50	174	3.8	406	8.8	7
9	-1.0192	0.4128	1096	48	204	4.4	610	13.2	11
10	-0.8541	0.4002	1115	46	240	5.2	850	18.5	16
11	-0.6981	0.3901	1133	45	256	5.6	1106	24.0	21
12	-0.5492	0.3820	1150	44	276	6.0	1382	30.0	27
13	-0.4058	0.3756	1167	43	295	6.4	1677	36.4	33
14	-0.2666	0.3708	1183	43	242	5.3	1919	41.7	39
15	-0.1305	0.3672	1198	42	279	6.1	2198	47.7	45
16	0.0033	0.3647	1214	42	240	5.2	2438	52.9	50
17	0.1358	0.3633	1229	42	262	5.7	2700	58.6	56
18	0.2676	0.3629	1244	42	238	5.2	2938	63.8	61
19	0.3994	0.3632	1260	42	209	4.5	3147	68.3	66
20	0.5317	0.3643	1275	42	209	4.5	3356	72.9	71
21	0.6649	0.3659	1290	42	196	4.3	3552	77.1	75
22	0.7995	0.3679	1306	43	191	4.1	3743	81.3	79
23	0.9357	0.3701	1322	43	157	3.4	3900	84.7	83
24	1.0734	0.3721	1338	43	145	3.1	4045	87.8	86
25	1.2127	0.3740	1354	43	127	2.8	4172	90.6	89
26	1.3532	0.3758	1370	43	92	2.0	4264	92.6	92
27	1.4951	0.3778	1386	44	80	1.7	4344	94.3	93
28	1.6389	0.3808	1403	44	73	1.6	4417	95.9	95
29	1.7857	0.3860	1420	45	64	1.4	4481	97.3	97
30	1.9378	0.3949	1438	46	43	0.9	4524	98.2	98
31	2.0993	0.4097	1456	47	36	0.8	4560	99.0	99
32	2.2761	0.4331	1477	50	14	0.3	4574	99.3	99
33	2.4787	0.4695	1500	54	17	0.4	4591	99.7	99
34	2.7250	0.5268	1529	61	9	0.2	4600	99.9	99
35	3.0500	0.6202	1566	72	2	0.0	4602	99.9	99
36	3.5344	0.7855	1622	91	2	0.0	4604	100.0	99
37	4.4122	1.1261	1724	130	2	0.0	4606	100.0	99
38	5.8476	1.9280	1890	223	0	0.0	4606	100.0	100

Reading Grade 4

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-4.7638	1.8358	1075	195	0	0.0	0	0.0	0
1	-3.5339	1.0184	1075	108	1	0.0	1	0.0	1
2	-2.8033	0.7334	1075	78	2	0.1	3	0.1	1
3	-2.3596	0.6099	1075	65	5	0.1	8	0.2	1
4	-2.0329	0.5380	1075	57	16	0.4	24	0.6	1
5	-1.7699	0.4901	1099	52	33	0.9	57	1.5	1
6	-1.5470	0.4558	1123	48	52	1.4	109	2.9	2
7	-1.3513	0.4300	1143	46	102	2.7	211	5.7	4
8	-1.1753	0.4099	1162	43	124	3.3	335	9.0	7
9	-1.0140	0.3939	1179	42	145	3.9	480	12.9	11
10	-0.8640	0.3810	1195	40	170	4.6	650	17.5	15
11	-0.7229	0.3706	1210	39	195	5.3	845	22.8	20
12	-0.5888	0.3621	1224	38	191	5.1	1036	27.9	25
13	-0.4603	0.3553	1238	38	189	5.1	1225	33.0	30
14	-0.3360	0.3499	1251	37	165	4.4	1390	37.5	35
15	-0.2151	0.3458	1264	37	176	4.7	1566	42.2	40
16	-0.0967	0.3428	1276	36	204	5.5	1770	47.7	45
17	0.0201	0.3410	1289	36	174	4.7	1944	52.4	50
18	0.1361	0.3403	1301	36	181	4.9	2125	57.3	55
19	0.2521	0.3407	1313	36	166	4.5	2291	61.7	59
20	0.3686	0.3423	1326	36	168	4.5	2459	66.3	64
21	0.4866	0.3450	1338	37	182	4.9	2641	71.2	69
22	0.6069	0.3489	1351	37	159	4.3	2800	75.5	73
23	0.7305	0.3543	1364	38	138	3.7	2938	79.2	77
24	0.8583	0.3612	1378	38	119	3.2	3057	82.4	81
25	0.9918	0.3698	1392	39	130	3.5	3187	85.9	84
26	1.1324	0.3805	1407	40	131	3.5	3318	89.4	88
27	1.2821	0.3937	1423	42	106	2.9	3424	92.3	91
28	1.4435	0.4102	1440	43	81	2.2	3505	94.4	93
29	1.6200	0.4308	1458	46	62	1.7	3567	96.1	95
30	1.8166	0.4571	1479	48	58	1.6	3625	97.7	97
31	2.0411	0.4920	1503	52	39	1.1	3664	98.7	98
32	2.3062	0.5403	1531	57	27	0.7	3691	99.5	99
33	2.6358	0.6126	1566	65	12	0.3	3703	99.8	99
34	3.0833	0.7363	1613	78	5	0.1	3708	99.9	99
35	3.8188	1.0210	1691	108	3	0.1	3711	100.0	99
36	5.0526	1.8374	1822	195	0	0.0	3711	100.0	100

