

Maryland School Assessment-
Mathematics:
Grades 3 through 8

Technical Report:
2009 Administration

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INTRODUCTION

The *Maryland School Assessment (MSA)* is a measure of students' reading and mathematics comprehension. The *MSA* fulfills recommendations of the Visionary Panel for Better Schools and meets the federal testing requirements of the *No Child Left Behind Act (NCLB)* of 2001.

New academic standards were designed to inform parents, teachers, and educators of what students actually learned in schools and to make schools accountable for teaching contents measured by the *MSA*. To this end, the Maryland State Department of Education (MSDE), in collaboration with hundreds of educators across the state, developed a series of math tests to measure students' achievement against the new academic standards.

In 2003, the *MSA-Math* was introduced in grades 3, 5, and 8; grades 4, 6, and 7 were added to the program in 2004.

The purpose of the 2009 *MSA-Math Technical Report* is to provide users and other interested parties with a general overview and statistical analysis results of the *MSA-Math*.

The 2009 *Technical Report* is composed of four sections.

The first section contains the following information:

- General overview and purposes of the *MSA-Math*
- Development and review of the *MSA-Math* items and test
- Test form design, test form specifications, item type, and item roles
- Operational form construction using the Rasch model
- Test administration
- Scoring procedures
- Operational item analyses
- Linking, equating, and scaling procedures
- Score interpretation
- Test validity and Unidimensionality analyses
- Field test analysis and item bank construction
- Quality assurance

The second section provides the current year's academic achievement results for grades 3 through 8. It contains information about the cutoff score and pass rate at each performance level for the 2009 math assessment. In addition, students' performance levels were analyzed by key student subgroups such as gender, ethnicity, and LEA (Local Education Agency).

In the third section, we summarized detailed statistical procedures used for the 2009 math test. This section provides psychometric information in detail to those who might be interested in learning psychometric characteristics and procedures applied in the *MSA-Math*.

The last section contains statistical results of the 2009 MSA-Math. It includes descriptive statistics for the 2009 math test based on raw scores and scale scores, accuracy and consistency of the 2009 math test, rater agreement rates, correlation coefficients among substrands, and total and substrand RS/SS conversion tables. Accordingly, this section provides the statistical and psychometric characteristics of the 2009 MSA-Math.

Four appendices provide additional statistical results for the 2009 MSA-Math: Appendix A contains stratified random sampling results; Appendix B contains 2009 MSA-Math scale score histograms and Tukey charts; Appendix C contains both classical and Rasch (One-Parameter Logistic Item Response Theory) item parameters. The last appendix contains test blueprints for grades 3 through 8.

1. OVERVIEW OF THE 2009 MARYLAND SCHOOL ASSESSMENT-MATHEMATICS

In 2002, the Maryland State Department of Education (MSDE), in order to conform to the requirements of the new Federal program “No Child Left Behind,” retired its award-winning *Maryland School Performance Assessment Program* and adopted a testing program known as the *Maryland School Assessment (MSA)*. The new program, like its predecessor, was based on the *Voluntary State Curriculum*, which set reasonable academic standards for what teachers were expected to teach and for what students were expected to learn in schools.

In 2003, the MSA-Math was introduced in grades 3, 5, and 8, with grades 4, 6, and 7 being added to the program in 2004. A Bookmark standard setting was conducted in 2003 to set proficiency level cut scores for grades 3, 5, and 8. Because 2004 was the first testing year for grades 4, 6, and 7, a second Bookmark standard setting was held in summer 2004 to set cut scores for these additional grades. The performance level cut scores were used to assign students to three proficiency levels (Basic, Proficient, and Advanced) for AYP reporting under the “No Child Left Behind” act. Information about the Bookmark procedures and results can be obtained from MSDE. It should be noted that these cut scores have been applied since 2003 (grades 3, 5, and 8) and 2004 (grades 4, 6, and 7).

It should be noted that in 2007, the MSA-Math was administered using a new vendor and applying a different IRT method (e.g., the Rasch model); therefore, a transformation of scale scores using the equipercentile method was conducted with the 2006 population data. Detailed information on the scale score transformation and its results can be found in Appendix C, *Year 2006 MSA-Math Recalibration Results from 3-PL IRT to the Rasch Model Using the Equipercentile Method* in the *2007 MSA-Math Technical Report*.

In 2007, MSDE implemented an important action plan on the MSA-Math test: dropping all of the SAT10 items from the 2008 assessment. Consequently, several SAT10 items which contributed to the 2007 criterion-referenced test (CRT) were replaced by Maryland-specific items in 2008.

For the purposes of year-to-year linking and equating, we first constructed 2009 a linking pool: only operational selected-response (SR) items (i.e., multiple-choice items) were included in the linking pool. It should be noted that these SR items appeared both in current and previous years’ assessments and were used as either core or core link items in previous years’ assessments (i.e., in any assessment before 2009). After setting up the linking pool, we conducted a stability check of linking items and decided which items should be excluded from or which items remain in the linking pool. During the calibration and equating processes, we kept and fixed the original operational Rasch item difficulty parameters of any linking items that remained through the stability check to put the 2009 assessment on a common scale. Accordingly, scale scores of the 2009 assessment were linked back to the 2006 assessment and all the scale scores of different years were comparable within each content and grade.

1.1 Purposes/Uses of the 2009 MSA-Math

By measuring students’ achievement against the new academic standards, the 2009 MSA-Math fulfills two main purposes. First, the MSA-Math was designed to inform parents, teachers, and educators of what students actually learned in schools by providing specific feedback that can be

used to improve the quality of schools, classrooms, and individualized instructional programs, and to model effective assessment approaches that can be used in classrooms. Second, the MSA-Math serves as an accountability tool to measure performance levels of individual students, schools, and districts against the new academic standards.

1.2 The Voluntary State Curriculum

Federal law requires that states align their tests with their state content standards. MSDE worked carefully and rigorously to construct new tests to provide a strong alignment as defined by the U.S. Department of Education.

The *Voluntary State Curriculum (VSC)*, which defined what students should know and be able to do at each grade level, helped schools understand the standards more clearly, and included more specificity with indicators and objectives. The format of the VSC specified standards statements, indicators, and objectives. Standards are broad, measurable statements of what students should know and be able to do. Indicators and objectives provide more specific content knowledge and skills that are unique at each grade level.

The objectives assessed by the MSA at each grade level are embedded in the VSC. In addition, they are identified with the notation, ***assessment limit***. Assessment limits provide clarification about the specific skills and content that students are expected to have learned for each assessed objective. Even though some objectives in the VSC may not have an Assessment limit at a given grade-level, these non-assessed objectives still must be included in instruction. They introduce important concepts in preparation for assessed skills and content at subsequent grade levels.

The following provides one example of assessment limit of Grade 3 MSA-Math:

STANDARD 1.0

Knowledge of Algebra, Patterns, and Functions

TOPIC:

A. [PATTERNS](#) AND FUNCTIONS

INDICATOR:

1. Identify, describe, extend, and create numeric [patterns](#) and functions

OBJECTIVES:

- a. Represent and analyze numeric [patterns](#) using skip counting

Assessment limits:

Use 2, 5, 10, or 100 starting with any whole number (0 – 1000)

It should be noted that it was not the case that every indicator would necessarily be tested each year even if 100% of the standards should be tested. Consequently, the VSC specified curricular indicators and objectives that contributed directly to measuring content standards, which were aligned to the MSA. More information on assessment limits and standards can be found in Appendix D, *The 2009 MSA-Math Blueprint*.

1.3 Development and Review of the 2009 MSA-Math Items and Test

As seen in Table 1.1, the development of the 2009 MSA-Math test required the involvement of four groups in addition to MSDE and Pearson. These groups are as follows:

National Psychometric Council

The National Psychometric Council (NPC) took a major role in reviewing and making recommendations to MSDE on the development and implementation of the 2009 MSA-Math program. For example, they made recommendations to MSDE on issues, such as test blueprints, operational form construction, field test design, item analysis, item selection for scoring purposes, linking, equating and scaling issues, and other relevant statistical and psychometric issues.

Content Review Committee

Content Review Committee members ensured that the MSA-Math was appropriately difficult and fair. Committee members were either specialists in math for test items, or experts in test construction and measurement. They represented all levels of education as well as the ethnic and social diversity of Maryland students. Committee members were from different areas of the state.

The educators' understanding of Maryland curriculum and extensive classroom experience made them a valuable source of information. They reviewed test items and forms and took a holistic approach to ensure that tests were fair and balanced across reporting categories.

Bias Review Committee

In addition to the Content Review Committee, a separate Bias Review Committee examined each item on math tests. They looked for indications of bias that would impact the performance of an identifiable group of students. Committee members discussed and, if necessary, rejected items based on gender, ethnic, religious, or geographical bias.

Vision Review Committee

A Vision Review Committee reviewed the items and any associated art for bias to the visually impaired. The committee makes their recommendations to NOT put any item they had a concern with on Form A.

Table 1.1 The 2009 MSA-Math Responsibility for Test Development

Development of the 2009 MSA-Math	Primary Responsibility
Development of Preliminary Blueprints and Item Specifications	Pearson; MSDE; NPC
Development of Operational Form Requirement and Session Blueprint	MSDE
Item Writing	MSDE; Pearson
Item Review	Pearson; MSDE; NPC; Content Review Committee
Bias Review	Pearson; MSDE; Bias Review Committee
Vision Review	Pearson; MSDE; Vision Review Committee
Modification of Special Forms	Pearson; MSDE
Review of Special Forms	MSDE
Construction of Operational Test Forms	Pearson; MSDE; NPC
Construction of Field Test Forms	Pearson; MSDE
Review of Operational Test Forms	MSDE
Final Construction of Test Forms	Pearson; MSDE

1.4 Test Form Design, Specifications, Item Types, and Item Roles

Test Form Design

The MSA-Math test had two forms of operational items at each grade. Field test items were embedded within the operational items resulting in a total of 10 test forms at each grade. As can be seen from Table 1.2, Forms A, B, C, D and E are identical with respect to operational items (designated as operational Form A) and differ only with respect to field test items. This is also true for Forms F, G, H, J, and K (designated as operational Form F).

Table 1.2 The 2009 MSA-Math Test Form Design: Grades 3 through 8

	Operational Item Sets					Field test Item Sets						
	A	F	A	B	C	D	E	F	G	H	J	K
Form A	X		X									
Form B	X			X								
Form C	X				X							
Form D	X					X						
Form E	X						X					
Form F		X						X				
Form G		X							X			
Form H		X								X		
Form J		X									X	
Form K		X										X

Note. Forms A, B, C, D, and E (Form A) are identical, and Forms F, G, H, J, and K (Form F) are identical in terms of operational test items.

Test Form Specifications and Reporting Category

Tables 1.3, 1.4, and 1.5 provide information on the total number of operational items included in each operational test form and how these items were broken down based on each content standard. It should be noted that the test specifications in these tables represent the targeted test design for each grade and show the targeted distribution of each content standard.

Mathematics has a total of seven content standards (Algebra, Geometry, Measurement, Statistics, Probability, Numbers and Computation, and Process). It should be acknowledged that some standards were combined for purposes of reporting subscale. Specifically, Geometry and Measurement standards and Statistics and Probability standards were combined to produce a total of five subscale reporting categories. Tables 1.6 through 1.23 provide information on the actual distribution of score points by standard and reporting category. The number of items and score points for each reporting standard were identical across forms within each grade.

Item Types

The 2009 MSA-Math included four types of items: *selected response (SR)*, *student-produced response (SPR)*, *brief constructed response (BCR)*, and *extended constructed response (ECR)*.

SR items require students to select a correct answer from several alternatives. For the 2009 MSA-Math, students selected an answer from four options. Each *SR* item was scored dichotomously (i.e., 0 or 1).

SPR items require students to record their answers on a grid by shading in circles corresponding to the numbers in their answer. For the 2009 MSA-Math, only grade 7 and 8 tests included *SPR* items. Each *SPR* item was scored dichotomously.

BCR items require students to provide a short answer using words, numbers, and/or symbols, while *ECR* items require students to write an answer that consists of more information than is required for a brief constructed response item.

Both *BCR* and *ECR* items consist of Step A and Step B. Step A contributes to the content score while Step B contributes to the process score. Each step was considered as an independent item and separately scored;

All *BCR* and *ECR* Step A items received a 0-1 score point range from two independent scorers; all *BCR* Step B items received a 0-2 score point range; all *ECR* Step B items received a 0-3 score point range from two independent scorers. The score given was the higher of the first and the second Reader's scores, provided they were adjacent. A resolution reader's score was used if two non-adjacent initial scores were received. That is, the resolution reader's score was used in place of both the first and second Reader's scores. It should be noted that grade 3 and 4 tests did not include *ECR* items.

The Role of Operational SR Item

Most SR items were used for both form-to-form and year-to-year calibration and linking. As a result, operational SR items fell into one of the following four categories: unique core, common core, unique core linking, and common core linking items. First of all, it should be noted that form-to-form linking was conducted with both the common core and the common core linking items. Form-to-form calibration and linking procedures can be found in section of chapter 1.9, *Form-to-Form Linking Procedures*. More importantly, however, year-to-year linking was conducted with only the core linking items and year-to-year calibration and linking procedures can be found in section of chapter 1.9, *Year-to-Year Linking Procedures*.

While unique core items appeared on either operational form A or F, common core items appeared on both forms. As a result, only the common core items were used for form-to-form linking. Because the core items were not included into the possible 2009 linking pool, on the other hand, item parameters of these items were recalibrated with the 2009 live, operational data (i.e., stratified random sample) and then reserved in the 2009 Maryland item bank for the possible use as core linking items in the future. Classical and Rasch analyses on these core items can be found in section of chapter 1.8, *Validation Check with the 2009 Core Items*.

While a few core linking items appeared only on either operational form A or F (i.e., unique core linking), most core linking items (i.e., common core linking) appeared on both operational forms. As a result, the common core linking items appearing on both forms were used for both form-to-form and year-to-year linking. The unique core linking items were used only for year-to-year linking.

The role of the core linking items was to place the 2009 scale on the 2006 scale. Because these core linking items carried their operational item parameters on the 2006 scale, they were included in the 2009 year-to-year linking pool. Classical analysis on these items can be found in section of chapter 1.8, *P-Value Check with Year-to-Year Core Linking Items*, and calibration, linking and equating procedures on these core linking items can be found in chapter 1.9, *Linking, Equating, and Scaling Procedures of the 2009 MSA-Math*.

The Role of Operational SPR, BCR, and ECR Items

SPR, BCR, and ECR items were divided into one of the following two categories: unique core or common core items. Only the common core items appearing on both operational forms were used for form-to-form calibration and linking. Because these items were not included in the 2009 year-to-year linking pool, new Rasch item and step difficulty parameters were estimated with the 2009 live, operational data set (i.e., stratified random sample). These new item and step difficulty parameters were used to produce each student's theta estimate. More detailed information about how much these items changed across years in terms of classical and Rasch item difficulty can be found in section of chapter 1.8, *Validation Check with the 2009 Core Items*.

Table 1.3 Item Type of Content Standard for the 2009 MSA-Math: Grades 3 and 4

Grade	Standard	Item Type	No. of Items of Each Form	
			A	F
3			65	65
	Algebra	<i>SR, BCR</i>	13	13
	Geometry	<i>SR, BCR</i>	8	8
	Measurement	<i>SR, BCR</i>	7	7
	Statistics	<i>SR, BCR</i>	12	12
	Probability	<i>SR</i>	2	2
	Number Computation	<i>SR, BCR</i>	16	16
	Process	<i>BCR</i>	7	7
4			64	64
	Algebra	<i>SR, BCR</i>	14	14
	Geometry	<i>SR, BCR</i>	7	7
	Measurement	<i>SR, BCR</i>	7	7
	Statistics	<i>SR, BCR</i>	8	8
	Probability	<i>SR, BCR</i>	7	7
	Number Computation	<i>SR, BCR</i>	14	14
	Process	<i>BCR</i>	7	7

Note. *SR* items are selected response items, and *BCR* items are brief constructed response items. Form A designates the forms A, B, C, D, and E. Form F designates the forms F, G, H, J, and K.

