

The Connecticut Mastery Test: Technical Report

**Prepared by
Irene Hendrawan & Arianto Wibowo**

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Part 1: Introduction

1.1. General Description of CMT

Connecticut General Statutes Section 10-14n mandates a statewide mastery test to be administered annually in March to all public school students enrolled in grades 3-8. In accordance with that mandate, the Connecticut Mastery Test (CMT) was designed to measure student performance in the areas of Mathematics, Reading, Writing, and Science. The assessment focuses on content that students at each grade level can reasonably be expected to have mastered. Although the legislation specifically prohibits the use of test results as the sole criterion for promotion or graduation, the CMT provides information about achievement that is used for many purposes. Some purposes of the CMT are to:

- set high expectations and standards for student achievement;
- test a comprehensive range of academic skills;
- disseminate useful test achievement information about students, schools, and districts;
- identify students in need of intervention;
- assess equitable educational opportunities; and
- continually monitor student progress in grades 3-8 over time.

The CMT has measured growth in achievement for Connecticut students since 1985, when it was first administered. A second generation of the CMT was introduced in 1993 and a third generation in fall 2000. A fourth generation, which is the version currently in use statewide, was introduced in March 2006. New generations of the test offer an opportunity to adjust content, re-establish standards, and reflect changes in philosophy and technology that have occurred since the previous generation was developed.

The CMT is one important measure for determining student achievement in all of Connecticut's public elementary and middle schools. In 1994, the Connecticut Academic Performance Test (CAPT) was instituted for all Connecticut 10th-grade students as the logical extension of the CMT in the high school. Together, the CMT and CAPT provide a comprehensive system of monitoring and reporting on the academic progress of Connecticut students.

All Connecticut public school students are required to participate in the CMT except for a small number of students with very limited English proficiency that may be exempted from the test. The CMT results provide the opportunity to publicly account for statewide student achievement on the skills and knowledge that Connecticut considers to be important.

The content of the CMT was selected to represent the most important Mathematics, Reading, Writing, and Science skills for students at each of the grades tested. The test content reflects the standards of Connecticut's Curriculum Frameworks. This document, combined with the CMT, aids educators throughout Connecticut in designing instructional programs across all grades to bring about continued improvement in student achievement.

The interpretation of CMT results does not depend on comparing students against one another in terms of performance. Instead, the best way to understand CMT scores is to compare student performance against the established achievement standards. While scores are reported for each of the five tests on the CMT, achievement standards have been established in the four broad areas of Mathematics, Reading, Writing, and Science. In 2000, three achievement standards were established by the Connecticut Board of Education (CSBE), creating four levels of achievement. In 2002, a fourth standard was added to the previous three by CSBE, creating five levels of performance: Advanced, Goal, Proficient, Basic, and Below Basic. The top two levels (Advanced and Goal) define the Goal Range, which is the same as what has historically been referred to as "at or above goal."

There are other ways in which student results are presented. The sections of the test differ in breadth and complexity for each grade and content area. For this reason, student performance is reported in various ways for

each section, most frequently in relation to content strand mastery standards. This information will be explained in more detail in later sections.

The CMT requires more from students than most traditional tests in the areas of mathematics, reading, writing, and science. While traditional assessments typically measure what students know, the CMT also employs performance tasks to measure what students can do with what they know. For example, instead of just doing mathematical calculations, students are asked to apply calculation skills to solve everyday problems. In writing, students are asked to demonstrate their communication skills by producing an essay on a grade-appropriate topic.

The CMT is intended to support high-quality classroom instruction by providing useful feedback to teachers. By administering the CMT in grades 3-8, school districts can gain a comprehensive picture of student achievement. This information can be used for such purposes as individual student diagnosis and placement, curriculum alignment, instructional programs, and communication with parents about student progress.

The CMT plays an important role in education at the school and district levels. CMT results are reported for each school, each school district, and the state as a whole. They are available to the press and to the public on the website www.cmtreports.com.

An aligned assessment program reinforces educational priorities established by Connecticut educators. The CMT provides important feedback to schools and school districts as they work to improve the effectiveness of their educational programs. Many initiatives are in place to support the use of CMT results and to guide instruction toward greater effectiveness.

1.2. 2012 CMT Test Design

The content of the 2010 CMT was selected to represent the most important Mathematics, Reading, Writing, and Science skills for students at each of the grades tested. The test content reflects the standards of Connecticut's Curriculum Frameworks. From Connecticut's Curriculum Frameworks, assessment standards were developed for the CMT.

The spring 2012 administration was the fourth operational (OP) administration of CMT4. Each administration comprises the following content areas:

1. **Mathematics**
Mathematics (MA) consists of a single test administered in two sessions for grades 3 and 4 and three sessions for grades 5 through 8. The tests contain dichotomously scored multiple-choice (MC) items, grid-in (GR) response items, and open-ended (OE) items scored on a 0-1, 0-2, or 0-3 scale.
2. **Reading**
Reading (RD) consists of two subtests:
 - 2.1. **Degrees of Reading Power**
Degrees of Reading Power (DRP) has a single session of MC items.
 - 2.2. **Reading Comprehension**
Reading Comprehension (RC) consists of MC items and OE items scored on a 0-2 scale. RC has two sessions.
3. **Writing**
Writing (WR) consists of two subtests:
 - 3.1. **Editing & Revising**
Editing & Revising (ER) has only MC items and one session.
 - 3.2. **Direct Assessment of Writing**
Direct Assessment of Writing (DAW) has a single prompt test scored on a 2-12 scale.

4. Science

Science (SC), which is administered in grades 5 and 8 only, consists of MC items and OE items scored on 0-2 scale.

Table 1 provides the test design for Form U (2012 CMT Operational). The breach form QU will be used in 2012 breach test.

Table 1: 2012 CMT Operational Test Design

Content	Subject	Grade	Number of Items				Total Items	Score Points	
			MC	GR	OE	ER			
Mathematics	Mathematics	3	76		18		94	0 – 106	
		4	80		16		96	0 – 110	
		5	80	13	20		113	0 – 132	
		6	71	18	27		116	0 – 140	
		7	70	19	31		120	0 – 146	
		8	61	20	36		117	0 – 146	
Reading	Degree of Reading Power	3	42				42	0 – 42	
		4	42				42	0 – 42	
		5	49				49	0 – 49	
		6	49				49	0 – 49	
		7	49				49	0 – 49	
		8	49				49	0 – 49	
	Reading Comprehension	3	22		9		31	0 – 40	
		4	24		8		32	0 – 40	
		5	22		9		31	0 – 40	
		6	22		9		31	0 – 40	
		7	20		10		30	0 – 40	
		8	20		10		30	0 – 40	
	Writing	Editing & Revising	3	32				32	0 – 32
			4	32				32	0 – 32
5			36				36	0 – 36	
6			36				36	0 – 36	
7			40				40	0 – 40	
8			40				40	0 – 40	
Direct Assessment of Writing		3				1	1	2 - 12	
		4				1	1	2 - 12	
		5				1	1	2 - 12	
		6				1	1	2 - 12	
		7				1	1	2 - 12	
		8				1	1	2 - 12	
Science	Science	5	36		3		39	0 - 42	
		8	45		3		48	0 - 51	

1.3. 2012 CMT Test Forms

The design of CMT forms reflects two critical goals of: 1) maintaining the horizontal link (year to year) from 2011 to the 2012 tests and 2) piloting new items for future years of CMT testing. Both of these goals are accomplished while maintaining the same high standards of CMT testing from previous years. The 2012 forms have links to the 2011 forms. Form QU is used as the breach form in 2012 CMT.

Part 2: Test Development

The process by which each form of the CMT is developed is extensive, spanning a two- or three-year period and going through many stages. The development process is led and overseen by staff members in the Bureau of Student Assessment at the Connecticut State Department of Education (CSDE), but it also involves many other people who represent a wide variety of perspectives and areas of expertise. CSDE curriculum specialists and content experts play a critical role and work closely with the assessment staff throughout the process. In addition, a major testing company and other organizations and individuals with experience in educational assessment are involved at appropriate points in the development process.

Advisory committees of Connecticut educators are particularly important throughout the development of the CMT. Advisory committees are composed of Connecticut educators with respected knowledge in particular content areas. A separate advisory committee is established for each part of the CMT: Mathematics, Reading, Writing and Science. Additionally, a Fairness Committee screens all test material to ensure that all groups of examinees are validly assessed. Educators are carefully selected for the advisory committees to be representative of school districts throughout Connecticut.

2.1. Content Standards

The first and most critical stage of test development is the basic conceptual design of the test, determining what the most important content to assess is and how that content can best be assessed given the present resources and constraints. These decisions have important implications for the direction of education in Connecticut and for the manner in which the progress of students, schools, and school districts will be measured for several years. These basic decisions are based on the collective expertise of both assessment specialists and curriculum specialists at CSDE, along with input from the CMT advisory committees. Current educational research in the content areas, current assessment research, and current policies and priorities for education in Connecticut form the bases for these decisions. For example, the content tested on the CMT is directly aligned with the content outlined in *The Connecticut Framework: K-12 Curricular Goals and Standards*.

Once content is determined, other issues must be decided. Test formats (i.e., the types of questions used) must be selected. Also, the methods of scoring the questions and performance tasks must be established. These factors are directly related to the skills and knowledge being assessed. There is, therefore, great variation between and within CMT tests, each uniquely designed to assess specific abilities.

When decisions have been made about test content and test format, they are referred to as “test specifications.” Test specifications serve as the rules for developing the actual test questions. Clear test specifications ensure that test material is not only consistent with the priorities of Connecticut educators, but also that test forms are comparable from year to year. Hundreds of Connecticut citizens and educators responded to surveys that identified the content intended to be included on each test form, validating the appropriateness of the material for students at each grade.

2.2 Item Development

Test items for the CMT4 were carefully developed in accordance with the established test specifications and test blueprint for each grade to reflect content standards in the Connecticut Curriculum Frameworks for mathematics, reading/language arts, and science. After test items were developed according to the test specifications, they underwent extensive review by the testing company, CMT content advisory committees, and the fairness committee before being piloted with Connecticut students in grades 3 through 8. The content advisory committees included content experts, regular and special education teachers, Connecticut State Department of Education curriculum and assessment content specialists, who are knowledgeable about grade appropriate educational content and processes. For the CMT4, the fairness committee was responsible for determining whether items were appropriate and fair to all examinees. Items that did not pass the scrutiny of the either committee were eliminated from the pool of pilot items.

After committee reviews, field test forms were created and piloted on a representative sample, stratified by scale score distribution, of approximately 2000 students per form. During pilot testing, representative samples of students in grades 3 through 8 try out new test questions for the purpose of identifying potential problems with the questions. Questions that are being piloted do not count toward a student's score. The utility of the potential test questions is evaluated based on the results of the pilot testing. Estimated pilot statistics such as the mean, point biserial, and Rasch difficulty, misinterpretation or confusion on the part of the test takers, and performance of various demographic groups are reviewed by CSDE assessment content staff and psychometricians. A judgment is made as to whether each test question enabled students to demonstrate the required skills and knowledge. In addition, for constructed response items that require hand-scoring, the contractor provides qualitative summaries about whether students appeared to have sufficient contextual knowledge to be able to fully respond to the item. Based on these pilot results, flawed items were removed from the item pool, including those showing test item bias or inappropriate levels of difficulty, some were revised for re-piloting, and some became candidates for inclusion on a future form of the CMT.

2.3 Forms Construction

With test specifications as a guide, test forms are carefully constructed, taking into consideration the difficulty of the items and the balance of content. Because a new form of the CMT is developed and administered every few years, it is critical that the forms are "parallel," that is, as similar as possible in terms of both content coverage and test difficulty. This parallelism allows meaningful comparisons to be made from one test form to another. Any slight differences in difficulty among test forms that remain are accounted for through the equating process.

In Connecticut, we think in terms of "generations" of our testing program to allow predictable points where the testing process can be reevaluated and revised as necessary. A "generation" of a Connecticut test spans about five to seven years. During those years, every effort is made to create test forms, score student work, and interpret results in the same way from year to year. The first generation of CMT began in 1985, the second generation began in 1993, and the third generation began in fall 2000. The current, fourth generation CMT began in March 2006. Each new generation of the CMT involves a process similar to the one described above.

Based on the CMT4 blueprints, all test forms of equivalent difficulty per grade were then simultaneously constructed from the grade level pool of items that met all the review criteria, using eMetric's proprietary software, TestBuilder. Every effort was made to ensure that strand level difficulties were comparable and that the items reflected the range of content within the strands across the generation.

Part 3: Validity

According to the 1999 AERA, APA, NCME *Standards*, “It is helpful to consider the four phases leading from the original statement of purpose(s) to the final product: (a) delineation of the purpose(s) of the test and the scope of the construct or the extent of the domain to be measured; (b) development and evaluation of the test specifications; (c) development, field testing, evaluation, and selection of the items and scoring guides and procedures; and (d) the assembly and evaluation of the test for operational use.

In the development and maintenance of CMT each of these phases is carefully planned and implemented. The following section details the critical psychometric procedures undertaken to ensure a strong validity argument for the use and interpretation of CMT (Kane, 2006; Messick, 1989).

3.1. Content Validity Survey

To examine the validity of the CMT for its intended applications, a number of studies have been conducted. The first focused on establishing content validity of each part of the CMT. In October 1984 (the year before the first administration of the grade 4 CMT), a survey of the objectives proposed for the grade 4 CMT was sent to more than 3,000 Connecticut educators. The purpose of the survey was to determine (1) the importance of the proposed mathematics and reading/writing objectives and (2) whether the objectives were taught prior to the fall administration of grade 4. Similar surveys of objectives proposed for grades 6 and 8 were sent to more than 8,000 Connecticut educators in October 1985.

For the third generation, another survey was developed and distributed in January 2000 for the same purpose. The respondents characterized the objectives as important educational outcomes to which students would be instructed prior to being tested. In addition to the test objective validation process, a two-step validation process was carried out. First, content experts reviewed all objectives and test items, examining the relationship between each item and its associated objective. Second, content experts judged how well each item and objective measured the purported content domain.

With the development of CMT4, CSDE commissioned Assessment and Evaluation Concepts, Inc. (AEC) to undertake a comprehensive survey of the Language Arts and Mathematics items to determine the match between item content and respective content strands, as well as the categorical concurrence between the test items and the broader content standards. In their summary report, AEC concluded that CSDE “has done a solid, quality job in matching the test items included on the CMT4 with the relevant content strands and standards of the Language Arts and Mathematics Curriculum Framework.” Such evidence, provided by an external reviewer, enhances the validity argument that the CMT4 content is relevant and representative of the constructs being measured.

When establishing validity for a newly developed test, it is common to correlate the examinee scores of the new test with the scores of other tests intended to measure similar content. The two tests need not be parallel or interchangeable, nor do they need to be used for the same purpose. Accordingly, the seventh edition of the Metropolitan Achievement Test (MAT7) was correlated with the CMT in 1993. In 2000, the Metropolitan Achievement Test, eighth edition (MAT8) was used during the first administration of the third generation CMT. Data from each of the four sections of the MAT (Total Language, Reading Comprehension, Math Concepts and Math Procedures) were used to compute the correlations among CMT tests and MAT sections. These correlations provided additional evidence to establish concurrent validity of the CMT.

The Direct Assessment of Writing portion of the CMT was additionally analyzed in another way. This was done because the Direct Assessment of Writing is a single, extended-response measure and, therefore, considerably different from the rest of the CMT tests. Validity concerns in this measure include the relation of the writing sample with the other language arts scores. Correlations between the Direct Assessment of Writing test and the other Language Arts tests (i.e., Degrees of Reading Power, Reading Comprehension, and Editing & Revising) were calculated to establish evidence of construct and concurrent validity.

3.2. Scoring Quality Assurance Procedures Undertaken during Development

Much of the following discussion applies to procedures undertaken during field testing and test construction phases of development work. Of course quality control is applied during the operational administration, but not with the aim of selecting or removing items.

In order to ensure the validity of inferences made from the CMT tests is to make certain there are quality control procedures in place for the scoring of the test. One such quality assurance component is to check the MC answer keys for MC items several times prior to test administration and one final time during the first run of live results. Items yielding low point-biserial correlations are checked a final time for miskeying.

For constructed-response (CR) items, CMT staff and contractor staff work with Connecticut educators to establish score boundaries in a process known as “range finding”. The score point examples and training sets so established are carried forward into operational scoring and elaborated with new samples of student responses. Reader training lasts up to several days, and readers must qualify by matching scores to several sets of prescored student responses. Once scoring begins, validity packets are used to maintain reader accuracy. These are packets of student responses with scores pre-assigned by CMT staff and Connecticut educators. Readers periodically receive these packets, and their responses are compared to the pre-assigned scores. If a reader assigns too many discrepant scores, that reader is retrained or removed from the project. Other QA procedures include a 100% second read for the writing prompts (DAW). There is a 20% second read for short answer and extended response items in mathematics and reading comprehension.

3.3. Item Quality Analysis Undertaken During Development

Another part of assessing the quality and validity of inferences made from an instrument is to assess the quality of the items on the test. This quality is typically assessed by examining the classical item statistics as well as the potential for item bias. Item bias could lead to less valid inferences made for certain subgroups.

Item specifications. CMT employs *Standards for Educational and Psychological Testing* (AERA, APA, NCME, 1999) as a primary source of guidance in the construction, field testing, and documentation of the tests. The introduction to the 1999 *Standards* best describes how those *Standards* are and will be used in the development and evaluation of CMT tests:

Evaluating the acceptability of a test or test application does not rest on the literal satisfaction of every standard in this document, and acceptability cannot be determined by using a checklist. (*Standards*, p. 4)

Thus, the terms ‘target’ and ‘goal’ are used when referring to various psychometric properties of the tests. For example, while it is a goal of test development for each high school test to have a reliability coefficient of .90 or greater, it is not our intention to scrap a test with a reliability coefficient of .89. Instead, the test results would be published, along with the reliability coefficient and associated standard error of measurement.

Item statistics. Because the CMT tests are used in making individual decisions about students, they must be very reliable, particularly at cut points (the score points that separate adjacent achievement categories). Target reliability coefficients of .90 (or higher) are therefore set for the important cut points of each test.

Other psychometric properties include item difficulty, item discrimination, and differential item functioning. General statistical targets are provided below:

For Multiple-Choice (MC) Items

Percent correct: greater than or equal to .25

Point biserial correlation with total score: greater than or equal to .20

Mantel-Haenszel: No Category C items (see below)

For Constructed-Response (CR) Items

Difficulty: any level as long as all score points are well represented

Correlation with total score: greater than or equal to .20

Generalized Mantel-Haenszel: No chi-square significant at .05 level of alpha

It should be pointed out that the point biserial correlations for MC items and the correlations for CR items refer to total scores of the field test form with the influence of the item in question removed.

Differential item functioning. The Mantel-Haenszel statistic computes an odds ratio for each item that compares item performance for a reference group and a focal group (for whom bias may be an issue). Specifically, the M-H statistic is a ratio of the probability of success on an item for the reference group to the probability of success on the same item for the focal group. When the ratio is greater than one, the probability of success on the item favors the reference group over the focal group. Note that M-H and other methods for identifying statistical bias are flagging mechanisms that do not necessarily mean that the performance difference is due to unfairness in the item. Instead, the standard procedure is for the bias committee review the items to make a final judgmental determination as to whether or not the item is actually biased.

Since its introduction in the field of epidemiology in 1959, Mantel-Haenszel statistics have been employed by many test developers, and several refinements have been added. Educational Testing Service (ETS) uses the Mantel-Haenszel statistic and calculates a D statistic which permits grouping of test items into three categories (Zieky, 1993). The D statistic is a function of the case-control odds estimator of risk generated by SAS's PROC FREQ. The D statistic is calculated as follows:

1. α = case-control estimate of risk (odds ratio)
2. β = natural log of α
3. $D = -2.35 * \beta$

Camilli and Shepard (1994, p. 121) describe three categories of items with respect to D:

- A D does not significantly differ from zero using Mantel-Haenszel chi-square, or D's absolute value is less than 1
- B D significantly differs from 0 and D has either (a) an absolute value less than 1.5 or (b) an absolute value not significantly different from 1
- C D's absolute value is significantly greater than or equal to 1.5

Camilli and Shepard note that Category B items are typically investigated for potential bias, while Category C items are typically removed. Others treat Category C items only as candidates for elimination, pending a reprieve from the committee. In other words, Category C items are considered unusable unless specifically declared usable by the committee. It should be noted that an item that allowed a target group to break out of a pattern of trailing behind the reference group on all other items would tend to fall into Category C. The committee would likely want to keep such an item, in spite of its Mantel-Haenszel status.

DIF occurs when an item shows different results by group (e.g., by race or sex) that cannot be explained by known differences in the overall achievement levels of the two groups. Overall achievement level is typically taken as score on an operational test, assuming that the operational test is itself free of bias. While committee members are free to examine all field-tested items, they must review all items with a Category C rating. Unless the committee specifically calls for the inclusion of any such item, that item is removed from the pool.

Part 4: CMT4 Achievement Standards

To continue to comply with the *No Child Left Behind* (NCLB) accountability requirements, the Connecticut State Department of Education (CSDE) carried over from the third generation Connecticut Mastery Test (CMT3) to the fourth generation (CMT4) the previously adopted achievement standards: Below Basic, Basic, Proficient, Goal and Advanced. The CMT3 was last administered in fall 2004 to students in Grades 4, 6 and 8 in mathematics, reading and writing. The CMT4 was first administered in Grades 3 through 8 in spring 2006 in the same three content areas.

The purpose of this section is to summarize the procedures used to accomplish the task of carrying over CMT3 standards to CMT4 and to recommend for approval the CMT4 achievement standards for each grade and content area. The recommendations take into consideration the results from a statistical intergenerational equating study, historical results from past CMT3 administrations, and input from our CMT Standards Review Panel composed of a diverse group of Connecticut educators. All procedures were discussed with and approved by our Technical Advisory Committee (TAC) prior to implementation. The TAC is composed of nationally recognized experts in the measurement field.

4.1. Standards for CMT3

In June 2002, the State Board of Education approved revisions to the standards for the CMT3 in Grades 4, 6 and 8. Standards were established based on scale scores (100-400) in three areas: mathematics, reading and writing. In all content areas, the standards define the different academic performance levels, denoted as Below Basic, Basic, Proficient, Goal and Advanced. The state goal has been an important benchmark for judging the quality of education in Connecticut for more than a decade. The proficient standard is used for accountability purposes as required by NCLB to make determinations about Adequate Yearly Progress (AYP) and schools in need of improvement.

4.2. Establishment of Standards for CMT4

When standards were being established for first and second generation CMT, a judgmental standard setting process called Modified Angoff, was employed. Through that process, groups of educators who were familiar with the performance of students at a particular grade level in a particular content area were asked to predict how students who just meet a particular standard (e.g., remedial standard) would perform on many different CMT items. Using the judgment of these groups of educators in consideration with other validity checks, appropriate state goal and remedial standards were recommended by the Department and adopted by the State Board of Education.

The third generation standards were developed through department staff working with a CMT3 Standards Advisory Panel composed of technical experts, district content experts and district research and testing specialists. The CMT3 standards were set to be as rigorous as the CMT2 standards and to be equivalent across grade levels and across content areas as much as possible.

The process of carrying over CMT3 standards to the CMT4 was based on an intergeneration linking study, consideration of historical results from the CMT3, and judgmental input from the CMT Standards Review Panel. The purpose of the linking study was to equate standards from Grades 3, 5 and 7 of CMT4 with Grades 4, 6 and 8 of CMT3 in order to maintain the same performance standards for NCLB purposes. The equating not only adjusted for differences in difficulty between CMT3 and CMT4, but also for differences due to the change in the testing window. The CMT4 standards for Grades 4, 6 and 8 were then derived through interpolation and extrapolation procedures by examining the previously established trends in standards across Grades 3, 5 and 7.

The Standards Review Panel assisted in the identification of acceptable and valid test standards for each content area of CMT4. Committee membership was broadly constituted to be representative of the state and to include a variety of stakeholders. The CMT Standards Review Panel was given an overview of the CMT3 including the content covered, score weighting, and reporting conventions. Differences between CMT3 and CMT4 were also discussed. Copies of the complete CMT4 were available for reference. In addition, the procedures for carrying

CMT3 standards over to CMT4 were presented in detail so that committee members would better understand their role in the process. They reviewed data from several related analyses and discussed implications from both an educational perspective and a technical perspective. They were asked particularly to provide input in the following three areas:

- Review results from the intergenerational linking procedure to ensure that standards are reasonable and appropriate across grades and content areas,
- Provide subjective input about the effect of changing testing from fall to spring and losing instructional time in March through June for CMT4 examinees, so that the CMT3 standards are maintained across the two generations of testing, and
- Provide subjective input about the reasonableness and consistency of the standards for all grades and content areas.

The full standard-setting report contains the projected percentages of students who will score at or above the CMT4 standards along with the comparative data from the 2004 CMT3 administration. Based on the best data that were available at the time the standards panel was convened, we were able to estimate the scale score cut points that correspond to the projected percentages. The scale score cut scores for 2008 CMT along with those used with CMT3 are presented in Tables 3 (below). The same scale score cut points established for the 2006 administration will be applied in all future CMT4 administrations.

4.3. Establishing Science Standards for CMT4

On May 20-22, 2008, the Connecticut State Department of Education (CSDE) conducted standard setting for the Science Test component of the Connecticut Mastery Test (CMT). CSDE staff had invited 25 science educators from around the state to participate in this activity and to recommend cut scores for the tests for grades 5 and 8. Measurement Incorporated (MI), the contractor for CMT, served as facilitator for the session employing the bookmark procedure (Cizek & Bunch, 2007).

With the Bookmark procedure, panelists examine test items in an ordered-item booklet and determine whether or not a minimally Basic, Proficient, Goal, or minimally Advanced student would have a 2/3 chance of answering the item correctly (for MC items) or obtain the given score point (for CR items). The ordered-item booklet consists of the items from the actual test but arranged in order of difficulty, with the easiest item on the first page and the most difficult item on the last page. MC and SCR items appear only once in the booklet, but ECR items and writing prompts appear once for each score point. An item worth three points would appear three times, the first time with a sample response representing one point, later with a sample response representing two points, and so on.

Each page contains essential information about the item, including its position in the ordered booklet, its position in the original booklet, and the achievement level (theta) required for a student to have a 2/3 chance of answering correctly or obtaining that point. These theta values are derived from analysis of the student responses to the items through the use of item response theory (IRT) procedures. Specifically, for CMT Science, MI uses the Rasch model for item calibration and test construction. This model allows for the calibration of all items and students on a common scale. This common calibration allows for the calculation of a probability of a correct response to a given item by a given student from information about the student's achievement level (theta) and the items difficulty level (delta).

Panelists enter four bookmarks on a special form, one each for the last page they believe a threshold student would have a 2/3 chance of answering correctly. The page number is associated with a theta required for a 2/3 chance of answering correctly. These theta values are averaged across all panelists. The mean theta is then translated into a score via a table from the Rasch analysis of the live test results. The tabled raw score closest to this value becomes the cut score

After panelists entered their bookmarks (page numbers) in Round 1, MI research assistants (one for each test) entered them into spreadsheets set up to convert the page numbers to theta values for the operational test and

calculate mean theta for each cut, as well as standard deviation and range. The facilitators shared these results with the panelists as described above at the beginning of Round 2. Table 2 summarizes the results of Round 1.

Table 2: Summary of Round 1

	Grade 5	Grade 8
Range of bookmarks for Basic	3-5	4-6
Range of bookmarks for Proficient	7-10	10-21
Range of bookmarks for Goal	17-28	23-39
Range of bookmarks for Advanced	34-37	42-48
Mean theta cut for Basic (S.D.)	-0.549 (0.151)	-0.294 (0.075)
Mean theta cut for Proficient (S.D.)	0.046 (0.068)	0.143 (0.109)
Mean theta cut for Goal (S.D.)	0.923 (0.104)	0.737 (0.265)
Mean theta cut for Advanced (S.D.)	1.801 (0.131)	1.945 (0.181)
Mean cut score for Basic	15	22
Mean cut score for Proficient	20	27
Mean cut score for Goal	28	33
Mean cut score for Advanced	34	43

Panelists received the feedback from Round 1 and discussed the range of bookmarks for each proficiency level, as well as the range of cut scores. Panelists then evaluated the items in the ordered item booklets. On this occasion, they skipped over the items at the beginning of the booklet that had not been delineated by Basic bookmarks by anyone in Round 1 and stopped on the last page delineated by an advanced bookmark in Round 1. Otherwise, procedures in Round 2 were exactly as those in Round 1. Table 3 shows the results of Round 2.