Reading Grade 5

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-4.8172	1.8413	1075	191	0	0.0	0	0.0	0
1	-3.5739	1.0273	1075	107	0	0.0	0	0.0	0
2	-2.8263	0.7440	1075	77	2	0.0	2	0.0	1
3	-2.3680	0.6209	1075	65	9	0.2	11	0.2	1
4	-2.0286	0.5488	1075	57	21	0.4	32	0.7	1
5	-1.7546	0.5006	1075	52	40	0.9	72	1.5	1
6	-1.5219	0.4658	1097	48	59	1.3	131	2.8	2
7	-1.3174	0.4395	1118	46	88	1.9	219	4.7	4
8	-1.1335	0.4189	1137	44	117	2.5	336	7.2	6
9	-0.9651	0.4025	1155	42	145	3.1	481	10.3	9
10	-0.8085	0.3893	1171	40	138	3.0	619	13.2	12
11	-0.6612	0.3786	1187	39	152	3.3	771	16.5	15
12	-0.5212	0.3699	1201	38	179	3.8	950	20.3	18
13	-0.3871	0.3629	1215	38	167	3.6	1117	23.9	22
14	-0.2574	0.3574	1229	37	157	3.4	1274	27.3	26
15	-0.1312	0.3533	1242	37	176	3.8	1450	31.0	29
16	-0.0075	0.3503	1254	36	169	3.6	1619	34.7	33
17	0.1145	0.3485	1267	36	198	4.2	1817	38.9	37
18	0.2356	0.3478	1280	36	165	3.5	1982	42.4	41
19	0.3566	0.3481	1292	36	200	4.3	2182	46.7	45
20	0.4783	0.3496	1305	36	198	4.2	2380	50.9	49
21	0.6014	0.3522	1318	37	225	4.8	2605	55.8	53
22	0.7267	0.3560	1331	37	209	4.5	2814	60.2	58
23	0.8552	0.3612	1344	38	227	4.9	3041	65.1	63
24	0.9880	0.3679	1358	38	199	4.3	3240	69.3	67
25	1.1263	0.3763	1372	39	205	4.4	3445	73.7	72
26	1.2717	0.3867	1387	40	217	4.6	3662	78.4	76
27	1.4262	0.3997	1404	42	196	4.2	3858	82.6	80
28	1.5923	0.4159	1421	43	197	4.2	4055	86.8	85
29	1.7736	0.4364	1440	45	160	3.4	4215	90.2	89
30	1.9752	0.4627	1461	48	158	3.4	4373	93.6	92
31	2.2050	0.4976	1485	52	106	2.3	4479	95.9	95
32	2.4759	0.5460	1513	57	95	2.0	4574	97.9	97
33	2.8121	0.6184	1548	64	62	1.3	4636	99.2	99
34	3.2673	0.7420	1595	77	22	0.5	4658	99.7	99
35	4.0120	1.0260	1672	107	13	0.3	4671	100.0	99
36	5.2536	1.8407	1801	191	1	0.0	4672	100.0	99