Table 1.4 Item Type of Content Standard for the 2009 MSA-Math: Grades 5 and 6

Grade	Standard	Item Type	No. of Items of Each Form	
			A	F
5			65	65
	Algebra	<i>SR, BCR, ECR</i>	15	15
	Geometry	<i>SR, BCR</i>	6	6
	Measurement	<i>SR, BCR</i>	8	8
	Statistics	<i>SR, BCR</i>	9	9
	Probability	<i>SR, BCR</i>	4	4
	Number Computation	<i>SR, BCR</i>	15	15
	Process	<i>BCR, ECR</i>	8	8
6			62	62
	Algebra	<i>SR, BCR, ECR</i>	14	14
	Geometry	<i>SR, BCR</i>	8	8
	Measurement	<i>SR, BCR</i>	6	6
	Statistics	<i>SR, BCR</i>	9	9
	Probability	<i>SR, BCR</i>	4	4
	Number Computation	<i>SR, BCR</i>	14	14
	Process	<i>BCR, ECR</i>	7	7

Note. *SR* items are selected response items, *BCR* items are brief constructed response items, and *ECR* items are Extended Constructed Response. Form A designates the forms A, B, C, D, and E. Form F designates the forms F, G, H, J, and K.

Table 1.5 Item Type of Content Standard for the 2009 MSA-Math: Grades 7 and 8

Grade	Standard	Item Type	No. of Items of Each Form	
			A	F
7			62	62
	Algebra	SR, SPR, BCR, ECR	14	14
	Geometry	SR, SPR, ECR	7	7
	Measurement	SR, SPR, BCR	6	6
	Statistics	SR, SPR, BCR, ECR	9	9
	Probability	SR, SPR, BCR	5	5
	Number Computation	SR, SPR	14	14
	Process	BCR, ECR	7	7
8			61	60
	Algebra	SR, SPR, BCR, ECR	15	15
	Geometry	SR, SPR, ECR	8	8
	Measurement	SR, SPR, BCR	5	5
	Statistics	SR, SPR, BCR, ECR	9	8*
	Probability	SR, SPR, BCR	4*	5
	Number Computation	SR, SPR	12	12
	Process	BCR, ECR	8	7*

Note. SR items are selected response items, SPR items are student-produced response, BCR items are brief constructed response items, and ECR items are extended constructed response. Form A designates the forms A, B, C, D, and E. Form F designates the forms F, G, H, J, and K.

Note. 62 items were originally developed for each operational form in grade 8. However, due to item development issues that affected two BCR items (i.e., scatter plot) on operational Form F caused MSDE and NPC to Do Not Score (DNS) the items. One probability SR item on operational Form A was deemed DNS.

Table 1.6 Item Distribution of Each Content Standard for the 2009 MSA-Math: Grade 3

Form	Total Item Number of Each Standard							Total # of Item
	1*	2*	3*	4*	5*	6*	7*	
A	13	8	7	12	2	16	7	65
F	13	8	7	12	2	16	7	65

Note. 1*. Algebra; 2*. Geometry; 3*. Measurement; 4*. Statistics; 5*. Probability; 6*. Numbers and Computation; 7*. Process

Table 1.7 Total and Reporting Content Standard Scores for the 2009 MSA-Math: Grade 3

Form	Total and Reporting Standard Scores					
	1	2&3	4&5	6	7	Total Score
A	13	15	14	16	14	72
F	13	15	14	16	14	72

Table 1.8 Item Type and Score Point Distribution for the 2009 MSA-Math: Grade 3

Form	# of SR Item	# of BCR Item		Total # of Item	Scores of SR	Scores of BCR		Total Score
		Step A	Step B			Step A	Step B	
A	51	7	7	65	51	7	14	72
F	51	7	7	65	51	7	14	72

Table 1.9 Item Distribution of Each Content Standard for the 2009 MSA-Math: Grade 4

Form	Total Item Number of Each Standard							Total # of Item
	1*	2*	3*	4*	5*	6*	7*	
A	14	7	7	8	7	14	7	64
F	14	7	7	8	7	14	7	64

Note. 1*. Algebra; 2*. Geometry; 3*. Measurement; 4*. Statistics; 5*. Probability; 6*. Numbers and Computation; 7*. Process

Table 1.10 Total and Reporting Content Standard Scores for the 2009 MSA-Math: Grade 4

Form	Total and Reporting Standard Scores					
	1	2&3	4&5	6	7	Total Score
A	14	14	15	14	14	71
F	14	14	15	14	14	71

Table 1.11 Item Type and Score Point Distribution for the 2009 MSA-Math: Grade 4

Form	# of SR Item	# of BCR item		Total # of Item	Scores of SR Item	Scores of BCR		Total Score
		Step A	Step B			Step A	Step B	
A	50	7	7	64	50	7	14	71
F	50	7	7	64	50	7	14	71

Table 1.12 Item Distribution of Each Content Standard for the 2009 MSA-Math: Grade 5

Form	Total Item Number of Each Standard							Total # of Item
	1*	2*	3*	4*	5*	6*	7*	
A	15	6	8	9	4	15	8	65
F	15	6	8	9	4	15	8	65

Note. 1*. Algebra; 2*. Geometry; 3*. Measurement; 4*. Statistics; 5*. Probability; 6*. Numbers and Computation; 7*. Process

Table 1.13 Total and Reporting Content Standard Scores for the 2009 MSA-Math: Grade 5

Form	Total and Reporting Standard Scores					Total Score
	1	2&3	4&5	6	7	
A	15	14	13	15	17	74
F	15	14	13	15	17	74

Table 1.14 Item Type and Score Point Distribution for the 2009 MSA-Math: Grade 5

Form	# of SR Item	# of BCR Item		# of ECR Item		Total # of Item	Scores of SR	Scores of BCR		Scores of ECR		Total Score
		Step A	Step B	Step A	Step B			Step A	Step B	Step A	Step B	
A	49	7	7	1	1	65	49	7	14	1	3	74
F	49	7	7	1	1	65	49	7	14	1	3	74

Table 1.15 Item Distribution of Each Content Standard for the 2009 MSA-Math: Grade 6

Form	Total Item Number of Each Standard							Total # of Item
	1*	2*	3*	4*	5*	6*	7*	
A	14	8	6	9	4	14	7	62
F	14	8	6	9	4	14	7	62

Note. 1*. Algebra; 2*. Geometry; 3*. Measurement; 4*. Statistics; 5*. Probability; 6*. Numbers and Computation; 7*. Process

Table 1.16 Total and Reporting Content Standard Scores for the 2009 MSA-Math: Grade 6

Form	Total and Reporting Standard Scores					
	1	2&3	4&5	6	7	Total Score
A	14	14	13	14	15	70
F	14	14	13	14	15	70

Table 1.17 Item Type and Score Point Distribution for the 2009 MSA-Math: Grade 6

Form	# of SR Item	# of BCR Item		# of ECR Item		Total # of Item	Scores of SR	Scores of BCR		Scores of ECR		Total Score
		Step A	Step B	Step A	Step B			Step A	Step B			
A	48	6	6	1	1	62	48	6	12	1	3	70
F	48	6	6	1	1	62	48	6	12	1	3	70

Table 1.18 Item Distribution of Each Content Standard for the 2009 MSA-Math: Grade 7

Form	Total Item Number of Each Standard							Total # of Item
	1*	2*	3*	4*	5*	6*	7*	
A	14	7	6	9	5	14	7	62
F	14	7	6	9	5	14	7	62

Note. 1*. Algebra; 2*. Geometry; 3*. Measurement; 4*. Statistics; 5*. Probability; 6*. Numbers and Computation; 7*. Process

Table 1.19 Total and Reporting Content Standard Scores for the 2009 MSA-Math: Grade 7

Form	Total and Reporting Standard Scores					
	1	2&3	4&5	6	7	Total Score
A	14	13	14	14	17	72
F	14	13	14	14	17	72

Table 1.20 Item Type and Score Point Distribution for the 2009 MSA-Math: Grade 7

Form	# of SR Item	# of SPR Item	# of BCR Item		# of ECR Item		Total # of Item	Scores of SR	Scores of SPR	Scores of BCR		Scores of ECR		Total Score
			Step A	Step B	Step A	Step B				Step A	Step B	Step A	Step B	
A	36	12	4	4	3	3	62	36	12	4	8	3	9	72
F	36	12	4	4	3	3	62	36	12	4	8	3	9	72

Table 1.21 Item Distribution of Each Content Standard for the 2009 MSA-Math: Grade 8

Form	Total Item Number of Each Standard							Total # of Item
	1*	2*	3*	4*	5*	6*	7*	
A	15	8	5	9	4*	12	8	61
F	15	8	5	8*	5	12	7*	60

Note. 1*. Algebra; 2*. Geometry; 3*. Measurement; 4*. Statistics; 5*. Probability; 6*. Numbers and Computation; 7*. Process

Note. 62 items were originally developed for each operational form in grade 8. However, due to item development issues that affected two BCR items (i.e., scatter plot) on operational Form F caused MSDE and NPC to Do Not Score (DNS) the items. One probability SR item on operational Form A was deemed DNS.

Table 1.22 Total and Reporting Content Standard Scores for the 2009 MSA-Math: Grade 8

Form	Total and Reporting Standard Scores					Total Score
	1	2&3	4&5	6	7	
A	15	13	13	12	19	72
F	15	13	13	12	17	70

Table 1.23 Item Type and Score Point Distribution for the 2009 MSA-Math: Grade 8

Form	# of SR Item	# of SPR Item	# of BCR Item		# of ECR Item		Total # of Item	Scores of SR	Scores of SPR	Scores of BCR		Scores of ECR		Total Score
			Step A	Step B	Step A	Step B				Step A	Step B	Step A	Step B	
A	33	12	5	5	3	3	61	33	12	5	10	3	9	72
F	34	12	4	4	3	3	60	34	12	4	8	3	9	70

1.5 Operational Test Form Construction Using the Rasch Model

The selection of items to be included in the final operational test forms of the 2009 MSA-Math required a careful consideration based on test blueprints, classical item analyses, *DIF* analyses, and IRT analyses. Specifically, the Rasch model (i.e., 1-Parameter Logistic IRT) played a major role in constructing the 2009 operational forms. First, Pearson suggested the following guidelines:

- Do not include items that are too easy or too hard.
- Do not include *BCR* items with score distributions that do not elicit the full range of rubric scores.
- Do not include items with *DIF* classifications “C” for the *SR* items and “CC” for the *BCR* items *unless* they have been deemed acceptable by the external review of content experts.
- Finally, do not include items which have Rasch *Infit* and *Outfit* mean-squares lower than .5 or higher than 1.5. More specific information on Rasch *Infit* and *Outfit* mean-squares can be found in the third part of the 2009 technical report, *Overview of Statistical Summaries*.

A procedure for using IRT methods to build tests that meet any desired set of test specifications was outlined by Lord (1977). The procedure utilizes an item bank with item parameter estimates available for the IRT model of choice, with accompanying information functions. The steps in the procedure suggested by Lord (1977) are as follows:

- First, the shape of desired test information needs to be decided. This was termed as the “target information function” by Lord (1977).
- Second, specific items need to be selected from the item bank with item information functions that will fill up hard-to-fill areas under the target information function.
- Third, the test information function after test items are added needs to be recalculated.
- Fourth, until the test information function approximates the target information function to a satisfactory degree, test items need to keep on being selected.

It should be noted that these steps were implemented within a framework defined by the content specification of the test. In addition, math content specialists from MSDE reviewed the final test forms of the 2009 MSA-Math. The following table and figure show an example of the 2009 MSA-Math operational test form construction using the Rasch (i.e., 1-PL IRT) method. Detailed information about constructing operational forms using the Rasch method can be obtained from either MSDE or Pearson.

Table 1.24 The 2009 Math Operational Test Construction Using the Rasch Model: Grade 4 Form A

Item Type	P-value	A	D_{i1}	D_{i2}
BCR_A	0.74	1.00	-0.0713	
BCR_B	0.73	1.00	-0.2255	0.4783
BCR_A	0.87	1.00	-1.1338	
BCR_B	0.45	1.00	-0.6131	4.3963
BCR_A	0.37	1.00	2.1316	
BCR_B	0.47	1.00	0.4623	2.7745
BCR_A	0.44	1.00	1.6468	
BCR_B	0.40	1.00	0.3771	3.7263
BCR_A	0.44	1.00	-0.2409	4.0341
BCR_B	0.82	1.00	-0.5527	
BCR_A	0.50	1.00	1.3917	
BCR_B	0.43	1.00	-0.5064	4.821
BCR_A	0.70	1.00	0.1552	
BCR_B	0.48	1.00	-0.7421	3.9335
SR	0.84	1.00	-0.7274	
SR	0.55	1.00	0.9747	
SR	0.94	1.00	-2.1097	
SR	0.80	1.00	-0.7990	
SR	0.83	1.00	-1.0550	
SR	0.68	1.00	-0.0118	
SR	0.79	1.00	-0.4437	
SR	0.70	1.00	-0.1077	
SR	0.66	1.00	0.1763	
SR	0.94	1.00	-2.7781	
SR	0.69	1.00	0.1230	
SR	0.79	1.00	-0.3698	
SR	0.76	1.00	-0.3619	
SR	0.65	1.00	0.0796	
SR	0.98	1.00	-3.5593	
SR	0.89	1.00	-1.2509	
SR	0.84	1.00	-0.7925	
SR	0.79	1.00	-0.3646	
SR	0.83	1.00	-0.7461	
SR	0.51	1.00	0.9291	
SR	0.53	1.00	1.1949	
SR	0.35	1.00	1.7570	
SR	0.50	1.00	0.6281	
SR	0.48	1.00	1.0327	
SR	0.50	1.00	0.9009	

Table 1.24 (Continued)

Item Type	P-value	A	D_{i1}	D_{i2}
SR	0.71	1.00	0.1774	
SR	0.40	1.00	1.4979	
SR	0.85	1.00	-1.2169	
SR	0.60	1.00	0.3940	
SR	0.66	1.00	0.4883	
SR	0.80	1.00	-0.4685	
SR	0.75	1.00	-0.2435	
SR	0.55	1.00	0.6901	
SR	0.81	1.00	-0.8522	
SR	0.93	1.00	-2.3000	
SR	0.81	1.00	-0.5617	
SR	0.79	1.00	-0.2781	
SR	0.81	1.00	-0.8156	
SR	0.75	1.00	-0.4674	
SR	0.97	1.00	-2.8436	
SR	0.73	1.00	-0.1831	
SR	0.63	1.00	0.3118	
SR	0.84	1.00	-0.9014	
SR	0.68	1.00	0.3863	
SR	0.90	1.00	-1.3494	
SR	0.68	1.00	0.1618	
SR	0.51	1.00	1.2932	
SR	0.70	1.00	-0.1060	
SR	0.83	1.00	-0.9767	
SR	0.60	1.00	0.4796	

Note. A: item discrimination; D_{i1} : first structure measure estimate; D_{i2} : second structure measure estimate.