Table 3: Summary of Round 2

	Grade 5	Grade 8
Range of bookmarks for Basic	3-4	4-5
Range of bookmarks for Proficient	7-10	11-17
Range of bookmarks for Goal	20-28	24-32
Range of bookmarks for Advanced	35-38	42-48
Mean theta cut for Basic (S.D.)	-0.786 (0.209)	-0.349 (0.082)
Mean theta cut for Proficient (S.D.)	-0.006 (0.048)	0.117 (0.031)
Mean theta cut for Goal (S.D.)	0.922 (0.064)	0.667 (0.137)
Mean theta cut for Advanced (S.D.)	1.855 (0.185)	2.043 (0.256)
Mean cut score for Basic	13	21
Mean cut score for Proficient	20	26
Mean cut score for Goal	28	32
Mean cut score for Advanced	34	43

Panelists returned for Round 3 and received the information in Table 3 as well as a graphic showing the percentages of students classified at each level, based on their Round 2 cut scores. Drs. Bunch and Deville led discussions of the range of cut scores as well as the impact data and answered panelists' questions. After this discussion, panelists completed their Readiness Forms, indicating that they were ready to go on to Round 3.

In Round 3, panelists entered not only the page numbers where they would place their bookmarks, but their cut scores and percentages of students scoring at or above that cut. Results are summarized in Table 4. Impact data are summarized in Table 5.

Table 4: Summary of Round 3

	Grade 5	Grade 8
Range of bookmarks for Basic	4-5	4-5
Range of bookmarks for Proficient	9-21	10-19
Range of bookmarks for Goal	26-28	24-34
Range of bookmarks for Advanced	37-39	41-50
Mean theta cut for Basic (S.D.)	-0.505 (0.058)	-0.360 (0.079)
Mean theta cut for Proficient (S.D.)	0.188 (0.275)	0.106 (0.075)
Mean theta cut for Goal (S.D.)	0.977 (0.030)	0.667 (0.142)
Mean theta cut for Advanced (S.D.)	2.137 (0.111)	2.058 (0.331)
Mean cut score for Basic	16	21
Mean cut score for Proficient	21	26
Mean cut score for Goal	28	32
Mean cut score for Advanced	36	43

Table 5: Percentages of Students at Each Level, Using Round 3 Cut Scores

	Grade 5*	Grade 8
Below Basic	7.4	14.6
Basic	11.0	10.0
Proficient	26.4	16.6
Goal	40.6	43.8
Advanced	14.7	14.9

After Round 3, MI staff shared results with panelists who then evaluated the process and outcomes. Before leaving the workshop, MI staff delivered the final cut scores and a summary of results to CSDE for final review and approval.

4.4. Levels of Achievement and Cut Scores

Table 6 shows the range of scale scores in each performance category.

Table 6: CMT4 Achievement Levels and Scale Score Ranges

Content Area	Grade	Below Basic	Basic	Proficient	Goal	Advanced
Mathematics	3	100 - 186	187 - 209	210 - 241	242 - 287	288 - 400
	4	100 - 193	194 - 214	215 - 244	245 - 289	290 - 400
	5	100 - 190	191 - 214	215 - 244	245 - 292	293 - 400
	6	100 - 189	190 - 213	214 - 243	244 - 284	285 - 400
	7	100 - 190	191 - 215	216 - 245	246 - 289	290 - 400
	8	100 - 190	191 - 213	214 - 244	245 - 286	287 - 400
Reading	3	100 - 201	202 - 216	217 - 234	235 - 278	279 - 400
	4	100 - 212	213 - 226	227 - 243	244 - 294	295 - 400
	5	100 - 202	203 - 214	215 - 229	230 - 278	279 - 400
	6	100 - 206	207 - 219	220 - 235	236 - 288	289 - 400
	7	100 - 193	194 - 207	208 - 221	222 - 272	273 - 400
	8	100 - 205	206 - 218	219 - 231	232 - 281	282 - 400

Content Area	Grade	Below Basic	Basic	Proficient	Goal	Advanced
Writing	3	100 - 187	188 - 211	212 - 239	240 - 286	287 - 400
	4	100 - 184	185 - 208	209 - 236	237 - 280	281 - 400
	5	100 - 185	186 - 208	209 - 237	238 - 283	284 - 400
	6	100 - 184	185 - 210	211 - 236	237 - 283	284 - 400
	7	100 - 191	192 - 212	213 - 235	236 - 269	270 - 400
	8	100 - 188	189 - 211	212 - 235	236 - 282	283 - 400
Science	5	100 - 187	188 - 212	213 - 247	248 - 299	300 - 400
	8	100 - 201	202 - 220	221 - 243	244 - 298	299 - 400

Part 5: Scaling and Equating

5.1 Calibration Process

The 2012 CMT test forms were scaled and equated using the Rasch model. The WINSTEPS software, written by Linacre (Mesa Press, 2005) was used to estimate the latent trait difficulty of each item on the test. WINSTEPS is a WINDOWS-based program that is widely used for similar high stakes tests. WINSTEPS (the Rasch model), allows for the estimation of item difficulty for multiple-choice, open-ended, and extended response items on a single scale. Using these item difficulties, the model is able to estimate the ability (theta) of each student corresponding to each student's raw score.

All scaling and equating analyses were undertaken by three independent groups: Measurement Incorporated (MI), the contractor, the Connecticut State Department of Education (CSDE), and H. Jane Rogers and H. Swaminathan from the University of Connecticut (UCONN). Results were compared and cross-checked to the fourth decimal point to ensure accuracy.

The equating was accomplished using a common item equating design. The purpose of the equating was to place the difficulty estimates of the Form U items on the same scale as 2011 CMT.

The equating procedure was accomplished in the following steps:

1. For Reading and Science, calibrate all items in the 2012 OP (See Charts 1 and 3 for calibration data matrix). This step is a free run calibration.

Chart 1: Calibration Design for 2012 CMT Operational Reading

Grade 3 - 8	Form U	U_RC	U_DRP
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Note:

U_RC = Form U Reading Comprehension

U_DRP = Form U DRP

Chart 2: Calibration Design for 2012 CMT Operational Writing

Grade 3 - 8	Form U	U_ER	U_DAW
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Note:

U_ER = Form U Editing & Revising

U_DAW = Form U DAW prompt

Chart 3: Calibration Design for 2012 CMT Operational Science

Grade 5 & 8	Form U	U_SC
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Note:

U_SC = Form U Science

2. For Reading and Science, select common items linking 2011 and 2012 forms. Do anchor evaluation using .3 rule between the estimates of difficulties from Step 1 and Form U (see Appendix A for the Rasch values of the linking items). This is an iterative process in which each item, starting with the one with the greatest absolute value difference, is removed until all items fulfill the criterion for inclusion. Using the remaining items the difference between the item parameter means from Form U and from Step 1 yields the equating

constant. Table 7 shows the equating constants for Form U. For Writing, calibrate the 2012 OP (see Chart 2 for sample calibration data matrix) by fixing the parameters for ER items. For DAW, the score is subtracted by 2 so that it is on a scale from 0 to 10. By fixing the parameters of the ER items, DAW item parameter will be on the same scale of the ER items. Thus, for Writing, the equating constant is zero.

Table 7: 2012 CMT Equating Constants

Grade	Reading	Science
3	-0.0814	
4	0.1007	
5	0.0411	-0.0984
6	-0.0026	
7	0.3284	
8	0.3526	-0.1231

- Using the item output files from Step 1 and anchoring their b-values, perform another run for Form U in order to obtain theta values for Form U. For Reading and Writing, the appropriate weights were included in the second calibration (see Table 8).

Table 8: Summary of Weighting for Reading and Writing

Content/Subject	Grade	Unweighted Scale	% of Total Scale	Score Weight	Compute Formula	Weighted Scale
Degree of Reading Power	3	0 – 42	50%	1.000		0 – 42
	4	0 – 42	50%	1.000		0 – 42
	5	0 – 49	50%	1.000		0 – 49
	6	0 – 49	50%	1.000		0 – 49
	7	0 – 49	50%	1.000		0 – 49
	8	0 – 49	50%	1.000		0 – 49
Reading Comprehension	3	0 – 40	50%	1.050		0 – 42
	4	0 – 40	50%	1.050		0 – 42
	5	0 – 40	50%	1.225		0 – 49
	6	0 – 40	50%	1.225		0 – 49
	7	0 – 40	50%	1.225		0 – 49
	8	0 – 40	50%	1.225		0 – 49
Total Reading	3	0 – 82				0 – 84
	4	0 – 82				0 – 84
	5	0 – 89				0 – 98
	6	0 – 89				0 – 98
	7	0 – 89				0 – 98
	8	0 – 89				0 – 98
Editing & Revising	3	0 – 32	40%	1.00		0 – 32
	4	0 – 32	40%	1.00		0 – 32
	5	0 – 36	40%	1.00		0 – 36
	6	0 – 36	40%	1.00		0 – 36
	7	0 – 40	40%	1.00		0 – 40
	8	0 – 40	40%	1.00		0 – 40
Direct Assessment of Writing	3	2 – 12	60%	4.80	(DAW-2)*4.80	0 – 48
	4	2 – 12	60%	4.80	(DAW-2)*4.80	0 – 48

Content/Subject	Grade	Unweighted Scale	% of Total Scale	Score Weight	Compute Formula	Weighted Scale
	5	2 – 12	60%	5.40	(DAW-2)*5.40	0 – 54
	6	2 – 12	60%	5.40	(DAW-2)*5.40	0 – 54
	7	2 – 12	60%	6.00	(DAW-2)*6.00	0 – 60
	8	2 – 12	60%	6.00	(DAW-2)*6.00	0 – 60
Total Writing	3	2 – 44				0 – 80
	4	2 – 44				0 – 80
	5	2 – 48				0 – 90
	6	2 – 48				0 – 90
	7	2 – 52				0 – 100
	8	2 – 52				0 – 100

4. Compute scale score (SS) and scale score standard error (SSE) for each form

$$SS = \left(\frac{T + EQ - T_{mean}}{T_{SD}} \right) * 45 + 250 \text{ and } SSE = \frac{T_{err}}{T_{SD}} * 45$$

where

T and T_{err} are the ability score and the standard error of the ability from the score file in Step 3.

EQ is the difference between the mean of difficulties estimates of the linking items on Form T' and mean of difficulties estimates of the common items on Form U, called the equating constant. This value was obtained in Step 2.

T_{mean} and T_{SD} are the scaling coefficients from CMT3 and 2006 CMT (see Table 9). Note: Statistics for grade 3, 5, and 7 were obtained from CMT3 and for grade 4, 6, and 8 were obtained from CMT4 (2006). Science grade 5 and 8 were obtained from 2008 CMT.

The minimum SS will be 100 and the maximum SS will be 400. SS less than 100 will be reported as 100 and SS greater than 400 will be reported as 400.

Item parameters for form Q' Writing were recalibrated in 2012 administration. These items were administered in 2007 (please refer to 2007 CMT Technical Report for complete description of the operational forms). Item parameters for form P' were taken as base scale. Forms X, Y and Q' were calibrated through a matrix calibration procedure without restricting parameters (free-run). Furthermore, the resulting parameters for items common to form P were equated to the parameters of form P obtained in 2007 using .3 anchor evaluations as described above. The resulting equating constants are added to form Q' free-run parameters and becomes the new parameters.

The score table for Mathematics is taken from the 2011 breach form Q'.

Appendix C contains the results of raw scores, theta, and scale score for Form U. Please contact CSDE for other subjects, forms and combinations.

Table 9: Scaling Coefficients

Content	Grade	T_{mean}	T_{SD}
Reading	3	0.99235	1.24795
	4	1.149643	1.173126
	5	1.19747	1.20351
	6	1.107734	1.241252
	7	1.52062	1.19801
	8	1.379708	1.271917
Writing	3	0.97123	1.24615
	4	1.405899	1.303604
	5	1.06359	1.23642
	6	1.200022	1.203568
	7	1.21748	1.36516
	8	1.123911	1.2611
Science	5	0.9769	1.04082
	8	0.79574	1.09107

Part 6: Item and Test Statistics

Table 10 and Appendix B present a summary and detailed result of item analysis (item quality) for grades 3 through 8 Form U, respectively. The following information is presented in each item analysis:

Classical and IRT difficulties: Classical Item difficulty is fundamentally a ratio of the proportion of examinees who answered the item correctly. Thus, an easy item has a high p-value and a difficult item has a low p-value. If an item has a very high p-value it may be so easy that it does not provide much information about what most examinees know or can do, while an item with a very low p-value may be so difficult that it is beyond the range of what most students know or can do. Therefore, items with very high or very low p-values may be rejected, unless content relevance overrides that concern.

The IRT difficulty described here is the Rasch IRT model's item difficulty parameter. This parameter influences the probability of correctly responding to the item as defined by the Rasch IRT model. For a given examinee's ability, the higher the IRT difficulty, the lower the probability of responding correctly. Thus, an easy item has a low Rasch difficulty and a difficult item has a high Rasch difficulty.

Item Discriminations: The point biserial correlation or item-total correlations measure the strength of the relationship between the particular item score and the total test score. Thus, item discrimination reflects how well a particular item differentiates between high and low total test performers. When the correlation is high, examinees that do well on the item also tend to do well on the entire test and correspondingly, examinees that do not do well on the item also tend not to do well on the total test.

Distractor Frequencies: The proportion of students who answered each option (A-E, 0-3, and 2-12) are presented for the multiple-choice items, open-ended and extended response, respectively.

Table 10: Summary of Item Analysis Form U

Subject	Grade	Rasch		P-value		Point biserial	
		Mean	Std	Mean	Std	Mean	Std
Mathematics	3	-0.0132	1.0438	0.95	0.27	0.36	0.10
	4	0.0315	0.9984	0.94	0.33	0.38	0.10
	5	-0.0332	1.1099	0.95	0.34	0.41	0.12
	6	-0.0486	1.0257	0.92	0.29	0.43	0.12
	7	-0.0255	0.8270	0.87	0.33	0.46	0.11
	8	0.0260	0.8011	0.86	0.31	0.46	0.13
Reading Comprehension	3	-0.7073	0.9602	0.94	0.25	0.41	0.06
	4	-0.1638	0.9479	0.93	0.33	0.34	0.10
	5	-0.6574	0.8254	1.01	0.34	0.34	0.07
	6	-0.6009	0.9115	1.04	0.34	0.35	0.07
	7	-0.0790	0.9206	1.05	0.42	0.36	0.11
	8	0.1186	1.1049	1.02	0.42	0.37	0.10
Degree of Reading Power	3	0.3806	1.2727	0.58	0.21	0.40	0.09
	4	0.3022	1.4352	0.67	0.22	0.38	0.09
	5	0.4830	1.1731	0.61	0.19	0.39	0.09

Subject	Grade	Rasch		P-value		Point biserial	
		Mean	Std	Mean	Std	Mean	Std
	6	0.3759	1.0471	0.68	0.17	0.41	0.10
	7	0.5778	1.2718	0.69	0.19	0.41	0.09
	8	0.4959	1.0108	0.71	0.14	0.45	0.11
Editing & Revising	3	-0.2138	0.9901	0.72	0.16	0.37	0.08
	4	-0.1592	0.9546	0.76	0.14	0.39	0.06
	5	-0.0260	0.9472	0.72	0.15	0.35	0.10
	6	-0.1309	0.8366	0.76	0.10	0.38	0.07
	7	-0.2388	1.0653	0.74	0.16	0.34	0.09
	8	-0.1311	0.9497	0.74	0.13	0.34	0.11
Direct Assessment of Writing	3	0.3346		8.33		0.53	
	4	0.5536		8.53		0.53	
	5	0.5081		8.26		0.49	
	6	0.7808		8.31		0.54	
	7	0.5485		8.17		0.60	
	8	0.3649		8.62		0.58	
Science	5	-0.0984	0.9462	0.79	0.26	0.38	0.12
	8	-0.1231	0.8471	0.73	0.17	0.39	0.10

6.1. Reliability

Reliability is a statistical index of the consistency of test performance over repeated trials. The simplest model for conveying the concept of reliability is to describe the test re-test method. If a test is administered to a group of examinees and then re-administered to the same examinees a short time later, the correlation of the scores across both test administrations estimates the reliability of the test. To measure reliability using a single administration, the test items are split using various techniques into half-length tests and those scores are then correlated. Cronbach's alpha estimates the lower-bound estimate of an infinite combination of split-halves and therefore is regarded as a very conservative method for assessing test reliability.

Table 11 summarizes reliability estimates for 2012 CMT. The reliability coefficients are based on Cronbach's alpha measure of internal consistency. When evaluating these results it is important to remember that reliability is partially a function of test length and thus reliability is likely to be greater for tests that have more items. Table 12 presents the mean and standard deviation of students' scale scores.

Table 11: 2012 CMT Cronbach's Alpha

Grade	Mathematics	Reading	Writing	Science
3	0.94	0.94	0.87	
4	0.95	0.93	0.88	
5	0.96	0.93	0.86	0.88
6	0.97	0.94	0.88	
7	0.97	0.94	0.87	
8	0.97	0.95	0.87	0.91

Table 12: 2012 CMT Scale Score Summary Statistics

Grade	Mathematics		Reading		Writing		Science	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std
3	262.59	50.54	245.19	42.22	254.16	45.76		
4	267.88	49.88	257.99	41.39	254.43	48.23		
5	273.24	53.40	248.00	40.95	255.78	41.08	261.78	50.34
6	266.84	46.26	261.36	41.57	260.50	50.76		
7	267.71	46.21	257.21	43.33	249.02	39.06		
8	264.36	43.64	265.63	44.32	255.55	42.93	255.57	45.93

6.2. Classification Consistency and Accuracy

Classification Consistency and Accuracy studies were measured using the IRT-Class program (see Lee, Hanson, and Brennan, 2002), developed by [CASMA](#) (Center for Advanced Studies in Measurement and Assessment) at the University of Iowa. The classification consistency and accuracy can be assessed based on the given ability distribution and the difficulty of the items (IRT parameters). Tables 13-16 contain the results of these analyses.

The results of decision consistency and accuracy computations show that for the most part, decisions are highly consistent (see Table 13). The consistency ratings at each cut score are generally in the upper 90s. This tends to tail off at the highest cut score (i.e., the upper end of the distributions). The classification accuracy estimates show that the accuracy indexes at each cut score are generally in the upper 90s (see Table 14).

The program also computes false negative rates for the test, which in effect are an estimate of those students that may have been misclassified to a performance category lower than their true performance category. The results of the false negatives, found in Table 15, indicate that a very small number of students may have been negatively misclassified in this way. In contrast, the false positive rates, which are estimate of those students that may have been misclassified to a performance category higher than their true performance category, are presented in Table 16. The results indicate that a very small number of students may have been positively misclassified.

Table 13: Classification Consistency

Content Area	Grade	Overall Classification Consistency	Cut Below Basic - Basic	Cut Basic - Proficient	Cut Proficient - Goal	Cut Goal - Advanced
Mathematics	3	0.82260	0.98576	0.97470	0.95312	0.90824
	4	0.83830	0.98519	0.97304	0.95545	0.92414
	5	0.86308	0.98577	0.97692	0.96778	0.93247
	6	0.87463	0.98507	0.97765	0.96694	0.94491
	7	0.87353	0.98280	0.97648	0.96590	0.94832
	8	0.87276	0.98363	0.97645	0.96614	0.94649
Reading	3	0.79688	0.96479	0.95437	0.94350	0.92462
	4	0.77267	0.96624	0.95280	0.93681	0.90413
	5	0.80324	0.96735	0.95842	0.94543	0.91694
	6	0.82865	0.97716	0.97081	0.96034	0.91152
	7	0.82408	0.97267	0.96559	0.95573	0.91888
	8	0.83085	0.96804	0.96163	0.95698	0.93105

Content Area	Grade	Overall Classification Consistency	Cut Below Basic - Basic	Cut Basic - Proficient	Cut Proficient - Goal	Cut Goal - Advanced
Writing	3	0.96640	0.96647	0.96646	0.96646	0.96648
	4	0.96954	0.96954	0.96954	0.96954	0.96955
	5	0.96430	0.96451	0.96442	0.96442	0.96444
	6	0.96443	0.96495	0.96491	0.96491	0.96491
	7	0.96474	0.96475	0.96475	0.96475	0.96475
	8	0.96701	0.96720	0.96720	0.96720	0.96729
Science	5	0.74953	0.97397	0.95861	0.93438	0.87654
	8	0.76438	0.96330	0.95531	0.94098	0.89430

Table 14: Classification Accuracy

Content Area	Grade	Overall Classification Accuracy	Cut Below Basic - Basic	Cut Basic - Proficient	Cut Proficient - Goal	Cut Goal - Advanced
Mathematics	3	0.87420	0.98998	0.98216	0.96641	0.93563
	4	0.88401	0.98961	0.98107	0.96863	0.94468
	5	0.90289	0.99007	0.98344	0.97707	0.95231
	6	0.91114	0.98936	0.98389	0.97664	0.96126
	7	0.90995	0.98759	0.98312	0.97577	0.96346
	8	0.90914	0.98844	0.98335	0.97583	0.96152
Reading	3	0.85124	0.97481	0.96791	0.96018	0.94645
	4	0.83181	0.97612	0.96666	0.95455	0.93203
	5	0.85418	0.97693	0.97059	0.96123	0.94125
	6	0.87447	0.98377	0.97946	0.97182	0.93732
	7	0.87029	0.98058	0.97564	0.96865	0.94254
	8	0.87431	0.97746	0.97276	0.96958	0.95117
Writing	3	0.94565	0.96281	0.97521	0.97625	0.97455
	4	0.96228	0.97509	0.97617	0.97810	0.97748
	5	0.94517	0.96566	0.97278	0.97486	0.97082
	6	0.95201	0.96169	0.96754	0.97506	0.97578
	7	0.94901	0.96500	0.97504	0.97504	0.97402
	8	0.94940	0.97358	0.97358	0.97741	0.96837
Science	5	0.81994	0.98179	0.97066	0.95360	0.91329
	8	0.82698	0.97419	0.96833	0.95647	0.92508

Table 15: False Negative Classification

Content	Grade	Overall False Negative	Cut Below Basic - Basic	Cut Basic - Proficient	Cut Proficient - Goal	Cut Goal - Advanced
Mathematics	3	0.07322	0.00531	0.00876	0.02271	0.03646
	4	0.06987	0.00581	0.00935	0.01704	0.03767
	5	0.05105	0.00512	0.01031	0.01033	0.02529
	6	0.04393	0.00513	0.00630	0.01157	0.02093
	7	0.04479	0.00570	0.00725	0.01166	0.02018
	8	0.03855	0.00556	0.00790	0.01024	0.01485

Content	Grade	Overall False Negative	Cut Below Basic - Basic	Cut Basic - Proficient	Cut Proficient - Goal	Cut Goal - Advanced
Reading	3	0.07427	0.01145	0.01771	0.02008	0.02601
	4	0.08232	0.01401	0.01741	0.01920	0.03294
	5	0.07272	0.01160	0.01494	0.01879	0.02946
	6	0.06533	0.00863	0.01051	0.01403	0.03324
	7	0.06595	0.00986	0.01269	0.01601	0.02886
	8	0.06209	0.01197	0.01319	0.01432	0.02419
Writing	3	0.03540	0.03537	0.01868	0.01116	0.00654
	4	0.02104	0.02104	0.01950	0.00804	0.00585
	5	0.03163	0.03151	0.02153	0.01648	0.00602
	6	0.03656	0.03617	0.02900	0.01674	0.01288
	7	0.03243	0.03242	0.01740	0.01740	0.00741
	8	0.02216	0.02212	0.02212	0.00971	0.00334
Science	5	0.10040	0.01109	0.01931	0.02185	0.04856
	8	0.09616	0.01256	0.02017	0.03221	0.03324

Table 16: False Positive Classification

Content	Grade	Overall False Positive	Cut Below Basic - Basic	Cut Basic - Proficient	Cut Proficient - Goal	Cut Goal - Advanced
Mathematics	3	0.05257	0.00471	0.00909	0.01088	0.02791
	4	0.04612	0.00458	0.00957	0.01432	0.01765
	5	0.04607	0.00481	0.00625	0.01260	0.02241
	6	0.04493	0.00551	0.00981	0.01179	0.01781
	7	0.04526	0.00671	0.00963	0.01257	0.01636
	8	0.05230	0.00600	0.00875	0.01393	0.02363
Reading	3	0.07448	0.01374	0.01438	0.01974	0.02754
	4	0.08588	0.00987	0.01593	0.02625	0.03504
	5	0.07311	0.01148	0.01447	0.01998	0.02930
	6	0.06020	0.00760	0.01003	0.01414	0.02945
	7	0.06375	0.00955	0.01167	0.01535	0.02860
	8	0.06360	0.01056	0.01405	0.01610	0.02465
Writing	3	0.01895	0.00182	0.00611	0.01259	0.01891
	4	0.01668	0.00387	0.00433	0.01387	0.01667
	5	0.02319	0.00282	0.00569	0.00865	0.02316
	6	0.01142	0.00214	0.00346	0.00820	0.01134
	7	0.01857	0.00259	0.00756	0.00756	0.01857
	8	0.02844	0.00430	0.00429	0.01288	0.02829
Science	5	0.07966	0.00712	0.01003	0.02455	0.03815
	8	0.07686	0.01325	0.01150	0.01131	0.04168

Part 7: Vertical Scale Score Development for CMT4

7.1. Overview

Vertical scaling is used to place test scores from assessments that vary in difficulty, but measure similar constructs, on the same scale. For example, students in grades 3-8 who take their state's reading achievement assessments, whereby each grade level has its own test can be provided vertically scaled scores so that a given student's achievement can be compared to students' scores from the same grade as well as across the grades. In addition, a vertical scale allows one to track a student's growth, e.g., in reading from year to year. Vertically scaled scores can also be aggregated, so that one could also track scores at the grade, school, or district level.

This type of scale can also be used to track student growth, relate the content and skills in items across grades, and examine the relationship of performance standards from grade to grade (see hypothetical values in Tables 17 and 18). Such a scale might also afford the state of Connecticut an additional method for reporting student achievement for purposes of No Child Left Behind, or simply as another approach to investigating and interpreting test scores for purposes of tracking growth and development.

The hypothetical numbers in Table 17 illustrate growth in two directions. First within a grade, e.g., grade 3, the raw and scale scores needed to attain Basic, Proficient, and Advanced proceed from 48 to 65 to 80 (raw) and 330 to 500 to 654 (scale). Looking across grades within a level, e.g., at the Proficient level, a grade 3 student must obtain a scale score of 500, while a grade 4 student needs a score of 559, etc., up to grade 8 where a student must score 700. (Raw scores are not relevant when examining growth across grades within a proficiency level.)

Table 18 illustrates, again using hypothetical numbers, the level of growth or the amount of score change needed when moving from grade to grade. As just described, at the Proficiency level, a score change of 59 points would be required. Likewise, a 45-point score change between grades 4 and 5 is needed to maintain a performance level of Proficient.

In summary, a vertical scale can be a useful tool to examine the growth of individual students or aggregates of students (e.g., schools). The scale can provide information regarding students' progress across grades as well as within a grade across proficiency levels.

Table 17: An Example of Scale Values, Cut Scores, and Performance Levels

Grade	Basic		Proficient		Advanced	
	Raw	Scale	Raw	Scale	Raw	Scale
3	48	330	65	500	80	654
4	42	354	64	559	80	748
5	39	382	62	604	81	799
6	44	417	69	641	83	823
7	43	426	65	673	80	867
8	47	507	64	700	81	914

Table 18: An Example of Scale Score Growth Expectations at Proficient

Grade Progression	Gain
3 to 4	59 points
4 to 5	45 points
5 to 6	37 points
6 to 7	32 points
7 to 8	27 points
3 to 8	200 points

In Spring 2007, the Connecticut State Department of Education (CSDE) decided to investigate the possibility of using vertical scales in its statewide testing program. This part provides information with respect to the vertical scaling analyses undertaken by the state’s contractor, Measurement Incorporated (MI).