Reading Grade 6

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-4.7836	1.8368	1075	176	0	0.0	0	0.0	0
1	-3.5511	1.0204	1075	98	0	0.0	0	0.0	0
2	-2.8162	0.7364	1075	70	0	0.0	0	0.0	0
3	-2.3680	0.6137	1075	59	5	0.1	5	0.1	1
4	-2.0364	0.5427	1075	52	7	0.2	12	0.3	1
5	-1.7681	0.4957	1075	47	21	0.5	33	0.7	1
6	-1.5394	0.4623	1075	44	37	0.8	70	1.5	1
7	-1.3376	0.4373	1089	42	62	1.4	132	2.9	2
8	-1.1549	0.4182	1106	40	91	2.0	223	4.9	4
9	-0.9865	0.4032	1122	39	118	2.6	341	7.5	6
10	-0.8289	0.3913	1137	37	116	2.6	457	10.1	9
11	-0.6795	0.3818	1152	37	134	2.9	591	13.0	12
12	-0.5367	0.3744	1165	36	127	2.8	718	15.8	14
13	-0.3988	0.3686	1178	35	145	3.2	863	19.0	17
14	-0.2647	0.3641	1191	35	156	3.4	1019	22.4	21
15	-0.1333	0.3610	1204	35	183	4.0	1202	26.5	24
16	-0.0038	0.3589	1216	34	163	3.6	1365	30.0	28
17	0.1246	0.3579	1229	34	184	4.1	1549	34.1	32
18	0.2526	0.3579	1241	34	194	4.3	1743	38.4	36
19	0.3811	0.3589	1253	34	229	5.0	1972	43.4	41
20	0.5106	0.3609	1265	35	206	4.5	2178	47.9	46
21	0.6419	0.3640	1278	35	221	4.9	2399	52.8	50
22	0.7758	0.3682	1291	35	220	4.8	2619	57.6	55
23	0.9134	0.3737	1304	36	239	5.3	2858	62.9	60
24	1.0555	0.3806	1318	36	235	5.2	3093	68.1	65
25	1.2036	0.3892	1332	37	243	5.3	3336	73.4	71
26	1.3591	0.3998	1347	38	213	4.7	3549	78.1	76
27	1.5240	0.4129	1362	40	246	5.4	3795	83.5	81
28	1.7010	0.4291	1379	41	219	4.8	4014	88.4	86
29	1.8937	0.4495	1398	43	178	3.9	4192	92.3	90
30	2.1073	0.4758	1418	46	124	2.7	4316	95.0	94
31	2.3497	0.5105	1441	49	115	2.5	4431	97.5	96
32	2.6342	0.5587	1469	53	63	1.4	4494	98.9	98
33	2.9851	0.6307	1502	60	29	0.6	4523	99.6	99
34	3.4566	0.7535	1547	72	14	0.3	4537	99.9	99
35	4.2197	1.0355	1620	99	5	0.1	4542	100.0	99
36	5.4757	1.8466	1741	177	1	0.0	4543	100.0	99

Reading Grade 7

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-4.8196	1.8377	1075	198	0	0.0	0	0.0	0
1	-3.5850	1.0216	1075	110	1	0.0	1	0.0	1
2	-2.8482	0.7373	1075	79	0	0.0	1	0.0	1
3	-2.3990	0.6141	1075	66	3	0.1	4	0.1	1
4	-2.0674	0.5423	1075	58	9	0.2	13	0.3	1
5	-1.7999	0.4945	1075	53	31	0.7	44	1.0	1
6	-1.5728	0.4602	1075	50	42	0.9	86	1.9	1
7	-1.3732	0.4344	1075	47	73	1.6	159	3.5	3
8	-1.1934	0.4144	1095	45	107	2.3	266	5.8	5
9	-1.0285	0.3985	1112	43	124	2.7	390	8.5	7
10	-0.8748	0.3858	1129	42	137	3.0	527	11.5	10
11	-0.7300	0.3756	1144	40	178	3.9	705	15.4	13
12	-0.5921	0.3674	1159	40	174	3.8	879	19.2	17
13	-0.4596	0.3609	1174	39	200	4.4	1079	23.6	21
14	-0.3312	0.3558	1187	38	196	4.3	1275	27.9	26
15	-0.2060	0.3520	1201	38	184	4.0	1459	31.9	30
16	-0.0831	0.3494	1214	38	206	4.5	1665	36.4	34
17	0.0384	0.3479	1227	38	214	4.7	1879	41.1	39
18	0.1592	0.3474	1240	37	232	5.1	2111	46.2	44
19	0.2800	0.3480	1253	38	221	4.8	2332	51.0	49
20	0.4016	0.3496	1266	38	208	4.6	2540	55.6	53
21	0.5248	0.3523	1280	38	223	4.9	2763	60.5	58
22	0.6502	0.3562	1293	38	218	4.8	2981	65.2	63
23	0.7788	0.3614	1307	39	211	4.6	3192	69.8	68
24	0.9118	0.3681	1321	40	210	4.6	3402	74.4	72
25	1.0503	0.3764	1336	41	202	4.4	3604	78.9	77
26	1.1958	0.3868	1352	42	195	4.3	3799	83.1	81
27	1.3503	0.3997	1369	43	178	3.9	3977	87.0	85
28	1.5162	0.4156	1387	45	170	3.7	4147	90.7	89
29	1.6971	0.4358	1406	47	126	2.8	4273	93.5	92
30	1.8980	0.4617	1428	50	119	2.6	4392	96.1	95
31	2.1266	0.4960	1452	53	78	1.7	4470	97.8	97
32	2.3955	0.5437	1481	59	42	0.9	4512	98.7	98
33	2.7286	0.6153	1517	66	32	0.7	4544	99.4	99
34	3.1791	0.7381	1566	80	21	0.5	4565	99.9	99
35	3.9166	1.0218	1645	110	3	0.1	4568	100.0	99
36	5.1513	1.8376	1778	198	2	0.0	4570	100.0	99