Note. Please refer to section 3.3 of this technical report to get detailed information about how to estimate structure measure estimate ($D_{ij} = D_i + F_{ij}$)

Note. BCR_A: Step A item; BCR_B: Step B item

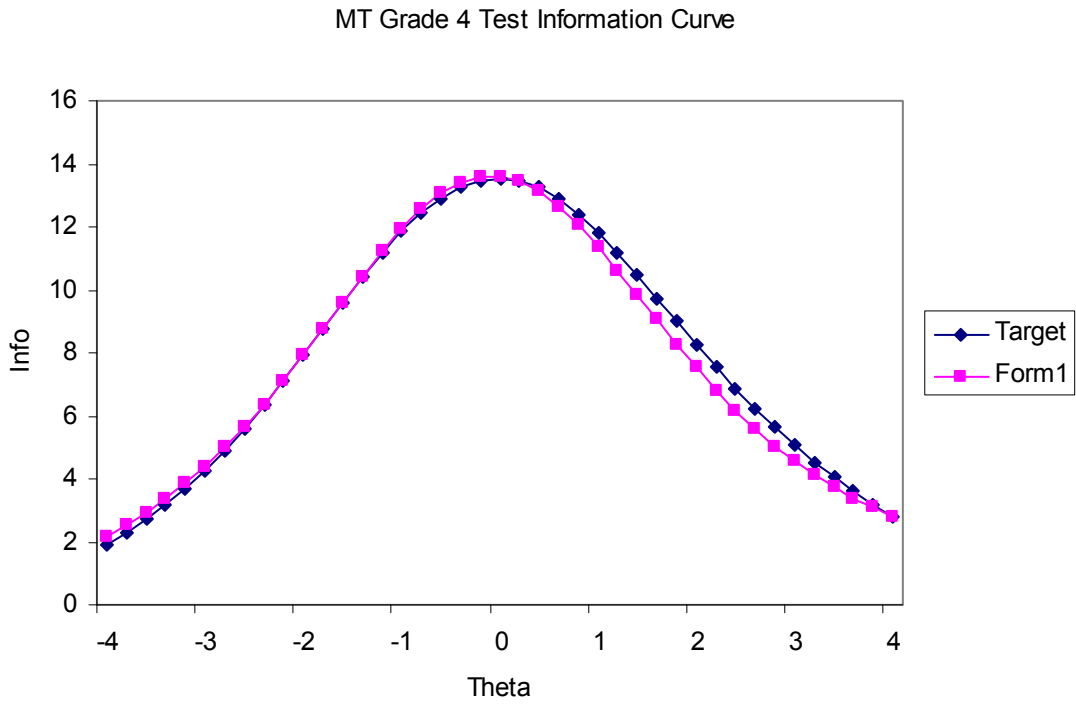


Figure 1.1 Test Information Curves of Target Form vs. Current Year’s Math Operational Test Form

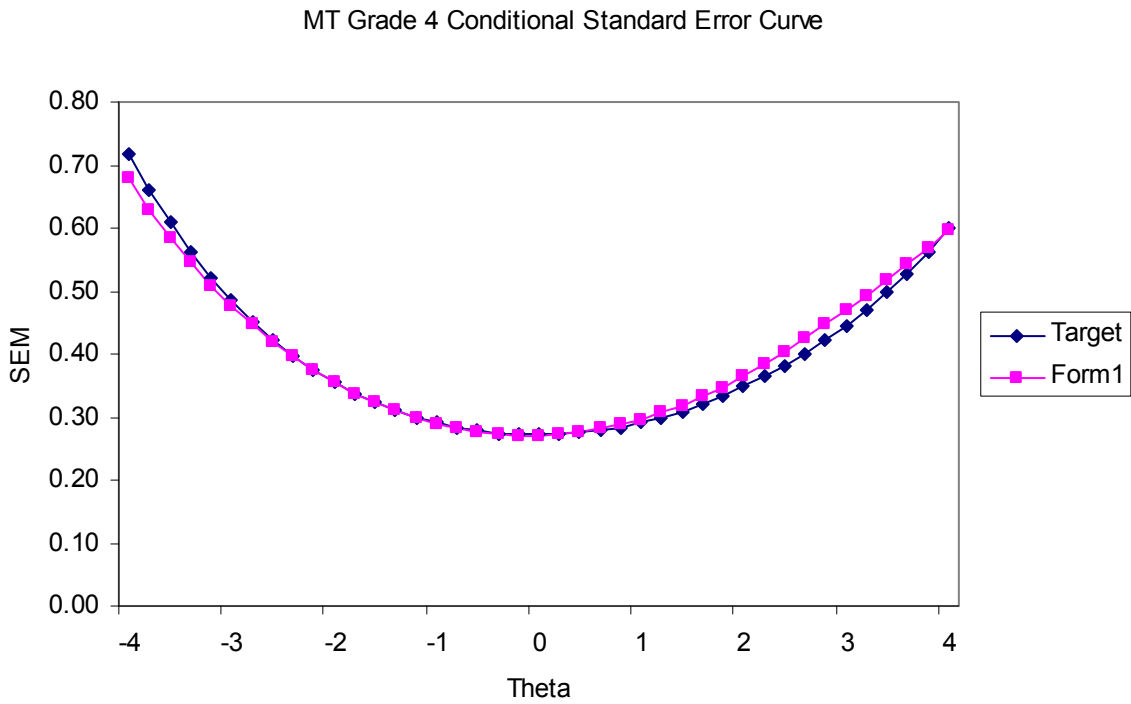


Figure 1.2 Standard Errors of Target Form vs. Current Year’s Math Operational Test Form

1.6 Test Administration of the 2009 MSA-Math

The 2009 MSA-Math test was administered to all students in grades 3 through 8 except for students taking the Alt-MSA-Math or the Mod-MSA-Math. Pearson coordinated the test administration procedures with MSDE prior to implementation. This chapter was prepared to provide general information about the 2009 test administration. Detailed information about the 2009 test administration can be obtained from the 2009 Test Administration and Coordination Manual (TACM) and Examiners Manual (EM) which are available from either MSDE or Pearson.

Test Materials

All test materials had to be stored in a secure location prior to test administration. The School Test Coordinator (STC) provided test administration training and test materials to the test examiners. The Daily Testing Materials Tracking Record (or an equivalent form designed by the LEA) was used to track the distribution and return of Test Books.

Before testing began, the Test Examiners (TEs) carefully inventoried all test materials given to them, as they were accountable for the return of all secure materials at the end of testing. The TEs checked to ensure they have all the materials they needed for testing.

For the Test Examiner, Pearson provided the following materials:

- MSA Examiner's Manual for grades 3 through 8- Math
- Pre-printed and generic labels
- Scoring Service Identification (SSID) sheets

For each student, the following materials were provided by Pearson:

- Test/Answer Book
- Special accommodations testing materials, if necessary

For each student, the following additional materials were provided by school or student:

- Two No. 2 pencils with erasers
- Blank scratch paper
- Classroom Calculator for Day 1 (all grades)
- Classroom ruler with both U.S. customary and metric measurements (all grades)
- Classroom protractor for grades 5 through 8
- Classroom compass for grades 7 and 8 only

Each classroom used for the assessment also needed the following additional materials:

- A sign for the door that reads "Testing: Do not Disturb"
- A digital clock or a watch, or clock with a second hand

Two test-related Examiners Manuals (EMs) were developed for the 2009 MSA: one version for reading and the other for mathematics for use in all grades 3-8. Developed in partnership with

MSDE, the EMs contained instructions for preparation and administration of the test. In addition to the EMs, one Test Administration and Coordination Manual (TACM) was developed for use by the Local Accountability Coordinators (LAC) and building-level School Test Coordinators (STC). Included in this manual were instructions for preparation of materials for testing, monitoring of testing, and packaging of materials for return to Pearson for scoring. The TACM was distributed and reviewed during a workshop in January for STCs and LACs, with duplicates sent to each school along with its testing materials.

Test Administration Schedule

The primary test window for MSA was established by MSDE (March 16-25, 2009, with make-up testing held March 26-31, 2009). However, each LEA (Local Education Agency) set a specific schedule for administration of the MSA within that window for their district. For a given test, grade, content area, and test format, all testing (with the exception of the make-up administration) had to take place on the same schedule. Each LEA schedule was submitted to MSDE in advance and approved for each district by the state. For example, all Grade 3 MSA-Math must be administered on the same days throughout the LEA. In addition, each content area in each grade was tested on two days during the window. In any given grade, one content area's primary testing window was completed before beginning the second content area's primary testing window.

The MSA-Math testing schedule allowed approximately 2 hours and 30 minutes for testing on Day 1 and 1 hour and 45 minutes on Day 2 (including preparation time and breaks).

For the 2009 MSA-Math, the primary testing days were as follows:

- Test materials delivered to schools (Examiner's Manuals, Test/Answer Books, and Test Coordinator's Kits) On or Before March 2, 2009
- Mathematics Primary Testing Window March 16 – March 25, 2009
- Make-up Testing Window March 26 – March 31, 2009

If a student was absent on the testing days, a make-up test was administered on any two consecutive days within the testing window. If a school had an unscheduled closing or delayed opening that prohibited the administration from occurring on the scheduled testing dates, the STCs were consulted by LACs to determine the testing schedule to be followed.

During the administration of the 2009 MSA-Math, MSDE had testing monitors in selected schools observing administration procedures and testing conditions. All monitors had identification cards for security purposes. There was no prior notification of which schools would be monitored, but monitors followed local procedures for reporting to the school's main office and giving proper notification that an MSDE monitor was in the building.

Student Participation

MSDE calculates actual participation of students who took the test. This means that the schools are held accountable not only for student achievement on MSA or Mod-MSA testing, but also they are accountable to ensure that at least 95% of students participate in testing. Accordingly, schools should do all they can to test all students on MSA, Mod-MSA, or Alt-MSA, as applicable.

All students in grades 3 through 5 had to participate in the 2009 MSA-Math, and all students in grades 6 through 8 had to participate in either the 2009 MSA-Math or Mod-MSA-Math. All students in grade 6 through 8 had to participate in the 2009 Mod-MSA-Math, if determined to be eligible by the student's IEP. The only exception was that students with severe cognitive disabilities were assessed by the *Alternate Maryland School Assessment* (Alt-MSA) instead of the regular MSA-Math or Mod-MSA-Math. The criteria that students need in order to be tested in the Alt-MSA program instead of the MSA-Math can be viewed in section 5, Appendix A of the TACM.

Participation of English Language Learners (ELLs) in the MSA-Math or the Mod-MSA-Math

There are special rules that apply to the participation of English Language Learners (ELLs) in the MSA-Math and the Mod-MSA-Math, as follows:

For the MSA-Math and Mod-MSA-Math, ELL students must participate in MSA-Math or Mod-MSA-Math regardless of how recently they entered the U.S. educational system. For ELL students in their first year of enrollment in a U.S. school, "participation" in the MSA-Math or the Mod-MSA-Math is defined as allowing the student to attempt the test for at least 20 minutes. If, after 20 minutes, the TE determines in his or her professional judgment that the student does not possess sufficient English fluency to be able to continue testing, the test administration for that student may be concluded at that time.

Accommodations for Assessment

Accommodations for assessment of students with disabilities (i.e., students having an Individualized Education Program or a Section 504 Plan) and students for English Language Learners (ELL) had to be approved and documented according to the procedures and requirements outlined in the document entitled "Maryland Accommodations Manual: A Guide to Selecting, Administrating, and Evaluating the Use of Accommodations for Instruction and Assessment" (MAM). A copy of the most recent edition of this document is available electronically on the LAC and STC web pages at <https://docushare.msde.state.md.us/docushare>.

No accommodations could be made for students merely because they were members of an instructional group. Any accommodation had to be based on individual needs and not on a category of disability area, level of instruction, environment, or other group characteristics. Responsibility for confirming the need and appropriateness of an accommodation rested with the LAC and school-based staff involved with each student's instructional program. A master list of all students and their accommodations had to be maintained by the principal and submitted to the LAC, who provided a copy to MSDE upon request. Please refer to Section 1 of the 2009 TACM for further information regarding testing accommodations.

Large-Print and Braille Test Books and Kurzweil™ Test Forms on CD

The MSA-Math was administered to those requiring (1) large-print Student Test/Answer Books or (2) Braille Test Books, or (3) Kurzweil™ Test Forms on CD for a verbatim reading

accommodation. For large-print Test/Answer Books, Braille Test Books, and Kurzweil™ Test Forms on CD, student responses were transcribed into the standard-size Test/Answer Book following testing.

The student's name, LEA number, and school number were written on the large-print Test/Answer Book for proper transcription into the the standard-size Test/Answer Book.

The pre-printed student ID label was affixed to the standard-size Test/Answer Book containing the transcribed responses, and not to the large-print Test/Answer Book or Braille books. The bubbles on the demographic page of the standard-size Test/Answer Book were not filled in if there was a pre-printed student ID label for the student.

A certified Test Examiner (TE) transcribed the student responses into a standard-size Test/Answer Book exactly as given by the student. The standard-size Test/Answer Book with the pre-printed or general label attached was returned to Pearson with all other Test/Answer Books.

Large-Print Test/Answer Books and Braille Test/Answer Books containing the original student responses prior to transcription are to be returned with Non-Scorable materials. Any Test/Answer Books which were used as source documents for transcription were invalidated by drawing a large slash across the student demographic page with a black permanent marker.

Once the student responses had been transcribed, the transcribed Test/Answer Book was returned for scoring with the standard-size materials. Specific packing instructions are provided in the 2009 TACM in sections 2 and 3.

Verbatim Reading Accommodation and Kurzweil™ Test Form on CD

Students who had a verbatim reading accommodation documented in their Individual Education Plan (IEP), ELL Plan, or Section 504 Plan, and who received that accommodation in regular instruction, received the accommodation on the 2009 MSA-Math. The accommodation was provided by a live reader or through technology. Appendix L of the 2009 TACM provided information on verbatim reading instruction. Technology used to provide the verbatim reading accommodation was Kurzweil™ reading software. Official, secure electronic copies of the test were ordered through the LAC. MSDE encouraged (but did not require) the use of the Kurzweil™ software to ensure uniformity in the delivery of the verbatim reading accommodation throughout the state.

Students using Kurzweil™ software had to familiarize themselves with its operation prior to the test administration. When there were technical difficulties with Kurzweil™ a certified staff member was used instead. Kurzweil™ Test Form CDs were shipped by Pearson. After testing, schools returned the CDs to Pearson with the non-scorable secure materials.

Administration Procedures for Students with IEP, 504 Plan, or ELL Plan Permitting a Dictated Responses or Use of Word Processor

A student whose IEP, 504 Plan, or ELL Plan permitted a dictated response had his/her responses transcribed at the school level by an eligible TE, or by a staff member working under the direct supervision of a certified TE, into the student's Test/Answer Book with a pre-printed or generic ID label attached.

A student whose IEP, 504 Plan, or ELL plan permitted the use of a word processor had his/her responses transcribed by hand or under the direct supervision of an eligible TE or STC exactly as the student entered his/her responses on the word processor. The student's responses were always

transcribed at the school level into the student's Test/Answer Book with the pre-printed or generic ID label attached. After the student's responses had been transcribed, the memory of the word processor was cleared. The original word-processed print-out was returned to Pearson with the non-scorable materials.

Test Format

All grade levels of the MSA-Math used a Test Book format in which students wrote their answers directly in the Test Book. There were 10 forms of MSA-Math. Different test forms were administered to students in each classroom participating in math tests, and each test form was identified by color and form number/letter. All forms of the MSA Test/Answer Books for each grade had the same grade designation and picture on the front cover. The Test/Answer Books were spiraled within a classroom, and each student used a combined Test/Answer Book.

Since the Test/Answer Books were scanned for scoring, students were encouraged not to use highlights in any part of the book. Although students might be accustomed to using highlighters in daily instruction, highlighting in the Test/Answer Book could obliterate information in a student's book when it was scanned for scoring. As an alternative to highlighting, students were allowed to lightly circle or underline information in test items or perform calculations to help them in responding, as long as markings did not interfere with the bubbled answer choice area and/or the track marks along the outside margins of each page.