7.2. Data Collection and Design

Data were collected as part of the regular testing administration in Spring 2007. Test scores from the regular, operational administration (Form P’) were used, as well as scores from shorter, supplemental exams. Items from the operational tests were used to construct all supplemental exams. Tables 19-21 provide the numbers and types of items from the Form P’ operational tests across grades 3-8. The Math tests were comprised of multiple-choice (MC), grid-in (GR), and open-ended (OE) questions. The Reading test is a combination of two separate parts, the Degree of Reading Power (DRP) and the Reading Comprehension (RC) test.

Table 19: Number and Item Types for Mathematics across Grades

Grade	Number of Items			Total Items
	MC	GR	OE	
3	76		18	94
4	80		16	96
5	80	13	20	113
6	71	18	27	116
7	70	19	31	120
8	61	20	36	117

Table 20: Number and Item Types for DRP across Grades

Grade	Number of MC Items	Total Items
3	42	42 of 73
4	42	42 of 74
5	49	49 of 80
6	49	49 of 80
7	49	49 of 79
8	49	49 of 79

Table 21: Number and Item Types for RC across Grades

Grade	Number of Items		Total Items
	MC	OE	
3	22	9	31 of 73
4	24	8	32 of 74
5	22	9	31 of 80
6	22	9	31 of 80
7	20	10	30 of 79
8	20	10	30 of 79

During the 2007 CMT administration, students in grades 3-8 were given a supplemental exam in addition to the regular, operational assessments. The supplemental exams were constructed so that the students could be tested ‘off grade’, meaning that, for example, grade 5 students were administered a supplemental test that contained either grade 4 or grade 6 operational items. The supplemental tests were shorter than the operational exams (students took only one section within the supplemental content area), but enough supplemental forms were created and administered to include all operational items. So for a given grade-level operational test, all items

were also administered to students in the adjacent grades via the supplemental exams. The design called for the administration of each grade-level item to approximately 1,500 students from each adjacent grade. This common item and student design permits vertical linking of performance across grades (see Table 22). The diagonal (boldface) fields represent the on-level items at a given grade level, while the off-diagonal fields represent the off-grade administration of the operational items to adjacent grades (the upper diagonal are the supplemental exams administered to adjacent lower grades, while the lower are the tests given to the adjacent higher grades).

Table 22: Common Item and Student Design

		Items					
		Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
Students	Grade 3	OP33	SU34				
	Grade 4	SU43	OP44	SU45			
	Grade 5		SU54	OP55	SU56		
	Grade 6			SU65	OP66	SU67	
	Grade 7				SU76	OP77	SU78
	Grade 8					SU87	OP88
	Grade 8						

Notation: OP=Operational test; SU=Supplemental test; Numerals=grade-level students and test level taken, e.g., SU56 refers to fifth-grade students who took the supplemental exam containing grade-six operational items.

7.3. Methodology

Only students who were administered Form P' (main form) during the 2007 Spring administration were included in the analyses. Equating analyses for the 2007 operational forms for the six grades and three content areas were performed and cross-validated (see 2007 CMT Technical Report).

Before beginning with the linking, we first examined the classical difficulties (p-values) from the on-grade data and values for the same items from the next higher grade. If an item had a p-value for the on-grade students that was 5%*maximum score or greater than that obtained from students in the next higher grade, we removed it from subsequent analyses. (Experience has shown that p-values from on-grade students are almost always higher than those obtained from students in the next lower grade, e.g., grade 4 students administered grade 4 test materials will, in general, perform better on every item than 3rd-grades taking those same 4th-grade items.) Because students in higher grades may have forgotten material learned the previous year, some items are likely to exhibit this 'reverse' pattern of difficulty. The item can work well when measuring on-grade performance, but may not be suitable for modeling a vertically linked continuum of learning. For this reason, we removed such items.

The linking plan follows the scheme represented in Appendix D. As explained below, there are two linking paths to follow, meaning we obtained two sets of item parameters for each grade level. The strength of this design is that we were able to determine how well the two links result in convergent values for the rescaled parameters.

Having obtained the two sets of parameters from following the upper and lower linking paths we then examined the item parameters to determine how similar they were by obtaining a correlation coefficient between the sets of parameters and used Fisher's z-test to determine if the differences were significant. An item that exhibited

very different parameter values was to be removed from further analysis. We then used the mean of the two parameter values for each item to proceed. The following steps detail the analyses.

Step 1 (see Appendix D). Based on advice from the Technical Advisory Committee, we set a middle grade as the base scale, namely grade 5. We first did a free run on the OP55 items and obtained item and person parameters.

There are common items linking OP55 and SU45. By anchoring the grade 5 items we obtained ‘new’ (i.e., different from what these grade 4 students would have from having taken OP44) thetas for the SU45 test takers. We then fixed these new theta values. Using the PAFILE command in WINSTEPS, i.e., anchoring students’ thetas, we then obtained item parameter estimates by linking to OP44.

Again starting from OP55, we had theta values for the grade-5 students from their on-grade testing and the initial free run. Linking to SU54 via the common students, we anchor their grade-5 theta values and obtained parameter estimates for the grade-4 items.

At this point we have two sets of parameters for the grade-4 items, each set linked to the grade-5 scale. We compared the two sets using a Pearson correlation and the Fisher Z-test. We expected $r > 0.90$. Fisher’s Z is calculated by:

$$Z = .5 \log \left(\frac{1+(r-0.9)}{1-(r-0.9)} \right), \text{ where}$$

$$Z \sim N \left(0, 1/\sqrt{n-3} \right), \text{ and where } n \text{ is the number of observations.}$$

Our plan was to remove ‘outliers’ until $Z < 1.96 / \sqrt{n-3}$, then calculate the average of the remaining item parameters. These estimates were then be used to obtain thetas for the OP44 students.

Step 2. At this point we had the OP44 item parameters and thetas, linked to the grade-5 scale, and proceeded as in the first step. There are common OP44 items linked to SU34. By fixing those item values, we obtained thetas for the test takers in SU34. We then anchored their theta values and linked to OP33, obtaining a set of item parameters for the grade-3 items.

Similar to the grades 5 and 4 connection, there are common students between OP44 and SU43. We anchored the theta values in OP44 and linked to SU43, giving us a second set of item parameter estimates for grade 3.

We then went through the same procedure described above to determine if the two linking paths and procedures gave us similar results. Finally, we used the average item parameter estimates to obtain thetas for the grade 3 students.

Step 3. The same procedures were used to link the higher grades. Again, we started with the free run of OP55, using those item parameter and theta estimates as the starting point. Common items link OP55 to SU65. Fixing the grade 5 item parameters, we obtained theta estimates for SU65. By fixing these theta values, we linked to OP66 to obtain grade-6 item parameters.

The link from OP55 to SU56 is the common students. We fixed the students’ theta values from their on-grade testing, i.e., OP55, and obtained item parameter estimates for the grade-6 items.

The items were examined to identify problematic ones, which were to be discarded. For the remaining items we calculated the mean of the two parameters and used that to get thetas for the grade-6 students.

Steps 4 and 5. The same procedures were used as just delineated for grades 7 and 8. When finished we had items and students on the same Rasch scale using grade 5 as the base.

Using the final item parameter and theta estimates a vertical, developmental scale was created to demonstrate what growth would look like across the grades in Math and Reading. It is emphasized here that the choice of a scale was somewhat arbitrary and was undertaken without consultation with CSDE or the TAC. The scale is for illustrative purpose only.

7.4. Results

Table 23 presents the number of items that were removed because of item p-value reversals, i.e., where the p-value for the item taken by the on-grade students was 5%*maximum score or higher than the p-value for the students at the higher adjacent grade. Noteworthy is that few items were removed, especially at the lower grades 3 and 4. More Math items were removed than Reading items. With respect to Reading, no items were

removed until grade 6, where 10 of 80 had to be discarded for further analysis. Grade 6 also saw the most Math items removed. The TAC and CSDE discussed why so many items from this particular grade level showed reversals and whether the content of the items might play a role. In addition, having removed a larger number of items, especially in Reading, likely affected the subsequent vertical scaling, although to what extent would be very difficult to determine. While removing these ‘misfitting’ items likely results in better vertical scales, further analysis, interpretation, and justification is needed to improve our understanding of how this procedure affects vertical scaling.

Table 23: Number of Items Removed based on P-value Reversal

Grade	# Items Removed	
	Mathematics	Reading
3		
4	2 / 96	
5	4 / 113	
6	8 / 116	10 / 80
7	4 / 120	3 / 79

The WINSTEPS runs were performed in the manner described above in Section 7.2.2. The two linking paths were followed linking grade to grade. The resulting two sets of item parameters were compared using Pearson’s correlation and the Fisher Z-test. No items were removed based on these analyses. The TAC suggested that the method of comparing the parameters may not have been stringent enough. An investigation into what other procedures might be more appropriate would be a worthwhile research project.

The final Rasch item parameters, using grade 5 as the base scale, can be found in Appendix E. Figure 1 is output from SAS that shows the distributions of thetas across grades in Mathematics based on the vertical scaling using the obtained Rasch values. The mean thetas increase across grades, from a mean of 0.3021 for grade 3 to a high of 2.9339 for grade 8. The variability in the distributions is quite similar, with standard deviations between 1.2 and 1.3. The range of the thetas across the six grades is approximately 10 logits, from -3.5 to 6.0.

Figure 1: Theta Distributions for Mathematics across Grades

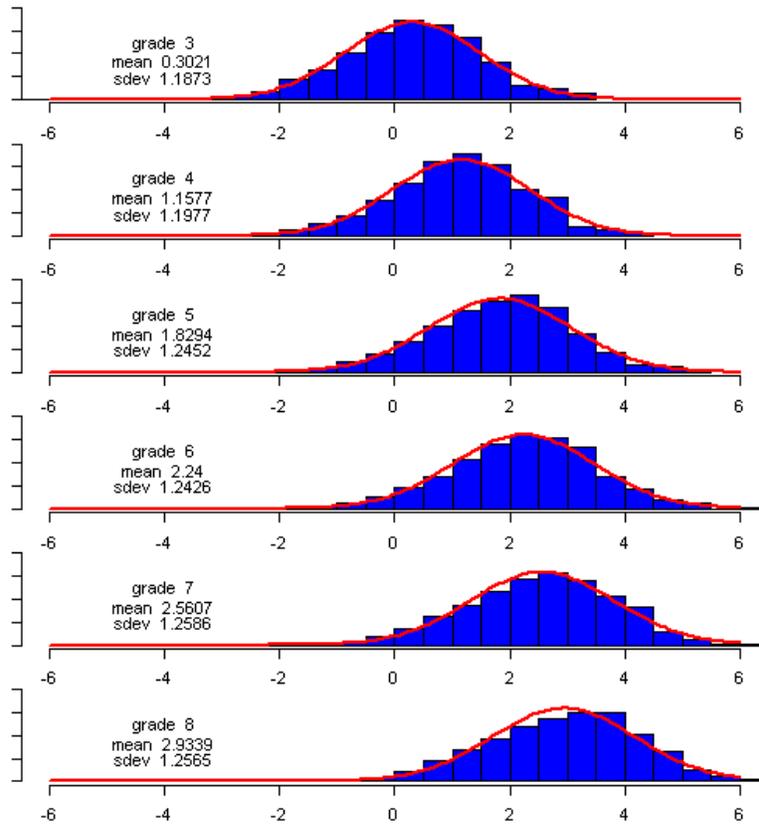
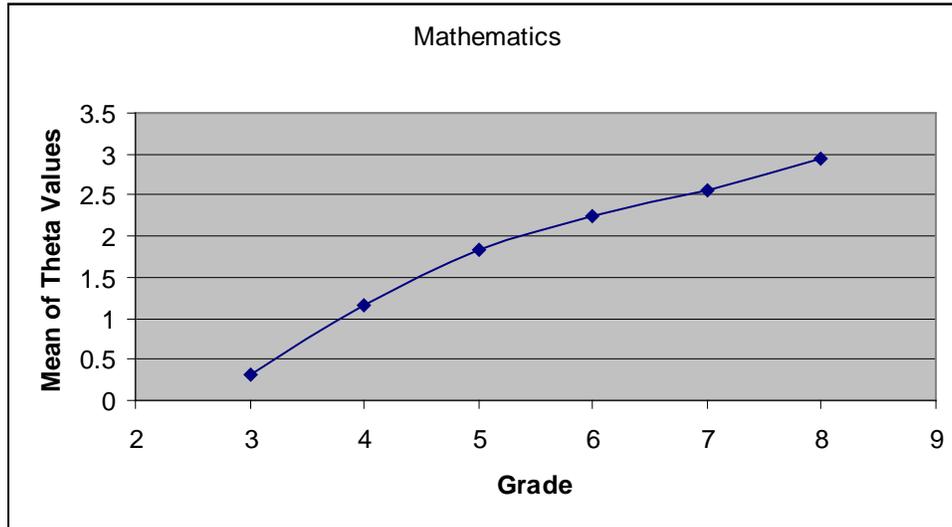


Figure 2 provides a graphic depiction of the increasing mean theta values in Mathematics across grades 3-8. Growth, as depicted here, appears to be steeper at the lower grades and becomes somewhat flatter in the upper grades. In other words, growth appears to slow as the students get older.

Figure 2: Mean of Theta Values for Mathematics across Grades



The pattern of thetas for Reading was similar to the pattern for the Mathematics (Figures 3-4). Again, the mean thetas increase across grades, from a mean of -0.0991 for grade 3 to a high of 2.0393 for grade 8 in Reading. The standard deviations were between 1.1 and 1.3 in Reading. Similar to Mathematics, the range of the thetas for Reading across the six grades is approximately 10 logits, from -3.5 to 6.0. Figure 4 show the increasing mean theta values in Reading across grades 3-8 respectively. Once again, growth appears to be steeper at the lower grades and becomes somewhat flatter in the upper grades, i.e., growth looks to slow as the students get older.

For illustrative purposes we constructed a vertical scale score in order to demonstrate what growth would look like across such a scale, and just as importantly, what the relationship would be across the grades when examining the performance levels. MI did not consult with CSDE or the TAC to generate this scale, although the results appear to be very promising.

At the outset of constructing the scale, we discovered that we could not use the score files given by WINSTEPS because some items were not included (a number of items had been removed due to p-value reversals). So we anchored the thetas and recalibrated all items. Having done that, we then recalibrated the thetas using all items with parameters obtained above.

The scale range chosen was 100-800. These somewhat arbitrary values come from simply doubling the present score scale used for all CMT tests (i.e., 100-400). At this point we have a theta for each student in grades 3-8. The student's vertical scale score (VS) is equal to:

$$VS = 100 + 700 * ((\text{theta} - \min(\text{theta})) / (\max(\text{theta}) - \min(\text{theta}))).$$

Figure 3: Theta Distributions for Reading across Grades

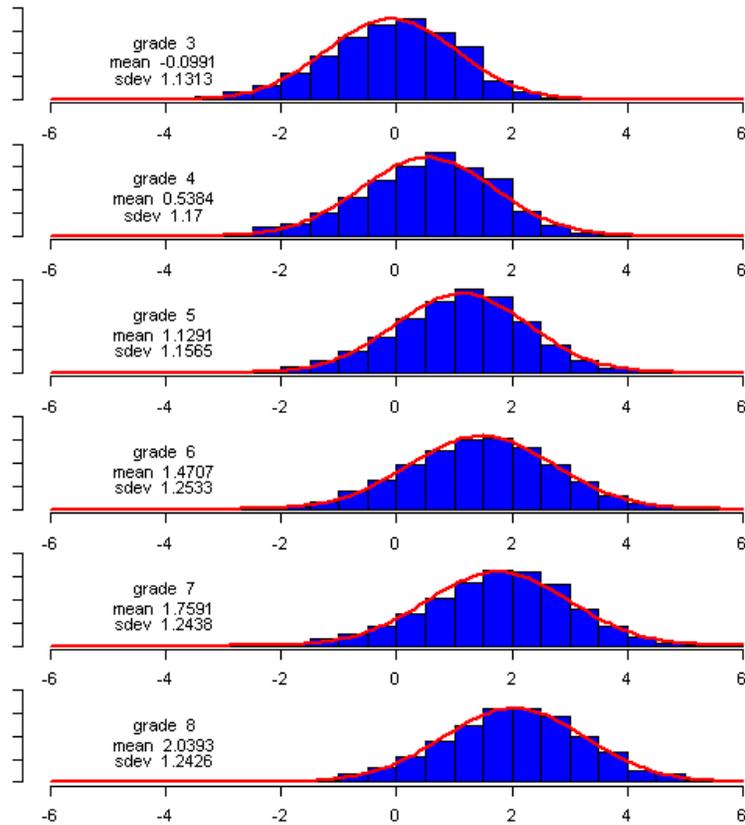
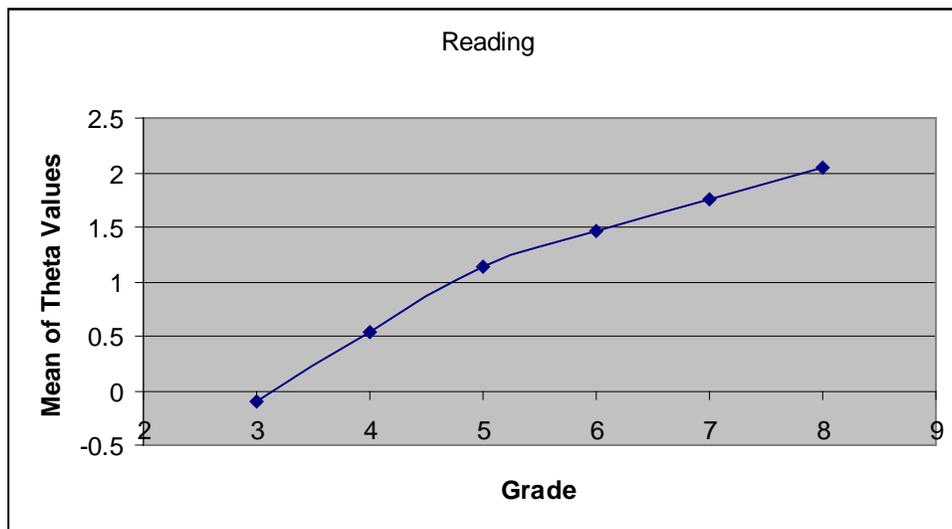


Figure 4: Mean of Theta Values for Reading across Grades



The vertical scores of the above formula have resulted in inconsistent vertical scale scores changes at the lower and upper end of the scale, which may lead to misinterpretation. University of Connecticut (H. Swaminathan and H. Jane Rogers) suggested and have implemented the necessary adjustments.

To obtain the vertically scaled cut scores, we started with the Mathematics and Reading scale score cut points for the different performance levels used operationally in CMT4 (where the scale is 100-400), and then found the corresponding raw cut scores. We then looked at the score file out of the final vertical scaling run in WINSTEPS to obtain the theta value that corresponds to the raw score. Finally, the theta values were inserted into the scale score formula above to obtain a student's VS on the vertical scale of 100-800 (Table 24).

Figures 5-6 depict the relationship between the vertically scaled cut scores across the proficiency levels for Mathematics and Reading respectively. Growth increases across the grades as do the cut scores. From the graphs it is clear that the cut scores for Advanced, especially in Reading, set this group well apart from the others.

Some degree of caution is advisable when interpreting the extent of growth, the speed of growth, and the extent of differences across grades. A vertical scale is most helpful when looking at such information across years and not simply for a single year, as presented in this report. That said, it appears these initial results indicate that a vertical scale may add another, and important, dimension for Connecticut's educators to interpret test scores.

Based on vertical scaling in CMT 2007, CSDE has decided to use the available results to generate the conversion tables for the whole generation of CMT4. In order to generate conversion tables in subsequent years, conversion tables mapping the conventional scale score to the vertical scale score will be used as lookup tables to determine the appropriate vertical scale score for a given conventional scale score.

Table 24: Vertical Scale Cut Scores in Mathematics and Reading at Each Proficiency Level for Grades 3-8 for CMT4

Content Area	Grade	Basic	Proficient	Goal	Advanced
Mathematics	3	396	418	452	499
	4	429	453	483	531
	5	450	476	506	558
	6	466	492	526	572
	7	483	509	543	593
	8	496	523	559	608
Reading	3	382	400	425	481
	4	410	427	447	507
	5	436	449	467	525
	6	439	455	475	545
	7	453	472	489	550
	8	466	483	500	564

Figure 5: Relationship of Mathematics Cut Scores for Each Proficiency Level across Grades

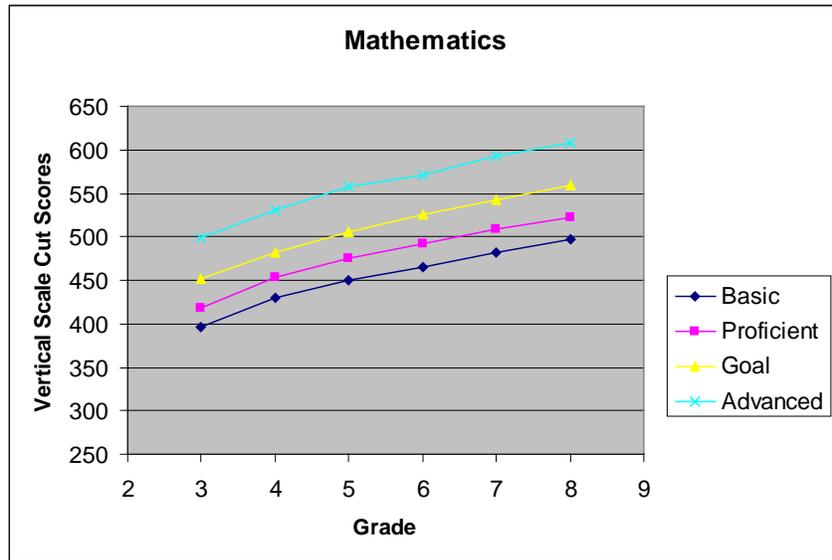
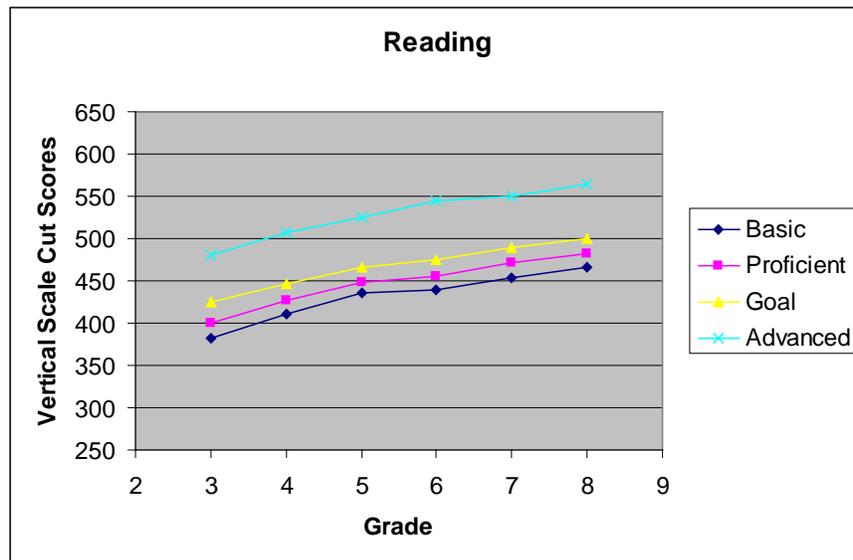


Figure 6: Relationship of Reading Cut Scores for Each Proficiency Level across Grades



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Appendix A: Rasch Values for Linking Items

Reading Comprehension Grade 3

Form U Item Position	Form Q' Item Position	Type	Rasch
1	1	OE	1.1234
2	2	MC	-1.3357
3	3	MC	-1.2408
4	4	MC	-2.5978
5	5	MC	-2.2436
6	6	MC	-0.3777
7	7	MC	-0.4076
8	8	OE	-0.1557
9	9	OE	1.0969
10	10	MC	-1.0166
11	11	MC	-0.4545
12	12	MC	-0.0464
13	13	MC	-0.7483
14	14	MC	-1.4568
15	15	OE	-0.6291
16	16	OE	-0.4700
17	17	OE	0.1539
18	18	MC	0.2247
19	19	MC	-0.0492
20	20	MC	-1.1070
21	21	MC	-0.9255
22	22	MC	-0.7754
23	23	OE	0.6396
24	24	OE	-0.7006
25	25	MC	-2.4070
26	26	MC	-1.6328
27	27	MC	-0.7014
28	28	MC	-1.3998
29	29	MC	-0.4545
30	30	MC	-1.0464
31	31	OE	0.1764

Reading Comprehension Grade 4

Form U Item Position	Form Q' Item Position	Type	Rasch
1	1	OE	-0.0676
2	2	MC	1.0293
3	3	MC	-1.1376
4	4	MC	0.3781
5	5	MC	-1.0894
6	6	MC	0.6032
7	7	OE	-0.5493
8	8	OE	0.1828
9	9	MC	-0.6174
10	10	MC	-0.1130
11	11	MC	-0.5793
12	12	MC	-0.9781
13	13	MC	-1.8743
14	14	MC	-1.4157
15	15	OE	0.9276
16	16	OE	0.1751
17	17	OE	0.0839
18	18	MC	0.8704
19	19	MC	-0.3519
20	20	MC	-0.1130
21	21	MC	-1.4792
22	22	MC	-1.3005
23	23	MC	1.3233
24	24	OE	1.1880
25	25	MC	-1.3490
26	26	MC	0.6649
27	27	MC	-0.0373
28	28	MC	-0.5012
29	29	MC	1.2672
30	30	OE	-0.9781
31	31	OE	1.8280
32	32	OE	0.3179

Reading Comprehension Grade 5

Form U Item Position	Form Q' Item Position	Type	Rasch
1	1	OE	-0.3664
2	2	MC	-0.4260
3	3	MC	-0.7007
4	4	MC	-0.3843
5	5	MC	-1.9755
6	6	MC	-1.7896
7	7	OE	-0.9490
8	8	OE	-0.1767
9	9	OE	0.6091
10	10	MC	0.4038
11	11	MC	-0.3119
12	12	MC	0.1744
13	13	MC	-0.2779
14	14	MC	-0.2686
15	15	OE	-0.3060
16	16	OE	0.3463
17	17	MC	-2.2203
18	18	MC	0.3372
19	19	MC	-0.2411
20	20	OE	-2.2455
21	21	OE	-1.2290
22	22	OE	-1.9066
23	23	MC	-0.7360
24	24	MC	-0.2740
25	25	MC	0.0238
26	26	MC	-0.0587
27	27	MC	-1.3512
28	28	MC	-1.3512
29	29	MC	-0.0426
30	30	OE	0.3879
31	31	OE	-0.6511

Reading Comprehension Grade 6

Form U Item Position	Form Q' Item Position	Type	Rasch
1	1	OE	-1.4764
2	2	MC	-1.0516
3	3	MC	-2.6530
4	4	MC	-0.6285
5	5	MC	-0.5258
6	6	OE	-0.2039
7	7	OE	0.7622
8	8	MC	-0.1314
9	9	MC	0.6760
10	10	MC	-0.6756
11	11	MC	-0.3533
12	12	MC	-1.0564
13	13	MC	0.9645
14	14	MC	-2.2110
15	15	OE	-1.5313
16	16	OE	0.5057
17	17	MC	-1.2719
18	18	MC	-0.6915
19	19	MC	-0.1231
20	20	MC	-0.7358
21	21	MC	-0.7075
22	22	OE	-0.4561
23	23	OE	0.3787
24	24	OE	-0.3507
25	25	MC	-0.1655
26	26	MC	0.6825
27	27	MC	-1.7498
28	28	MC	-0.3673
29	29	MC	-0.8020
30	30	MC	-1.2201
31	31	OE	0.7910