Reading Grade 8

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-4.8992	1.8372	1050	202	0	0.0	0	0.0	0
1	-3.6659	1.0208	1050	112	0	0.0	0	0.0	0
2	-2.9303	0.7367	1050	81	0	0.0	0	0.0	0
3	-2.4818	0.6137	1050	67	1	0.0	1	0.0	1
4	-2.1504	0.5423	1050	60	1	0.0	2	0.0	1
5	-1.8828	0.4949	1050	54	10	0.2	12	0.3	1
6	-1.6551	0.4610	1050	51	29	0.7	41	1.0	1
7	-1.4545	0.4356	1050	48	50	1.2	91	2.1	2
8	-1.2735	0.4160	1063	46	60	1.4	151	3.5	3
9	-1.1070	0.4006	1082	44	76	1.8	227	5.3	4
10	-0.9516	0.3882	1099	43	95	2.2	322	7.5	6
11	-0.8048	0.3784	1115	42	126	2.9	448	10.4	9
12	-0.6648	0.3705	1130	41	123	2.9	571	13.3	12
13	-0.5299	0.3642	1145	40	151	3.5	722	16.8	15
14	-0.3991	0.3594	1160	40	176	4.1	898	20.8	19
15	-0.2712	0.3558	1174	39	162	3.8	1060	24.6	23
16	-0.1456	0.3534	1187	39	204	4.7	1264	29.3	27
17	-0.0212	0.3520	1201	39	221	5.1	1485	34.5	32
18	0.1025	0.3516	1215	39	228	5.3	1713	39.8	37
19	0.2263	0.3522	1228	39	270	6.3	1983	46.0	43
20	0.3508	0.3538	1242	39	249	5.8	2232	51.8	49
21	0.4768	0.3564	1256	39	248	5.8	2480	57.6	55
22	0.6052	0.3602	1270	40	225	5.2	2705	62.8	60
23	0.7366	0.3652	1284	40	223	5.2	2928	68.0	65
24	0.8722	0.3716	1299	41	250	5.8	3178	73.8	71
25	1.0131	0.3796	1315	42	220	5.1	3398	78.9	76
26	1.1609	0.3895	1331	43	208	4.8	3606	83.7	81
27	1.3173	0.4019	1348	44	173	4.0	3779	87.7	86
28	1.4849	0.4174	1367	46	157	3.6	3936	91.4	90
29	1.6672	0.4371	1387	48	127	2.9	4063	94.3	93
30	1.8690	0.4624	1409	51	94	2.2	4157	96.5	95
31	2.0980	0.4963	1434	55	71	1.6	4228	98.1	97
32	2.3670	0.5436	1464	60	48	1.1	4276	99.3	99
33	2.6998	0.6149	1500	68	17	0.4	4293	99.7	99
34	3.1496	0.7376	1550	81	12	0.3	4305	99.9	99
35	3.8866	1.0215	1631	112	3	0.1	4308	100.0	99
36	5.1208	1.8375	1767	202	0	0.0	4308	100.0	100

Reading Grade 11

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-5.0548	1.8409	1000	217	0	0.0	0	0.0	0
1	-3.8119	1.0273	1000	121	1	0.0	1	0.0	1
2	-3.0634	0.7453	1000	88	0	0.0	1	0.0	1
3	-2.6025	0.6236	1000	74	2	0.0	3	0.1	1
4	-2.2592	0.5529	1000	65	3	0.1	6	0.1	1
5	-1.9801	0.5061	1000	60	6	0.1	12	0.3	1
6	-1.7415	0.4725	1000	56	24	0.6	36	0.8	1
7	-1.5304	0.4472	1000	53	28	0.7	64	1.5	1
8	-1.3394	0.4276	1000	50	37	0.9	101	2.4	2
9	-1.1633	0.4121	1018	49	63	1.5	164	3.9	3
10	-0.9988	0.3996	1037	47	62	1.5	226	5.3	5
11	-0.8432	0.3895	1056	46	83	2.0	309	7.3	6
12	-0.6948	0.3813	1073	45	95	2.2	404	9.5	8
13	-0.5521	0.3747	1090	44	100	2.4	504	11.8	11
14	-0.4137	0.3695	1106	44	96	2.3	600	14.1	13
15	-0.2788	0.3654	1122	43	128	3.0	728	17.1	16
16	-0.1464	0.3625	1138	43	116	2.7	844	19.8	18
17	-0.0157	0.3606	1153	43	162	3.8	1006	23.6	22
18	0.1140	0.3597	1169	42	158	3.7	1164	27.4	25
19	0.2433	0.3597	1184	42	193	4.5	1357	31.9	30
20	0.3730	0.3607	1199	43	191	4.5	1548	36.4	34
21	0.5037	0.3627	1215	43	208	4.9	1756	41.3	39
22	0.6363	0.3658	1230	43	230	5.4	1986	46.7	44
23	0.7716	0.3701	1246	44	217	5.1	2203	51.8	49
24	0.9106	0.3757	1263	44	274	6.4	2477	58.2	55
25	1.0544	0.3830	1280	45	247	5.8	2724	64.0	61
26	1.2045	0.3922	1297	46	283	6.7	3007	70.7	67
27	1.3628	0.4038	1316	48	268	6.3	3275	77.0	74
28	1.5316	0.4185	1336	49	242	5.7	3517	82.7	80
29	1.7144	0.4374	1357	52	223	5.2	3740	87.9	85
30	1.9162	0.4620	1381	54	180	4.2	3920	92.1	90
31	2.1444	0.4951	1408	58	143	3.4	4063	95.5	94
32	2.4119	0.5418	1440	64	95	2.2	4158	97.7	97
33	2.7424	0.6127	1479	72	59	1.4	4217	99.1	98
34	3.1892	0.7353	1531	87	32	0.8	4249	99.9	99
35	3.9224	1.0195	1618	120	5	0.1	4254	100.0	99
36	5.1536	1.8362	1763	217	1	0.0	4255	100.0	99