Security of Test Materials

The following code of ethics conforms to the Standards for Educational and Psychological Testing developed by the American Educational Research Association, the American Psychological Association, and the National Council on Measurement in Education (Pearson, 2009):

It is breach of professional ethics for school personnel to provide verbal or nonverbal clues or answers, teach items on the test, share writing prompts, coach, hint, or in any way influence a student's performance during the testing situation. A breach of ethics may result in invalidation of test results and local education agency (LEA) or MSDE disciplinary action. (p. 11)

The Test/Answer Books for the 2009 MSA-Math were confidential and kept secure at all times. Unauthorized use, duplication, or reproduction of any or all portions of the assessment was prohibited, which is reflected by the following statement (Person, 2009):

Violation of security can result in prosecution and/or penalties as imposed by the Maryland State Board of Education and/or State Superintendent of Schools in accordance with the COMAR 13A.03.04 and 13A.12.05. (p. 11)

All materials were treated as confidential and placed in locked areas. Secure and non-secure test materials were as follows:

- Secure materials: Test/Answer Books (including large-print and Braille), Kurzweil™ test forms on CD, and used scratch paper
- Non-secure materials: TACM, Examiner's Manuals, unused pre-printed student and generic ID labels, unused FedEx return shipping labels, and unused green/orange shipping labels

1.7 Hand Scoring Procedures of the 2009 MSA-Math

Students' responses to *SR* and *SPR* items were machine-scored, and their responses to *BCR* and *ECR* items were individually read and scored by Pearson.

Hand Scoring Staff

The PSC Project Manager (PSC PM), Content Specialist (CS), and Scoring Directors (SD) participated in the rangefinding sessions in Maryland. (Detailed information about rangefinding procedures can be found in the following portion of this section: *Development Procedures for Rangefinding*.) The SD was responsible for maintaining annotations and meeting minutes from all sessions. These notes were a record of the comments and decisions made by the MSDE personnel and members of the Maryland teacher committee. These notes were utilized by the SD responsible for training the Scoring Supervisors and Scorers for the respective Maryland prompts.

1) Scorer

A graduate of a four-year accredited college or university who had completed the Maryland-specific domain training. The scorers were eligible to score items for which they had been trained and successfully qualified.

2) Scoring Supervisor

A reader who directly monitored the scoring of a team of Scorers and retrained as needed. The reader had successfully completed the PSC Scoring Supervisor training.

3) Scoring Director (SD)

An experienced and knowledgeable PSC team leader who was responsible for selecting a wide variety of student responses for such activities as rangefinding and building training materials. Selected papers were then submitted to MSDE for comment and approval. Scoring directors remained on the project as rangefinding participants and trainers. Scoring directors worked with scoring supervisors and the Content Specialist to oversee the scoring of several items. An SD's main duty during scoring was to rule on validity of questionable papers and to maintain consistency in scoring decisions.

4) Content Specialist (CS)

Experienced content/training personnel who had served as SDs and were selected by the Scoring Resources staff and Project Manager to train and support Scoring Directors for Maryland.

Scorer Recruitment and Qualifications

All Scorers for MSDE had to provide Pearson their résumé and documentation of a four-year college degree. Human Resources made every effort to recruit Scorers with a teaching background and to match Scorers to projects which suited their educational background and previous scoring experience. Regardless of educational background, applicants then participated in a one-day general introductory training workshop presented by a PSC staff member. These workshops allowed Pearson to introduce potential Scorers and Scoring Supervisors to large-scale scoring in general and to the Maryland rubric specifically. The PSC staff member who presented the workshop evaluated potential Supervisors and submitted these evaluations to the PSC Site Manager with his/her recommendations. Those who successfully completed the workshop were

added to Pearson's general pool of potential Scorers and Supervisors of MSA Math. This addition to the scoring pool did not qualify these Scorers for scoring the MSDE program.

Scoring Supervisor Selection

The training for new Scoring Supervisors consisted of a two-day course focusing on the duties and responsibilities necessary to successfully manage a team of Scorers. The workshop was led by the PSC Site Manager and Scoring Directors. The instruction included a review of PSC policies and procedures, sessions on use of ePEN and the monitoring reports to track a Scorer's speed and accuracy, role playing activities which explored various situations that could occur with Scorers during the scoring of a project, and Scorer counseling and retraining guidelines. Upon completion of the workshop, the PSC Site Manager and Scoring Directors in conjunction with the Content Specialist reviewed each participant's performance, making sure that each had a complete understanding of the Scoring Supervisor role and its responsibilities. Any participant they found who did not perform to their satisfaction was not added to the qualified Supervisor list.

Scoring Supervisor Project Training and Qualification

Project-specific Supervisor training for MSDE was conducted in the days immediately preceding Scorer training. This training began with the SD reading the rubrics aloud and answering any questions the Supervisor might have regarding the rubric. The SD then read each anchor paper aloud to the Supervisors. Each response in the anchor set was thoroughly explained, including the notes and comments of the rangefinding committee. Practice Set 1 was reviewed next. The Supervisors scored the practice set individually in the electronic scoring system (ePEN) as well as recorded their scores on a paper copy of the practice set, and then waited for all Supervisors to complete scoring the set. When everyone had completed scoring the training set, the SD discussed the responses one by one, focusing on why each received that score and not another. The SD reviewed with the group the reason for assigning each score point and discussed each paper in its entirety. The Supervisors were then ready to score Practice Set 2. Practice Set 2 was scored and reviewed exactly as Practice Set 1.

Having thoroughly discussed both practice sets with the group, the SD explained that in order for a participant to qualify as a Scoring Supervisor, it was required that the Supervisor should score at least 90% perfect agreement on Step A and 80% perfect agreement on Step B on two of three qualifying sets or one of two qualifying sets, depending on the number of sets available for each item (Qualification Rules, Attachment M). The Supervisors scored the first qualifying set individually and recorded their scores in ePEN. As each Supervisor finished scoring, the SD reviewed the qualifying reports before allowing the Supervisor to proceed to the next qualifying set. Each response was reviewed and any questions the Supervisor had were addressed before the Supervisor attempted the next qualifying set. The Supervisor followed the same procedure with Qualifying set 2 (and set 3 if available). Supervisors had to pass one of two or two of three sets (depending on the number of qualifying sets available per item) with 80% agreement for Math Step B and 90% in Math Step A as specified in the qualification rules or they would be released from the MSDE project.

Scoring Supervisor Duties

Scoring Supervisors were responsible for monitoring the training and qualifying of the Scorers assigned to their team. The Supervisors assisted the SD, if requested, during the training of the Scorers. The Supervisor was responsible for monitoring Scorers' progress through the qualifying sets. The Supervisor was also responsible for monitoring each Scorer's assignment of scores to

the responses. Additionally, the Supervisor reviewed the statistical reports with each individual on the team. The Supervisor consulted the SD regarding variations by the team members from the acceptable standards (95% for Math Step A, and 85% for Math Step B). The Supervisor had the initial responsibility to see that the Scorer maintained the set standards through individual retraining. The SD monitored the Supervisor by reviewing team statistics and working one-on-one with the Supervisor.

Scoring Director Selection and Qualification

The candidates for Scoring Director had been recommended by the Content Specialist, PSC Resource Staffing Managers or Site Manager. The recommendations were based upon the evaluations the candidates received as Scorers and Supervisors and were part of their personnel file. The candidates generally had been Supervisors on large-scale projects for multiple teams, and/or they had served as Supervisors on small-scale projects where Supervisors trained their individual teams. They had been evaluated on their ability to train Scorers as well as their ability to monitor the scoring accuracy and consistency of Scorers. These evaluations were submitted in writing at the end of each scoring project by the Site Managers and SDs that had observed the work of the SD candidates.

Scoring Director Project Training

The SDs familiarized themselves with the rubric. Any questions regarding the rubric were addressed by the PSC Content Specialist or MSDE. The next step was for the SD to become familiar with all their items and all training materials and scoring decisions/issues associated with their items prior to Supervisor training.

Scoring Director Duties

The SD's job was to conduct the training of the Supervisors and Scorers, oversee the actual scoring of the papers, monitor the work of the Supervisor, and act as the decision-maker for situations or questions that may arise during the scoring process. For example, all condition code (foreign language, off-topic, off-mode, etc.) responses were reviewed by the SD, who had to confirm any such decision and ensure consistency of decisions. (Blank condition codes were assigned at the Scorer level and did not require SD confirmation.) Additionally the SD and Supervisor conducted all resolution readings. The resolution score became the reported score.

The SD also reviewed any potential questionable content responses and forwarded those to the Content Specialist to consult with MSDE before processing.

The SD was also responsible for daily statistical review and analysis of all monitoring reports to ensure the quality of the scoring. Review of the data allowed the SD not only to monitor the Scorer but also to provide the Supervisor with additional input. Available data included 1) individual Scorer agreement rates between two independent scorings; 2) score point distributions by Scorer and trend review; 3) prompt statistics for agreement rates and score point distributions; 4) Resolution data; 5) scorer-level and item-level agreement on validity papers pre-scored by MSDE.

Scorer Training

Scorer training was led by the SD, and each SD was responsible for training the items he/she monitored throughout scoring. After sufficient student responses were scored for equating purposes for the first item, the SD reconvened the group and trained the second item. Training began with the definition and an overview of holistic scoring. Training continued with a reading

and discussion of the generic rubric and item, and then the student responses in the anchor set were read and discussed. In the anchor set the scores had been recorded on the student responses and were arranged in ascending point-scale order. Each annotated anchor response was read aloud and discussed thoroughly. Emphasis was placed on the Scorers' understanding of how the responses differed from one another in incremental quality, how each response reflected the description of its score point as generalized in the scoring rubric, and how each reflected the MSDE's standard for application of each score point.

Once Scorers had all their questions answered and the discussion of the anchor set was finished, the Scorers began to assign scores to the first practice set. Each Scorer independently read and scored the responses in the practice set in the electronic scoring system (ePEN). The correct scores were then read to the group when everyone had completed the scoring. In addition, each practice paper was discussed as to reasons for applying each given score. At this point, Scorers interacted with the SD in discussing the characteristics of each response that earned the assigned score point. The same format was followed for each practice set. During this process, the job of the Scorer was to internalize the scoring scale and adjust his or her individual scoring to conform to that scale. Once all practice papers had been scored and fully discussed, Scorers began the qualifying process.

For MSA Math, there were two or three qualifying sets, depending on the particular item. MSDE informed PSC in writing for each specific administration how many qualifying sets were approved and were available to the Scorers. Scorers had to achieve at least 90% perfect agreement on Step A and 80% perfect agreement on Step B on two of three qualifying sets or one of two qualifying sets, depending on the number of sets available for each item.

Scoring Rules for MSA-Math

The following scoring rules were applied to MSA-Math BCR and ECR items:

- Math BCR (Brief Constructed Response) items were scored:
 - Step A: 0, 1 with two readings
 - Step B: 0, 1, 2 with two readings
- Math ECR (Extended Constructed Response) items were scored:
 - Step A: 0, 1 with two readings
 - Step B: 0,1,2,3 with two readings
- Scores given were the higher of the 1st and 2nd Scorer's scores provided they were adjacent.
- For example:

1 st Scorer	2 nd Scorer	Final Score
1	2	2
2	3	3

- A resolution scorer was used if two non-adjacent initial scores were received.

- The resolution scorer's score was used in place of both the 1st and 2nd Scorers' scores.
- For example:

1 st Scorer	2 nd Scorer	Resolution Scorer	Final Score
0	2	1	1
0	3	2	2
1	3	3	3
2	0	1	1
3	0	2	2

Inter-Rater Agreement

Pearson's scoring system generated many kinds of internal monitoring reports that enabled the project leadership to monitor the accuracy and consistency of scoring. These reports were compiled by prompt, listed the entire prompt's Scorers, and provided the results of their scoring for each day. Information on these reports included the number of responses read by the Scorers during the period, the number and percent of condition code responses, and the number of responses for which there had been a second reading. The number of responses with second readings provided data that allowed for reporting of the number and percent of responses with perfect agreement; the number and percent of responses on which the first Scorer was a point lower than the second Scorer; the number and percent of responses on which the first Scorer was a point higher than the second Scorer (Adjacent); and the number and percent of responses differing by more than one score point (Non-Adjacent). The Scoring Director also reviewed the daily statistical reports to identify individuals or teams who might need retraining in order to provide continuous scoring consistency on the project. MSDE received data summary reports. Statistical summaries of inter-rater reliability can be found in section 3.4, *Inter-Rater Reliability*.

Scorer Retraining

When a Scorer's performance fell below acceptable parameters for a project, the Scorer was retrained. Retraining was the process by which the SD or Supervisor utilized a number of methods such as individual tutoring on problem score points, individual review of selected responses, and anchor and rubric review to get a Scorer back on track with the guidelines provided by a specific program. Group retraining was conducted by the SD every Monday (or following any extended break) during the scoring project. In addition, daily retraining occurred as deemed necessary by the MSDE representative and CS.

Backreading

Pearson's ePEN system allowed Supervisors and/or SDs to conduct backreads as an additional monitoring method. When conducting backreads, the Supervisor or SD received images of student responses and the scores assigned by the Scorer. Responses selected for backreads might be randomly selected or might be targeted backreads (e.g., responses receiving specific scores, etc.). These backreads were very useful in tracking specific areas of confusion for a given Scorer or group of Scorers and assisted the Supervisor and SD in knowing just how to direct retraining activities for individual Scorers or teams. The initial backreading percentage was set at 3%. This

percentage might be adjusted either higher or lower by the Supervisor based upon the performance of the Scorer.

Development Procedures for Rangefinding

Scoring Directors were selected by the PSC Scoring Resource Manager and Content Specialist to prepare sets of papers for client approval. These experienced SDs were judged by the CS for their ability to recognize and assemble a wide variety of responses. The SD also participated with the clients as a facilitator during the rangefinding session in order to make notes and be prepared to assemble the finished sets to the client's specifications. For a given math prompt, the SD had the following responsibilities:

- 1) To know the prompt and the rubric thoroughly
- 2) To read responses
 - Looked for responses that seemed to represent the full range of quality as described in the rubric.
 - Searched all orders for responses, with particular emphasis on the state's high-performing districts.
 - Included not only papers that were homogeneous in their level of quality but also papers that differed in quality from variable to variable but which could be given an overall classification of High, Medium, or Low.
 - Marked High, Medium, and Low papers—marked especially good ones that might potentially receive top scores.
- 3) To sort copies
 - Copies were sorted into piles, reflecting the nature of the flag—all potential high papers were together, all potential medium papers were together, etc., with all problem papers grouped together.
 - For problem or decision papers, duplicates of types of problems were culled. The best example of each problem type was retained; the rest were set aside for possible future use.
- 4) To develop sets for rangefinding
 - Decided which particular papers from the sorted piles should go into sets for rangefinding. Each paper selected went into a rangefinding set arranged in performance from low to high performance.

Rangefinding Procedures

The objective of rangefinding sessions was for the team members to arrive at a consensus as to the score of each paper in the proposed training materials. These sessions were attended by Maryland educators, MSDE, and PSC Project Manager, Content Specialists, and Scoring Directors, who selected and prepared all of the papers that would be reviewed. These papers and their corresponding scores formed the basis of selecting final Anchor Sets, Practice Sets, and Qualifying Sets. Discussions among the team members were important, as they revealed what kinds of qualities characterized certain score points. The most difficult aspects involved balancing widely discrepant qualities found in the same paper and defining the line between adjacent scores.

During formal rangefinding, the procedure for assigning scores to the papers in each set was as follows:

- The item was reviewed by the committee and criteria were discussed for receiving full credit.
- Selected “grounding” papers that represented the full range of scores were read aloud and discussed by the rangefinding panel. Reading aloud focused attention on the ideas presented—or what the student had to say—allowing the panel members to divorce themselves from how the paper looked or how well it had been edited.
- After each response was read, each panel member independently assigned a score. An overall tentative score was assigned to each response on which there seemed to be consensus. However, all assigned scores at this point, even those on responses for which there were complete agreement, were provisional and subject to change based on later considerations.
- All subsequent responses were read and scored by each panel member independently, using the tentative scores on the previous sets as guidelines. After each set had been read, the results were recorded on a consensus sheet and discussed after each committee member had already recorded tentative scoring decisions. There might be frequent reference to previous responses to make sure that decisions on score points were consistent.