Reading Comprehension Grade 7

Form U Item Position	Form T Item Position	Form Q' Item Position	Type	Rasch
3		3	MC	-1.3096
5		5	MC	-1.9997
7		8	OE	0.0141
18	16		OE	-0.8579
19	17		MC	-1.1915
20	18		MC	0.0232
21	19		MC	-0.2773
22	20		MC	-1.1526
23	21		OE	-0.0111

Reading Comprehension Grade 8

Form U Item Position	Form Q' Item Position	Type	Rasch
1	1	OE	0.1239
2	2	OE	0.3293
3	3	MC	0.6614
4	4	MC	-1.9556
5	5	MC	0.4330
6	6	MC	-0.1293
7	7	OE	0.6614
8	8	OE	1.0126
9	9	MC	2.8787
10	10	MC	0.2854
11	11	MC	-0.0495
12	12	MC	0.5130
13	13	OE	0.8429
14	14	OE	0.4415
15	15	OE	0.2513
16	16	MC	0.6095
17	17	MC	-0.5778
18	18	MC	-1.3386
19	19	MC	-0.8378
20	20	MC	-1.6250
21	21	MC	0.3255
22	22	MC	0.3783
23	23	OE	-0.6428
24	24	OE	-0.1967
25	25	MC	-0.6311
26	26	MC	-2.5810
27	27	MC	1.6690
28	28	OE	1.1335
29	29	OE	-0.0589
30	30	OE	0.3516

Editing & Revising

Grade	Form U Item Position	Form Q' Item Position	Type	Rasch
3	1	1	MC	1.2031
	2	2	MC	-0.3382
	3	3	MC	0.6066
	4	4	MC	-0.6586
	5	5	MC	-0.9780
	6	6	MC	1.6618
	7	7	MC	-0.0765
	8	8	MC	-0.4173
	9	9	MC	-1.2775
	10	10	MC	-0.6970
	11	11	MC	-1.4878
	12	12	MC	-1.3127
	13	13	MC	2.5916
	14	14	MC	-0.4637
	15	15	MC	-0.6713
	16	16	MC	-0.1938
	17	17	MC	-0.8166
	18	18	MC	0.2456
	19	19	MC	0.0135
	20	20	MC	1.3821
	21	21	MC	0.4087
	22	22	MC	-0.2185
	23	23	MC	0.3158
	24	24	MC	0.2976
	25	25	MC	0.4472
	26	26	MC	-0.9632
	27	27	MC	1.6757
	28	28	MC	1.7316
	29	29	MC	-0.1208
	30	30	MC	-0.1762
	31	31	MC	-0.9438
	32	32	MC	0.1959
4	1	1	MC	-0.3952
	2	2	MC	1.0866
	3	3	MC	-1.3610
	4	4	MC	-0.7253

Grade	Form U Item Position	Form Q' Item Position	Type	Rasch
	5	5	MC	0.3621
	6	6	MC	-0.6673
	7	7	MC	0.7294
	8	8	MC	0.1057
	9	9	MC	-0.8209
	10	10	MC	-0.6435
	11	11	MC	1.3969
	12	12	MC	0.6743
	13	13	MC	-0.0859
	14	14	MC	0.7896
	15	15	MC	-0.3660
	16	16	MC	-1.7744
	17	17	MC	-0.8365
	18	18	MC	0.8095
	19	19	MC	-0.3251
	20	20	MC	-0.6625
	21	21	MC	-1.0344
	22	22	MC	-0.1453
	23	23	MC	0.0188
	24	24	MC	-0.4119
	25	25	MC	-1.0463
	26	26	MC	1.2268
	27	27	MC	0.8152
	28	28	MC	1.1462
	29	29	MC	1.0376
	30	30	MC	0.6480
	31	31	MC	-0.4588
	32	32	MC	2.5554
5	1	1	MC	-2.6965
	2	2	MC	-0.2541
	3	3	MC	-0.5972
	4	4	MC	-0.4550
	5	5	MC	1.8581
	6	6	MC	-0.6803
	7	7	MC	1.0784
	8	8	MC	1.6700
	9	9	MC	0.9064

Grade	Form U Item Position	Form Q' Item Position	Type	Rasch
	10	10	MC	0.8070
	11	11	MC	-0.7046
	12	12	MC	-0.9442
	13	13	MC	0.2202
	14	14	MC	0.2371
	15	15	MC	0.8494
	16	16	MC	-0.5894
	17	17	MC	-1.0301
	18	18	MC	1.2686
	19	19	MC	-0.455
	20	20	MC	0.2733
	21	21	MC	-0.1405
	22	22	MC	0.8169
	23	23	MC	-1.2497
	24	24	MC	-0.2641
	25	25	MC	0.0348
	26	26	MC	0.1634
	27	27	MC	0.8270
	28	28	MC	0.7669
	29	29	MC	1.0588
	30	30	MC	-0.3078
	31	31	MC	0.7819
	32	32	MC	0.5341
	33	33	MC	-1.2109
	34	34	MC	1.3125
	35	35	MC	0.0556
	36	36	MC	-0.3317
6	1	1	MC	0.2909
	2	2	MC	0.0763
	3	3	MC	-1.4016
	4	4	MC	0.9396
	5	5	MC	0.1917
	6	6	MC	-0.1626
	7	7	MC	1.8716
	8	8	MC	-0.1377
	9	9	MC	0.3990
	10	10	MC	-0.6068

Grade	Form U Item Position	Form Q' Item Position	Type	Rasch
	11	11	MC	-0.7331
	12	12	MC	-0.6024
	13	13	MC	-0.0956
	14	14	MC	-0.6376
	15	15	MC	0.5614
	16	16	MC	-0.6244
	17	17	MC	0.5472
	18	18	MC	0.4869
	19	19	MC	0.9077
	20	20	MC	2.2361
	21	21	MC	-0.6199
	22	22	MC	-0.0269
	23	23	MC	-1.4583
	24	24	MC	0.4344
	25	25	MC	0.6264
	26	26	MC	0.6710
	27	27	MC	0.0269
	28	28	MC	0.7810
	29	29	MC	0.4226
	30	30	MC	-0.2948
	31	31	MC	0.6264
	32	32	MC	-0.2278
	33	33	MC	-0.2723
	34	34	MC	1.1680
	35	35	MC	-0.2948
	36	36	MC	-0.6555
7	1	1	MC	0.5832
	2	2	MC	-0.2064
	3	3	MC	1.0013
	4	4	MC	-0.6475
	5	5	MC	-0.885
	6	6	MC	-1.9156
	7	7	MC	-1.2211
	8	8	MC	-1.8169
	9	9	MC	0.5029
	10	10	MC	0.0353
	11	11	MC	0.5915

Grade	Form U Item Position	Form Q' Item Position	Type	Rasch
	12	12	MC	-0.5607
	13	13	MC	0.4496
	14	14	MC	0.2410
	15	15	MC	0.0793
	16	16	MC	1.0013
	17	17	MC	-2.5799
	18	18	MC	-2.0419
	19	19	MC	-1.7742
	20	20	MC	-0.6057
	21	21	MC	0.8862
	22	22	MC	-0.0813
	23	23	MC	-0.6475
	24	24	MC	3.0280
	25	25	MC	-0.3601
	26	26	MC	-0.1481
	27	27	MC	-0.8660
	28	28	MC	-0.0813
	29	29	MC	-0.5488
	30	30	MC	1.3244
	31	31	MC	0.4496
	32	32	MC	-0.2518
	33	33	MC	0.1259
	34	34	MC	0.7029
	35	35	MC	0.4608
	36	36	MC	-0.5934
	37	37	MC	0.1290
	38	38	MC	0.3985
	39	39	MC	0.6596
	40	40	MC	1.3140
8	1	1	MC	-1.3756
	2	2	MC	-1.3685
	3	3	MC	1.1062
	4	4	MC	0.5127
	5	5	MC	-0.8431
	6	6	MC	1.1719
	7	7	MC	0.4438
	8	8	MC	-1.2991

Grade	Form U Item Position	Form Q' Item Position	Type	Rasch
	9	9	MC	-0.6137
	10	10	MC	-1.5102
	11	11	MC	-1.3404
	12	12	MC	0.7176
	13	13	MC	0.4380
	14	14	MC	0.6986
	15	15	MC	-1.8259
	16	16	MC	1.8250
	17	17	MC	0.0023
	18	18	MC	0.5070
	19	19	MC	-0.2460
	20	20	MC	0.1624
	21	21	MC	0.8377
	22	22	MC	0.7633
	23	23	MC	2.2180
	24	24	MC	-0.9702
	25	25	MC	-0.8028
	26	26	MC	0.4554
	27	27	MC	-0.3145
	28	28	MC	-0.2838
	29	29	MC	0.3259
	30	30	MC	1.0910
	31	31	MC	1.1870
	32	32	MC	-0.0660
	33	33	MC	0.3795
	34	34	MC	0.1273
	35	35	MC	0.3647
	36	36	MC	0.3259
	37	37	MC	0.4669
	38	38	MC	1.1139
	39	39	MC	0.5353
	40	40	MC	-1.0961

Science

Grade	Form U Item Position	Form T Item Position	Type	Rasch
5	3	3	MC	-0.1384
	6	6	MC	-0.4675
	8	8	MC	-1.7061
	9	9	MC	-0.8094
	11	11	MC	-1.1464
	16	16	MC	-0.9482
	24	24	MC	-1.0647
	25	25	MC	-0.1959
	29	29	MC	-1.1424
	30	30	MC	0.4488
	32	32	MC	-0.6495
	33	33	MC	-0.4747
8	7	7	MC	-0.1102
	13	13	MC	-0.3131
	14	14	MC	-0.4456
	17	17	MC	-0.6688
	20	20	MC	-0.9836
	22	22	MC	-1.2306
	26	26	MC	0.0158
	32	32	MC	0.7115
	41	41	MC	0.7348
	44	44	MC	-1.0914
	46	46	MC	-0.6446
	48	48	MC	0.8764

Appendix B: Item Analysis

Mathematics Form U Grade 3 Item Analysis

Multiple-choice Items

PC = Proportion Correct

RPB = Point-biserial correlation for keyed answer

A – D = Proportion answering each distractor; answer key is shaded

Open-ended Items

Mean = Mean OE score

Corr = Item-total correlation

0 – 3 = Percent of students at each score point

Item	Type	Rasch	PC/Mean	RPB/Corr
1	MC	-0.9362	0.95	0.26
2	MC	-0.2485	0.91	0.31
3	MC	-0.0781	0.89	0.29
4	MC	-0.7256	0.93	0.17
5	MC	-0.4565	0.92	0.34
6	MC	-1.1944	0.96	0.29
7	MC	-0.6449	0.95	0.27
8	MC	-1.8677	0.98	0.32
9	MC	-0.7716	0.96	0.31
10	MC	-1.9997	0.98	0.28
11	MC	1.0593	0.81	0.48
12	MC	-0.4502	0.92	0.34
13	MC	-1.2477	0.96	0.26
14	MC	-0.6593	0.94	0.33
15	MC	-0.0232	0.88	0.37
16	MC	-0.1349	0.91	0.37
17	MC	-1.2369	0.95	0.25
18	MC	-2.7234	0.99	0.15
19	MC	-0.8848	0.94	0.12
20	MC	-0.3170	0.89	0.32
21	MC	-1.2260	0.95	0.35
22	MC	0.8315	0.79	0.47
23	MC	-0.1880	0.87	0.42
24	MC	-0.4887	0.92	0.27
25	MC	-1.0737	0.94	0.32
26	MC	0.9267	0.81	0.30
27	MC	0.2895	0.85	0.47

Item	Type	Rasch	PC/Mean	RPB/Corr
28	MC	0.6841	0.82	0.45
29	MC	1.2427	0.70	0.17
30	MC	-0.8765	0.95	0.17
31	MC	1.2661	0.74	0.48
32	MC	-0.6379	0.93	0.46
33	MC	-0.5279	0.92	0.46
34	MC	-0.6884	0.93	0.41
35	MC	1.3979	0.74	0.57
36	MC	-0.5015	0.92	0.46
37	MC	2.1732	0.62	0.53
38	MC	1.2690	0.77	0.52
39	MC	1.8672	0.63	0.33
40	MC	1.3781	0.69	0.42
41	MC	1.2835	0.73	0.34
42	MC	1.7861	0.66	0.44
43	MC	1.4623	0.67	0.32
44	MC	-0.5279	0.95	0.33
45	MC	-0.3170	0.91	0.33
46	OE	-1.3739	0.95	0.33
47	OE	-1.4106	0.96	0.33
48	OE	-0.9898	0.95	0.23
49	OE	-0.9898	0.96	0.22
50	OE	0.3918	0.86	0.38
51	OE	0.0415	1.83	0.41
52	OE	0.2490	1.78	0.43
53	OE	0.4257	1.58	0.58
54	OE	0.7142	1.53	0.37
55	OE	1.3820	1.40	0.46
56	OE	0.8656	1.65	0.43
57	MC	-0.4804	0.91	0.29
58	MC	-0.5156	0.91	0.37
59	MC	-0.2522	0.90	0.41
60	MC	-0.4233	0.91	0.31
61	MC	0.1601	0.85	0.47
62	MC	-0.3572	0.88	0.39
63	MC	-1.1925	0.96	0.31
64	MC	-1.5352	0.97	0.30

Item	Type	Rasch	PC/Mean	RPB/Corr
65	MC	-1.2681	0.96	0.32
66	MC	-1.3276	0.96	0.27
67	MC	0.1140	0.87	0.42
68	MC	-1.6206	0.98	0.30
69	MC	-0.3681	0.92	0.37
70	MC	-1.6082	0.97	0.34
71	MC	-0.2019	0.89	0.39
72	MC	-0.3039	0.90	0.31
73	MC	0.7945	0.77	0.39
74	MC	0.0927	0.88	0.31
75	MC	-0.4574	0.91	0.33
76	MC	-0.4804	0.93	0.32
77	MC	-0.3145	0.91	0.35
78	MC	-0.1335	0.88	0.32
79	MC	0.7977	0.81	0.41
80	MC	0.9242	0.79	0.55
81	MC	0.6488	0.80	0.49
82	MC	0.7026	0.82	0.53
83	MC	1.0791	0.79	0.55
84	MC	0.8615	0.76	0.41
85	MC	0.9797	0.70	0.19
86	MC	1.9295	0.58	0.34
87	MC	1.4137	0.67	0.49
88	OE	-0.0774	1.87	0.32
89	OE	0.2722	1.81	0.37
90	OE	0.5974	0.83	0.39
91	OE	0.7292	0.81	0.34
92	OE	0.9857	0.82	0.37
93	OE	1.9209	1.78	0.55
94	OE	2.1025	1.51	0.55

Mathematics Form U Grade 4 Item Analysis

Multiple-choice Items

PC = Proportion Correct

RPB = Point-biserial correlation for keyed answer

A – D = Proportion answering each distractor; answer key is shaded

Open-ended Items

Mean = Mean OE score

Corr = Item-total correlation

0 – 3 = Percent of students at each score point

Item	Type	Rasch	PC/Mean	RPB/Corr
1	MC	-0.6007	0.90	0.26
2	MC	0.4838	0.80	0.34
3	MC	-0.1429	0.86	0.44
4	MC	0.6130	0.80	0.43
5	MC	0.2208	0.83	0.46
6	MC	1.0047	0.72	0.47
7	MC	-1.8263	0.97	0.17
8	MC	-0.0908	0.85	0.31
9	MC	-1.3243	0.96	0.20
10	MC	-0.1918	0.86	0.33
11	MC	1.4994	0.64	0.54
12	MC	0.8477	0.75	0.54
13	MC	0.3803	0.81	0.58
14	MC	1.0967	0.72	0.51
15	MC	0.8627	0.75	0.58
16	MC	0.6130	0.75	0.50
17	MC	0.6292	0.78	0.61
18	MC	1.1447	0.66	0.46
19	MC	-0.2465	0.85	0.38
20	MC	-1.0445	0.94	0.34
21	MC	-0.5895	0.91	0.46
22	MC	-0.7953	0.92	0.30
23	MC	-0.1649	0.84	0.35
24	MC	-1.0014	0.93	0.38
25	MC	0.5902	0.77	0.37
26	MC	1.0624	0.72	0.39
27	MC	1.9678	0.50	0.36
28	MC	1.0824	0.69	0.36

Item	Type	Rasch	PC/Mean	RPB/Corr
29	MC	0.2096	0.82	0.52
30	MC	2.1094	0.51	0.43
31	MC	-0.9663	0.93	0.34
32	MC	0.0583	0.87	0.17
33	MC	-0.6287	0.91	0.28
34	MC	-0.7582	0.93	0.31
35	MC	0.9813	0.67	0.32
36	MC	-0.2326	0.89	0.41
37	MC	-0.2651	0.91	0.44
38	MC	-0.0737	0.85	0.30
39	MC	-0.3508	0.90	0.47
40	MC	-0.1297	0.87	0.47
41	MC	-1.4626	0.95	0.32
42	MC	0.4048	0.82	0.29
43	MC	-0.9116	0.94	0.33
44	MC	-1.2472	0.94	0.28
45	MC	-1.2472	0.95	0.40
46	MC	0.2020	0.80	0.47
47	OE	-1.0300	0.91	0.21
48	OE	-0.6572	0.90	0.26
49	OE	-0.6934	1.92	0.32
50	OE	-0.6324	1.87	0.31
51	OE	-0.5694	1.67	0.37
52	OE	1.9867	0.98	0.45
53	OE	0.0741	1.73	0.49
54	OE	-0.6358	1.85	0.33
55	OE	1.0658	1.40	0.48
56	OE	0.3210	1.77	0.36
57	MC	-0.8753	0.93	0.29
58	MC	0.2489	0.79	0.50
59	MC	1.1673	0.70	0.53
60	MC	0.7550	0.75	0.35
61	MC	-2.1387	0.98	0.24
62	MC	-1.8713	0.97	0.26
63	MC	-1.2441	0.95	0.34
64	MC	-0.8687	0.92	0.35
65	MC	-1.3575	0.95	0.33

Item	Type	Rasch	PC/Mean	RPB/Corr
66	MC	-0.8428	0.92	0.40
67	MC	-1.7319	0.96	0.32
68	MC	-0.9767	0.92	0.39
69	MC	-0.1928	0.87	0.50
70	MC	0.1873	0.84	0.44
71	MC	-0.7557	0.92	0.47
72	MC	1.3451	0.67	0.26
73	MC	-1.2525	0.95	0.41
74	MC	-0.0325	0.87	0.44
75	MC	-0.1026	0.87	0.20
76	MC	-0.3108	0.87	0.20
77	MC	-0.4367	0.90	0.41
78	MC	1.5158	0.61	0.43
79	MC	1.5695	0.54	0.25
80	MC	-0.7375	0.91	0.24
81	MC	-1.0049	0.94	0.27
82	MC	0.0937	0.88	0.39
83	MC	1.3320	0.69	0.47
84	MC	1.1103	0.64	0.45
85	MC	1.1484	0.67	0.46
86	MC	1.4231	0.62	0.39
87	MC	1.6584	0.58	0.52
88	MC	1.2396	0.63	0.50
89	MC	-0.9286	0.91	0.26
90	MC	-0.1537	0.90	0.26
91	OE	0.0860	0.82	0.44
92	OE	0.2453	0.84	0.28
93	OE	0.7783	1.58	0.40
94	OE	0.8016	1.61	0.38
95	OE	2.0803	2.08	0.62
96	OE	1.0552	2.05	0.59

Mathematics Form U Grade 5 Item Analysis

Grid-in Items

PC = Proportion Correct

RPB = Point-Biserial correlation

Multiple-choice Items

PC = Proportion Correct

RPB = Point-biserial correlation for keyed answer

A – D = Proportion answering each distractor; answer key is shaded

Open-ended Items

Mean = Mean OE score

Corr = Item-total correlation

0 – 3 = Percent of students at each score point

Item	Type	Rasch	PC/Mean	RPB/Corr
1	MC	0.1095	0.86	0.51
2	MC	-2.1126	0.97	0.31
3	MC	-2.0534	0.97	0.31
4	MC	-0.0244	0.84	0.45
5	MC	-1.0550	0.92	0.26
6	MC	0.0038	0.84	0.43
7	MC	-1.5848	0.95	0.32
8	MC	-1.1128	0.94	0.25
9	MC	-0.5412	0.90	0.20
10	MC	-3.0123	0.99	0.20
11	MC	-1.2352	0.96	0.31
12	MC	-0.5889	0.91	0.19
13	MC	-1.3005	0.95	0.30
14	MC	-0.0818	0.87	0.54
15	MC	0.6479	0.80	0.57
16	MC	-0.6601	0.92	0.39
17	MC	0.5616	0.79	0.56
18	MC	1.1836	0.72	0.53
19	MC	0.0198	0.85	0.52
20	MC	0.8623	0.77	0.56
21	MC	-0.3808	0.88	0.46
22	MC	0.7841	0.70	0.37
23	MC	0.4359	0.77	0.41
24	MC	0.2973	0.80	0.33
25	MC	-1.2513	0.94	0.48
26	MC	-0.6883	0.91	0.46

Item	Type	Rasch	PC/Mean	RPB/Corr
27	MC	0.6003	0.77	0.29
28	MC	-1.2839	0.95	0.41
29	MC	-0.3616	0.89	0.52
30	MC	0.0980	0.85	0.60
31	MC	-0.2370	0.87	0.57
32	MC	-0.5728	0.90	0.52
33	MC	0.9066	0.73	0.48
34	MC	1.1250	0.68	0.51
35	MC	0.1437	0.82	0.39
36	MC	1.9190	0.53	0.35
37	GR	-0.4643	0.88	0.45
38	GR	-0.4946	0.89	0.48
39	GR	-0.6827	0.90	0.42
40	GR	-0.7054	0.90	0.47
41	GR	-0.9454	0.92	0.46
42	GR	-0.7054	0.90	0.48
43	GR	-0.2370	0.85	0.32
44	GR	1.0228	0.71	0.57
45	GR	1.1502	0.67	0.45
46	GR	1.2527	0.66	0.56
47	GR	0.5257	0.79	0.46
48	GR	0.7382	0.76	0.64
49	OE	0.2916	1.64	0.54
50	OE	0.7211	1.53	0.54
51	MC	-0.3645	0.87	0.45
52	MC	-0.7848	0.89	0.49
53	MC	-0.7912	0.89	0.47
54	MC	-0.7978	0.89	0.35
55	MC	-2.5128	0.98	0.18
56	MC	0.3601	0.78	0.29
57	MC	-0.2610	0.87	0.35
58	MC	-0.5175	0.87	0.38
59	MC	-1.1520	0.93	0.21
60	MC	-0.5678	0.89	0.39
61	MC	-1.2017	0.91	0.29
62	MC	0.6435	0.73	0.51
63	MC	-0.3245	0.86	0.54

Item	Type	Rasch	PC/Mean	RPB/Corr
64	MC	0.1395	0.80	0.45
65	MC	0.8199	0.72	0.42
66	MC	-2.3212	0.97	0.11
67	MC	2.5773	0.41	0.35
68	MC	1.6475	0.58	0.41
69	MC	1.5179	0.66	0.52
70	MC	1.6180	0.76	0.30
71	MC	1.2408	0.68	0.38
72	MC	0.4460	0.75	0.33
73	MC	0.3307	0.77	0.40
74	MC	-1.8934	0.97	0.23
75	MC	-0.3394	0.90	0.42
76	MC	-0.4741	0.89	0.44
77	MC	-1.0273	0.93	0.32
78	MC	-1.1849	0.97	0.30
79	MC	1.1378	0.65	0.44
80	MC	-0.0470	0.84	0.35
81	MC	1.1117	0.65	0.33
82	GR	1.3363	0.60	0.49
83	GR	1.0325	0.68	0.51
84	OE	0.4566	0.78	0.54
85	OE	0.0757	1.70	0.48
86	OE	1.5211	1.25	0.61
87	OE	0.4185	1.64	0.39
88	OE	-0.3589	1.87	0.33
89	OE	0.7030	1.59	0.68
90	OE	1.9415	1.03	0.56
91	MC	-2.2087	0.99	0.19
92	MC	1.1349	0.77	0.23
93	MC	2.0462	0.51	0.43
94	MC	-2.2637	0.97	0.22
95	MC	-1.1120	0.93	0.25
96	MC	0.0544	0.88	0.46
97	MC	-2.7715	0.99	0.15
98	MC	-0.8371	0.93	0.26
99	MC	-0.2900	0.93	0.31
100	MC	1.3308	0.71	0.34

Item	Type	Rasch	PC/Mean	RPB/Corr
101	MC	0.2178	0.81	0.25
102	MC	0.5396	0.79	0.44
103	MC	0.5836	0.75	0.33
104	GR	0.6336	0.74	0.61
105	OE	-0.8100	1.94	0.27
106	OE	-0.5430	1.86	0.39
107	OE	0.9680	1.33	0.39
108	OE	-0.4576	1.79	0.32
109	OE	0.6364	1.74	0.35
110	OE	1.1229	1.48	0.51
111	OE	1.1601	1.47	0.49
112	OE	0.6925	2.31	0.61
113	OE	1.2426	2.07	0.69

Mathematics Form U Grade 6 Item Analysis

Grid-in Items

PC = Proportion Correct

RPB = Point-Biserial correlation

Multiple-choice Items

PC = Proportion Correct

RPB = Point-biserial correlation for keyed answer

A – D = Proportion answering each distractor; answer key is shaded

Open-ended Items

Mean = Mean OE score

Corr = Item-total correlation

0 – 3 = Percent of students at each score point

Item	Type	Rasch	PC/Mean	RPB/Corr
1	MC	-2.3393	0.97	0.29
2	MC	-1.3253	0.94	0.35
3	MC	-1.2399	0.91	0.39
4	MC	-2.5689	0.98	0.24
5	MC	-1.5967	0.95	0.35
6	MC	-2.4558	0.97	0.21
7	MC	-0.9750	0.92	0.46
8	MC	-1.5530	0.92	0.28
9	MC	-0.1465	0.78	0.38
10	MC	-0.3064	0.86	0.59
11	MC	0.2510	0.78	0.60
12	MC	2.4818	0.33	0.31
13	MC	0.3842	0.76	0.55
14	MC	1.2888	0.62	0.53
15	MC	0.0703	0.80	0.58
16	MC	0.6575	0.71	0.52
17	MC	0.0963	0.82	0.58
18	MC	-0.3328	0.85	0.52
19	MC	0.6126	0.77	0.58
20	MC	-0.0293	0.84	0.62
21	MC	0.3000	0.72	0.46
22	MC	-0.0769	0.81	0.38
23	MC	-0.3749	0.83	0.50
24	MC	-0.0091	0.79	0.39
25	MC	-0.1150	0.80	0.48
26	MC	-0.8945	0.89	0.43

Item	Type	Rasch	PC/Mean	RPB/Corr
27	MC	0.6013	0.70	0.44
28	MC	0.7103	0.67	0.36
29	MC	-1.0113	0.87	0.43
30	MC	-0.3442	0.76	0.41
31	GR	-1.5530	0.92	0.32
32	GR	-1.1192	0.89	0.44
33	GR	-1.9721	0.94	0.30
34	GR	-1.1416	0.90	0.37
35	GR	0.2013	0.75	0.41
36	GR	0.2013	0.72	0.37
37	GR	0.5702	0.69	0.53
38	GR	0.0801	0.76	0.38
39	GR	-0.4255	0.84	0.35
40	GR	0.3961	0.71	0.38
41	OE	0.6013	0.74	0.63
42	OE	1.1043	0.68	0.46
43	OE	0.6696	1.43	0.63
44	OE	1.2369	1.10	0.64
45	OE	0.5897	1.33	0.60
46	OE	1.0647	1.23	0.69
47	OE	0.5599	1.52	0.55
48	OE	0.8972	1.37	0.58
49	MC	0.6758	0.76	0.46
50	MC	-1.6641	0.93	0.25
51	MC	-1.5620	0.96	0.31
52	MC	-1.1023	0.91	0.46
53	MC	-0.0751	0.79	0.39
54	MC	0.4631	0.72	0.50
55	MC	-0.7493	0.87	0.39
56	MC	-0.9523	0.90	0.23
57	MC	-0.0582	0.79	0.41
58	MC	-1.5271	0.95	0.13
59	MC	-0.5564	0.86	0.45
60	MC	0.6704	0.72	0.40
61	MC	0.9299	0.65	0.48
62	MC	-0.0549	0.78	0.39
63	MC	0.8056	0.63	0.34