Science Grade 8

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-4.8790	1.8393	1050	214	0	0.0	0	0.0	0
1	-3.6402	1.0247	1050	119	0	0.0	0	0.0	0
2	-2.8968	0.7419	1050	86	0	0.0	0	0.0	0
3	-2.4407	0.6199	1050	72	0	0.0	0	0.0	0
4	-2.1017	0.5492	1050	64	4	0.1	4	0.1	1
5	-1.8266	0.5023	1050	58	6	0.2	10	0.3	1
6	-1.5915	0.4689	1050	54	12	0.3	22	0.6	1
7	-1.3836	0.4440	1050	52	34	1.0	56	1.6	1
8	-1.1953	0.4248	1050	49	39	1.1	95	2.7	2
9	-1.0215	0.4097	1070	48	52	1.5	147	4.1	3
10	-0.8586	0.3978	1088	46	82	2.3	229	6.4	5
11	-0.7043	0.3883	1106	45	72	2.0	301	8.5	7
12	-0.5564	0.3809	1124	44	109	3.1	410	11.5	10
13	-0.4137	0.3752	1140	44	110	3.1	520	14.6	13
14	-0.2745	0.3710	1156	43	122	3.4	642	18.1	16
15	-0.1380	0.3681	1172	43	152	4.3	794	22.3	20
16	-0.0032	0.3664	1188	43	162	4.6	956	26.9	25
17	0.1308	0.3659	1203	43	181	5.1	1137	32.0	29
18	0.2648	0.3666	1219	43	197	5.5	1334	37.5	35
19	0.3999	0.3684	1235	43	217	6.1	1551	43.6	41
20	0.5367	0.3715	1251	43	218	6.1	1769	49.8	47
21	0.6762	0.3759	1267	44	223	6.3	1992	56.0	53
22	0.8197	0.3818	1283	44	206	5.8	2198	61.8	59
23	0.9682	0.3893	1301	45	232	6.5	2430	68.4	65
24	1.1234	0.3989	1319	46	222	6.2	2652	74.6	71
25	1.2871	0.4109	1338	48	214	6.0	2866	80.6	78
26	1.4620	0.4261	1358	49	182	5.1	3048	85.8	83
27	1.6516	0.4454	1380	52	165	4.6	3213	90.4	88
28	1.8607	0.4704	1404	55	123	3.5	3336	93.9	92
29	2.0973	0.5038	1432	59	88	2.5	3424	96.3	95
30	2.3739	0.5506	1464	64	66	1.9	3490	98.2	97
31	2.7145	0.6213	1504	72	42	1.2	3532	99.4	99
32	3.1724	0.7432	1557	86	15	0.4	3547	99.8	99
33	3.9178	1.0257	1643	119	7	0.2	3554	100.0	99
34	5.1581	1.8399	1787	214	0	0.0	3554	100.0	100

Science Grade 11

Raw	Meas	MeasSE	SS	SSSE	Freq	Freq%	Cum	Cum%	Pct
0	-4.8871	1.8382	1100	166	0	0.0	0	0.0	0
1	-3.6510	1.0229	1100	92	0	0.0	0	0.0	0
2	-2.9111	0.7397	1100	67	0	0.0	0	0.0	0
3	-2.4579	0.6177	1100	56	4	0.1	4	0.1	1
4	-2.1215	0.5471	1100	49	20	0.5	24	0.6	1
5	-1.8483	0.5005	1100	45	46	1.2	70	1.9	1
6	-1.6149	0.4674	1100	42	56	1.5	126	3.4	3
7	-1.4083	0.4427	1118	40	86	2.3	212	5.7	5
8	-1.2209	0.4238	1135	38	137	3.7	349	9.3	7
9	-1.0478	0.4091	1151	37	146	3.9	495	13.2	11
10	-0.8852	0.3975	1165	36	176	4.7	671	17.9	16
11	-0.7310	0.3883	1179	35	177	4.7	848	22.7	20
12	-0.5832	0.3812	1193	34	186	5.0	1034	27.6	25
13	-0.4400	0.3757	1205	34	218	5.8	1252	33.5	31
14	-0.3004	0.3718	1218	34	189	5.1	1441	38.5	36
15	-0.1633	0.3691	1230	33	192	5.1	1633	43.6	41
16	-0.0276	0.3677	1243	33	186	5.0	1819	48.6	46
17	0.1074	0.3674	1255	33	203	5.4	2022	54.0	51
18	0.2427	0.3683	1267	33	180	4.8	2202	58.8	56
19	0.3790	0.3703	1279	33	174	4.6	2376	63.5	61
20	0.5172	0.3735	1292	34	174	4.6	2550	68.1	66
21	0.6583	0.3781	1305	34	168	4.5	2718	72.6	70
22	0.8035	0.3841	1318	35	162	4.3	2880	77.0	75
23	0.9539	0.3918	1331	35	143	3.8	3023	80.8	79
24	1.1111	0.4015	1345	36	137	3.7	3160	84.4	83
25	1.2770	0.4137	1360	37	129	3.4	3289	87.9	86
26	1.4543	0.4289	1376	39	110	2.9	3399	90.8	89
27	1.6464	0.4483	1394	40	108	2.9	3507	93.7	92
28	1.8583	0.4735	1413	43	82	2.2	3589	95.9	95
29	2.0978	0.5070	1434	46	51	1.4	3640	97.3	97
30	2.3779	0.5539	1460	50	46	1.2	3686	98.5	98
31	2.7224	0.6246	1491	56	37	1.0	3723	99.5	99
32	3.1847	0.7463	1532	67	16	0.4	3739	99.9	99
33	3.9350	1.0283	1600	93	3	0.1	3742	100.0	99
34	5.1794	1.8415	1712	166	0	0.0	3742	100.0	100