This iterative process of reading, charting, and discussing successive responses had three results:

- It established scores for papers for which there was virtually unanimous agreement.
- It identified papers that were on the line between two adjacent scores, necessitating the clarification of that line.
- It contributed to understanding the rationale behind scoring decisions.

During this process, the tentative scores assigned to earlier responses became firm.

1.8 The 2009 Operational Item Analyses

Classical Analysis with Common Items Used for Form-to-Form Linking

As mentioned in chapter 1.4, two operational forms were randomly distributed to students and linked using common items appearing on both forms (i.e., operational forms A and F). As a result, classical analysis of these common items was conducted to check if the two groups taking different operational forms were equivalent. The following descriptive statistics were calculated based on a raw, number-right score of the common items: mean (M) and standard deviation (SD). The results indicated that the students taking the two operational forms were statistically close and equivalent across all grades, as seen from Table 1.25.

Table 1.25 Descriptive Statistics of Form-to-Form Common Items

Grade	Form	No. of Items	N	M	SD
3	A	38	30,174	31.11	6.51
	F	38	29,789	31.15	6.36
4	A	37	29,532	28.48	7.15
	F	37	29,476	28.66	7.00
5	A	37	30,344	28.60	7.50
	F	37	30,103	28.91	7.33
6	A	31	29,789	21.03	7.06
	F	31	29,240	20.96	6.98
7	A	40	30,318	26.91	9.57
	F	40	29,596	27.21	9.54
8	A	28	30,760	16.47	7.23
	F	28	30,282	16.65	7.25

Note. Form A designates the identical operational portion of Forms A, B, C, D, and E. Form F designates the identical operational portion of Forms F, G, H, J, and K.

Note. Analysis was conducted with a statewide population.

P-Value Check with Year-to-Year Core Linking Items

As mentioned in chapter 1.4, different years' assessments were linked using core linking items. This section was prepared to provide information about how much p-values (i.e., classical item difficulty) of the 2009 core linking items varied from previous years.

First, only SR items were used for the purpose of year-to-year linking. Second, classical analysis (e.g., p-value) on these items was conducted with a statewide population, and item sequence numbers on the tables were assigned based on the 2009 assessment. Finally it should be noted that detailed information about Rasch analysis on these core linking items can be found in chapter 1.9, *Linking, Equating, Scaling Procedures of the 2009 MSA-Math*.

As seen in Tables 1.26 through 1.37, we could conclude that most of the 2009 p-values were almost the same or slightly increased compared to those of previous years across all grades.

Table 1.26 P-Value Comparisons of Core Linking Items for Previous Year vs. Year 2009: Grade 3 Form A

Item Seq. No.	Item CID	Previous Year	Y09 FA	Item Seq. No.	Item CID	Previous Year	Y09 FA
1	3509931	0.69	0.70	49	3509961	0.91	0.93
2	3548055	0.93	0.98	50	10000044158	0.86	0.87
5	3510009	0.84	0.86	51	3510018	0.78	0.80
7	3548054	0.93	0.96	52	3510035	0.88	0.89
14	3510017	0.91	0.93	55	3510055	0.62	0.62
15	3510006	0.59	0.58	56	3510058	0.88	0.90
16	3509960	0.78	0.80	62	3510347	0.74	0.72
17	3509964	0.79	0.78	63	3510053	0.84	0.85
21	3509983	0.91	0.94	64	3510041	0.92	0.94
22	3510022	0.51	0.56	65	3510051	0.57	0.57
23	3509927	0.80	0.79	66	3509929	0.53	0.56
29	3510062	0.85	0.85	67	3510329	0.55	0.66
32	3509988	0.73	0.72	68	3510033	0.82	0.85
33	3510070	0.97	0.98	69	3510043	0.77	0.77
41	3510063	0.78	0.80	72	3509962	0.90	0.91
45	3509926	0.39	0.51	82	3510036	0.85	0.87
46	3548507	0.85	0.88				
48	3510065	0.94	0.95				

Note. Analysis was conducted with a statewide population.

Note. Item sequence numbers were assigned based on the 2009 assessment.

Descriptive Statistics of Year-to-Year Core Linking Items: Grade 3 Form A

Form	Year	No. of Items	<i>M</i>	<i>SD</i>
A	Previous Year	34	0.78	0.15
	Year 2009	34	0.80	0.14

Table 1.27 P-Value Comparisons of Core Linking Items for Previous Year vs. Year 2009: Grade 3 Form F

Item Seq. No.	Item CID	Previous Year	Y09 FF	Item Seq. No.	Item CID	Previous Year	Y09 FF
1	3509931	0.69	0.70	49	3509961	0.91	0.93
2	3548055	0.93	0.98	51	3510018	0.78	0.81
5	3510009	0.84	0.86	52	3510035	0.88	0.89
7	3548054	0.93	0.96	55	3510055	0.62	0.63
8	3509979	0.84	0.89	56	3510058	0.88	0.90
14	3510017	0.91	0.92	62	3510347	0.74	0.73
15	3510006	0.59	0.58	63	3510053	0.84	0.87
16	3509960	0.78	0.80	64	3510041	0.92	0.95
17	3509964	0.79	0.78	65	3510051	0.57	0.56
21	3509983	0.91	0.94	66	3509929	0.53	0.56
22	3510022	0.51	0.57	67	3510329	0.55	0.64
23	3509927	0.80	0.73	68	3510033	0.82	0.86
24	3509928	0.88	0.95	69	3510043	0.77	0.77
32	3509988	0.73	0.74	70	3510012	0.80	0.80
33	3510070	0.97	0.98	72	3509962	0.90	0.92
41	3510063	0.78	0.80	80	3509950	0.72	0.78
45	3509926	0.39	0.48	82	3510036	0.85	0.87
47	10000044163	0.76	0.78				
48	3510065	0.94	0.95				

Note. Analysis was conducted with a statewide population.

Note. Item sequence numbers were assigned based on the 2009 assessment.

Descriptive Statistics of Year-to-Year Core Linking Items: Grade 3 Form F

Form	Year	No. of Items	<i>M</i>	<i>SD</i>
F	Previous Year	36	0.78	0.14
	Year 2009	36	0.80	0.14

Table 1.28 P-Value Comparisons of Core Linking Items for Previous Year vs. Year 2009: Grade 4 Form A

Item Seq. No.	Item CID	Previous Year	Y09 FA	Item Seq. No.	Item CID	Previous Year	Y09 FA
1	3488052	0.61	0.65	47	3515575	0.71	0.90
2	3515407	0.86	0.87	49	3515471	0.86	0.86
3	100000044146	0.91	0.92	50	3515630	0.52	0.56
6	3515408	0.76	0.79	54	3515533	0.84	0.84
7	3515641	0.79	0.81	55	3515631	0.78	0.79
8	3515410	0.87	0.89	62	100000201857	0.45	0.48
10	3515605	0.61	0.63	63	3515543	0.80	0.80
18	3488159	0.87	0.89	64	3515853	0.80	0.79
19	3515447	0.52	0.53	65	3497869	0.81	0.82
22	3515604	0.69	0.69	66	3548078	0.50	0.51
23	3515737	0.83	0.83	67	3515933	0.76	0.79
24	3515576	0.65	0.67	68	3515519	0.86	0.86
25	3515470	0.73	0.73	69	3515795	0.65	0.64
26	3515643	0.42	0.47	71	3548086	0.81	0.80
32	3515571	0.80	0.84	78	3515506	0.90	0.90
33	100000044144	0.94	0.96	80	3515632	0.69	0.70
34	3515421	0.85	0.85	81	3548088	0.75	0.77

Note. Analysis was conducted with a statewide population.

Note. Item sequence numbers were assigned based on the 2009 assessment.

Descriptive Statistics of Year-to-Year Core Linking Items: Grade 4 Form A

Form	Year	<i>N</i>	<i>M</i>	<i>SD</i>
A	Previous Year	34	0.74	0.14
	Year 2009	34	0.76	0.13

Table 1.29 P-Value Comparisons of Core Linking Items for Previous Year vs. Year 2009: Grade 4 Form F

Item Seq. No.	Item CID	Previous Year	Y09 FF	Item Seq. No.	Item CID	Previous Year	Y09 FF
2	3515407	0.86	0.87	36	3548767	0.71	0.70
3	10000044146	0.91	0.92	47	3515575	0.71	0.91
6	3515408	0.76	0.79	49	3515471	0.86	0.86
7	3515641	0.79	0.82	50	3515630	0.52	0.57
8	3515410	0.87	0.89	54	3515533	0.84	0.85
10	3515605	0.61	0.63	55	3515631	0.78	0.78
11	3488056	0.51	0.51	62	100000201857	0.45	0.45
18	3488159	0.87	0.88	63	3515543	0.80	0.81
19	3515447	0.52	0.54	64	3515853	0.80	0.82
22	3515604	0.69	0.69	65	3515785	0.71	0.78
23	3515737	0.83	0.84	66	3548078	0.50	0.54
25	3515470	0.73	0.73	67	3515933	0.76	0.80
26	3515643	0.42	0.47	68	3515519	0.86	0.87
27	3497882	0.77	0.79	69	3515795	0.65	0.64
31	100000201937	0.82	0.91	71	3548086	0.81	0.81
32	3515571	0.80	0.85	78	3515506	0.90	0.91
33	10000044144	0.94	0.96	80	3515632	0.69	0.69
34	3515421	0.85	0.86	81	3548088	0.75	0.79

Note. Analysis was conducted with a statewide population.

Note. Item sequence numbers were assigned based on the 2009 assessment.

Descriptive Statistics of Year-to-Year Core Linking Items: Grade 4 Form F

Form	Year	<i>N</i>	<i>M</i>	<i>SD</i>
F	Previous Year	36	0.74	0.14
	Year 2009	36	0.76	0.14

Table 1.30 P-Value Comparisons of Core Linking Items for Previous Year vs. Year 2009: Grade 5 Form A

Item Seq. No.	Item CID	Previous Year	Y09 FA	Item Seq. No.	Item CID	Previous Year	Y09 FA
2	3511269	0.88	0.88	43	3511513	0.85	0.86
8	3511203	0.86	0.92	44	3488272	0.56	0.53
16	3511196	0.58	0.57	47	3511266	0.70	0.70
18	3488373	0.66	0.68	48	3488431	0.74	0.74
19	3511467	0.82	0.82	49	3511470	0.86	0.85
20	3512529	0.58	0.58	55	3512595	0.80	0.78
21	3511339	0.66	0.65	56	3488241	0.91	0.92
23	100000043853	0.67	0.70	58	1000000438	0.82	0.81
26	3511216	0.71	0.69	60	3511396	0.88	0.85
27	3512638	0.74	0.70	61	3511429	0.77	0.78
28	3511499	0.63	0.63	64	3511626	0.81	0.86
34	3488506	0.40	0.40	70	3511631	0.78	0.79
37	3488324	0.75	0.78	71	3488251	0.61	0.64
38	3511246	0.76	0.79	72	3511439	0.77	0.78
39	3511458	0.87	0.90	82	3488328	0.71	0.71
42	3511566	0.66	0.68	83	3511448	0.77	0.76

Note. Analysis was conducted with a statewide population.

Note. Item sequence numbers were assigned based on the 2009 assessment.

Descriptive Statistics of Year-to-Year Core Linking Items: Grade 5 Form A

Form	Year	<i>N</i>	<i>M</i>	<i>SD</i>
A	Previous Year	32	0.74	0.11
	Year 2009	32	0.74	0.12

Table 1.31 P-Value Comparisons of Core Linking Items for Previous Year vs. Year 2009: Grade 5 Form F

Item Seq. No.	Item CID	Previous Year	Y09 FF	Item Seq. No.	Item CID	Previous Year	Y09 FF
2	3511269	0.88	0.89	44	100000209182	0.21	0.20
8	3511203	0.86	0.94	47	3511266	0.70	0.70
16	3511196	0.58	0.57	48	3488431	0.74	0.75
18	3488373	0.66	0.69	49	3511470	0.86	0.86
19	3511467	0.82	0.82	55	3512595	0.80	0.79
20	3512529	0.58	0.60	56	3488241	0.91	0.92
21	3511339	0.66	0.66	58	100000043857	0.82	0.83
23	100000043853	0.67	0.70	60	3511396	0.88	0.86
26	3511216	0.71	0.64	61	3511429	0.77	0.77
27	3512638	0.74	0.76	64	3511626	0.81	0.88
37	3488324	0.75	0.78	70	3511631	0.78	0.80
38	3511246	0.76	0.77	71	3488251	0.61	0.64
39	3511458	0.87	0.93	72	3511439	0.77	0.79
40	3512616	0.44	0.48	82	3488328	0.71	0.72
42	3511566	0.66	0.67	83	3511448	0.77	0.77
43	3511513	0.85	0.87				

Note. Analysis was conducted with a statewide population.

Note. Item sequence numbers were assigned based on the 2009 assessment.

Descriptive Statistics of Year-to-Year Core Linking Items: Grade 5 Form F

Form	Year	<i>N</i>	<i>M</i>	<i>SD</i>
F	Previous Year	31	0.73	0.14
	Year 2009	31	0.74	0.15

Table 1.32 P-Value Comparisons of Core Linking Items for Previous Year vs. Year 2009: Grade 6 Form A

Item Seq. No.	Item CID	Previous Year	Y09 FA	Item Seq. No.	Item CID	Previous Year	Y09 FA
1	3516257	0.88	0.90	34	3516331	0.49	0.52
2	100000078832	0.55	0.82	35	3516241	0.84	0.86
3	3516291	0.53	0.54	36	3516247	0.60	0.63
6	3516243	0.72	0.73	37	3516329	0.60	0.71
9	3516248	0.74	0.85	38	3516355	0.70	0.71
10	3516559	0.91	0.92	45	3492095	0.80	0.79
11	3516255	0.77	0.77	50	3516929	0.65	0.72
12	3516258	0.61	0.64	54	3516906	0.60	0.60
19	3516240	0.64	0.67	55	3516332	0.52	0.53
20	3516909	0.59	0.58	56	3516256	0.61	0.63
25	3516351	0.52	0.50	57	3516302	0.69	0.71
26	3516290	0.75	0.69	61	3516375	0.61	0.63
27	100000043862	0.61	0.62	68	3516613	0.54	0.57
29	3517010	0.48	0.54	80	3516303	0.55	0.55
30	100000043865	0.53	0.55				

Note. Analysis was conducted with a statewide population.

Note. Item sequence numbers were assigned based on the 2009 assessment.

Descriptive Statistics of Year-to-Year Core Linking Items: Grade 6 Form A

Form	Year	<i>N</i>	<i>M</i>	<i>SD</i>
A	Previous Year	29	0.64	0.12
	Year 2009	29	0.67	0.12

Table 1.33 P-Value Comparisons of Core Linking Items for Previous Year vs. Year 2009: Grade 6 Form F

Item Seq. No.	Item CID	Previous Year	Y09 FF	Item Seq. No.	Item CID	Previous Year	Y09 FF
1	3516257	0.88	0.89	34	3516331	0.49	0.52
2	3488263	0.79	0.87	35	3516241	0.84	0.86
3	3516291	0.53	0.55	36	3516247	0.60	0.63
4	3492143	0.77	0.79	37	3516329	0.60	0.65
6	3516243	0.72	0.74	38	3516355	0.70	0.71
9	3516248	0.74	0.84	45	3492095	0.80	0.78
10	3516559	0.91	0.92	50	3516929	0.65	0.70
11	3516255	0.77	0.78	54	3516906	0.60	0.66
12	3516258	0.61	0.65	55	3516332	0.52	0.53
19	3516240	0.64	0.66	56	3516256	0.61	0.63
20	3516909	0.59	0.58	57	3516302	0.69	0.71
25	3516351	0.52	0.50	61	3516375	0.61	0.62
26	3516290	0.75	0.69	68	3516613	0.54	0.56
27	100000043862	0.61	0.61	80	3516303	0.55	0.56
30	100000043865	0.53	0.55				

Note. Analysis was conducted with a statewide population.