Item	Type	Rasch	PC/Mean	RPB/Corr
64	MC	0.8189	0.69	0.41
65	MC	-0.9325	0.89	0.44
66	MC	0.4831	0.70	0.33
67	MC	-0.7093	0.88	0.48
68	MC	0.1081	0.77	0.38
69	MC	-0.7005	0.90	0.27
70	MC	-0.5852	0.87	0.37
71	MC	0.1428	0.79	0.40
72	MC	1.2697	0.56	0.37
73	MC	-0.4996	0.86	0.37
74	MC	0.7357	0.66	0.45
75	GR	0.6346	0.70	0.47
76	GR	0.5874	0.69	0.47
77	GR	1.3836	0.58	0.53
78	GR	1.3001	0.56	0.41
79	GR	-0.4679	0.85	0.50
80	GR	-0.2602	0.79	0.36
81	OE	-0.0649	0.79	0.33
82	OE	0.2931	0.75	0.55
83	OE	1.1210	1.22	0.45
84	OE	0.6419	1.50	0.59
85	OE	1.1213	1.13	0.57
86	OE	0.6693	1.37	0.57
87	OE	0.3122	1.54	0.60
88	OE	0.6407	1.48	0.43
89	OE	1.3840	1.17	0.54
90	MC	0.3937	0.72	0.44
91	MC	-1.7493	0.95	0.35
92	MC	-3.0507	0.98	0.16
93	MC	-0.0717	0.76	0.27
94	MC	-1.7177	0.94	0.19
95	MC	-0.3262	0.86	0.28
96	MC	-1.5410	0.92	0.35
97	MC	-0.4758	0.90	0.29
98	MC	-1.5133	0.92	0.37
99	MC	0.7519	0.65	0.54
100	MC	0.8029	0.64	0.16

Item	Type	Rasch	PC/Mean	RPB/Corr
101	MC	0.8269	0.67	0.56
102	MC	0.6097	0.72	0.60
103	MC	-0.5482	0.87	0.37
104	MC	-0.3299	0.84	0.47
105	GR	0.1365	0.75	0.59
106	GR	2.2190	0.37	0.46
107	OE	-1.5662	1.93	0.24
108	OE	-0.2748	0.83	0.30
109	OE	-0.4303	1.84	0.37
110	OE	0.5758	1.49	0.48
111	OE	0.4934	1.43	0.48
112	OE	0.6071	1.46	0.50
113	OE	0.4706	1.62	0.41
114	OE	1.6208	1.11	0.60
115	OE	0.8080	1.82	0.60
116	OE	1.2448	1.51	0.55

Mathematics Form U Grade 7 Item Analysis

Grid-in Items

PC = Proportion Correct

RPB = Point-Biserial correlation

Multiple-choice Items

PC = Proportion Correct

RPB = Point-biserial correlation for keyed answer

A – D = Proportion answering each distractor; answer key is shaded

Open-ended Items

Mean = Mean OE score

Corr = Item-total correlation

0 – 3 = Percent of students at each score point

Item	Type	Rasch	PC/Mean	RPB/Corr
1	MC	-2.0499	0.95	0.20
2	MC	-1.3912	0.89	0.31
3	MC	-1.3364	0.87	0.39
4	MC	0.2609	0.71	0.59
5	MC	-0.2759	0.78	0.46
6	MC	0.4828	0.67	0.54
7	MC	0.3282	0.74	0.55
8	MC	-0.4326	0.83	0.57
9	MC	-1.0748	0.90	0.33
10	MC	0.5839	0.71	0.64
11	MC	-1.4883	0.92	0.41
12	MC	-0.3238	0.80	0.50
13	MC	-2.2753	0.95	0.38
14	MC	-1.4192	0.89	0.25
15	MC	-0.4832	0.80	0.46
16	MC	-0.4041	0.83	0.58
17	MC	-0.3935	0.80	0.55
18	MC	-0.3619	0.81	0.58
19	MC	-0.5459	0.77	0.38
20	MC	0.0962	0.85	0.43
21	MC	-0.0594	0.79	0.42
22	MC	-0.3066	0.81	0.46
23	MC	1.2056	0.56	0.55
24	MC	-0.2624	0.76	0.33
25	MC	0.4174	0.70	0.50
26	MC	0.2727	0.74	0.45

Item	Type	Rasch	PC/Mean	RPB/Corr
27	MC	-1.3257	0.92	0.36
28	MC	0.8508	0.62	0.53
29	MC	-0.1365	0.76	0.47
30	MC	1.6093	0.46	0.37
31	MC	0.5979	0.61	0.49
32	MC	-0.6102	0.85	0.41
33	MC	-0.3865	0.78	0.51
34	MC	-1.4592	0.89	0.44
35	GR	-0.5760	0.83	0.30
36	GR	-0.3445	0.78	0.39
37	GR	1.3387	0.51	0.58
38	GR	0.3830	0.67	0.50
39	GR	0.4403	0.67	0.57
40	GR	0.5308	0.64	0.49
41	OE	-0.3794	0.77	0.47
42	OE	0.9025	0.56	0.47
43	OE	-0.2489	0.82	0.54
44	OE	-0.5162	0.85	0.59
45	OE	-0.1554	1.51	0.62
46	OE	0.2239	1.39	0.71
47	OE	1.1364	1.16	0.57
48	OE	0.3376	1.40	0.70
49	OE	0.6631	1.40	0.52
50	OE	0.1098	1.56	0.48
51	MC	0.2807	0.67	0.48
52	MC	-1.6355	0.91	0.27
53	MC	0.3202	0.68	0.50
54	MC	0.0811	0.72	0.46
55	MC	0.2750	0.67	0.57
56	MC	0.2948	0.68	0.53
57	MC	0.2123	0.79	0.46
58	MC	0.2008	0.73	0.30
59	MC	-0.1100	0.74	0.48
60	MC	-0.3932	0.71	0.36
61	MC	-0.6549	0.82	0.57
62	MC	0.2466	0.63	0.45
63	MC	-0.3762	0.77	0.40

Item	Type	Rasch	PC/Mean	RPB/Corr
64	MC	0.4287	0.62	0.41
65	MC	-0.7749	0.83	0.26
66	MC	-0.0421	0.73	0.46
67	MC	0.1516	0.68	0.42
68	MC	0.3872	0.65	0.46
69	MC	-1.5380	0.90	0.43
70	MC	-0.2565	0.76	0.53
71	MC	-0.7949	0.83	0.40
72	MC	0.2637	0.68	0.55
73	GR	-0.8312	0.82	0.54
74	GR	1.6986	0.38	0.56
75	GR	0.6458	0.63	0.60
76	GR	0.3230	0.70	0.58
77	GR	0.6216	0.69	0.47
78	GR	0.6805	0.57	0.58
79	GR	1.2764	0.67	0.44
80	GR	1.1403	0.54	0.51
81	OE	1.1848	0.50	0.52
82	OE	0.3594	0.66	0.60
83	OE	-0.2157	1.56	0.54
84	OE	-0.7898	1.77	0.48
85	OE	0.3201	1.38	0.65
86	OE	1.6794	0.64	0.43
87	OE	0.1851	1.27	0.50
88	OE	-0.1402	1.59	0.53
89	OE	1.1362	0.79	0.59
90	OE	0.7788	1.27	0.63
91	MC	-0.8231	0.85	0.34
92	MC	0.0514	0.72	0.37
93	MC	-0.3124	0.80	0.22
94	MC	0.3900	0.67	0.34
95	MC	-1.9705	0.93	0.26
96	MC	-0.8272	0.82	0.47
97	MC	0.9679	0.47	0.38
98	MC	-0.3694	0.78	0.29
99	MC	-0.9271	0.87	0.45
100	MC	-0.9228	0.90	0.31

Item	Type	Rasch	PC/Mean	RPB/Corr
101	MC	-0.5513	0.83	0.40
102	MC	-1.0185	0.87	0.30
103	MC	1.4426	0.45	0.45
104	MC	-0.4764	0.74	0.30
105	GR	1.1926	0.56	0.50
106	GR	-0.1131	0.71	0.32
107	GR	0.8024	0.60	0.51
108	GR	-1.0319	0.84	0.38
109	GR	-0.8724	0.75	0.42
110	OE	1.0672	0.46	0.36
111	OE	-1.1045	1.87	0.26
112	OE	0.3644	1.37	0.23
113	OE	0.5635	1.51	0.51
114	OE	0.1708	1.51	0.56
115	OE	-0.0630	1.67	0.39
116	OE	0.9983	1.13	0.41
117	OE	0.3613	1.17	0.45
118	OE	0.2212	1.48	0.47
119	OE	-0.0631	2.37	0.59
120	OE	1.4213	1.39	0.60

Mathematics Form U Grade 8 Item Analysis

Grid-in Items

PC = Proportion Correct

RPB = Point-Biserial correlation

Multiple-choice Items

PC = Proportion Correct

RPB = Point-biserial correlation for keyed answer

A – D = Proportion answering each distractor; answer key is shaded

Open-ended Items

Mean = Mean OE score

Corr = Item-total correlation

0 – 3 = Percent of students at each score point

Item	Type	Rasch	PC/Mean	RPB/Corr
1	MC	-0.8654	0.84	0.50
2	MC	0.5023	0.61	0.44
3	MC	-1.5883	0.91	0.35
4	MC	-0.1160	0.69	0.49
5	MC	0.0865	0.72	0.63
6	MC	-0.7167	0.82	0.59
7	MC	-0.2404	0.77	0.61
8	MC	-0.0841	0.73	0.55
9	MC	-0.3946	0.80	0.36
10	MC	-0.0556	0.75	0.55
11	MC	0.4801	0.64	0.49
12	MC	-1.3994	0.90	0.31
13	MC	0.6312	0.56	0.57
14	MC	0.9065	0.54	0.54
15	MC	-0.5468	0.78	0.49
16	MC	1.7272	0.34	0.32
17	MC	0.1764	0.67	0.41
18	MC	1.3275	0.43	0.26
19	MC	0.3791	0.59	0.32
20	MC	1.3981	0.49	0.22
21	MC	-0.7087	0.80	0.41
22	MC	-0.1907	0.75	0.47
23	MC	-1.4854	0.88	0.40
24	MC	-0.2875	0.76	0.36
25	MC	-1.2697	0.84	0.42
26	MC	-1.2645	0.85	0.46

Item	Type	Rasch	PC/Mean	RPB/Corr
27	GR	-0.7611	0.79	0.26
28	GR	0.1971	0.70	0.60
29	GR	0.9906	0.53	0.45
30	GR	0.0162	0.66	0.42
31	GR	1.5773	0.37	0.42
32	GR	1.5826	0.39	0.54
33	OE	0.2615	0.79	0.23
34	OE	-0.6380	0.74	0.22
35	OE	-0.3423	0.76	0.43
36	OE	-0.1907	0.75	0.46
37	OE	0.3591	1.36	0.66
38	OE	0.6065	1.24	0.59
39	OE	0.7461	1.22	0.68
40	OE	0.7731	1.24	0.62
41	OE	0.6382	1.26	0.52
42	OE	-0.2953	1.71	0.42
43	MC	0.6809	0.53	0.25
44	MC	-0.1666	0.71	0.23
45	MC	0.3294	0.65	0.53
46	MC	-0.1129	0.71	0.48
47	MC	-0.8855	0.82	0.42
48	MC	-0.0540	0.73	0.62
49	MC	-0.2669	0.74	0.53
50	MC	-0.0804	0.77	0.52
51	MC	0.0041	0.71	0.61
52	MC	-0.2240	0.70	0.25
53	MC	-0.1278	0.70	0.50
54	MC	0.1155	0.66	0.44
55	MC	-0.1070	0.73	0.42
56	MC	0.1325	0.65	0.31
57	MC	0.3866	0.69	0.54
58	MC	-0.5189	0.83	0.57
59	GR	1.3859	0.63	0.47
60	GR	0.1662	0.64	0.47
61	GR	-0.2916	0.75	0.61
62	GR	0.0415	0.74	0.63
63	GR	-0.6267	0.73	0.58

Item	Type	Rasch	PC/Mean	RPB/Corr
64	GR	0.8102	0.68	0.50
65	GR	-0.6508	0.72	0.58
66	GR	0.6120	0.64	0.49
67	GR	0.7021	0.68	0.51
68	GR	-0.2058	0.68	0.56
69	OE	0.8339	0.56	0.65
70	OE	0.1268	0.67	0.55
71	OE	0.5634	1.27	0.69
72	OE	-0.7251	1.69	0.59
73	OE	-0.0864	1.48	0.53
74	OE	-0.6307	1.67	0.45
75	OE	1.3481	0.95	0.58
76	OE	0.3335	1.42	0.57
77	OE	0.3823	1.35	0.62
78	OE	0.5787	1.23	0.63
79	OE	-0.1365	1.45	0.45
80	OE	0.8329	1.06	0.59
81	OE	0.7679	1.14	0.54
82	MC	-0.3102	0.78	0.38
83	MC	-1.1484	0.81	0.12
84	MC	-1.7521	0.93	0.23
85	MC	-0.5622	0.84	0.28
86	MC	-1.5670	0.90	0.25
87	MC	-0.6028	0.77	0.32
88	MC	-0.3133	0.85	0.36
89	MC	-1.7636	0.93	0.37
90	MC	-1.1191	0.86	0.31
91	MC	0.7549	0.58	0.52
92	MC	-0.1248	0.71	0.49
93	MC	0.1042	0.80	0.43
94	MC	0.6571	0.58	0.24
95	MC	-0.4081	0.86	0.27
96	MC	0.7892	0.69	0.42
97	MC	-1.4564	0.90	0.38
98	MC	-0.5455	0.79	0.41
99	MC	-0.1040	0.73	0.46
100	MC	-1.2967	0.86	0.39

Item	Type	Rasch	PC/Mean	RPB/Corr
101	GR	0.3676	0.65	0.58
102	GR	1.5225	0.56	0.58
103	GR	-0.4468	0.81	0.40
104	GR	0.5587	0.66	0.47
105	OE	-0.7032	0.88	0.28
106	OE	1.4511	0.58	0.53
107	OE	0.9102	0.38	0.32
108	OE	-0.2480	1.41	0.32
109	OE	0.0383	1.40	0.54
110	OE	-0.4914	1.51	0.55
111	OE	0.4309	1.33	0.60
112	OE	0.9127	1.22	0.57
113	OE	-0.7850	1.57	0.50
114	OE	0.7390	1.13	0.44
115	OE	-0.4886	1.52	0.43
116	OE	0.7799	1.82	0.71
117	OE	2.1036	0.95	0.57

Reading Comprehension Form U Grade 3 Item Analysis

Multiple-choice Items

PC = Proportion Correct

RPB = Point-biserial correlation for keyed answer

A – D = Proportion answering each distractor; answer key is shaded

Open-ended Items

Mean = Mean OE score

Corr = Item-total correlation

0 – 2 = Percent of students at each score point

Item	Type	Rasch	PC/Mean	RPB/Corr
1	OE	1.2207	0.89	0.37
2	MC	-1.4383	0.87	0.34
3	MC	-1.3362	0.86	0.46
4	MC	-3.0985	0.97	0.29
5	MC	-2.4195	0.94	0.27
6	MC	-0.1582	0.70	0.44
7	OE	-0.2572	1.53	0.42
8	OE	-0.2306	1.34	0.44
9	OE	0.1961	1.24	0.46
10	MC	-0.8961	0.81	0.44
11	MC	-0.3651	0.73	0.33
12	MC	0.0553	0.66	0.39
13	MC	-0.8469	0.80	0.48
14	MC	-1.4293	0.87	0.35
15	MC	-0.6364	0.77	0.47
16	MC	-0.4144	0.74	0.49
17	OE	0.2508	1.28	0.43
18	OE	0.1492	1.25	0.55
19	MC	-0.0344	0.68	0.39
20	MC	-1.1984	0.84	0.48
21	MC	-0.7865	0.79	0.45
22	MC	-0.6321	0.77	0.39
23	OE	1.0805	0.92	0.41
24	OE	-0.6583	1.57	0.42
25	MC	-2.5374	0.95	0.32
26	MC	-1.8860	0.91	0.38
27	MC	-0.5578	0.76	0.43
28	MC	-1.3774	0.86	0.33

Item	Type	Rasch	PC/Mean	RPB/Corr
29	MC	-0.5393	0.76	0.39
30	MC	-1.1288	0.84	0.46
31	OE	-0.0149	1.27	0.41

Degree of Reading Power Form U Grade 3 Item Analysis

Multiple-choice Items

PC = Proportion Correct

RPB = Point-biserial correlation for keyed answer

A– E = Proportion answering each distractor; answer key is shaded

Item	Type	Rasch	PC	RPB
1	MC	-1.2789	0.85	0.33
2	MC	-0.8322	0.80	0.48
3	MC	0.2428	0.62	0.44
4	MC	-2.0375	0.92	0.40
5	MC	-2.0850	0.92	0.34
6	MC	-1.2029	0.85	0.39
7	MC	-2.0667	0.92	0.34
8	MC	-0.7988	0.80	0.38
9	MC	0.5231	0.57	0.53
10	MC	-0.3013	0.72	0.45
11	MC	-1.2241	0.85	0.35
12	MC	-0.4019	0.74	0.48
13	MC	0.1600	0.64	0.39
14	MC	-0.0116	0.67	0.49
15	MC	0.0055	0.67	0.45
16	MC	0.6451	0.55	0.26
17	MC	-0.6180	0.77	0.39
18	MC	-0.3009	0.72	0.35
19	MC	-0.4818	0.75	0.39
20	MC	0.1631	0.64	0.36
21	MC	1.0002	0.48	0.41
22	MC	1.4217	0.40	0.37
23	MC	-0.3334	0.73	0.41
24	MC	1.6447	0.35	0.48
25	MC	0.8901	0.50	0.42
26	MC	0.0846	0.65	0.52
27	MC	0.4429	0.59	0.57
28	MC	1.4175	0.40	0.33
29	MC	2.5058	0.21	0.23
30	MC	0.0019	0.67	0.50
31	MC	0.0715	0.66	0.54
32	MC	1.3504	0.41	0.41

Item	Type	Rasch	PC	RPB
33	MC	0.3256	0.61	0.55
34	MC	2.2318	0.25	0.29
35	MC	2.6281	0.20	0.30
36	MC	1.3853	0.40	0.41
37	MC	1.7505	0.33	0.35
38	MC	1.8387	0.32	0.48
39	MC	2.4488	0.22	0.23
40	MC	1.8682	0.31	0.34
41	MC	2.1703	0.26	0.29
42	MC	0.7400	0.53	0.49

Reading Comprehension Form U Grade 4 Item Analysis

Multiple-choice Items

PC = Proportion Correct

RPB = Point-biserial correlation for keyed answer

A – D = Proportion answering each distractor; answer key is shaded

Open-ended Items

Mean = Mean OE score

Corr = Item-total correlation

0 – 2 = Percent of students at each score point

Item	Type	Rasch	PC/Mean	RPB/Corr
1	OE	-0.3521	1.45	0.36
2	OE	0.6854	1.35	0.44
3	MC	-1.1047	0.89	0.23
4	MC	0.5258	0.67	0.16
5	MC	-1.1463	0.89	0.42
6	MC	0.5724	0.66	0.48
7	MC	-0.6019	0.84	0.40
8	OE	0.0655	1.56	0.45
9	MC	-0.5724	0.84	0.41
10	MC	-0.0986	0.77	0.31
11	MC	-0.5692	0.84	0.46
12	MC	-0.8775	0.87	0.44
13	MC	-1.9608	0.95	0.31
14	MC	-1.6245	0.93	0.37
15	MC	1.1470	0.55	0.25
16	OE	-0.0827	1.57	0.42
17	OE	-0.5288	1.62	0.45
18	MC	0.9054	0.60	0.14
19	MC	-0.1559	0.78	0.29
20	MC	-0.1483	0.78	0.43
21	MC	-1.6093	0.93	0.29
22	MC	-1.2090	0.90	0.38
23	OE	1.0938	1.11	0.41
24	OE	0.8003	1.22	0.40
25	MC	-1.2655	0.90	0.33
26	MC	0.8596	0.60	0.24
27	MC	0.0939	0.74	0.34
28	MC	-0.1647	0.78	0.37

Item	Type	Rasch	PC/Mean	RPB/Corr
29	MC	1.2609	0.52	0.16
30	MC	-0.8519	0.87	0.25
31	MC	1.8971	0.39	0.23
32	OE	-0.2235	1.54	0.36

Degree of Reading Power Form U Grade 4 Item Analysis

Multiple-choice Items

PC = Proportion Correct

RPB = Point-biserial correlation for keyed answer

A– E = Proportion answering each distractor; answer key is shaded

Item	Type	Rasch	PC	RPB
1	MC	-0.9068	0.87	0.46
2	MC	-2.1000	0.95	0.33
3	MC	-1.7616	0.94	0.33
4	MC	-0.4516	0.82	0.37
5	MC	-1.5505	0.92	0.36
6	MC	0.3644	0.70	0.44
7	MC	-1.0906	0.89	0.45
8	MC	-2.5103	0.97	0.30
9	MC	-0.0837	0.77	0.51
10	MC	-0.7742	0.86	0.40
11	MC	-0.6750	0.85	0.32
12	MC	-1.4732	0.92	0.38
13	MC	-0.7641	0.86	0.35
14	MC	0.7530	0.63	0.50
15	MC	0.2262	0.72	0.45
16	MC	0.5651	0.66	0.36
17	MC	0.3110	0.71	0.48
18	MC	-0.3944	0.81	0.35
19	MC	-0.7528	0.86	0.48
20	MC	-0.6701	0.85	0.39
21	MC	-0.6734	0.85	0.52
22	MC	-0.8603	0.87	0.47
23	MC	-0.5333	0.83	0.21
24	MC	0.7102	0.63	0.42
25	MC	0.2789	0.71	0.45
26	MC	4.1984	0.08	0.12
27	MC	1.7581	0.42	0.35
28	MC	0.4930	0.67	0.43
29	MC	2.0720	0.36	0.27
30	MC	1.2702	0.52	0.36
31	MC	2.7093	0.25	0.33
32	MC	0.6213	0.65	0.50

Item	Type	Rasch	PC	RPB
33	MC	1.7221	0.43	0.29
34	MC	1.3065	0.51	0.43
35	MC	0.2777	0.71	0.43
36	MC	2.2119	0.33	0.38
37	MC	2.4696	0.29	0.22
38	MC	1.0174	0.57	0.26
39	MC	1.3254	0.51	0.42
40	MC	2.4646	0.29	0.36
41	MC	1.5591	0.46	0.49
42	MC	0.0324	0.75	0.35

Reading Comprehension Form U Grade 5 Item Analysis

Multiple-choice Items

PC = Proportion Correct

RPB = Point-biserial correlation for keyed answer

A – D = Proportion answering each distractor; answer key is shaded

Open-ended Items

Mean = Mean OE score

Corr = Item-total correlation

0 – 2 = Percent of students at each score point

Item	Type	Rasch	PC/Mean	RPB/Corr
1	OE	-0.9897	1.52	0.27
2	MC	-0.2338	0.76	0.25
3	MC	-0.8545	0.84	0.39
4	MC	-0.3428	0.78	0.29
5	MC	-1.7851	0.93	0.33
6	MC	-1.8915	0.93	0.33
7	MC	-1.0377	0.86	0.31
8	OE	-0.2277	1.38	0.30
9	OE	-0.4296	1.55	0.37
10	MC	0.6289	0.61	0.38
11	MC	-0.2557	0.76	0.41
12	MC	0.3049	0.67	0.29
13	MC	-0.1934	0.75	0.45
14	MC	-0.2097	0.75	0.31
15	OE	-0.1399	1.48	0.44
16	OE	0.0316	1.47	0.34
17	MC	-2.4489	0.96	0.28
18	MC	0.3992	0.65	0.22
19	MC	-0.4174	0.79	0.44
20	MC	-2.1882	0.95	0.22
21	MC	-1.3827	0.90	0.36
22	MC	-1.9951	0.94	0.33
23	OE	-1.1812	1.78	0.43
24	OE	-0.2585	1.57	0.44
25	OE	-0.0969	1.38	0.40
26	OE	-0.2751	1.46	0.43
27	MC	-1.4909	0.90	0.44
28	MC	-1.2778	0.89	0.33

Item	Type	Rasch	PC/Mean	RPB/Corr
29	MC	0.0796	0.71	0.21
30	MC	0.5138	0.63	0.36
31	MC	-0.7336	0.83	0.33

Degree of Reading Power Form U Grade 5 Item Analysis

Multiple-choice Items

PC = Proportion Correct

RPB = Point-biserial correlation for keyed answer

A– E = Proportion answering each distractor; answer key is shaded

Item	Type	Rasch	PC	RPB
1	MC	-2.2706	0.95	0.26
2	MC	-0.4687	0.79	0.44
3	MC	-1.7220	0.92	0.22
4	MC	-1.4352	0.90	0.31
5	MC	-0.5398	0.80	0.41
6	MC	-0.2889	0.77	0.30
7	MC	0.1646	0.69	0.42
8	MC	0.0891	0.71	0.29
9	MC	-0.4515	0.79	0.50
10	MC	0.0970	0.70	0.43
11	MC	-0.6088	0.81	0.41
12	MC	0.2665	0.67	0.41
13	MC	-1.3139	0.89	0.39
14	MC	0.8836	0.56	0.56
15	MC	-2.6470	0.97	0.31
16	MC	1.0351	0.52	0.49
17	MC	0.2339	0.68	0.45
18	MC	0.0734	0.71	0.56
19	MC	1.1924	0.49	0.42
20	MC	2.4717	0.26	0.34
21	MC	-0.2163	0.76	0.54
22	MC	1.5669	0.42	0.33
23	MC	2.6165	0.23	0.25
24	MC	-0.0106	0.72	0.40
25	MC	-0.4950	0.80	0.44
26	MC	1.6829	0.40	0.21
27	MC	-0.2679	0.76	0.42
28	MC	-0.1771	0.75	0.51
29	MC	2.1610	0.31	0.31
30	MC	-0.1965	0.75	0.34
31	MC	2.2579	0.29	0.29
32	MC	1.3848	0.45	0.31

Item	Type	Rasch	PC	RPB
33	MC	0.5368	0.62	0.55
34	MC	1.0319	0.53	0.40
35	MC	0.0632	0.71	0.55
36	MC	1.3998	0.45	0.44
37	MC	1.5987	0.41	0.50
38	MC	1.0067	0.53	0.36
39	MC	1.0304	0.53	0.45
40	MC	0.9016	0.55	0.42
41	MC	1.7637	0.38	0.32
42	MC	1.2549	0.48	0.32
43	MC	1.7973	0.37	0.28
44	MC	0.8611	0.56	0.34
45	MC	1.1837	0.49	0.38
46	MC	1.0890	0.51	0.43
47	MC	1.2030	0.49	0.37
48	MC	0.5026	0.63	0.48
49	MC	1.3760	0.46	0.36

Reading Comprehension Form U Grade 6 Item Analysis

Multiple-choice Items

PC = Proportion Correct

RPB = Point-biserial correlation for keyed answer

A – D = Proportion answering each distractor; answer key is shaded

Open-ended Items

Mean = Mean OE score

Corr = Item-total correlation

0 – 2 = Percent of students at each score point

Item	Type	Rasch	PC/Mean	RPB/Corr
1	MC	-1.7227	0.93	0.33
2	MC	-1.1175	0.89	0.38
3	MC	-3.3790	0.99	0.23
4	MC	-0.4029	0.82	0.45
5	MC	-0.3524	0.81	0.29
6	OE	-0.3797	1.54	0.36
7	OE	-0.0713	1.46	0.38
8	OE	-0.3898	1.57	0.43
9	OE	0.5265	1.34	0.43
10	MC	-0.4303	0.82	0.25
11	MC	-0.0272	0.76	0.43
12	MC	-0.7096	0.85	0.29
13	MC	1.1851	0.55	0.32
14	MC	-2.0428	0.95	0.35
15	MC	-1.4452	0.92	0.39
16	OE	0.1744	1.43	0.41
17	OE	-1.5059	1.81	0.34
18	MC	-0.7525	0.86	0.29
19	MC	0.2009	0.73	0.15
20	MC	-0.8305	0.87	0.35
21	MC	-0.5482	0.83	0.31
22	MC	-0.3421	0.81	0.35
23	MC	0.3891	0.70	0.35
24	OE	-1.0019	1.71	0.35
25	OE	0.0394	1.48	0.36
26	MC	0.5695	0.67	0.18
27	MC	-1.8450	0.94	0.37
28	MC	-0.4616	0.82	0.32