Appendix O:

PSSA and PSSA-M Demographics Comparison

PSSA and PSSA-M Demographics Comparison

In response to a recommendation by Pennsylvania's Technical Advisory Committee (TAC), tables were assembled to provide a demographic comparison of students taking the PSSA-Modified (PSSA-M) assessment for the current year with those of the previous year. The recommendation included the advisability of comparisons with students taking the standard assessment (PSSA). The following tables contain the percent of assessed students contributing to state summary statistics for gender and ethnicity categories for 2012 and 2011 for the PSSA-M and PSSA for Mathematics, Reading, and Science. Tables providing a gender and ethnicity breakdown by subject, type of test, and year are the following:

Mathematics
- 2012 PSSA-M
- 2011 PSSA-M
- 2012 PSSA
- 2011 PSSA

Reading
- 2012 PSSA-M
- 2011 PSSA-M
- 2012 PSSA
- 2011 PSSA

Science
- 2012 PSSA-M
- 2011 PSSA-M
- 2012 PSSA
- 2011 PSSA

Demographic Comparisons for PSSA-M and PSSA Averaged Across Grade Levels

The percent of students in major demographic categories were averaged across the assessed grade levels (Grades 4-8, 11 for PSSA-M and PSSA Mathematics and Reading and Grades 8 and 11 for PSSA-M and PSSA Science). The consistent finding for each subject in both 2011 and 2012, as noted in the table below, is that the demographic composition of the PSSA-M group was clearly more male and minority (black and Latino/Hispanic) than those taking the standard PSSA. A comparison of the two years revealed that those taking the PSSA-M in 2012 were slightly more male and minority with white students dropping by approximately two percent.

Average Percent of Students in Selected Demographic Categories
Receiving Scores on the 2012 PSSA-M or the 2012 PSSA

Subject	Test	Male		Black		Latino/Hispanic		White	
		2012	2011	2012	2011	2012	2011	2012	2011
Mathematics	PSSA-M	60.1	59.2	22.6	21.7	10.2	9.6	64.1	66.2
	PSSA	50.8	50.9	14.6	14.8	8.1	7.4	72.4	73.3
Reading	PSSA-M	63.4	62.9	21.2	20.1	9.9	9.4	65.9	67.9
	PSSA	50.7	50.7	14.5	14.8	8.1	7.7	72.4	72.9
Science	PSSA-M	62.7	62.4	21.1	19.4	9.9	9.4	66.9	68.8
	PSSA	50.6	50.4	13.4	13.9	7.2	6.8	74.7	75.0

Demographic Comparisons for PSSA-M and PSSA by Grade and Subject Area

A direct comparison of 2012 and 2011 demographic data for students taking the standard PSSA with those receiving the PSSA-M is comparable since both were obtained from Post-Appeals files. In the following tables displaying PSSA-M results by grade level for 2011 and 2012, the following may be observed:

- The number of students participating in the PSSA-M rose slightly from 2011 to 2012.
- The demographic composition of those assessed in by the PSSA-M in 2012 appear similar in terms of gender composition; however the percentage of white students decreased by approximately one to nearly four percent points depending on subject and grade level while decreases for students taking the PSSA were typically less than one percent.