Note. Item sequence numbers were assigned based on the 2009 assessment.

Descriptive Statistics of Year-to-Year Core Linking Items: Grade 6 Form F

Form	Year	<i>N</i>	<i>M</i>	<i>SD</i>
F	Previous Year	29	0.66	0.12
	Year 2009	29	0.68	0.12

Table 1.34 P-Value Comparisons of Core Linking Items for Previous Year vs. Year 2009: Grade 7 Form A

Item Seq. No.	Item CID	Previous Year	Y09 FA	Item Seq. No.	Item CID	Previous Year	Y09 FA
1	3517604	0.34	0.36	50	100000433	0.34	0.35
2	3517601	0.51	0.55	51	3517687	0.57	0.61
3	3517609	0.58	0.60	52	3517692	0.83	0.84
7	3517616	0.63	0.67	63	3517712	0.46	0.47
8	3517634	0.67	0.71	64	3517714	0.55	0.58
10	3517638	0.77	0.78	65	3517716	0.68	0.69
12	3517650	0.66	0.69	66	3517718	0.70	0.72
18	3517652	0.69	0.74	69	3517721	0.52	0.53
19	3547473	0.80	0.83	70	3517691	0.61	0.66
20	3517663	0.32	0.35	72	3555858	0.45	0.46
30	3517667	0.53	0.60	79	3555859	0.74	0.77
31	3517678	0.92	0.94	80	3517752	0.64	0.66
32	3517742	0.59	0.60	81	3488830	0.58	0.60
42	10000043349	0.36	0.34				
43	3517656	0.65	0.67				

Note. Analysis was conducted with a statewide population.

Note. Item sequence numbers were assigned based on the 2009 assessment.

Descriptive Statistics of Year-to-Year Core Linking Items: Grade 7 Form A

Form	Year	<i>N</i>	<i>M</i>	<i>SD</i>
A	Previous Year	28	0.60	0.15
	Year 2009	28	0.62	0.16

Table 1.35 P-Value Comparisons of Core Linking Items for Previous Year vs. Year 2009: Grade 7 Form F

Item Seq. No.	Item CID	Previous Year	Y09 FF	Item Seq. No.	Item CID	Previous Year	Y09 FF
1	3517604	0.34	0.36	44	3491634	0.29	0.32
2	3517601	0.51	0.56	50	10000043338	0.34	0.34
3	3517609	0.58	0.61	51	3517687	0.57	0.61
7	3517616	0.63	0.67	52	3517692	0.83	0.84
8	3517634	0.67	0.72	63	3517712	0.46	0.50
10	3517638	0.77	0.78	64	3517714	0.55	0.62
12	3517650	0.66	0.70	65	3517716	0.68	0.69
18	3517652	0.69	0.77	66	3517718	0.70	0.73
19	3547473	0.80	0.84	69	3517721	0.52	0.55
20	3517663	0.32	0.35	70	3517691	0.61	0.69
30	3517667	0.53	0.56	72	3555858	0.45	0.47
31	3517678	0.92	0.95	79	3555859	0.74	0.77
32	3517742	0.59	0.60	80	3517752	0.64	0.67
42	10000043349	0.36	0.33	81	3488830	0.58	0.57
43	3517656	0.65	0.67				

Note. Analysis was conducted with a statewide population.

Note. Item sequence numbers were assigned based on the 2009 assessment.

Descriptive Statistics of Year-to-Year Core Linking Items: Grade 7 Form F

Form	Year	<i>N</i>	<i>M</i>	<i>SD</i>
F	Previous Year	29	0.59	0.16
	Year 2009	29	0.62	0.17

Table 1.36 P-Value Comparisons of Core Linking Items for Previous Year vs. Year 2009: Grade 8 Form A

Item Seq. No.	Item CID	Previous Year	Y09 FA	Item Seq. No.	Item CID	Previous Year	Y09 FA
1	3514015	0.28	0.27	47	3514052	0.53	0.53
2	3514014	0.57	0.57	48	3487539	0.63	0.64
5	3514016	0.78	0.81	49	100000043311	0.36	0.37
7	3514053	0.73	0.77	50	3487525	0.50	0.53
8	100000043330	0.45	0.47	51	3487540	0.65	0.67
14	3500150	0.47	0.48	52	3514074	0.42	0.46
22	3514595	0.68	0.71	53	3514075	0.65	0.67
27	100000043320	0.47	0.46	62	3514095	0.31	0.33
32	3514058	0.33	0.35	63	3487568	0.19	0.20
33	3514062	0.43	0.45	65	3514103	0.68	0.70
38	3514156	0.73	0.77	66	100000043304	0.28	0.32
41	100000043323	0.49	0.51	78	3487912	0.53	0.53
42	3514291	0.75	0.81	79	3514710	0.54	0.56
46	3514055	0.56	0.59				

Note. Analysis was conducted with a statewide population.

Note. Item sequence numbers were assigned based on the 2009 assessment.

Descriptive Statistics of Year-to-Year Core Linking Items: Grade 8 Form A

Form	Year	<i>N</i>	<i>M</i>	<i>SD</i>
A	Previous Year	27	0.52	0.16
	Year 2009	27	0.54	0.17

Table 1.37 P-Value Comparisons of Core Linking Items for Previous Year vs. Year 2009: Grade 8 Form F

Item Seq. No.	Item CID	Previous Year	Y09 FF	Item Seq. No.	Item CID	Previous Year	Y09 FF
1	3514015	0.28	0.28	47	3514052	0.53	0.54
2	3514014	0.57	0.58	48	3487539	0.63	0.65
5	3514016	0.78	0.82	50	3487525	0.50	0.54
7	3514053	0.73	0.78	51	3487540	0.65	0.68
8	100000043330	0.45	0.49	52	3514074	0.42	0.48
14	3500150	0.47	0.49	53	3514075	0.65	0.67
32	3514058	0.33	0.35	62	3514095	0.31	0.34
33	3514062	0.43	0.46	65	3514103	0.68	0.72
38	3514156	0.73	0.74	73	3492047	0.34	0.30
41	100000043323	0.49	0.52	78	3487912	0.53	0.56
42	3514291	0.75	0.80	79	3514710	0.54	0.56
46	3514055	0.56	0.58				

Note. Analysis was conducted with a statewide population.

Note. Item sequence numbers were assigned based on the 2009 assessment.

Descriptive Statistics of Year-to-Year Core Linking Items: Grade 8 Form F

Form	Year	<i>N</i>	<i>M</i>	<i>SD</i>
F	Previous Year	23	0.54	0.15
	Year 2009	23	0.56	0.16

Validation Check with the 2009 MSA-Math Core Items

As mentioned in chapter 1.4, operational items fell into one of two categories: core and core linking items. Because the core items were not included into the 2009 year-to-year linking pool, Rasch item and step difficulty parameters of the core items were reestimated with the 2009 stratified random samples during calibration and equating. (Please see section 1.9 and Appendix A for stratified random sampling procedures) As a result, this section was prepared to provide detailed information about how much the core items changed in terms of item difficulty, both classical item p-value and Rasch item difficulty. Detailed information about the roles of the 2009 core and core linking items can be found in section 1.4, *Test Form Design, Specifications, Item Type, and Item Roles*.

A smaller number of cases (approximately 2,500) in the table indicates that it is a field-test item. P-values of both BCR and ECR items were calculated by dividing the item mean score by the item score range (i.e., score point 2 for BCR and 3 for ECR). The percentage of “Omits” for each CR item was low and indicated that a small number of students did not respond at all. In general, item p-value analysis results indicated that most of the 2009 p-values were almost the same or somewhat increased compared to those in previous years across all grades.

With respect to the Rasch item calibration and equating, it should be noted that we coded “Omit” of each item as “missing” before we ran the data with the Rasch model. In general, the level of the 2009 item difficulties stayed almost the same or became a little lower compared to that of previous years across all grades. It should be noted that all of the Rasch item and step difficulty parameters were on a common scale (i.e., linked to the 2006 assessment).

In conclusion, both p-value and Rasch item difficulty results reflected the same phenomenon, indicating that the level of item difficulty stayed the same or became a little lower.

Table 1.38 P-Value Comparisons of Core Items for Previous Year vs. Year 2009: Grade 3 Form A

Item CID	Previous Year	Year 09 Form A	Item CID	Previous Year	Year 09 Form A
10000011184	0.60	0.57	3488139	0.41	0.47
3595527	0.56	0.56	3564095	0.42	0.45
100000210424	0.52	0.58	3510072	0.85	0.87
100000025225	0.88	0.83	3564080	0.60	0.61
3509941	0.58	0.62	3509967	0.90	0.91
3595501	0.55	0.56	3509949	0.60	0.76
100000025207	0.94	0.95	3985609	0.58	0.68
3510005	0.51	0.61	3497888	0.90	0.91
100000025196	0.87	0.90	3547998	0.88	0.88
3595519	0.63	0.64	3564094	0.52	0.55
100000025199	0.95	0.94	100000011195	0.88	0.90
3488065	0.86	0.88	100000018397	0.88	0.85
100000004258	0.90	0.89	100000011207	0.85	0.83
			3490569	0.89	0.91

Note. Bold-faced number indicates that it is Brief Constructed Response (BCR) item.

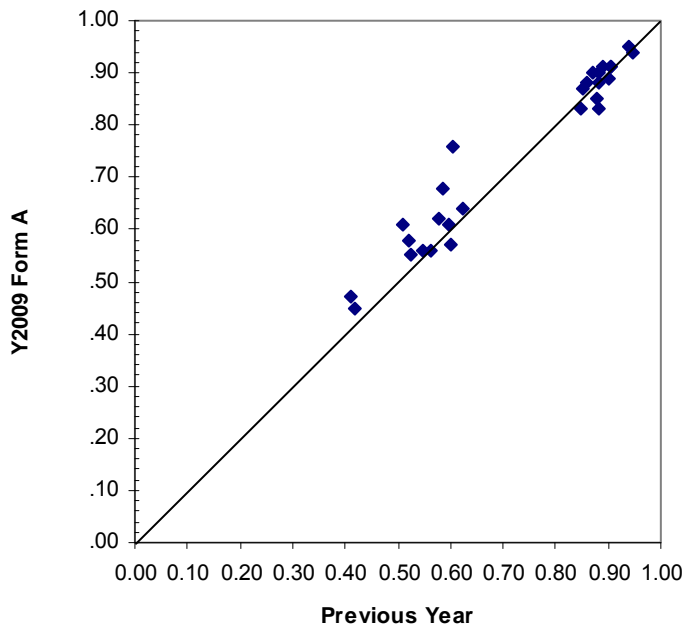


Table 1.39 Score-Point Distribution Comparisons of Constructed Response Core Items for Previous Year vs. Year 2009: Grade 3 Form A

Year	Item CID	Item Type	N	Mean	SD	Score-Point Distribution (%)			
						0	1	2	Omit
2008	100000011184	BCR	2,571	0.60	0.49	39.32	60.21		0.47
2008	3595527	BCR	2,571	1.13	0.52	6.65	71.61	20.50	1.24
2008	3509941	BCR	29,364	0.58	0.49	41.23	57.86		0.91
2008	3595501	BCR	29,364	1.10	0.61	12.19	62.16	23.74	1.91
2008	100000025196	BCR	2,556	0.87	0.33	12.56	87.21		0.23
2008	3595519	BCR	2,556	1.25	0.78	19.72	33.61	45.70	0.98
2007	3488139	BCR	2,150	0.41	0.49	57.95	41.07		0.98
2007	3564095	BCR	2,150	0.84	0.62	26.70	59.35	12.23	1.72
2008	3510072	BCR	29,364	0.85	0.36	14.45	84.99		0.56
2008	3564080	BCR	29,364	1.19	0.79	22.14	33.94	42.60	1.32
2006	3509949	BCR	2,845	0.60	0.49	37.50	60.35		2.14
2006	3985609	BCR	2,845	1.17	0.57	24.00	32.40	42.20	1.34
2007	3547998	BCR	2,189	0.88	0.32	10.83	88.31		0.87
2007	3564094	BCR	2,189	1.05	0.57	12.75	67.29	18.82	1.14
2009	100000011184	BCR	30,174	0.57	0.49	42.47	57.18		0.35
2009	3595527	BCR	30,174	1.11	0.51	7.28	73.07	19.15	0.50
2009	3509941	BCR	30,174	0.62	0.48	37.39	62.16		0.44
2009	3595501	BCR	30,174	1.12	0.57	10.59	65.66	22.94	0.81
2009	100000025196	BCR	30,174	0.9	0.3	9.86	89.69		0.45
2009	3595519	BCR	30,174	1.28	0.74	16.33	37.70	45.16	0.81
2009	3488139	BCR	30,174	0.47	0.5	52.11	47.33		0.56
2009	3564095	BCR	30,174	0.9	0.61	23.12	61.70	14.29	0.88
2009	3510072	BCR	30,174	0.87	0.34	12.76	86.92		0.32
2009	3564080	BCR	30,174	1.23	0.75	18.69	38.28	42.26	0.77
2009	3509949	BCR	30,174	0.76	0.43	23.06	75.81		1.14
2009	3985609	BCR	30,174	1.36	0.71	12.65	37.33	49.22	0.80
2009	3547998	BCR	30,174	0.88	0.33	11.66	87.83		0.51
2009	3564094	BCR	30,174	1.1	0.56	10.53	67.07	21.60	0.80

Table 1.40 Rasch Item and Step Difficulty Comparisons of Core Items for Previous Year vs. Year 2009: Grade 3 Form A

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2
2008	3	10000011184	BCR_A	1.5687		
2008	4	3595527	BCR_B	1.4040	-2.3770	2.3770
2004	8	10000210424	SR	1.3435		
2008	18	10000025225	SR	-0.5433		
2008	19	3509941	BCR_A	1.5122		
2008	20	3595501	BCR_B	1.5891	-1.8002	1.8002
2008	24	10000025207	SR	-1.3387		
2006	25	3510005	SR	1.8874		
2008	26	10000025196	BCR_A	-0.4187		
2008	27	3595519	BCR_B	1.3106	-0.5282	0.5282
2008	28	10000025199	SR	-1.4434		
2007	30	3488065	SR	-0.4640		
2008	31	10000004258	SR	-0.8902		
2007	36	3488139	BCR_A	2.3340		
2007	37	3564095	BCR_B	2.4437	-1.7282	1.7282
2008	42	3510072	BCR_A	-0.2447		
2008	43	3564080	BCR_B	1.5000	-0.5243	0.5243
2006	47	3509967	SR	-0.9029		
2006	53	3509949	BCR_A	1.3843		
2006	54	3985609	BCR_B	1.5179	-0.4973	0.4973
2007	71	3497888	SR	-0.9392		
2007	73	3547998	BCR_A	-0.7716		
2007	74	3564094	BCR_B	1.5840	-2.0306	2.0306
2008	75	10000011195	SR	-0.5799		
2008	76	10000018397	SR	-0.5179		
2008	80	10000011207	SR	-0.0709		
2007	81	3490569	SR	-0.8519		
2009	3	10000011184	BCR_A	1.5806		
2009	4	3595527	BCR_B	1.4153	-2.5617	2.5617
2009	8	10000210424	SR	1.6564		
2009	18	10000025225	SR	-0.2038		
2009	19	3509941	BCR_A	1.4160		
2009	20	3595501	BCR_B	1.5639	-1.9549	1.9549
2009	24	10000025207	SR	-1.4723		
2009	25	3510005	SR	1.3897		
2009	26	10000025196	BCR_A	-0.7697		
2009	27	3595519	BCR_B	1.2125	-0.9262	0.9262
2009	28	10000025199	SR	-1.6379		

Table 1.40 (continued)

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2
2009	30	3488065	SR	-0.4834		
2009	31	100000004258	SR	-0.6636		
2009	36	3488139	BCR_A	2.1303		
2009	37	3564095	BCR_B	2.4239	-2.0904	2.0904
2009	42	3510072	BCR_A	-0.3424		
2009	43	3564080	BCR_B	1.4331	-0.8085	0.8085
2009	47	3509967	SR	-0.8856		
2009	53	3509949	BCR_A	0.5146		
2009	54	3985609	BCR_B	0.9641	-0.9820	0.9820
2009	71	3497888	SR	-0.9265		
2009	73	3547998	BCR_A	-0.4669		
2009	74	3564094	BCR_B	1.6096	-2.008	2.008
2009	75	100000011195	SR	-0.8620		
2009	76	100000018397	SR	-0.2798		
2009	80	100000011207	SR	0.0479		
2009	81	3490569	SR	-0.9778		

Note. Rasch item and step difficulties are on a common scale.