Item	Type	Rasch	PC/Mean	RPB/Corr
29	MC	-0.8450	0.87	0.38
30	MC	-1.1972	0.90	0.41
31	OE	0.0866	1.47	0.48

Degree of Reading Power Form U Grade 6 Item Analysis

Multiple-choice Items

PC = Proportion Correct

RPB = Point-biserial correlation for keyed answer

A– E = Proportion answering each distractor; answer key is shaded

Item	Type	Rasch	PC	RPB
1	MC	-0.6239	0.84	0.43
2	MC	0.2080	0.73	0.29
3	MC	-0.4148	0.82	0.45
4	MC	-2.0968	0.95	0.29
5	MC	-0.4181	0.82	0.44
6	MC	-0.3668	0.81	0.50
7	MC	0.3705	0.70	0.45
8	MC	-0.6156	0.84	0.35
9	MC	-0.8961	0.87	0.29
10	MC	0.1834	0.73	0.45
11	MC	-0.9289	0.87	0.44
12	MC	-1.2064	0.90	0.43
13	MC	-0.9747	0.88	0.49
14	MC	-0.0181	0.76	0.46
15	MC	0.1047	0.74	0.37
16	MC	-0.2850	0.80	0.47
17	MC	1.0071	0.58	0.40
18	MC	-0.7400	0.86	0.47
19	MC	-0.6524	0.85	0.19
20	MC	0.0787	0.75	0.45
21	MC	1.2789	0.53	0.33
22	MC	0.4601	0.69	0.56
23	MC	0.2226	0.73	0.38
24	MC	1.0546	0.57	0.52
25	MC	-0.3919	0.82	0.45
26	MC	0.0124	0.76	0.57
27	MC	3.4074	0.17	0.06
28	MC	-0.5154	0.83	0.49
29	MC	2.5959	0.28	0.25
30	MC	0.6757	0.65	0.51
31	MC	0.2187	0.73	0.46
32	MC	0.7523	0.63	0.53

Item	Type	Rasch	PC	RPB
33	MC	1.5529	0.48	0.37
34	MC	-0.5096	0.83	0.48
35	MC	0.5234	0.67	0.52
36	MC	1.5030	0.49	0.32
37	MC	0.5658	0.67	0.47
38	MC	1.4245	0.50	0.39
39	MC	0.6548	0.65	0.54
40	MC	1.7946	0.43	0.42
41	MC	0.9871	0.59	0.41
42	MC	0.3310	0.71	0.52
43	MC	1.8917	0.41	0.21
44	MC	0.5074	0.68	0.43
45	MC	0.7752	0.63	0.35
46	MC	2.1406	0.36	0.26
47	MC	1.6279	0.46	0.43
48	MC	0.4262	0.69	0.44
49	MC	0.7382	0.64	0.44

Reading Comprehension Form U Grade 7 Item Analysis

Multiple-choice Items

PC = Proportion Correct

RPB = Point-biserial correlation for keyed answer

A – D = Proportion answering each distractor; answer key is shaded

Open-ended Items

Mean = Mean OE score

Corr = Item-total correlation

0 – 2 = Percent of students at each score point

Item	Type	Rasch	PC/Mean	RPB/Corr
1	OE	-0.3195	1.71	0.40
2	MC	-0.1621	0.82	0.42
3	MC	-0.4578	0.86	0.17
4	MC	0.9663	0.65	0.07
5	MC	-1.8774	0.96	0.31
6	MC	-1.1033	0.91	0.34
7	OE	-0.2764	1.65	0.38
8	OE	0.5614	1.45	0.55
9	MC	-0.0404	0.81	0.38
10	MC	1.0448	0.63	0.41
11	MC	3.1326	0.25	0.09
12	MC	-0.1798	0.82	0.30
13	MC	1.1811	0.61	0.20
14	MC	-0.4163	0.85	0.44
15	MC	-0.9171	0.90	0.33
16	OE	0.1376	1.49	0.48
17	OE	0.4675	1.46	0.43
18	OE	-0.9805	1.73	0.28
19	MC	-1.0224	0.91	0.26
20	MC	0.1828	0.78	0.37
21	MC	-0.3349	0.84	0.37
22	MC	-1.1008	0.91	0.40
23	OE	-0.0431	1.55	0.42
24	OE	-0.5450	1.72	0.50
25	MC	-0.4602	0.86	0.38
26	MC	-0.1083	0.82	0.29
27	MC	0.7915	0.68	0.42
28	MC	0.1186	0.78	0.45

Item	Type	Rasch	PC/Mean	RPB/Corr
29	OE	-0.4796	1.65	0.39
30	OE	-0.1298	1.58	0.42

Degree of Reading Power Form U Grade 7 Item Analysis

Multiple-choice Items

PC = Proportion Correct

RPB = Point-biserial correlation for keyed answer

A– E = Proportion answering each distractor; answer key is shaded

Item	Type	Rasch	PC	RPB
1	MC	-0.0429	0.81	0.50
2	MC	0.0969	0.79	0.33
3	MC	-0.0258	0.80	0.31
4	MC	0.2679	0.76	0.48
5	MC	-1.9627	0.96	0.27
6	MC	-1.5036	0.94	0.32
7	MC	-2.0068	0.96	0.35
8	MC	-0.2162	0.83	0.38
9	MC	0.1356	0.78	0.43
10	MC	0.3917	0.74	0.49
11	MC	-0.2429	0.83	0.32
12	MC	-1.3984	0.93	0.43
13	MC	-1.0049	0.91	0.39
14	MC	0.0981	0.79	0.51
15	MC	-0.4978	0.86	0.29
16	MC	-0.3803	0.85	0.47
17	MC	0.3022	0.76	0.36
18	MC	-1.0228	0.91	0.38
19	MC	4.6693	0.08	0.16
20	MC	-0.8497	0.89	0.46
21	MC	1.3854	0.57	0.41
22	MC	2.0833	0.43	0.31
23	MC	1.3169	0.58	0.52
24	MC	1.0413	0.63	0.23
25	MC	0.6142	0.71	0.44
26	MC	0.9977	0.64	0.49
27	MC	0.5157	0.72	0.45
28	MC	0.0545	0.79	0.53
29	MC	-0.8970	0.90	0.47
30	MC	1.0056	0.64	0.50
31	MC	1.9561	0.45	0.48
32	MC	0.4531	0.73	0.51

Item	Type	Rasch	PC	RPB
33	MC	1.0506	0.63	0.52
34	MC	1.1914	0.60	0.29
35	MC	-0.1567	0.82	0.53
36	MC	1.3268	0.58	0.43
37	MC	2.5111	0.35	0.21
38	MC	1.1487	0.61	0.39
39	MC	0.9763	0.64	0.52
40	MC	1.0629	0.63	0.28
41	MC	1.0536	0.63	0.43
42	MC	0.5088	0.73	0.54
43	MC	1.4532	0.55	0.43
44	MC	0.7700	0.68	0.48
45	MC	1.4687	0.55	0.44
46	MC	1.7271	0.50	0.37
47	MC	1.5637	0.53	0.38
48	MC	2.5069	0.35	0.40
49	MC	2.8173	0.30	0.38

Reading Comprehension Form U Grade 8 Item Analysis

Multiple-choice Items

PC = Proportion Correct

RPB = Point-biserial correlation for keyed answer

A – D = Proportion answering each distractor; answer key is shaded

Open-ended Items

Mean = Mean OE score

Corr = Item-total correlation

0 – 2 = Percent of students at each score point

Item	Type	Rasch	PC/Mean	RPB/Corr
1	OE	0.3416	1.53	0.54
2	OE	0.2753	1.56	0.51
3	MC	1.1058	0.63	0.23
4	MC	-1.9565	0.96	0.31
5	OE	0.2375	1.55	0.48
6	OE	-0.3247	1.63	0.42
7	MC	0.4000	0.75	0.27
8	MC	1.4058	0.58	0.30
9	MC	2.9072	0.30	0.27
10	MC	0.4817	0.74	0.41
11	MC	0.2945	0.77	0.31
12	MC	0.9844	0.66	0.47
13	MC	1.1905	0.62	0.38
14	OE	0.5424	1.49	0.49
15	OE	0.0572	1.56	0.45
16	MC	0.2177	0.78	0.32
17	MC	-0.3935	0.85	0.40
18	MC	-1.0232	0.91	0.25
19	MC	-0.9033	0.90	0.39
20	MC	-1.5896	0.94	0.28
21	MC	0.2951	0.77	0.30
22	MC	0.5639	0.73	0.42
23	OE	-0.8789	1.75	0.41
24	OE	-0.4970	1.62	0.43
25	MC	-0.5653	0.87	0.17
26	MC	-2.4559	0.97	0.22
27	MC	1.6455	0.53	0.38
28	MC	1.3188	0.60	0.29

Item	Type	Rasch	PC/Mean	RPB/Corr
29	OE	-0.1261	1.50	0.42
30	OE	0.0076	1.48	0.45

Degree of Reading Power Form U Grade 8 Item Analysis

Multiple-choice Items

PC = Proportion Correct

RPB = Point-biserial correlation for keyed answer

A– E = Proportion answering each distractor; answer key is shaded

Item	Type	Rasch	PC	RPB
1	MC	-1.3362	0.93	0.28
2	MC	0.2600	0.77	0.39
3	MC	-0.1172	0.82	0.50
4	MC	-1.8420	0.95	0.29
5	MC	0.8948	0.67	0.24
6	MC	1.0950	0.64	0.25
7	MC	-1.8759	0.96	0.36
8	MC	-2.1627	0.97	0.34
9	MC	0.2720	0.77	0.44
10	MC	1.6426	0.53	0.29
11	MC	-1.2974	0.93	0.37
12	MC	0.2968	0.77	0.41
13	MC	0.1952	0.78	0.46
14	MC	-0.2688	0.84	0.46
15	MC	-0.7042	0.88	0.43
16	MC	-0.4609	0.86	0.53
17	MC	0.4225	0.75	0.53
18	MC	1.6861	0.53	0.24
19	MC	0.3199	0.76	0.36
20	MC	-0.4481	0.86	0.31
21	MC	1.1024	0.64	0.51
22	MC	0.2614	0.77	0.58
23	MC	0.7100	0.70	0.47
24	MC	0.0586	0.80	0.51
25	MC	1.0577	0.64	0.57
26	MC	0.7034	0.70	0.56
27	MC	2.0220	0.46	0.53
28	MC	-0.0231	0.81	0.57
29	MC	1.9345	0.48	0.28
30	MC	2.2071	0.43	0.36
31	MC	1.1279	0.63	0.28
32	MC	0.1387	0.79	0.52

Item	Type	Rasch	PC	RPB
33	MC	0.7573	0.70	0.47
34	MC	0.6686	0.71	0.57
35	MC	0.8481	0.68	0.49
36	MC	0.5228	0.73	0.53
37	MC	0.9203	0.67	0.59
38	MC	1.7603	0.51	0.53
39	MC	1.3826	0.58	0.58
40	MC	0.5560	0.73	0.54
41	MC	0.9471	0.66	0.65
42	MC	0.6574	0.71	0.61
43	MC	1.6206	0.54	0.52
44	MC	0.4106	0.75	0.47
45	MC	0.5009	0.74	0.63
46	MC	1.0529	0.64	0.35
47	MC	1.2216	0.61	0.42
48	MC	0.5860	0.72	0.52
49	MC	2.0115	0.46	0.41

Editing and Revising Form U Grade 3 Item Analysis

Multiple-choice Items

PC = Proportion Correct

RPB = Point-biserial correlation for keyed answer

A – D = Proportion answering each distractor; answer key is shaded

Item	Type	Rasch	PC	RPB
1	MC	0.9535	0.52	0.29
2	MC	-0.5812	0.82	0.33
3	MC	0.3589	0.62	0.31
4	MC	-0.8994	0.83	0.35
5	MC	-1.2166	0.89	0.29
6	MC	1.4114	0.41	0.20
7	MC	-0.3210	0.75	0.47
8	MC	-0.6598	0.78	0.45
9	MC	-1.5140	0.88	0.44
10	MC	-0.9376	0.85	0.40
11	MC	-1.7227	0.89	0.34
12	MC	-1.5490	0.91	0.46
13	MC	2.3402	0.31	0.28
14	MC	-0.7058	0.81	0.48
15	MC	-0.9120	0.86	0.31
16	MC	-0.4376	0.77	0.42
17	MC	-1.0565	0.83	0.29
18	MC	-0.0006	0.69	0.46
19	MC	-0.2315	0.78	0.34
20	MC	1.1321	0.48	0.28
21	MC	0.1618	0.65	0.43
22	MC	-0.4622	0.77	0.42
23	MC	0.0693	0.69	0.47
24	MC	0.0512	0.70	0.44
25	MC	0.2001	0.67	0.34
26	MC	-1.2020	0.88	0.49
27	MC	1.4252	0.40	0.26
28	MC	1.4810	0.44	0.35
29	MC	-0.3650	0.79	0.42
30	MC	-0.4202	0.76	0.47
31	MC	-1.1826	0.85	0.40
32	MC	-0.0500	0.72	0.31

Editing and Revising Form U Grade 4 Item Analysis

Multiple-choice Items

PC = Proportion Correct

RPB = Point-biserial correlation for keyed answer

A – D = Proportion answering each distractor; answer key is shaded

Item	Type	Rasch	PC	RPB
1	MC	-0.6074	0.84	0.41
2	MC	0.8778	0.62	0.43
3	MC	-1.5714	0.93	0.31
4	MC	-0.9371	0.86	0.42
5	MC	0.1505	0.70	0.27
6	MC	-0.8791	0.87	0.37
7	MC	0.5188	0.67	0.39
8	MC	-0.1064	0.77	0.38
9	MC	-1.0326	0.88	0.49
10	MC	-0.8555	0.88	0.35
11	MC	1.1900	0.58	0.43
12	MC	0.4635	0.69	0.45
13	MC	-0.2982	0.82	0.29
14	MC	0.5792	0.67	0.37
15	MC	-0.5783	0.84	0.43
16	MC	-1.9838	0.95	0.37
17	MC	-1.0482	0.91	0.42
18	MC	0.5992	0.63	0.47
19	MC	-0.5374	0.85	0.45
20	MC	-0.8743	0.88	0.36
21	MC	-1.2457	0.89	0.40
22	MC	-0.3577	0.78	0.40
23	MC	-0.1935	0.77	0.44
24	MC	-0.6242	0.83	0.37
25	MC	-1.2573	0.92	0.37
26	MC	1.0187	0.59	0.52
27	MC	0.6049	0.66	0.41
28	MC	0.9377	0.58	0.27
29	MC	0.8285	0.64	0.41
30	MC	0.4371	0.73	0.32
31	MC	-0.6711	0.85	0.32
32	MC	2.3593	0.35	0.25

Editing and Revising Form U Grade 5 Item Analysis

Multiple-choice Items

PC = Proportion Correct

RPB = Point-biserial correlation for keyed answer

A – D = Proportion answering each distractor; answer key is shaded

Item	Type	Rasch	PC	RPB
1	MC	-2.8183	0.97	0.27
2	MC	-0.3811	0.80	0.32
3	MC	-0.7235	0.85	0.45
4	MC	-0.5816	0.85	0.26
5	MC	1.7346	0.38	0.32
6	MC	-0.8064	0.89	0.33
7	MC	0.9521	0.53	0.40
8	MC	1.5456	0.47	0.18
9	MC	0.7797	0.52	0.38
10	MC	0.6801	0.61	0.28
11	MC	-0.8308	0.87	0.45
12	MC	-1.0697	0.88	0.43
13	MC	0.0928	0.71	0.33
14	MC	0.1097	0.74	0.31
15	MC	0.7225	0.52	0.13
16	MC	-0.7158	0.85	0.47
17	MC	-1.1554	0.90	0.40
18	MC	1.1428	0.51	0.26
19	MC	-0.5816	0.82	0.19
20	MC	0.1459	0.71	0.41
21	MC	-0.2676	0.79	0.53
22	MC	0.6901	0.63	0.30
23	MC	-1.3743	0.91	0.29
24	MC	-0.3910	0.82	0.47
25	MC	-0.0925	0.79	0.47
26	MC	0.0360	0.74	0.36
27	MC	0.7001	0.60	0.37
28	MC	0.6399	0.63	0.39
29	MC	0.9325	0.54	0.28
30	MC	-0.4347	0.79	0.52
31	MC	0.6550	0.60	0.32
32	MC	0.4068	0.66	0.39

Item	Type	Rasch	PC	RPB
33	MC	-1.3357	0.92	0.35
34	MC	1.1869	0.50	0.17
35	MC	-0.0717	0.75	0.38
36	MC	-0.4585	0.81	0.40

Editing and Revising Form U Grade 6 Item Analysis

Multiple-choice Items

PC = Proportion Correct

RPB = Point-biserial correlation for keyed answer

A – D = Proportion answering each distractor; answer key is shaded

Item	Type	Rasch	PC	RPB
1	MC	0.1738	0.69	0.35
2	MC	-0.0411	0.77	0.27
3	MC	-1.5198	0.91	0.35
4	MC	0.8246	0.65	0.35
5	MC	0.0745	0.74	0.26
6	MC	-0.2804	0.80	0.27
7	MC	1.7615	0.52	0.46
8	MC	-0.2554	0.82	0.41
9	MC	0.2822	0.70	0.43
10	MC	-0.7249	0.87	0.37
11	MC	-0.8514	0.86	0.41
12	MC	-0.7205	0.87	0.36
13	MC	-0.2133	0.79	0.42
14	MC	-0.7558	0.83	0.39
15	MC	0.4451	0.68	0.37
16	MC	-0.7425	0.86	0.46
17	MC	0.4308	0.71	0.38
18	MC	0.3703	0.73	0.25
19	MC	0.7925	0.60	0.39
20	MC	-2.7973	0.97	0.23
21	MC	-0.7381	0.84	0.28
22	MC	-0.1445	0.75	0.29
23	MC	-1.5766	0.94	0.34
24	MC	0.3177	0.72	0.39
25	MC	0.5102	0.70	0.42
26	MC	0.5550	0.63	0.40
27	MC	-0.0906	0.79	0.53
28	MC	0.6654	0.59	0.30
29	MC	0.3059	0.70	0.42
30	MC	-0.4127	0.84	0.51
31	MC	0.5102	0.70	0.45
32	MC	-0.3457	0.77	0.41

Item	Type	Rasch	PC	RPB
33	MC	-0.3901	0.81	0.41
34	MC	1.0539	0.63	0.50
35	MC	-0.4127	0.83	0.42
36	MC	-0.7736	0.83	0.40

Editing and Revising Form U Grade 7 Item Analysis

Multiple-choice Items

PC = Proportion Correct

RPB = Point-biserial correlation for keyed answer

A – D = Proportion answering each distractor; answer key is shaded

Item	Type	Rasch	PC	RPB
1	MC	0.4412	0.67	0.24
2	MC	-0.3492	0.77	0.36
3	MC	0.8599	0.58	0.39
4	MC	-0.7903	0.76	0.33
5	MC	-1.0277	0.88	0.25
6	MC	-2.0569	0.95	0.35
7	MC	-1.3634	0.90	0.34
8	MC	-1.9585	0.93	0.37
9	MC	0.3607	0.66	0.27
10	MC	-0.1074	0.75	0.38
11	MC	0.4494	0.61	0.27
12	MC	-0.7036	0.85	0.33
13	MC	0.3073	0.66	0.33
14	MC	0.0985	0.72	0.22
15	MC	-0.0633	0.74	0.41
16	MC	0.8599	0.55	0.32
17	MC	-2.7202	0.97	0.24
18	MC	-2.1834	0.95	0.32
19	MC	-1.9158	0.94	0.34
20	MC	-0.7485	0.86	0.32
21	MC	0.7447	0.59	0.45
22	MC	-0.2240	0.79	0.43
23	MC	-0.7903	0.83	0.49
24	MC	2.8921	0.20	0.21
25	MC	-0.5029	0.80	0.46
26	MC	-0.2909	0.79	0.42
27	MC	-1.0087	0.88	0.39
28	MC	-0.2240	0.82	0.34
29	MC	-0.6915	0.79	0.30
30	MC	1.1838	0.47	0.11
31	MC	0.3073	0.65	0.20
32	MC	-0.3946	0.80	0.46

Item	Type	Rasch	PC	RPB
33	MC	-0.0167	0.72	0.46
34	MC	0.5610	0.60	0.43
35	MC	0.3186	0.65	0.28
36	MC	-0.7362	0.85	0.46
37	MC	-0.0136	0.77	0.35
38	MC	0.2561	0.70	0.46
39	MC	0.5177	0.63	0.32
40	MC	1.1734	0.48	0.20

Editing and Revising Form U Grade 8 Item Analysis

Multiple-choice Items

PC = Proportion Correct

RPB = Point-biserial correlation for keyed answer

A – D = Proportion answering each distractor; answer key is shaded

Item	Type	Rasch	PC	RPB
1	MC	-1.5912	0.92	0.38
2	MC	-1.5841	0.93	0.37
3	MC	0.8714	0.61	0.26
4	MC	0.2831	0.70	0.51
5	MC	-1.0622	0.90	0.39
6	MC	0.9365	0.52	0.27
7	MC	0.2149	0.72	0.26
8	MC	-1.5151	0.91	0.31
9	MC	-0.8343	0.83	0.21
10	MC	-1.7249	0.92	0.39
11	MC	-1.5561	0.92	0.12
12	MC	0.4863	0.70	0.50
13	MC	0.2091	0.68	0.29
14	MC	0.4675	0.65	0.37
15	MC	-2.0387	0.94	0.27
16	MC	1.5829	0.48	0.28
17	MC	-0.2230	0.71	0.19
18	MC	0.2775	0.67	0.32
19	MC	-0.4694	0.81	0.44
20	MC	-0.0642	0.74	0.12
21	MC	0.6053	0.65	0.29
22	MC	0.5316	0.66	0.56
23	MC	1.9715	0.42	0.36
24	MC	-1.1885	0.89	0.43
25	MC	-1.0221	0.87	0.44
26	MC	0.2264	0.67	0.29
27	MC	-0.5373	0.80	0.43
28	MC	-0.5069	0.81	0.35
29	MC	0.0979	0.73	0.50
30	MC	0.8563	0.55	0.34
31	MC	0.9514	0.56	0.44
32	MC	-0.2908	0.78	0.49

Item	Type	Rasch	PC	RPB
33	MC	0.1511	0.71	0.17
34	MC	-0.0990	0.72	0.43
35	MC	0.1364	0.70	0.36
36	MC	0.0979	0.73	0.38
37	MC	0.2378	0.73	0.28
38	MC	0.8789	0.59	0.20
39	MC	0.3056	0.71	0.36
40	MC	-1.3134	0.90	0.38

Direct Assessment of Writing Form U Item Analysis

Extended Response

Mean = Mean EX score

Corr = Item-total correlation

2 – 12 = Percent of students at each score point

Grade	Rasch	Mean	Corr	2	3	4	5	6	7	8	9	10	11	12
3	0.3346	8.33	0.53	0.01	0.00	0.02	0.02	0.09	0.11	0.32	0.18	0.15	0.07	0.03
4	0.5536	8.53	0.53	0.00	0.00	0.01	0.01	0.06	0.07	0.39	0.20	0.17	0.06	0.02
5	0.5081	8.26	0.49	0.00	0.00	0.01	0.01	0.08	0.11	0.40	0.19	0.12	0.05	0.02
6	0.7808	8.31	0.54	0.00	0.00	0.02	0.01	0.09	0.10	0.36	0.18	0.16	0.05	0.02
7	0.5485	8.17	0.60	0.00	0.00	0.02	0.02	0.11	0.10	0.38	0.18	0.12	0.05	0.02
8	0.3649	8.62	0.58	0.00	0.00	0.01	0.01	0.06	0.06	0.39	0.19	0.18	0.08	0.03

Science Form U Grade 5 Item Analysis

Multiple-choice Items

PC = Proportion Correct

RPB = Point-biserial correlation for keyed answer

A – D = Proportion answering each distractor; answer key is shaded

Open-ended Items

Mean = Mean OE score

Corr = Item-total correlation

0 – 2 = Percent of students at each score point

Item	Type	Rasch	PC/Mean	RPB/Corr
1	MC	-1.0181	0.87	0.13
2	MC	-0.5191	0.81	0.46
3	MC	-0.1522	0.76	0.42
4	MC	1.8595	0.39	0.12
5	MC	0.3839	0.67	0.41
6	MC	-0.4298	0.80	0.59
7	MC	-1.4488	0.91	0.39
8	MC	-1.3308	0.90	0.37
9	MC	-0.8603	0.85	0.36
10	MC	0.7968	0.60	0.25
11	MC	-1.3022	0.89	0.48
12	MC	1.0422	0.55	0.22
13	MC	0.3832	0.67	0.21
14	MC	0.1323	0.72	0.25
15	MC	-0.8458	0.85	0.34
16	MC	-1.0695	0.87	0.47
17	MC	-0.5005	0.81	0.39
18	MC	-1.0016	0.87	0.52
19	MC	1.4659	0.47	0.18
20	OE	0.2482	1.27	0.46
21	OE	-0.4096	1.67	0.40
22	OE	0.1854	1.51	0.54
23	MC	-0.9905	0.87	0.45
24	MC	-1.1467	0.88	0.43
25	MC	-0.1634	0.76	0.31
26	MC	0.1971	0.71	0.45
27	MC	-0.1620	0.76	0.54
28	MC	1.2768	0.50	0.21

Item	Type	Rasch	PC/Mean	RPB/Corr
29	MC	-1.1996	0.89	0.53
30	MC	0.6529	0.63	0.38
31	MC	0.9484	0.57	0.44
32	MC	-0.6027	0.82	0.35
33	MC	-0.3153	0.79	0.37
34	MC	2.2426	0.32	0.37
35	MC	0.4484	0.66	0.24
36	MC	1.0506	0.55	0.41
37	MC	-0.0151	0.74	0.44
38	MC	-0.2891	0.78	0.42
39	MC	-1.3793	0.90	0.36

Science Form U Grade 8 Item Analysis

Multiple-choice Items

PC = Proportion Correct

RPB = Point-biserial correlation for keyed answer

A – D = Proportion answering each distractor; answer key is shaded

Open-ended Items

Mean = Mean OE score

Corr = Item-total correlation

0 – 2 = Percent of students at each score point

Item	Type	Rasch	PC/Mean	RPB/Corr
1	MC	-0.8436	0.81	0.50
2	MC	-1.0623	0.84	0.36
3	MC	-1.7597	0.91	0.42
4	MC	-0.9921	0.83	0.37
5	MC	0.5024	0.59	0.34
6	MC	1.2026	0.45	0.36
7	MC	0.4136	0.61	0.20
8	MC	0.4347	0.61	0.37
9	MC	-1.6674	0.90	0.39
10	MC	-0.9190	0.82	0.36
11	MC	-0.8720	0.82	0.42
12	MC	0.1901	0.65	0.40
13	MC	-0.1414	0.71	0.29
14	MC	-0.5035	0.77	0.43
15	MC	-0.4317	0.76	0.42
16	MC	-0.6629	0.79	0.51
17	MC	-0.8177	0.81	0.54
18	MC	0.1216	0.66	0.45
19	MC	-0.0293	0.69	0.31
20	MC	-0.9763	0.83	0.44
21	MC	-0.2659	0.73	0.44
22	MC	-1.3656	0.87	0.40
23	OE	0.0790	1.36	0.59
24	OE	0.6490	1.13	0.58
25	OE	1.5644	0.79	0.45
26	MC	0.0740	0.67	0.33
27	MC	0.2725	0.64	0.32
28	MC	-0.8751	0.82	0.47