Gender and Ethnicity Percent Breakdown for 2012 PSSA-M: Mathematics

Demographic or Educational Characteristic	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
Gender						
Female	39.9	39.8	41.0	40.1	38.1	40.2
Male	60.0	60.1	58.9	59.8	61.8	59.7
Race/Ethnicity						
Amer. Indian or Alaskan Native	0.2	0.2	0.3	0.2	0.2	0.2
Asian or Pacific Islander	1.1	0.9	1.2	1.1	0.9	1.1
Black/African American non-Hispanic	23.8	23.9	23.7	20.9	21.0	22.4
Latino/Hispanic	11.0	10.7	10.3	10.5	9.8	8.6
White non-Hispanic	61.1	62.2	62.8	65.6	66.2	66.7
Multi-Racial/Ethnic	2.6	2.1	1.7	1.6	1.7	0.8
Assessed Students in State Summaries	2,708	3,726	4,061	4,283	4,444	4,606

Gender and Ethnicity Percent Breakdown for 2011 PSSA-M: Mathematics

Demographic or Educational Characteristic	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
Gender						
Female	40.3	42.8	41.2	39.8	40.7	39.6
Male	59.6	57.1	58.8	60.0	59.1	60.3
Race/Ethnicity						
Amer. Indian or Alaskan Native	0.3	0.2	0.1	0.3	0.0	0.2
Asian or Pacific Islander	0.8	1.1	0.8	0.8	1.0	0.7
Black/African American non-Hispanic	23.7	23.0	20.7	21.7	21.0	20.2
Latino/Hispanic	11.1	10.5	10.2	8.5	9.6	7.6
White non-Hispanic	62.2	64.1	66.7	66.9	67.1	70.1
Multi-Racial/Ethnic	1.8	0.9	1.4	1.6	1.1	0.9
Assessed Students in State Summaries	2,375	3,366	3,600	3,972	4,114	4,269

Gender and Ethnicity Percent Breakdown for 2012 PSSA: Mathematics

Demographic or Educational Characteristic	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
Gender						
Female	48.9	49.1	49.1	49.0	49.1	49.7
Male	51.0	50.8	50.9	51.0	50.9	50.2
Race/Ethnicity						
American Indian or Alaskan Native	0.2	0.1	0.1	0.1	0.1	0.2
Asian or Pacific Islander	3.5	3.5	3.3	3.1	3.2	3.4
Black/African American non-Hispanic	15.0	14.8	14.7	14.9	14.5	13.4
Latino/Hispanic	8.7	8.6	8.1	8.2	8.1	6.6
White non-Hispanic	70.6	71.3	72.1	72.1	72.6	75.5
Multi-Racial/Ethnic	1.9	1.6	1.6	1.5	1.5	1.0
Assessed Students in State Summaries	122,526	124,973	126,661	127,152	126,204	125,113

Gender and Ethnicity Percent Breakdown for 2011 PSSA: Mathematics

Demographic or Educational Characteristic	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
Gender						
Female	49.0	49.0	48.8	49.2	48.6	49.6
Male	51.0	51.0	51.1	50.7	51.2	50.3
Race/Ethnicity						
American Indian or Alaskan Native	0.1	0.2	0.1	0.1	0.1	0.2
Asian or Pacific Islander	3.4	3.3	3.0	3.0	2.9	3.0
Black/African American non-Hispanic	15.1	15.0	15.2	15.1	14.7	13.9
Latino/Hispanic	8.3	7.9	7.6	7.4	7.0	6.2
White non-Hispanic	71.5	72.2	72.8	73.3	74.1	75.9
Multi-Racial/Ethnic	1.5	1.4	1.1	1.0	0.9	0.8
Assessed Students in State Summaries	125,604	126,578	126,630	126,993	126,786	127,797

Gender and Ethnicity Percent Breakdown for 2012 PSSA-M: Reading

Demographic or Educational Characteristic	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
Gender						
Female	35.8	35.2	37.7	37.8	35.5	37.1
Male	64.1	64.7	62.2	62.1	64.5	62.8
Race/Ethnicity						
American Indian or Alaskan Native	0.2	0.1	0.3	0.2	0.2	0.1
Asian or Pacific Islander	1.2	1.2	1.2	1.0	1.1	1.2
Black/African American non-Hispanic	20.8	21.3	21.9	19.7	20.5	23.2
Latino/Hispanic	10.0	10.1	9.6	10.8	10.0	9.0
White non-Hispanic	65.4	65.7	65.4	66.8	66.6	65.4
Multi-Racial/Ethnic	2.3	1.6	1.6	1.4	1.6	0.9
Assessed Students in State Summaries	3,711	4,672	4,543	4,570	4,308	4,255

Gender and Ethnicity Percent Breakdown for 2011 PSSA-M: Reading

Demographic or Educational Characteristic	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
Gender						
Female	35.2	38.5	37.2	37.5	37.6	36.2
Male	64.8	61.4	62.8	62.4	62.3	63.4
Race/Ethnicity						
American Indian or Alaskan Native	0.2	0.3	0.1	0.3	0.1	0.2
Asian or Pacific Islander	0.9	1.2	0.7	1.1	1.2	0.8
Black/African American non-Hispanic	19.9	21.0	19.0	19.4	20.5	21.0
Latino/Hispanic	9.9	9.5	9.9	9.4	9.9	8.0
White non-Hispanic	67.7	66.8	68.8	68.2	67.4	68.7
Multi-Racial/Ethnic	1.4	1.2	1.3	1.5	1.0	0.8
Assessed Students in State Summaries	3,388	3,947	3,983	3,974	3,647	3,919