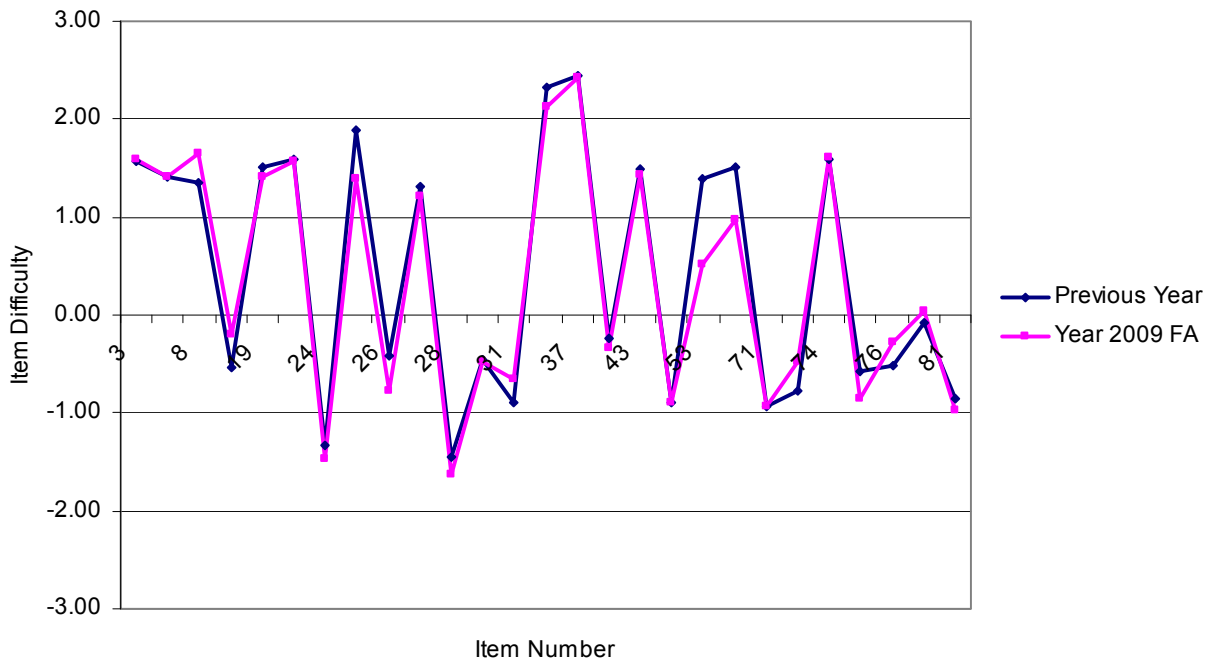


Figure 1.3 Rasch Item Difficulty Comparisons of Core Items for Previous Year vs. Year 2009: Grade 3 Form A

Table 1.41 P-Value Comparisons of Core Items for Previous Year vs. Year 2009: Grade 3 Form F

Item CID	Previous Year	Year 09 Form F	Item CID	Previous Year	Year 09 Form F
100000011186	0.72	0.73	3564083	0.79	0.82
3595529	0.52	0.60	3488087	0.37	0.44
100000011211	0.67	0.68	3564099	0.31	0.40
100000025225	0.88	0.83	100000004263	0.86	0.86
3509941	0.58	0.63	100000213058	0.79	0.87
3595501	0.55	0.56	3511729	0.71	0.68
100000004275	0.37	0.44	3509978	0.61	0.66
100000025196	0.87	0.90	3985610	0.45	0.50
3595519	0.63	0.64	100000025211	0.76	0.77
100000025210	0.95	0.96	3509932	0.98	0.98
100000004270	0.85	0.88	3564086	0.44	0.46
100000025202	0.81	0.86	100000011196	0.83	0.83
100000004258	0.90	0.90	100000018395	0.90	0.91
3510067	0.85	0.85	3510176	0.59	0.65

Note. Bold-faced number indicates that it is Brief Constructed Response (BCR) item.

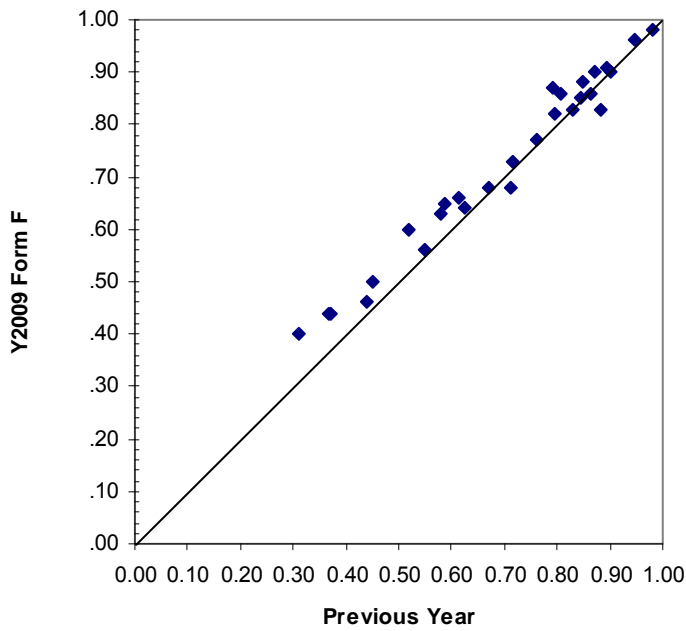


Table 1.42 Score-Point Distribution Comparisons of Constructed Response Core Items for Previous Year vs. Year 2009: Grade 3 Form F

Year	Item CID	Item Type	N	Mean	SD	Score-Point Distribution (%)			
						0	1	2	Omit
2008	100000011186	BCR	2,585	0.72	0.45	27.66	71.76		0.58
2008	3595529	BCR	2,585	1.03	0.43	6.38	81.55	10.95	1.12
2008	3509941	BCR	29,364	0.58	0.49	41.23	57.86		0.91
2008	3595501	BCR	29,364	1.10	0.61	12.19	62.16	23.74	1.91
2008	100000025196	BCR	2,556	0.87	0.33	12.56	87.21		0.23
2008	3595519	BCR	2,556	1.25	0.78	19.72	33.61	45.70	0.98
2008	3510067	BCR	29,253	0.85	0.36	14.75	84.62		0.62
2008	3564083	BCR	29,253	1.59	0.61	5.26	28.70	65.01	1.03
2007	3488087	BCR	2,073	0.37	0.48	60.83	37.34		1.83
2007	3564099	BCR	2,073	0.62	0.69	47.13	38.54	11.63	2.70
2006	3509978	BCR	2,818	0.61	0.49	38.04	61.18		0.78
2006	3985610	BCR	2,818	0.91	0.38	18.50	70.10	10.10	1.10
2008	3509932	BCR	29,253	0.98	0.14	1.31	98.07		0.63
2008	3564086	BCR	29,253	0.88	0.62	24.86	59.60	14.23	1.32
2009	100000011186	BCR	29,789	0.73	0.44	26.18	73.44		0.38
2009	3595529	BCR	29,789	1.21	0.52	5.05	68.22	26.18	0.55
2009	3509941	BCR	29,789	0.63	0.48	36.18	63.38		0.44
2009	3595501	BCR	29,789	1.12	0.57	10.04	66.55	22.62	0.79
2009	100000025196	BCR	29,789	0.90	0.3	9.41	90.16		0.44
2009	3595519	BCR	29,789	1.28	0.73	16.12	38.23	44.89	0.76
2009	3510067	BCR	29,789	0.85	0.36	15.10	84.52		0.39
2009	3564083	BCR	29,789	1.65	0.61	6.31	21.38	71.69	0.61
2009	3488087	BCR	29,789	0.44	0.5	55.20	43.86		0.94
2009	3564099	BCR	29,789	0.79	0.64	31.53	54.22	12.57	1.69
2009	3509978	BCR	29,789	0.66	0.47	33.40	66.18		0.43
2009	3985610	BCR	29,789	1.00	0.45	9.57	79.39	10.34	0.69
2009	3509932	BCR	29,789	0.98	0.13	1.28	98.31		0.41
2009	3564086	BCR	29,789	0.92	0.65	24.46	57.37	17.39	0.79

**Table 1.43 Rasch Item and Step Difficulty Comparisons of Core Items for Previous Year vs. Year 2009:
Grade 3 Form F**

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2
2008	3	100000011186	BCR_A	0.8721		
2008	4	3595529	BCR_B	1.7686	-2.8580	2.8580
2008	13	100000011211	SR	1.1742		
2008	18	100000025225	SR	-0.5433		
2008	19	3509941	BCR_A	1.5122		
2008	20	3595501	BCR_B	1.5891	-1.8002	1.8002
2008	25	100000004275	SR	2.6241		
2008	26	100000025196	BCR_A	-0.4187		
2008	27	3595519	BCR_B	1.3106	-0.5282	0.5282
2008	28	100000025210	SR	-1.5572		
2008	29	100000004270	SR	-0.3022		
2008	30	100000025202	SR	0.0473		
2008	31	100000004258	SR	-0.8902		
2008	36	3510067	BCR_A	-0.2338		
2008	37	3564083	BCR_B	0.1995	-0.9490	0.9490
2007	42	3488087	BCR_A	2.4701		
2007	43	3564099	BCR_B	2.9223	-0.9692	0.9692
2008	44	100000004263	SR	-0.3298		
2004	46	100000213058	SR	-0.3189		
2008	50	3511729	SR	0.9162		
2006	53	3509978	BCR_A	1.3364		
2006	54	3985610	BCR_B	2.3317	-2.1612	2.1612
2008	71	100000025211	SR	0.5946		
2008	73	3509932	BCR_A	-2.7407		
2008	74	3564086	BCR_B	2.4652	-1.6902	1.6902
2008	75	100000011196	SR	-0.0568		
2008	76	100000018395	SR	-0.8257		
2006	81	3510176	SR	1.3847		
2009	3	100000011186	BCR_A	0.7532		
2009	4	3595529	BCR_B	1.0151	-2.4072	2.4072
2009	13	100000011211	SR	1.0793		
2009	18	100000025225	SR	-0.2038		
2009	19	3509941	BCR_A	1.4160		
2009	20	3595501	BCR_B	1.5639	-1.9549	1.9549
2009	25	100000004275	SR	2.3631		
2009	26	100000025196	BCR_A	-0.7697		
2009	27	3595519	BCR_B	1.2125	-0.9262	0.9262
2009	28	100000025210	SR	-2.1068		
2009	29	100000004270	SR	-0.5454		
2009	30	100000025202	SR	-0.2431		
2009	31	100000004258	SR	-0.6636		
2009	36	3510067	BCR_A	-0.0129		

Table 1.43 (continued)

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2
2009	37	3564083	BCR_B	0.2571	-0.4253	0.4253
2009	42	3488087	BCR_A	2.4484		
2009	43	3564099	BCR_B	2.8035	-1.5459	1.5459
2009	44	10000004263	SR	-0.2543		
2009	46	100000213058	SR	-0.4736		
2009	50	3511729	SR	1.0809		
2009	53	3509978	BCR_A	1.1411		
2009	54	3985610	BCR_B	2.0758	-2.6995	2.6995
2009	71	100000025211	SR	0.4822		
2009	73	3509932	BCR_A	-2.8170		
2009	74	3564086	BCR_B	2.3423	-1.5697	1.5697
2009	75	100000011196	SR	0.0623		
2009	76	100000018395	SR	-0.8495		
2009	81	3510176	SR	1.2021		

Note. Rasch item and step difficulties are on a common scale.



Figure 1.4 Rasch Item Difficulty Comparisons of Core Items for Previous Year vs. Year 2009: Grade 3 Form F

Table 1.44 P-Value Comparisons of Core Items for Previous Year vs. Year 2009: Grade 4 Form A

Item CID	Previous Year	Year 09 Form A	Item CID	Previous Year	Year 09 Form A
3487819	0.43	0.50	3488150	0.31	0.38
3564186	0.40	0.44	3564176	0.43	0.47
3515827	0.58	0.65	10000007115	0.89	0.88
10000025162	0.93	0.91	10000025157	0.92	0.92
10000044142	0.82	0.83	3488145	0.59	0.70
3595499	0.45	0.47	3564189	0.42	0.48
10000007124	0.65	0.65	10000012183	0.59	0.6
10000025172	0.36	0.61	10000011509	0.79	0.76
3985613	0.28	0.46	10000011489	0.97	0.97
10000018336	0.75	0.78	100000201842	0.74	0.87
10000007112	0.46	0.45	3515783	0.75	0.74
10000025188	0.66	0.68	3595560	0.74	0.72
3487993	0.89	0.92	3488164	0.93	0.91
10000007125	0.68	0.71	100000201853	0.78	0.87
3515823	0.45	0.45			
3595532	0.40	0.38			

Note. Bold-faced number indicates that it is Brief Constructed Response (BCR) item.