Item	Type	Rasch	PC/Mean	RPB/Corr
29	MC	0.8887	0.52	0.23
30	MC	0.0835	0.67	0.31
31	MC	0.3338	0.63	0.34
32	MC	0.8674	0.52	0.39
33	MC	-0.1290	0.71	0.38
34	MC	-0.8639	0.82	0.36
35	MC	0.6584	0.56	0.27
36	MC	1.1021	0.47	0.24
37	MC	0.8828	0.52	0.31
38	MC	0.6778	0.56	0.34
39	MC	1.5842	0.38	0.22
40	MC	-0.3588	0.75	0.58
41	MC	0.8964	0.52	0.34
42	MC	-0.4278	0.76	0.46
43	MC	-0.1124	0.71	0.42
44	MC	-1.0195	0.83	0.48
45	MC	-1.0475	0.84	0.30
46	MC	-0.8498	0.81	0.58
47	MC	-1.1906	0.85	0.37
48	MC	0.7971	0.54	0.33

Appendix C: Raw Score, Theta, Scale Score and Vertical Scale Score

Reading Grade 3 Form U

Raw Score	Theta	Scale Score	Vertical Scale Score
0	-6.3223	100	235
1	-5.0917	100	240
2	-4.3615	100	245
3	-3.9198	100	250
4	-3.5967	100	255
5	-3.3389	100	260
6	-3.1226	100	265
7	-2.9348	105	269
8	-2.7682	111	274
9	-2.6177	117	279
10	-2.4800	122	285
11	-2.3526	126	288
12	-2.2338	131	295
13	-2.1222	135	299
14	-2.0167	139	303
15	-1.9164	142	307
16	-1.8207	146	312
17	-1.7290	149	316
18	-1.6408	152	320
19	-1.5558	155	323
20	-1.4736	158	328
21	-1.3938	161	331
22	-1.3164	164	335
23	-1.2409	167	339
24	-1.1672	169	341
25	-1.0952	172	345
26	-1.0246	174	348
27	-0.9554	177	350
28	-0.8874	179	353

Raw Score	Theta	Scale Score	Vertical Scale Score
29	-0.8205	182	358
30	-0.7546	184	360
31	-0.6895	186	362
32	-0.6252	189	366
33	-0.5615	191	369
34	-0.4985	193	371
35	-0.4359	196	375
36	-0.3737	198	377
37	-0.3120	200	379
38	-0.2504	202	382
39	-0.1891	204	384
40	-0.1278	207	388
41	-0.0666	209	391
42	-0.0053	211	393
43	0.0560	213	395
44	0.1175	216	399
45	0.1793	218	401
46	0.2415	220	404
47	0.3040	222	407
48	0.3669	225	410
49	0.4304	227	413
50	0.4946	229	415
51	0.5594	231	417
52	0.6250	234	421
53	0.6915	236	424
54	0.7590	239	427
55	0.8274	241	430
56	0.8971	244	434
57	0.9680	246	436

Raw Score	Theta	Scale Score	Vertical Scale Score
58	1.0403	249	440
59	1.1140	251	443
60	1.1895	254	446
61	1.2667	257	450
62	1.3458	260	454
63	1.4271	263	458
64	1.5107	266	462
65	1.5970	269	465
66	1.6861	272	468
67	1.7784	275	472
68	1.8742	279	477
69	1.9741	282	481
70	2.0787	286	485
71	2.1883	290	489
72	2.3041	294	494
73	2.4270	299	499
74	2.5583	304	503
75	2.6997	309	508
76	2.8537	314	511
77	3.0235	320	515
78	3.2140	327	519
79	3.4328	335	523
80	3.6925	344	527
81	4.0169	356	531
82	4.4591	372	536
83	5.1889	398	541
84	17.6928	400	542

Reading Grade 4 Form U

Raw Score	Theta	Scale Score	Vertical Scale Score
0	-6.2656	100	250
1	-5.0407	100	255
2	-4.3177	100	260
3	-3.8825	100	265
4	-3.5653	100	269
5	-3.3126	100	275
6	-3.1009	100	279
7	-2.9174	100	284
8	-2.7545	104	289
9	-2.6074	110	293
10	-2.4727	115	298
11	-2.3481	120	303
12	-2.2318	124	308
13	-2.1223	128	312
14	-2.0188	132	317
15	-1.9203	136	321
16	-1.8262	140	326
17	-1.7359	143	330
18	-1.6490	147	334
19	-1.5651	150	337
20	-1.4837	153	341
21	-1.4048	156	344
22	-1.3280	159	348
23	-1.2531	162	352
24	-1.1800	164	354
25	-1.1084	167	357
26	-1.0381	170	361
27	-0.9692	173	364
28	-0.9014	175	366

Raw Score	Theta	Scale Score	Vertical Scale Score
29	-0.8346	178	370
30	-0.7688	180	372
31	-0.7038	183	376
32	-0.6395	185	378
33	-0.5759	188	382
34	-0.5129	190	384
35	-0.4505	192	387
36	-0.3884	195	390
37	-0.3267	197	392
38	-0.2654	200	396
39	-0.2043	202	398
40	-0.1434	204	400
41	-0.0826	207	404
42	-0.0218	209	406
43	0.0389	211	409
44	0.0998	214	412
45	0.1607	216	414
46	0.2219	218	417
47	0.2834	221	420
48	0.3451	223	423
49	0.4073	225	425
50	0.4700	228	429
51	0.5333	230	431
52	0.5972	233	434
53	0.6619	235	436
54	0.7274	238	440
55	0.7939	240	442
56	0.8615	243	447
57	0.9302	245	449

Raw Score	Theta	Scale Score	Vertical Scale Score
58	1.0003	248	452
59	1.0718	251	455
60	1.1450	254	458
61	1.2200	257	463
62	1.2970	260	466
63	1.3761	263	470
64	1.4577	266	473
65	1.5421	269	476
66	1.6296	272	480
67	1.7204	276	484
68	1.8151	279	488
69	1.9142	283	493
70	2.0182	287	498
71	2.1280	291	501
72	2.2444	296	507
73	2.3686	301	511
74	2.5022	306	516
75	2.6469	311	520
76	2.8055	317	524
77	2.9817	324	528
78	3.1808	332	533
79	3.4111	341	536
80	3.6860	351	541
81	4.0310	364	545
82	4.5012	382	548
83	5.2697	400	552
84	17.8299	400	553

Reading Grade 5 Form U

Raw Score	Theta	Scale Score	Vertical Scale Score
0	-6.5992	100	275
1	-5.3735	100	279
2	-4.6497	100	284
3	-4.2138	100	287
4	-3.8960	100	291
5	-3.6429	100	296
6	-3.4309	100	300
7	-3.2474	100	304
8	-3.0846	100	308
9	-2.9377	100	312
10	-2.8035	102	317
11	-2.6795	107	322
12	-2.5639	111	326
13	-2.4554	115	330
14	-2.3530	119	334
15	-2.2557	122	338
16	-2.1630	126	344
17	-2.0744	129	347
18	-1.9892	132	350
19	-1.9072	135	354
20	-1.8280	138	358
21	-1.7514	141	361
22	-1.6770	144	364
23	-1.6047	147	369
24	-1.5343	149	371
25	-1.4656	152	374
26	-1.3985	154	377
27	-1.3328	157	380
28	-1.2685	159	382
29	-1.2053	162	386
30	-1.1434	164	388
31	-1.0824	166	391
32	-1.0223	169	393
33	-0.9632	171	396

Raw Score	Theta	Scale Score	Vertical Scale Score
34	-0.9048	173	398
35	-0.8472	175	401
36	-0.7902	177	403
37	-0.7338	179	406
38	-0.6780	181	408
39	-0.6227	183	410
40	-0.5678	186	414
41	-0.5134	188	416
42	-0.4593	190	419
43	-0.4055	192	421
44	-0.3520	194	423
45	-0.2987	196	425
46	-0.2456	198	429
47	-0.1926	200	431
48	-0.1397	202	433
49	-0.0870	204	436
50	-0.0341	205	437
51	0.0186	207	439
52	0.0715	209	442
53	0.1245	211	444
54	0.1775	213	446
55	0.2308	215	449
56	0.2843	217	451
57	0.3380	219	454
58	0.3921	221	456
59	0.4465	223	457
60	0.5012	226	461
61	0.5565	228	464
62	0.6122	230	466
63	0.6685	232	469
64	0.7254	234	471
65	0.7830	236	473
66	0.8413	238	475
67	0.9004	240	478

Raw Score	Theta	Scale Score	Vertical Scale Score
68	0.9603	243	481
69	1.0213	245	484
70	1.0832	247	486
71	1.1464	250	490
72	1.2108	252	492
73	1.2765	254	495
74	1.3437	257	498
75	1.4126	260	502
76	1.4833	262	504
77	1.5559	265	507
78	1.6308	268	511
79	1.7081	271	514
80	1.7882	274	517
81	1.8713	277	521
82	1.9577	280	525
83	2.0482	283	528
84	2.1431	287	532
85	2.2430	291	537
86	2.3489	295	541
87	2.4619	299	544
88	2.5832	303	547
89	2.7145	308	551
90	2.8584	314	555
91	3.0181	320	558
92	3.1985	326	562
93	3.4073	334	566
94	3.6569	343	569
95	3.9713	355	573
96	4.4037	371	575
97	5.1239	398	579
98	6.3468	400	584

Reading Grade 6 Form U

Raw Score	Theta	Scale Score	Vertical Scale Score
0	-6.5190	100	285
1	-5.2878	100	289
2	-4.5578	100	293
3	-4.1176	100	297
4	-3.7968	100	301
5	-3.5420	100	305
6	-3.3291	100	309
7	-3.1454	100	314
8	-2.9831	102	318
9	-2.8371	107	322
10	-2.7042	112	326
11	-2.5817	116	330
12	-2.4680	120	334
13	-2.3615	124	338
14	-2.2613	128	343
15	-2.1663	131	347
16	-2.0761	134	350
17	-1.9899	138	356
18	-1.9073	141	359
19	-1.8278	143	361
20	-1.7513	146	365
21	-1.6772	149	369
22	-1.6055	152	372
23	-1.5358	154	375
24	-1.4680	157	378
25	-1.4019	159	381
26	-1.3374	161	384
27	-1.2743	164	387
28	-1.2125	166	389
29	-1.1518	168	392
30	-1.0922	170	394
31	-1.0337	172	397
32	-0.9760	174	399
33	-0.9191	176	402

Raw Score	Theta	Scale Score	Vertical Scale Score
34	-0.8631	178	404
35	-0.8076	180	407
36	-0.7529	182	409
37	-0.6987	184	411
38	-0.6450	186	414
39	-0.5917	188	416
40	-0.5389	190	418
41	-0.4864	192	421
42	-0.4343	194	423
43	-0.3824	196	426
44	-0.3307	198	429
45	-0.2793	200	431
46	-0.2280	201	432
47	-0.1768	203	434
48	-0.1257	205	437
49	-0.0746	207	439
50	-0.0236	209	441
51	0.0276	211	445
52	0.0787	213	447
53	0.1301	214	448
54	0.1815	216	450
55	0.2331	218	453
56	0.2850	220	455
57	0.3372	222	457
58	0.3896	224	460
59	0.4425	226	462
60	0.4957	228	465
61	0.5494	230	467
62	0.6037	232	469
63	0.6584	234	472
64	0.7138	236	474
65	0.7699	238	477
66	0.8267	240	480
67	0.8844	242	482

Raw Score	Theta	Scale Score	Vertical Scale Score
68	0.9430	244	485
69	1.0025	246	487
70	1.0632	248	489
71	1.1250	251	493
72	1.1881	253	495
73	1.2526	255	497
74	1.3187	258	501
75	1.3865	260	503
76	1.4561	263	507
77	1.5278	265	509
78	1.6019	268	513
79	1.6785	271	517
80	1.7580	273	520
81	1.8406	276	524
82	1.9269	280	527
83	2.0173	283	532
84	2.1123	286	536
85	2.2128	290	540
86	2.3195	294	544
87	2.4335	298	549
88	2.5564	302	552
89	2.6899	307	556
90	2.8365	313	561
91	2.9997	318	565
92	3.1845	325	569
93	3.3988	333	574
94	3.6553	342	578
95	3.9782	354	582
96	4.4212	370	585
97	5.1548	397	589
98	6.3891	400	594

Reading Grade 7 Form U

Raw Score	Theta	Scale Score	Vertical Scale Score
0	-6.4681	100	301
1	-5.2465	100	305
2	-4.5284	100	309
3	-4.0981	100	314
4	-3.7857	100	318
5	-3.5380	100	323
6	-3.3312	100	328
7	-3.1526	100	332
8	-2.9948	100	337
9	-2.8527	100	341
10	-2.7231	103	346
11	-2.6036	107	350
12	-2.4925	112	355
13	-2.3883	116	361
14	-2.2901	119	364
15	-2.1970	123	369
16	-2.1083	126	372
17	-2.0235	129	376
18	-1.9422	132	379
19	-1.8639	135	384
20	-1.7883	138	387
21	-1.7152	141	391
22	-1.6442	143	393
23	-1.5752	146	397
24	-1.5081	149	400
25	-1.4425	151	403
26	-1.3785	153	405
27	-1.3158	156	408
28	-1.2544	158	411
29	-1.1941	160	413
30	-1.1349	163	417
31	-1.0765	165	419
32	-1.0191	167	422
33	-0.9624	169	423

Raw Score	Theta	Scale Score	Vertical Scale Score
34	-0.9065	171	426
35	-0.8512	173	428
36	-0.7965	175	431
37	-0.7424	177	433
38	-0.6887	179	435
39	-0.6355	181	439
40	-0.5827	183	441
41	-0.5302	185	443
42	-0.4780	187	445
43	-0.4261	189	448
44	-0.3743	191	450
45	-0.3228	193	452
46	-0.2714	195	454
47	-0.2200	197	457
48	-0.1688	199	459
49	-0.1175	201	461
50	-0.0662	203	465
51	-0.0149	205	467
52	0.0366	207	469
53	0.0882	209	472
54	0.1399	210	473
55	0.1919	212	475
56	0.2441	214	477
57	0.2967	216	480
58	0.3495	218	482
59	0.4029	220	484
60	0.4566	222	487
61	0.5109	224	489
62	0.5657	226	492
63	0.6211	229	496
64	0.6771	231	498
65	0.7340	233	501
66	0.7917	235	503
67	0.8502	237	504

Raw Score	Theta	Scale Score	Vertical Scale Score
68	0.9097	239	507
69	0.9703	242	511
70	1.0320	244	513
71	1.0950	246	515
72	1.1594	249	519
73	1.2254	251	521
74	1.2930	254	525
75	1.3624	256	527
76	1.4339	259	531
77	1.5077	262	534
78	1.5839	265	538
79	1.6629	268	542
80	1.7450	271	545
81	1.8306	274	549
82	1.9201	277	553
83	2.0140	281	557
84	2.1130	285	562
85	2.2179	289	566
86	2.3296	293	570
87	2.4493	297	574
88	2.5786	302	578
89	2.7196	307	582
90	2.8748	313	586
91	3.0482	320	591
92	3.2454	327	594
93	3.4748	336	598
94	3.7506	346	602
95	4.0986	359	606
96	4.5753	377	610
97	5.3556	400	614
98	6.6331	400	619

Reading Grade 8 Form U

Raw Score	Theta	Scale Score	Vertical Scale Score
0	-6.5514	100	301
1	-5.3250	100	306
2	-4.5998	100	311
3	-4.1624	100	316
4	-3.8428	100	322
5	-3.5879	100	327
6	-3.3738	100	332
7	-3.1880	101	337
8	-3.0230	107	343
9	-2.8738	112	348
10	-2.7373	117	354
11	-2.6109	121	359
12	-2.4929	125	364
13	-2.3822	129	368
14	-2.2775	133	374
15	-2.1781	137	378
16	-2.0833	140	382
17	-1.9926	143	386
18	-1.9056	146	389
19	-1.8219	149	394
20	-1.7411	152	397
21	-1.6629	155	401
22	-1.5873	158	404
23	-1.5138	160	407
24	-1.4424	163	411
25	-1.3728	165	413
26	-1.3050	167	416
27	-1.2387	170	420
28	-1.1740	172	423
29	-1.1106	174	426
30	-1.0484	177	429
31	-0.9875	179	432
32	-0.9277	181	434
33	-0.8688	183	437

Raw Score	Theta	Scale Score	Vertical Scale Score
34	-0.8109	185	439
35	-0.7539	187	442
36	-0.6976	189	444
37	-0.6421	191	447
38	-0.5872	193	449
39	-0.5330	195	451
40	-0.4794	197	454
41	-0.4263	199	456
42	-0.3736	200	457
43	-0.3214	202	461
44	-0.2695	204	463
45	-0.2180	206	465
46	-0.1668	208	468
47	-0.1158	210	470
48	-0.0650	211	471
49	-0.0144	213	475
50	0.0361	215	477
51	0.0865	217	479
52	0.1369	219	482
53	0.1874	220	483
54	0.2378	222	486
55	0.2883	224	488
56	0.3390	226	490
57	0.3899	227	491
58	0.4410	229	495
59	0.4923	231	498
60	0.5439	233	500
61	0.5960	235	503
62	0.6485	237	505
63	0.7014	238	506
64	0.7548	240	509
65	0.8089	242	511
66	0.8636	244	514
67	0.9191	246	516

Raw Score	Theta	Scale Score	Vertical Scale Score
68	0.9754	248	518
69	1.0325	250	521
70	1.0907	252	524
71	1.1499	254	527
72	1.2103	256	529
73	1.2721	259	533
74	1.3353	261	535
75	1.4000	263	537
76	1.4665	266	541
77	1.5350	268	544
78	1.6056	270	546
79	1.6786	273	550
80	1.7543	276	553
81	1.8330	279	557
82	1.9152	281	559
83	2.0011	284	563
84	2.0915	288	568
85	2.1870	291	571
86	2.2884	295	575
87	2.3968	298	578
88	2.5135	303	582
89	2.6403	307	585
90	2.7796	312	589
91	2.9348	317	592
92	3.1107	324	596
93	3.3149	331	600
94	3.5602	340	603
95	3.8702	351	607
96	4.2982	366	611
97	5.0144	391	614
98	6.2345	400	618

Writing Grade 3 Form U

Raw Score	Theta	Scale Score
0	-5.4291	100
1	-4.2785	100
2	-3.6482	100
3	-3.2932	100
4	-3.0462	105
5	-2.8560	112
6	-2.7004	117
7	-2.5677	122
8	-2.4511	126
9	-2.3463	130
10	-2.2504	134
11	-2.1615	137
12	-2.0780	140
13	-1.9990	143
14	-1.9235	145
15	-1.8509	148
16	-1.7807	151
17	-1.7123	153
18	-1.6456	156
19	-1.5801	158
20	-1.5158	160
21	-1.4522	162
22	-1.3892	165
23	-1.3267	167
24	-1.2645	169
25	-1.2024	172
26	-1.1404	174
27	-1.0782	176

Raw Score	Theta	Scale Score
28	-1.0158	178
29	-0.9531	181
30	-0.8899	183
31	-0.8261	185
32	-0.7618	187
33	-0.6966	190
34	-0.6305	192
35	-0.5636	195
36	-0.4955	197
37	-0.4263	200
38	-0.3558	202
39	-0.2838	205
40	-0.2105	207
41	-0.1355	210
42	-0.0587	213
43	0.0199	216
44	0.1004	219
45	0.1830	222
46	0.2677	225
47	0.3547	228
48	0.4440	231
49	0.5355	234
50	0.6292	238
51	0.7250	241
52	0.8229	245
53	0.9225	248
54	1.0237	252
55	1.1263	256

Raw Score	Theta	Scale Score
56	1.2299	259
57	1.3345	263
58	1.4399	267
59	1.5461	271
60	1.6531	275
61	1.7612	279
62	1.8708	282
63	1.9820	287
64	2.0957	291
65	2.2123	295
66	2.3327	299
67	2.4578	304
68	2.5887	308
69	2.7266	313
70	2.8731	319
71	3.0300	324
72	3.1996	330
73	3.3851	337
74	3.5912	345
75	3.8250	353
76	4.0986	363
77	4.4354	375
78	4.8878	391
79	5.6254	400
80	6.8586	400

Writing Grade 4 Form U

Raw Score	Theta	Scale Score
0	-5.3889	100
1	-4.2286	100
2	-3.5905	100
3	-3.2325	100
4	-2.9860	100
5	-2.7986	105
6	-2.6473	110
7	-2.5200	114
8	-2.4096	118
9	-2.3116	122
10	-2.2230	125
11	-2.1415	128
12	-2.0657	130
13	-1.9943	133
14	-1.9264	135
15	-1.8614	137
16	-1.7984	139
17	-1.7372	142
18	-1.6772	144
19	-1.6181	146
20	-1.5596	148
21	-1.5014	150
22	-1.4433	152
23	-1.3850	154
24	-1.3264	156
25	-1.2672	158
26	-1.2074	160
27	-1.1467	162

Raw Score	Theta	Scale Score
28	-1.0851	164
29	-1.0225	166
30	-0.9588	168
31	-0.8939	171
32	-0.8277	173
33	-0.7603	175
34	-0.6916	178
35	-0.6214	180
36	-0.5497	182
37	-0.4765	185
38	-0.4018	188
39	-0.3252	190
40	-0.2468	193
41	-0.1663	196
42	-0.0837	199
43	0.0013	202
44	0.0889	205
45	0.1792	208
46	0.2724	211
47	0.3689	214
48	0.4685	218
49	0.5716	221
50	0.6781	225
51	0.7882	229
52	0.9017	233
53	1.0183	237
54	1.1381	241
55	1.2606	245

Raw Score	Theta	Scale Score
56	1.3855	249
57	1.5123	254
58	1.6410	258
59	1.7712	263
60	1.9029	267
61	2.0362	272
62	2.1716	276
63	2.3094	281
64	2.4507	286
65	2.5964	291
66	2.7477	296
67	2.9060	302
68	3.0728	308
69	3.2498	314
70	3.4383	320
71	3.6397	327
72	3.8553	335
73	4.0868	343
74	4.3372	351
75	4.6123	361
76	4.9234	371
77	5.2934	384
78	5.7749	400
79	6.5376	400
80	7.7863	400

Writing Grade 5 Form U

Raw Score	Theta	Scale Score
0	-5.4517	100
1	-4.2491	100
2	-3.5702	100
3	-3.1860	100
4	-2.9221	105
5	-2.7227	112
6	-2.5631	118
7	-2.4300	123
8	-2.3155	127
9	-2.2148	131
10	-2.1245	134
11	-2.0422	137
12	-1.9662	140
13	-1.8953	142
14	-1.8284	145
15	-1.7649	147
16	-1.7041	149
17	-1.6454	151
18	-1.5884	153
19	-1.5328	156
20	-1.4784	157
21	-1.4247	159
22	-1.3716	161
23	-1.3189	163
24	-1.2664	165
25	-1.2139	167
26	-1.1613	169
27	-1.1084	171
28	-1.0551	173
29	-1.0014	175
30	-0.9472	177

Raw Score	Theta	Scale Score
31	-0.8923	179
32	-0.8366	181
33	-0.7802	183
34	-0.7230	185
35	-0.6649	187
36	-0.6060	189
37	-0.5461	191
38	-0.4852	194
39	-0.4234	196
40	-0.3607	198
41	-0.2968	200
42	-0.2319	203
43	-0.1659	205
44	-0.0987	208
45	-0.0303	210
46	0.0394	213
47	0.1105	215
48	0.1830	218
49	0.2570	221
50	0.3327	223
51	0.4100	226
52	0.4892	229
53	0.5701	232
54	0.6530	235
55	0.7378	238
56	0.8246	241
57	0.9131	245
58	1.0035	248
59	1.0956	251
60	1.1891	255
61	1.2840	258

Raw Score	Theta	Scale Score
62	1.3800	262
63	1.4768	265
64	1.5741	269
65	1.6718	272
66	1.7696	276
67	1.8673	279
68	1.9649	283
69	2.0624	286
70	2.1597	290
71	2.2572	293
72	2.3549	297
73	2.4533	301
74	2.5526	304
75	2.6534	308
76	2.7563	312
77	2.8619	315
78	2.9712	319
79	3.0851	324
80	3.2050	328
81	3.3325	333
82	3.4701	338
83	3.6208	343
84	3.7894	349
85	3.9830	356
86	4.2140	365
87	4.5052	375
88	4.9092	390
89	5.5941	400
90	6.7869	400

Writing Grade 6 Form U

Raw Score	Theta	Scale Score
0	-5.4772	100
1	-4.2856	100
2	-3.6178	100
3	-3.2397	100
4	-2.9783	100
5	-2.7790	101
6	-2.6178	107
7	-2.4819	112
8	-2.3639	117
9	-2.2590	121
10	-2.1642	124
11	-2.0772	127
12	-1.9963	130
13	-1.9205	133
14	-1.8487	136
15	-1.7802	139
16	-1.7144	141
17	-1.6509	143
18	-1.5893	146
19	-1.5293	148
20	-1.4704	150
21	-1.4127	152
22	-1.3558	154
23	-1.2994	157
24	-1.2436	159
25	-1.1881	161
26	-1.1329	163
27	-1.0777	165
28	-1.0226	167
29	-0.9674	169
30	-0.9120	171

Raw Score	Theta	Scale Score
31	-0.8564	173
32	-0.8005	175
33	-0.7442	177
34	-0.6876	179
35	-0.6305	182
36	-0.5728	184
37	-0.5147	186
38	-0.4559	188
39	-0.3965	190
40	-0.3365	193
41	-0.2756	195
42	-0.2141	197
43	-0.1517	199
44	-0.0883	202
45	-0.0240	204
46	0.0414	207
47	0.1080	209
48	0.1759	212
49	0.2451	214
50	0.3159	217
51	0.3884	220
52	0.4627	222
53	0.5389	225
54	0.6172	228
55	0.6978	231
56	0.7808	234
57	0.8662	238
58	0.9543	241
59	1.0450	244
60	1.1384	248
61	1.2346	251

Raw Score	Theta	Scale Score
62	1.3335	255
63	1.4350	259
64	1.5391	263
65	1.6456	267
66	1.7545	271
67	1.8659	275
68	1.9796	279
69	2.0960	283
70	2.2154	288
71	2.3382	293
72	2.4651	297
73	2.5968	302
74	2.7343	307
75	2.8787	313
76	3.0312	318
77	3.1930	325
78	3.3649	331
79	3.5476	338
80	3.7412	345
81	3.9457	353
82	4.1613	361
83	4.3890	369
84	4.6320	378
85	4.8967	388
86	5.1950	399
87	5.5502	400
88	6.0156	400
89	6.7607	400
90	7.9961	400

Writing Grade 7 Form U

Raw Score	Theta	Scale Score
0	-5.8087	100
1	-4.5964	100
2	-3.8978	100
3	-3.4926	100
4	-3.2091	104
5	-2.9927	111
6	-2.8186	117
7	-2.6734	122
8	-2.5490	126
9	-2.4401	129
10	-2.3431	133
11	-2.2555	136
12	-2.1754	138
13	-2.1014	141
14	-2.0323	143
15	-1.9674	145
16	-1.9058	147
17	-1.8469	149
18	-1.7904	151
19	-1.7359	153
20	-1.6830	154
21	-1.6313	156
22	-1.5807	158
23	-1.5309	159
24	-1.4818	161
25	-1.4331	163
26	-1.3847	164
27	-1.3364	166
28	-1.2881	167
29	-1.2397	169
30	-1.1911	171
31	-1.1422	172
32	-1.0929	174
33	-1.0430	175

Raw Score	Theta	Scale Score
34	-0.9926	177
35	-0.9416	179
36	-0.8900	181
37	-0.8377	182
38	-0.7847	184
39	-0.7310	186
40	-0.6766	188
41	-0.6215	189
42	-0.5658	191
43	-0.5095	193
44	-0.4524	195
45	-0.3948	197
46	-0.3366	199
47	-0.2778	201
48	-0.2183	203
49	-0.1582	205
50	-0.0974	207
51	-0.0360	209
52	0.0263	211
53	0.0894	213
54	0.1534	215
55	0.2184	217
56	0.2845	219
57	0.3518	221
58	0.4205	224
59	0.4904	226
60	0.5620	228
61	0.6352	231
62	0.7100	233
63	0.7866	236
64	0.8651	238
65	0.9454	241
66	1.0274	244
67	1.1113	246