Gender and Ethnicity Percent Breakdown for 2012 PSSA: Reading

Demographic or Educational Characteristic	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
Gender						
Female	49.1	49.4	49.2	49.1	49.2	49.8
Male	50.8	50.6	50.8	50.8	50.8	50.1
Race/Ethnicity						
American Indian or Alaskan Native	0.2	0.1	0.1	0.1	0.1	0.2
Asian or Pacific Islander	3.5	3.5	3.4	3.1	3.2	3.3
Black/African American non-Hispanic	15.0	14.8	14.7	14.9	14.5	13.3
Latino/Hispanic	8.7	8.6	8.2	8.2	8.1	6.6
White non-Hispanic	70.6	71.3	72.0	72.1	72.6	75.5
Multi-Racial/Ethnic	1.9	1.6	1.6	1.5	1.5	1.0
Assessed Students in State Summaries	121,479	124,007	126,146	126,765	126,250	125,380

Gender and Ethnicity Percent Breakdown for 2011 PSSA: Reading

Demographic or Educational Characteristic	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 11
Gender						
Female	49.2	49.2	49.1	49.0	49.4	49.7
Male	50.8	50.8	50.9	51.0	50.6	50.3
Race/Ethnicity						
American Indian or Alaskan Native	0.1	0.2	0.2	0.1	0.1	0.2
Asian or Pacific Islander	3.4	3.3	3.1	3.1	3.0	3.0
Black/African American non-Hispanic	15.2	15.0	15.2	14.9	14.8	13.9
Latino/Hispanic	8.4	7.9	8.0	7.9	7.6	6.2
White non-Hispanic	71.4	72.2	72.2	72.7	73.3	75.9
Multi-Racial/Ethnic	1.5	1.4	1.3	1.3	1.1	0.8
Assessed Students in State Summaries	124,535	125,963	126,170	126,902	127,125	127,997

Gender and Ethnicity Percent Breakdown for 2012 PSSA-M: Science

Demographic or Educational Characteristic	**Gr. 8**	**Gr. 11**
Gender		
Female	36.9	37.7
Male	63.1	62.2
Race/Ethnicity		
American Indian or Alaskan Native	0.2	0.2
Asian or Pacific Islander	0.9	1.0
Black/African American non-Hispanic	19.6	22.6
Latino/Hispanic	10.0	8.8
White non-Hispanic	67.5	66.2
Multi-Racial/Ethnic	1.7	1.0
Assessed Students in State Summaries	3,554	3,742

Gender and Ethnicity Percent Breakdown for 2011 PSSA-M: Science

Demographic or Educational Characteristic	**Gr. 8**	**Gr. 11**
Gender		
Female	38.2	36.7
Male	61.7	63.1
Race/Ethnicity		
American Indian or Alaskan Native	0.1	0.3
Asian or Pacific Islander	1.3	0.8
Black/African American non-Hispanic	19.1	19.7
Latino/Hispanic	10.4	8.3
White non-Hispanic	67.9	69.7
Multi-Racial/Ethnic	1.0	1.0
Assessed Students in State Summaries	3,252	3,540

Gender and Ethnicity Percent Breakdown for 2012 PSSA: Science

Demographic or Educational Characteristic	**Gr. 8**	**Gr. 11**
Gender		
Female	49.1	49.7
Male	50.9	50.2
Race/Ethnicity		
American Indian or Alaskan Native	0.1	0.2
Asian or Pacific Islander	3.2	3.4
Black/African American non-Hispanic	14.4	12.4
Latino/Hispanic	8.1	6.2
White non-Hispanic	72.6	76.7
Multi-Racial/Ethnic	1.5	1.0
Assessed Students in State Summaries	126,112	121,693

Gender and Ethnicity Percent Breakdown for 2011 PSSA: Science

Demographic or Educational Characteristic	**Gr. 8**	**Gr. 11**
Gender		
Female	49.3	49.6
Male	50.6	50.3
Race/Ethnicity		
American Indian or Alaskan Native	0.1	0.2
Asian or Pacific Islander	3.1	3.0
Black/African American non-Hispanic	14.7	13.1
Latino/Hispanic	7.6	6.0
White non-Hispanic	73.2	76.8
Multi-Racial/Ethnic	1.1	0.8
Assessed Students in State Summaries	127,075	125,307

Average Percent of Students in Selected Demographic Categories Receiving Scores on the 2012 PSSA-M or the 2012 PSSA

Subject	**Test**	**Male**	**Black**	**Lat/Hisp**	**White**
Mathematics	PSSA-M	59.2	21.7	9.6	66.2
	PSSA	50.9	14.8	7.4	73.3
Reading	PSSA-M	62.9	20.1	9.4	67.9
	PSSA	50.7	14.8	7.7	72.9
Science	PSSA-M	62.4	19.4	9.4	68.8
	PSSA	50.4	13.9	6.8	75.0