Raw Score	Theta	Scale Score
68	1.1968	249
69	1.2839	252
70	1.3723	255
71	1.4619	258
72	1.5524	261
73	1.6438	264
74	1.7359	267
75	1.8284	270
76	1.9215	273
77	2.0150	276
78	2.1090	279
79	2.2037	283
80	2.2994	286
81	2.3962	289
82	2.4945	292
83	2.5947	295
84	2.6973	299
85	2.8029	302
86	2.9120	306
87	3.0255	310
88	3.1442	314
89	3.2691	318
90	3.4015	322
91	3.5433	327
92	3.6967	332
93	3.8648	337
94	4.0523	343
95	4.2666	351
96	4.5200	359
97	4.8358	369
98	5.2670	383
99	5.9828	400
100	7.2006	400

Writing Grade 8 Form U

Raw Score	Theta	Scale Score
0	-5.5806	100
1	-4.3743	100
2	-3.6822	100
3	-3.2825	100
4	-3.0046	103
5	-2.7944	110
6	-2.6272	116
7	-2.4896	121
8	-2.3734	125
9	-2.2731	129
10	-2.1850	132
11	-2.1064	135
12	-2.0353	137
13	-1.9704	140
14	-1.9104	142
15	-1.8544	144
16	-1.8018	146
17	-1.7520	147
18	-1.7045	149
19	-1.6589	151
20	-1.6148	152
21	-1.5721	154
22	-1.5304	155
23	-1.4896	157
24	-1.4494	158
25	-1.4097	160
26	-1.3703	161
27	-1.3311	162
28	-1.2920	164
29	-1.2527	165
30	-1.2133	167
31	-1.1736	168
32	-1.1335	169
33	-1.0929	171

Raw Score	Theta	Scale Score
34	-1.0516	172
35	-1.0097	174
36	-0.9670	175
37	-0.9234	177
38	-0.8788	179
39	-0.8333	180
40	-0.7867	182
41	-0.7389	184
42	-0.6900	185
43	-0.6399	187
44	-0.5885	189
45	-0.5358	191
46	-0.4817	193
47	-0.4263	195
48	-0.3695	197
49	-0.3112	199
50	-0.2515	201
51	-0.1903	203
52	-0.1275	205
53	-0.0632	208
54	0.0028	210
55	0.0704	212
56	0.1396	215
57	0.2105	217
58	0.2831	220
59	0.3573	223
60	0.4331	225
61	0.5104	228
62	0.5892	231
63	0.6693	234
64	0.7507	237
65	0.8331	240
66	0.9165	243
67	1.0006	246

Raw Score	Theta	Scale Score
68	1.0854	249
69	1.1707	252
70	1.2564	255
71	1.3423	258
72	1.4284	261
73	1.5147	264
74	1.6012	267
75	1.6881	270
76	1.7753	273
77	1.8631	276
78	1.9516	280
79	2.0412	283
80	2.1320	286
81	2.2245	289
82	2.3190	293
83	2.4159	296
84	2.5155	300
85	2.6187	303
86	2.7258	307
87	2.8375	311
88	2.9546	315
89	3.0780	320
90	3.2090	324
91	3.3490	329
92	3.5002	335
93	3.6655	341
94	3.8494	347
95	4.0591	355
96	4.3065	364
97	4.6149	375
98	5.0366	390
99	5.7404	400
100	6.9476	400

Science Grade 5 Form U

Raw Score	Theta	Scale Score
0	-5.2700	100
1	-4.0382	100
2	-3.3048	100
3	-2.8583	100
4	-2.5290	100
5	-2.2635	106
6	-2.0382	115
7	-1.8403	124
8	-1.6623	132
9	-1.4993	139
10	-1.3479	145
11	-1.2057	151
12	-1.0709	157
13	-0.9420	163
14	-0.8181	168
15	-0.6980	173
16	-0.5812	178
17	-0.4668	183
18	-0.3543	188
19	-0.2431	193
20	-0.1327	198
21	-0.0227	203
22	0.0876	207
23	0.1987	212
24	0.3110	217
25	0.4252	222
26	0.5420	227
27	0.6619	232
28	0.7859	237
29	0.9148	243
30	1.0496	249
31	1.1917	255
32	1.3425	262
33	1.5040	269

Raw Score	Theta	Scale Score
34	1.6786	276
35	1.8700	284
36	2.0829	294
37	2.3250	304
38	2.6092	316
39	2.9589	331
40	3.4277	352
41	4.1852	384
42	5.4348	400

Science Grade 8 Form U

Raw Score	Theta	Scale Score
0	-5.4102	100
1	-4.1829	100
2	-3.4563	100
3	-3.0170	100
4	-2.6951	101
5	-2.4374	112
6	-2.2201	121
7	-2.0305	128
8	-1.8611	135
9	-1.7069	142
10	-1.5646	148
11	-1.4318	153
12	-1.3067	158
13	-1.1879	163
14	-1.0744	168
15	-0.9653	172
16	-0.8599	177
17	-0.7576	181
18	-0.6579	185
19	-0.5605	189
20	-0.4648	193
21	-0.3705	197
22	-0.2775	201
23	-0.1853	204
24	-0.0937	208
25	-0.0024	212
26	0.0888	216

Raw Score	Theta	Scale Score
27	0.1801	220
28	0.2718	223
29	0.3642	227
30	0.4576	231
31	0.5522	235
32	0.6484	239
33	0.7464	243
34	0.8468	247
35	0.9500	251
36	1.0564	256
37	1.1667	260
38	1.2817	265
39	1.4022	270
40	1.5293	275
41	1.6646	281
42	1.8098	287
43	1.9675	293
44	2.1410	300
45	2.3355	308
46	2.5586	318
47	2.8234	329
48	3.1538	342
49	3.6035	361
50	4.3429	391
51	5.5807	400

Appendix D: 2007 Vertical Scaling Design

Step 1: Grades 5 and 4

		Items					
		Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
Students	Grade 3						
	Grade 4		OP44	SU45			
	Grade 5		SU54	OP55			
	Grade 6						
	Grade 7						
	Grade 8						

Step 2: Grades 4 and 3

		Items					
		Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
Students	Grade 3	OP33	SU34				
	Grade 4	SU43	OP44				
	Grade 5						
	Grade 6						
	Grade 7						
	Grade 8						

Step 3: Grades 5 and 6

		Items					
		Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
Students	Grade 3						
	Grade 4						
	Grade 5			OP55	SU56		
	Grade 6			SU65	OP66		
	Grade 7						
	Grade 8						

Step 4: Grades 6 and 7

		Items					
		Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
Students	Grade 3						
	Grade 4						
	Grade 5						
	Grade 6				OP66	SU67	
	Grade 7				SU76	OP77	
	Grade 8						

Step 5: Grades 7 and 8

		Items					
		Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
Students	Grade 3						
	Grade 4						
	Grade 5						
	Grade 6						
	Grade 7					OP77	SU78
	Grade 8					SU87	OP88

Appendix E: 2007 Vertical Scaling Item Parameters

Mathematics Grade 3

Item	Rasch	Item	Rasch	Item	Rasch	Item	Rasch
1	-2.8289	31	-1.0542	61	-1.5802	91	-1.6397
2	-2.8289	32	-1.9134	62	-1.9039	92	-1.3445
3	-2.3674	33	-2.3248	63	-3.2659	93	0.5030
4	-1.9349	34	-0.5533	64	-3.1784	94	0.0523
5	-3.1565	35	-0.5234	65	-3.6727		
6	-1.9165	36	-1.6831	66	-2.1237		
7	-2.9605	37	-2.2273	67	-2.4766		
8	-3.5134	38	-0.7116	68	-2.8326		
9	-2.7590	39	-0.0255	69	-2.1604		
10	-3.5899	40	-0.3118	70	-2.0956		
11	-2.9749	41	-0.6549	71	-1.5840		
12	-2.4750	42	-0.5423	72	-2.2827		
13	-2.2828	43	-0.3999	73	-1.9825		
14	-1.4639	44	-2.3204	74	-2.7443		
15	-2.6452	45	-0.5826	75	-0.2788		
16	-2.6303	46	-3.7232	76	-1.2143		
17	-4.1474	47	-3.6099	77	-1.8231		
18	-2.2995	48	-3.1113	78	-2.1420		
19	-3.1516	49	-2.7093	79	-2.8222		
20	-1.3555	50	-0.5573	80	-1.5169		
21	-1.6911	51	-1.8210	81	-1.6199		
22	-2.1563	52	-1.7251	82	-1.5752		
23	-3.5267	53	-1.3208	83	-1.7558		
24	-1.4084	54	-1.1930	84	-0.7891		
25	-2.6770	55	-1.6570	85	-0.3757		
26	-1.9881	56	-0.9115	86	-1.2356		
27	-1.7598	57	-2.1981	87	0.1570		
28	-0.9878	58	-2.1344	88	-2.2464		
29	-1.4148	59	-1.4836	89	-1.6672		
30	-1.6346	60	-2.1705	90	-1.4303		

Mathematics Grade 4

Item	Rasch	Item	Rasch	Item	Rasch	Item	Rasch
1	-1.3568	31	-1.5592	61	-1.8457	91	-0.0013
2	-1.2408	32	-1.8041	62	-1.5735	92	-0.7767
3	-0.8814	33	-0.0663	63	-2.7019	93	0.6334
4	-0.2297	34	-1.1577	64	-1.9994	94	-0.1058
5	-0.4677	35	-0.1147	65	-2.6518	95	0.0392
6	-0.6352	36	-1.1128	66	-1.5477	96	1.4420
7	-2.8457	37	-1.4850	67	-2.1216		
8	-1.0952	38	-0.7946	68	-1.5919		
9	-1.9060	39	-1.0541	69	-1.2198		
10	-0.9105	40	-1.3542	70	0.2857		
11	0.4287	41		71	-1.1513		
12	0.6741	42	-0.0857	72	-0.7915		
13	0.5269	43	-1.6381	73	-0.6878		
14	-0.4459	44	-0.6923	74	-0.6521		
15	-0.5082	45	-1.5974	75	-0.4266		
16	0.1620	46	-0.2013	76	-0.7894		
17	-0.1681	47	-2.9179	77	-0.9344		
18	0.5636	48	-1.7287	78	-0.5967		
19	-1.3851	49	-1.2675	79	-1.9560		
20	-0.3557	50	-1.1861	80	0.4345		
21	-1.1024	51	-0.4039	81	-0.9651		
22	-0.6729	52	-0.1272	82	-0.0384		
23	-1.3184	53	-1.2915	83	-1.5419		
24	-2.1129	54	-0.7645	84	-0.9469		
25	0.6601	55	-0.2368	85	0.4911		
26		56	0.0142	86	0.4323		
27	0.1883	57	-2.5592	87	0.5196		
28	-0.0949	58	0.6236	88	1.0539		
29	0.9666	59	-2.4591	89	0.6946		
30	0.1688	60	1.3347	90	-2.1113		

Mathematics Grade 5

Item	Rasch	Item	Rasch	Item	Rasch	Item	Rasch
1	0.2430	31	0.2563	61	-1.2513	91	-2.5352
2	-1.1374	32	0.2721	62	0.1707	92	0.9364
3	-1.4107	33	1.0004	63	0.5742	93	-0.4448
4	-0.6478	34	1.1034	64	0.7699	94	-1.6185
5	-1.4418	35	1.5466	65	0.3421	95	1.6568
6	-0.7330	36	0.8918	66	1.0528	96	
7	0.0795	37	-0.6235	67	-0.1787	97	-2.3061
8	-1.3261	38	-0.5573	68	0.6137	98	-1.7419
9	-1.8281	39	-1.0064	69	0.9084	99	0.0980
10	-1.7528	40	-0.5668	70	0.4264	100	0.7395
11	0.4860	41	-0.5533	71	1.4481	101	0.1134
12	-0.2347	42	-0.7844	72	0.7345	102	-0.0673
13	-0.7828	43	1.0470	73	2.1093	103	0.3062
14	-0.9799	44	1.7387	74	-0.1804	104	0.6890
15	-0.6139	45	0.4207	75	0.3146	105	
16	0.4722	46	0.9318	76	-1.0892	106	-0.7996
17	0.8383	47	1.1792	77	-1.9681	107	-0.3627
18	0.0323	48	1.2777	78	0.0812	108	0.1124
19	0.7017	49	0.6913	79	-2.1912	109	
20	0.5022	50		80	0.0181	110	1.1478
21	-0.2339	51	-0.7644	81	0.7413	111	0.2395
22	0.2839	52	-0.4867	82	1.7422	112	0.7315
23	-1.6341	53	-1.0874	83	0.8614	113	0.7131
24	-1.1040	54	-0.1301	84	0.1272		
25	0.5426	55	-1.8012	85	1.4567		
26	-1.5710	56	-1.5072	86	0.1992		
27	0.5407	57	-1.1452	87	1.1201		
28	0.5169	58	1.9280	88	0.6921		
29	-0.3732	59	-0.6823	89	2.0091		
30	-0.4858	60	0.1865	90	1.0146		

Mathematics Grade 6

Item	Rasch	Item	Rasch	Item	Rasch	Item	Rasch
1		31	-0.7939	61	0.6704	91	-0.5719
2		32	0.0366	62	1.1852	92	
3		33	-0.5048	63	1.5758	93	-0.6010
4	0.4495	34	-0.1615	64	1.6527	94	1.2601
5		35	1.3895	65	-0.2652	95	0.4007
6	0.0215	36	1.0923	66	1.6452	96	0.8343
7	0.3735	37	1.0030	67	1.2201	97	-0.3165
8	0.3375	38	1.3515	68	-0.6254	98	-0.3921
9	-0.5731	39	0.8677	69	-0.3384	99	1.6105
10	-0.5632	40	0.5838	70	1.8522	100	0.8216
11	1.9470	41	0.2909	71	0.9939	101	1.4601
12		42	1.0855	72	0.0884	102	2.3511
13	2.3273	43	2.1570	73	1.3038	103	1.2280
14	1.9761	44	1.2492	74	0.5231	104	0.1563
15	2.1892	45	1.4157	75	1.5465	105	2.9840
16	4.0231	46	1.9082	76	1.0031	106	0.7693
17	1.3887	47	1.3593	77	2.7053	107	-0.1900
18	0.8666	48	1.0128	78	2.5778	108	-0.4902
19	0.2592	49	-0.9193	79	1.1900	109	1.1349
20	0.7919	50	1.4976	80	1.1546	110	0.7909
21	0.9325	51	1.6723	81	1.2215	111	0.1987
22	1.3947	52	-0.0015	82	0.8889	112	
23	-0.8950	53	0.7809	83	0.8497	113	0.8111
24	0.4462	54	-0.3470	84	1.3505	114	2.3412
25	0.4503	55	0.1295	85	0.9314	115	1.7668
26		56	-1.1697	86	2.3232	116	2.3128
27	0.9129	57	-1.7431	87	0.9812		
28	2.4046	58	0.3350	88	1.6998		
29	0.1812	59	2.3287	89	2.3203		
30	0.0879	60	1.6443	90	1.8628		

Mathematics Grade 7

Item	Rasch	Item	Rasch	Item	Rasch	Item	Rasch
1	1.6452	31	2.7910	61	0.6478	91	1.6412
2	0.9978	32	0.6919	62	2.1939	92	0.5607
3	1.3189	33	2.0991	63	1.0881	93	1.5911
4	-0.0182	34	0.4326	64	1.3910	94	1.2450
5	0.3476	35	0.9154	65	1.6935	95	-0.1923
6	1.3623	36	2.6043	66	1.1128	96	0.4864
7	1.4797	37	2.8881	67	1.7952	97	1.1370
8	1.3931	38	1.4167	68	2.2867	98	3.2034
9	1.0928	39	1.3385	69	0.4971	99	0.3455
10	2.0582	40	1.2454	70	1.0727	100	-0.3284
11		41	0.8032	71	1.1418	101	1.2226
12	-0.4667	42	2.2834	72	1.5024	102	0.7798
13		43	1.0035	73	2.1359	103	0.8478
14	0.8611	44	1.2344	74	1.9791	104	1.8159
15	1.2069	45	2.3294	75	0.6566	105	2.1487
16	1.1550	46		76	1.6999	106	1.9329
17	1.7152	47	2.2300	77	3.1412	107	2.8423
18	2.1062	48	2.1005	78	3.6413	108	1.6330
19		49	1.1848	79	2.6361	109	1.9439
20	0.7116	50	1.8001	80	2.7781	110	1.5873
21	1.7317	51	-0.5794	81	4.1535	111	1.4191
22	2.2566	52	2.1742	82	3.3380	112	1.5634
23	1.7549	53	2.0938	83	1.3214	113	2.2074
24	1.4677	54	1.7031	84	2.2025	114	0.9626
25	1.9449	55	1.5473	85	3.2240	115	1.9166
26	1.3225	56	2.0468	86	1.7455	116	2.8778
27	2.9138	57	1.4236	87	1.2290	117	1.0076
28	1.2778	58	0.4976	88	2.5369	118	1.6561
29	0.6929	59	1.5459	89	2.7677	119	2.3484
30	1.9322	60	1.4187	90	2.2121	120	1.4833

Mathematics Grade 8

Item	Rasch	Item	Rasch	Item	Rasch	Item	Rasch
1	0.7142	31	2.4179	61	2.0525	91	1.3803
2	-0.1553	32	3.7860	62	2.1408	92	2.4175
3	1.5577	33	2.6466	63	1.5228	93	1.1683
4	1.2378	34	1.8214	64	2.8161	94	2.3084
5	2.4511	35	1.4226	65	1.5893	95	1.9837
6	1.4852	36	1.4770	66	3.0423	96	2.2688
7	2.2539	37	2.6153	67	2.8613	97	0.2606
8	2.1423	38	2.3687	68	2.7289	98	1.0831
9	1.2587	39	3.6861	69	3.1240	99	1.5549
10	2.1683	40	2.2154	70	3.5272	100	2.3493
11	2.4212	41	2.0238	71	1.6793	101	2.4743
12	2.1638	42	1.7555	72	2.0206	102	3.4871
13	1.2769	43	1.2808	73	1.6825	103	2.8794
14	3.3054	44	1.8446	74	2.8544	104	1.5141
15	1.0512	45	1.8863	75	3.3514	105	1.5069
16	3.2360	46	1.8680	76	2.2902	106	3.3533
17	4.0854	47	1.1331	77	3.0849	107	0.9235
18	2.0304	48	1.5075	78	2.1684	108	2.6986
19	2.2099	49	1.6237	79	2.8776	109	1.3295
20	1.7169	50	2.2365	80	1.6935	110	1.5370
21	2.0504	51	1.6284	81	2.6452	111	2.6014
22	1.9332	52	1.3946	82	-0.3455	112	3.0736
23	1.8264	53	1.6339	83	2.4389	113	2.5804
24	2.2983	54	2.1826	84	0.6018	114	0.9604
25	1.1153	55	1.3707	85	0.8505	115	2.3058
26	1.0233	56	3.1479	86	0.2512	116	3.2384
27	1.7201	57	1.4934	87	1.3091	117	3.8168
28	1.9424	58	1.6362	88	2.7917		
29	3.3517	59	1.8087	89	1.1807		
30	3.1742	60	2.0301	90	0.9951		

Reading Grade 3

Item	Rasch	Item	Rasch	Item	Rasch
1	-2.2752	31	-1.2373	61	-0.6064
2	-1.6975	32	-2.2198	62	0.0588
3	-1.8020	33	-3.4067	63	0.2450
4	-1.7297	34	0.1471	64	2.0209
5	-2.9475	35	-3.0766	65	-0.1800
6	-0.9245	36	-2.2975	66	-0.4630
7	-0.2724	37	-2.2905	67	-0.0562
8	-2.6627	38	-2.0748	68	0.3684
9	-0.7832	39	-0.4722	69	0.6888
10	-1.7056	40	-2.1046	70	-0.2298
11	0.0274	41	-0.3336	71	0.1948
12	-1.1025	42	-0.2262	72	2.9546
13	-0.7582	43	-1.3892	73	0.0359
14	-0.8707	44	-2.0555		
15	-2.7154	45	-2.4293		
16	-2.2477	46	0.1517		
17	-1.3746	47	-1.1577		
18	-1.2063	48	-1.2690		
19	0.3762	49	-2.5622		
20	-1.6417	50	-1.0729		
21	-0.2227	51	-0.4442		
22	-0.9508	52	1.8735		
23	-1.8797	53	-0.5480		
24	-2.2929	54	0.1520		
25	-1.1315	55	-0.9777		
26	-2.9637	56	-0.5158		
27	-0.9948	57	-0.9274		
28	-0.0592	58	0.5213		
29	0.0879	59	0.6859		
30	0.6637	60	-0.1596		

Reading Grade 4

Item	Rasch	Item	Rasch	Item	Rasch
1	-0.7089	31	0.1402	61	-0.6392
2	-0.1836	32	0.3316	62	-1.2143
3	-1.6700	33	-2.7555	63	0.0138
4	-0.4203	34	-0.4246	64	0.6999
5	-0.3009	35	-2.5469	65	0.9780
6	-0.9574	36	-2.4156	66	0.6070
7	-2.5057	37	-2.9201	67	-0.3407
8	0.4718	38	0.7037	68	1.3876
9	0.0449	39	-1.3012	69	1.0430
10	0.6372	40	-0.8776	70	1.2334
11	-0.2606	41	-0.3881	71	0.1436
12	-1.6258	42	-0.6515	72	0.2120
13	-0.9046	43	-1.9602	73	0.6090
14	-1.7263	44	-1.2707	74	0.7324
15	0.7509	45	-2.0750		
16	-0.0586	46	-1.3029		
17	-2.1638	47	-0.4253		
18	0.6454	48	-1.9542		
19	-0.3429	49	-0.4621		
20	-1.0316	50	-0.9550		
21	-1.6007	51	0.1880		
22	-0.8506	52	-1.3278		
23	-0.6032	53	-1.1946		
24	0.2684	54	-0.2376		
25	-1.0976	55	-0.9079		
26	-0.9530	56	0.1344		
27	-1.3296	57	-0.3709		
28	-2.0063	58	-0.8250		
29	-0.3332	59	0.1093		
30	0.2858	60	0.2162		

Reading Grade 5

Item	Rasch	Item	Rasch	Item	Rasch
1	0.4761	31	0.0701	61	-0.4597
2	-1.2916	32	-0.9537	62	0.6785
3	0.0686	33	-0.0553	63	1.3191
4	-0.6705	34	-0.4766	64	1.1737
5	-0.4715	35	-1.9012	65	0.0610
6	-1.0044	36	-0.6014	66	-0.3632
7	-1.0657	37	-2.1300	67	0.7273
8	-1.0273	38	0.0412	68	2.7605
9	-0.0134	39	-0.1381	69	1.0828
10	0.5252	40	-0.8039	70	2.1633
11	-1.0322	41	-0.4789	71	0.3668
12	-0.7421	42	0.4830	72	0.1463
13	0.2260	43	-0.6770	73	1.7036
14	-0.0905	44	-1.1085	74	2.7479
15	-1.1737	45	-0.0930	75	0.0783
16	0.4392	46	-0.2227	76	0.9983
17	0.3024	47	-0.5283	77	0.6077
18	-0.8568	48	-1.2816	78	1.5340
19	-0.2929	49	0.5868	79	2.5326
20	-0.5229	50	0.3920	80	1.0631
21	-1.2249	51	0.1618		
22	-0.6656	52	-0.5918		
23	1.3514	53	-0.1984		
24	0.3625	54	0.0811		
25	-0.4868	55	-0.3852		
26	-0.3425	56	0.7193		
27	-0.6531	57	0.6612		
28	0.1220	58	-0.5023		
29	-0.1804	59	0.3689		
30	0.8700	60	-0.2702		

Reading Grade 6

Item	Rasch	Item	Rasch	Item	Rasch
1	0.3440	31		60	-0.0156
2	0.2273	32	-0.8286	61	-0.1455
3	-0.2147	33	-0.9278	62	-0.3798
4	-0.1598	34	-1.5433	63	1.9635
5	-1.3337	35	-2.1579	64	-0.1416
6	-0.7368	36	0.8403	65	0.7694
7		37	0.2109	66	1.1086
8		38	-0.0994	67	2.4647
9		39	-0.2018	68	0.1839
10		40	0.2185	69	1.5365
11	-0.3305	41	-1.6415	70	1.9504
12	0.6884	42	-0.5216	71	0.7398
13	1.4165	43	1.2414	72	0.7333
14	0.4371	44	-0.8555	73	1.9378
15	0.9828	45	0.1595	74	1.7457
16	-0.1848	46	0.0015	75	2.5750
17		47	0.9341	76	1.7614
18		48	-0.0080	77	1.1785
19	-0.6227	49	0.4917	78	1.6963
20		50	-0.1116	79	1.3511
21	-0.3355	51	-0.6936	80	0.7651
22	-0.9129	52	-0.2615		
23		53	-0.9350		
24	0.3786	54	-0.4850		
25	-0.1675	55	-0.0487		
26	1.5991	56	0.4576		
27	0.6001	57	0.4803		
28	0.3259	58	0.9775		
29	0.6243	59	2.5622		
30					

Reading Grade 7

Item	Rasch	Item	Rasch	Item	Rasch
1	0.8380	31	-0.8242	61	0.7137
2	-0.1030	32	2.0739	62	0.7800
3	0.2115	33	-0.7778	63	0.5800
4	-0.5060	34	0.0685	64	0.8840
5	0.9224	35	-1.0503	65	3.8243
6	-0.2342	36	-1.2692	66	0.9976
7	1.6791	37	-0.6115	67	3.6574
8	0.9395	38	0.4427	68	2.8367
9	1.2416	39	-0.5769	69	1.1184
10	1.2094	40	-0.8495	70	0.3200
11	0.6480	41	1.1862	71	-0.0672
12	1.6882	42	-1.1745	72	2.0750
13	0.7562	43	-0.9524	73	2.6772
14	0.0093	44	2.1948	74	1.2851
15	1.1575	45	-0.6199	75	0.7597
16		46	2.5497	76	0.9321
17	0.8410	47	-0.0239	77	2.2661
18	0.4500	48	0.2340	78	1.4464
19	0.5534	49	0.2219	79	1.3375
20	-0.2206	50	0.2804		
21	1.4109	51	0.3534		
22		52	0.0063		
23	1.2756	53	0.2784		
24	-1.0703	54	0.9002		
25	0.3006	55	1.0462		
26	0.7926	56	0.4724		
27	-0.0052	57	0.0568		
28	0.3838	58	0.3424		
29	0.8190	59	0.1761		
30		60	0.2078		

Reading Grade 8

Item	Rasch	Item	Rasch	Item	Rasch
1	1.0162	31	0.4008	61	2.1807
2	-0.1109	32	-0.8264	62	0.5464
3	-0.1922	33	-0.4446	63	0.9193
4	0.9395	34	-1.1448	64	1.2376
5	-0.5964	35	-1.0438	65	0.3397
6	0.9717	36	0.2674	66	2.1689
7	0.6273	37	1.6623	67	0.4247
8	0.6985	38	-1.2522	68	1.4031
9	-0.0418	39	0.5921	69	-0.2368
10	0.6438	40	-1.2833	70	1.3233
11	0.9471	41	-0.5995	71	1.3018
12	2.6963	42	0.7230	72	2.9400
13	2.1340	43	0.0812	73	1.9515
14	1.5278	44	0.5894	74	1.2048
15	1.1405	45	0.4144	75	1.7735
16	1.6237	46	-0.2184	76	1.1724
17	0.8520	47	-0.5136	77	1.4446
18	1.5780	48	-1.0386	78	1.8979
19	0.2812	49	-0.0661	79	2.7678
20	1.7631	50	0.9103		
21	2.0243	51	-0.1334		
22	0.9542	52	1.7172		
23	0.5519	53	0.0844		
24	1.1824	54	1.1377		
25	-0.2073	55	-0.2513		
26	0.3962	56	-0.5704		
27	0.1540	57	1.1669		
28	0.1187	58	1.0414		
29	0.9496	59	1.1940		
30	1.2782	60	0.5009		