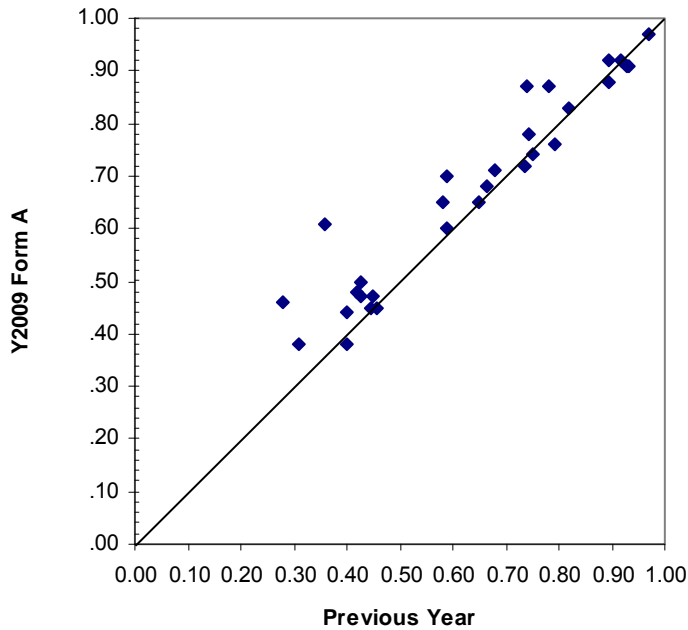


Table 1.45 Score-Point Distribution Comparisons of Constructed Response Core Items for Previous Year vs. Year 2009: Grade 4 Form A

Year	Item CID	Item Type	N	Mean	SD	Score-Point Distribution (%)			
						0	1	2	Omit
2007	3487819	BCR	2,173	0.43	0.50	55.82	42.75		1.43
2007	3564186	BCR	2,173	0.80	0.46	20.29	75.38	2.49	1.84
2008	100000044142	BCR	30,101	0.82	0.38	16.89	82.01		1.10
2008	3595499	BCR	30,101	0.90	0.56	19.62	67.90	10.80	1.67
2004	100000025172	BCR	10,401	0.37	0.48	61.37	36.92		1.48
2004	3985613	BCR	10,401	0.56	0.61	45.57	44.12	6.18	3.26
2008	3515823	BCR	30,101	0.45	0.50	54.09	44.61		1.30
2008	3595532	BCR	30,101	0.80	0.62	28.76	57.76	11.15	2.33
2007	3488150	BCR	2,179	0.31	0.46	68.20	31.07		0.73
2007	3564176	BCR	2,179	0.86	0.69	30.89	50.11	17.76	1.24
2007	3488145	BCR	2,130	0.59	0.49	39.95	58.87		1.17
2007	3564189	BCR	2,130	0.84	0.63	27.37	57.84	13.05	1.74
2008	3515783	BCR	29,933	0.75	0.43	24.51	74.97		0.51
2008	3595560	BCR	29,933	1.47	0.73	13.22	24.30	61.52	0.95
2009	3487819	BCR	29,532	0.50	0.50	48.90	50.38		0.72
2009	3564186	BCR	29,532	0.87	0.48	17.96	74.87	6.12	1.04
2009	100000044142	BCR	29,532	0.83	0.37	15.97	83.19		0.83
2009	3595499	BCR	29,532	0.93	0.55	17.64	69.16	11.98	1.23
2009	100000025172	BCR	29,532	0.61	0.49	38.31	61.13		0.56
2009	3985613	BCR	29,532	0.92	0.63	22.83	59.65	16.42	1.10
2009	3515823	BCR	29,532	0.45	0.50	54.31	44.64		1.05
2009	3595532	BCR	29,532	0.76	0.58	30.03	60.40	7.84	1.74
2009	3488150	BCR	29,532	0.38	0.48	61.60	37.51		0.89
2009	3564176	BCR	29,532	0.95	0.72	27.53	47.94	23.30	1.24
2009	3488145	BCR	29,532	0.70	0.46	29.29	70.10		0.61
2009	3564189	BCR	29,532	0.95	0.53	15.00	72.15	11.65	1.20
2009	3515783	BCR	29,532	0.74	0.44	25.25	74.11		0.64
2009	3595560	BCR	29,532	1.43	0.76	15.36	23.47	59.89	1.28

Table 1.46 Rasch Item and Step Difficulty Comparisons of Core Items for Previous Year vs. Year 2009: Grade 4 Form A

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2
2007	4	3487819	BCR_A	1.4461		
2007	5	3564186	BCR_B	2.4073	-2.9945	2.9945
2006	9	3515827	SR	0.7444		
2008	11	10000025162	SR	-1.8646		
2008	20	10000044142	BCR_A	-0.5527		
2008	21	3595499	BCR_B	1.8966	-2.1375	2.1375
2008	27	10000007124	SR	0.5634		
2004	28	10000025172	BCR_A	1.2405		
2004	29	3985613	BCR_B	2.0371	-1.4842	1.4842
2008	30	10000018336	SR	0.0884		
2008	31	10000007112	SR	1.5155		
2008	35	10000025188	SR	0.4849		
2007	36	3487993	SR	-1.3829		
2008	37	10000007125	SR	0.5246		
2008	38	3515823	BCR_A	1.6468		
2008	39	3595532	BCR_B	2.0517	-1.6746	1.6746
2007	44	3488150	BCR_A	2.2404		
2007	45	3564176	BCR_B	1.6411	-1.2952	1.2952
2008	46	10000007115	SR	-1.3641		
2008	48	10000025157	SR	-1.6646		
2007	51	3488145	BCR_A	0.5813		
2007	52	3564189	BCR_B	1.6234	-1.6600	1.6600
2008	53	10000012183	SR	0.8859		
2008	56	10000011509	SR	-0.2393		
2008	57	10000011489	SR	-2.7177		
2005	70	100000201842	SR	-0.6388		
2008	73	3515783	BCR_A	-0.0713		
2008	74	3595560	BCR_B	0.1264	-0.3519	0.3519
2008	77	3488164	SR	-1.8417		
2004	79	100000201853	SR	-1.1133		
2009	4	3487819	BCR_A	1.3917		
2009	5	3564186	BCR_B	2.1573	-2.6637	2.6637
2009	9	3515827	SR	0.6152		
2009	11	10000025162	SR	-1.5223		
2009	20	10000044142	BCR_A	-0.7600		
2009	21	3595499	BCR_B	1.7168	-2.1933	2.1933
2009	27	10000007124	SR	0.5869		
2009	28	10000025172	BCR_A	0.7480		
2009	29	3985613	BCR_B	1.5908	-1.7399	1.7399
2009	30	10000018336	SR	-0.2781		
2009	31	10000007112	SR	1.6779		
2009	35	10000025188	SR	0.3956		

Table 1.46 (continued)

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2
2009	36	3487993	SR	-1.7595		
2009	37	10000007125	SR	0.2837		
2009	38	3515823	BCR_A	1.6944		
2009	39	3595532	BCR_B	2.3297	-1.8612	1.8612
2009	44	3488150	BCR_A	2.1316		
2009	45	3564176	BCR_B	1.6184	-1.1561	1.1561
2009	46	10000007115	SR	-1.3705		
2009	48	100000025157	SR	-1.7237		
2009	51	3488145	BCR_A	0.1552		
2009	52	3564189	BCR_B	1.5957	-2.3378	2.3378
2009	53	100000012183	SR	0.8211		
2009	56	100000011509	SR	-0.2239		
2009	57	100000011489	SR	-2.8436		
2009	70	100000201842	SR	-1.0863		
2009	73	3515783	BCR_A	-0.0626		
2009	74	3595560	BCR_B	0.1566	-0.3225	0.3225
2009	77	3488164	SR	-1.6322		
2009	79	100000201853	SR	-1.2081		

Note. Rasch item and step difficulties are on a common scale.

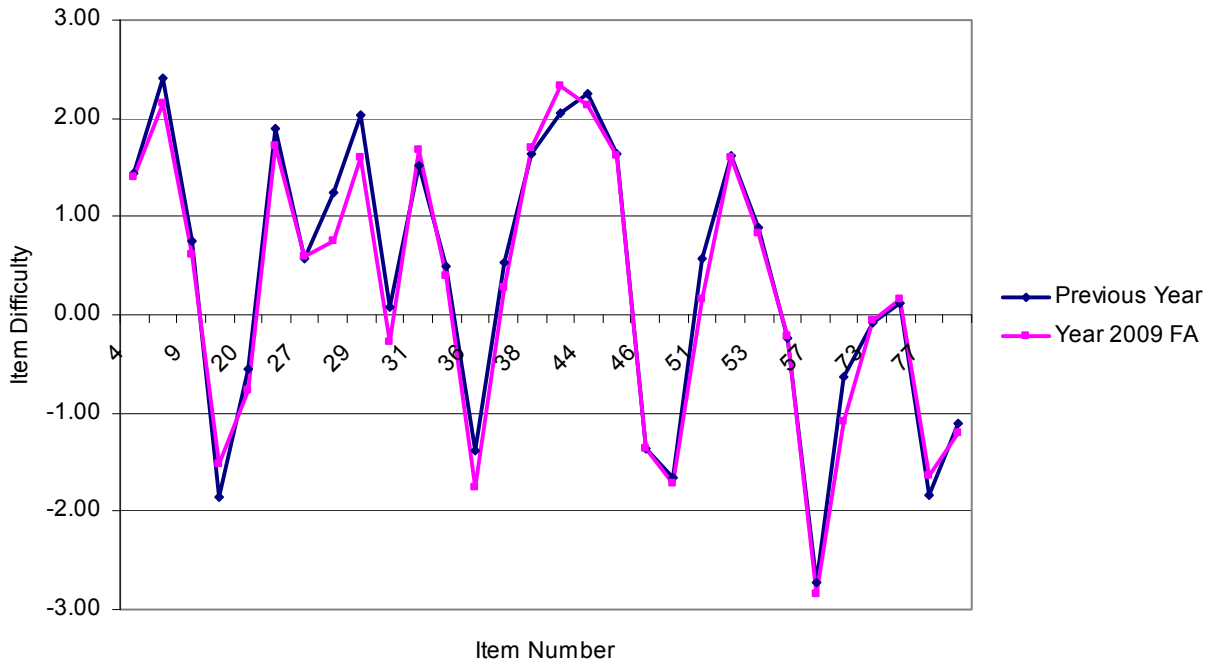


Figure 1.5 Rasch Item Difficulty Comparisons of Core Items for Previous Year vs. Year 2009: Grade 4 Form A

Table 1.47 P-Value Comparisons of Core Items for Previous Year vs. Year 2009: Grade 4 Form F

Item CID	Previous Year	Year 09 Form F	Item CID	Previous Year	Year 09 Form F
3488053	0.81	0.79	3515807	0.73	0.75
3487819	0.43	0.51	3564165	0.35	0.39
3564186	0.40	0.43	3497865	0.64	0.66
10000025153	0.99	0.98	10000025156	0.85	0.84
10000044142	0.82	0.83	3488145	0.59	0.72
3595499	0.45	0.47	3564189	0.42	0.48
10000007116	0.58	0.62	3551477	0.50	0.53
3515642	0.26	0.28	100000201942	0.55	0.69
3985619	0.38	0.42	100000201852	0.75	0.85
3498610	0.90	0.93	100000201939	0.82	0.93
10000025158	0.62	0.51	100000201940	0.55	0.68
100000201938	0.59	0.66	3985623	0.41	0.64
3985620	0.39	0.42	100000212986	0.47	0.59
			3502602	0.59	0.61

Note. Bold-faced number indicates that it is Brief Constructed Response (BCR) item.

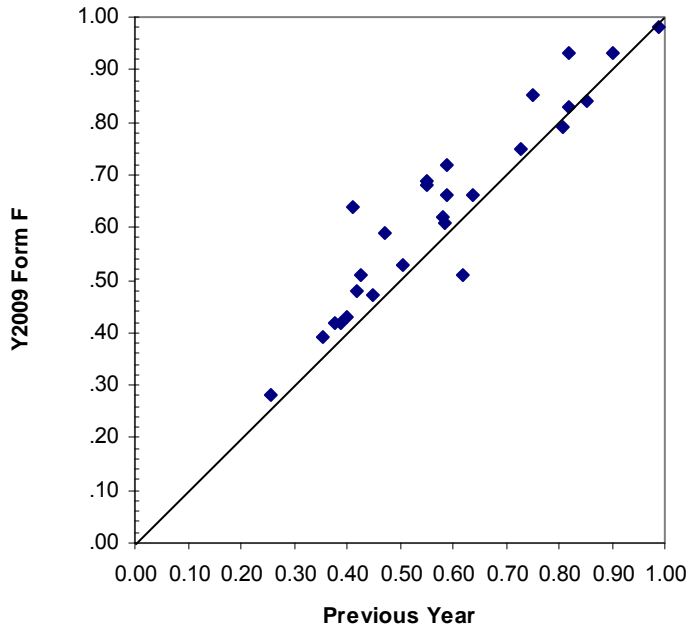


Table 1.48 Score-Point Distribution Comparisons of Constructed Response Core Items for Previous Year vs. Year 2009: Grade 4 Form F

Year	Item CID	Item Type	N	Mean	SD	Score-Point Distribution (%)			
						0	1	2	Omit
2007	3487819	BCR	2,173	0.43	0.50	55.82	42.75		1.43
2007	3564186	BCR	2,173	0.80	0.46	20.29	75.38	2.49	1.84
2008	10000044142	BCR	30,101	0.82	0.38	16.89	82.01		1.10
2008	3595499	BCR	30,101	0.90	0.56	19.62	67.90	10.80	1.67
2006	3515642	BCR	24,774	0.26	0.44	72.37	25.63		1.84
2006	3985619	BCR	24,774	0.75	0.51	38.7	41.2	16.9	2.25
2005	10000201938	BCR	25,326	0.59	0.49	38.68	59.11		1.89
2005	3985620	BCR	25,326	0.78	0.41	27.0	61.3	8.53	2.25
2008	3515807	BCR	30,101	0.73	0.45	24.02	72.76		3.23
2008	3564165	BCR	30,101	0.71	0.65	38.63	48.61	11.01	1.75
2007	3488145	BCR	2,130	0.59	0.49	39.95	58.87		1.17
2007	3564189	BCR	2,130	0.84	0.63	27.37	57.84	13.05	1.74
2005	10000201940	BCR	12,555	0.56	0.50	43.03	55.56		1.41
2005	3985623	BCR	12,555	0.83	0.63	48.60	16.80	32.8	1.62
2009	3487819	BCR	29,476	0.51	0.5	48.50	50.77		0.73
2009	3564186	BCR	29,476	0.87	0.49	18.36	74.41	6.18	1.04
2009	10000044142	BCR	29,476	0.83	0.37	15.90	83.23		0.87
2009	3595499	BCR	29,476	0.93	0.55	17.41	69.37	11.96	1.26
2009	3515642	BCR	29,476	0.28	0.45	70.80	28.03		1.16
2009	3985619	BCR	29,476	0.84	0.72	32.78	46.11	18.80	2.31
2009	10000201938	BCR	29,476	0.66	0.47	33.17	66.19		0.64
2009	3985620	BCR	29,476	0.85	0.46	18.39	76.43	4.12	1.06
2009	3515807	BCR	29,476	0.75	0.43	20.96	75.02		4.02
2009	3564165	BCR	29,476	0.79	0.64	32.17	54.02	12.42	1.39
2009	3488145	BCR	29,476	0.72	0.45	27.65	71.70		0.65
2009	3564189	BCR	29,476	0.96	0.52	14.61	72.43	11.77	1.19
2009	10000201940	BCR	29,476	0.68	0.47	30.92	68.13		0.95
2009	3985623	BCR	29,476	1.28	0.84	23.61	22.50	52.59	1.30

Table 1.49 Rasch Item and Step Difficulty Comparisons of Core Items for Previous Year vs. Year 2009: Grade 4 Form F

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2
2007	1	3488053	SR	-0.7442		
2007	4	3487819	BCR_A	1.4461		
2007	5	3564186	BCR_B	2.4073	-2.9945	2.9945
2008	9	10000025153	SR	-3.8367		
2008	20	10000044142	BCR_A	-0.5527		
2008	21	3595499	BCR_B	1.8966	-2.1375	2.1375
2008	24	10000007116	SR	0.9058		
2006	28	3515642	BCR_A	2.3491		
2006	29	3985619	BCR_B	1.6714	-0.9459	0.9459
2007	35	3498610	SR	-1.7458		
2008	37	10000025158	SR	0.8480		
2005	38	100000201938	BCR_A	0.2673		
2005	39	3985620	BCR_B	1.6258	-1.9431	1.9431
2008	44	3515807	BCR_A	0.0553		
2008	45	3564165	BCR_B	2.2474	-1.2842	1.2842
2008	46	3497865	SR	0.6767		
2008	48	10000025156	SR	-0.9340		
2007	51	3488145	BCR_A	0.5813		
2007	52	3564189	BCR_B	1.6234	-1.6600	1.6600
2007	53	3551477	SR	1.0150		
2005	56	100000201942	SR	0.4552		
2004	57	100000201852	SR	-0.8584		
2004	70	100000201939	SR	-1.4026		
2005	73	100000201940	BCR_A	0.4695		
2005	74	3985623	BCR_B	1.1279	0.4578	-0.4578
2004	77	100000212986	SR	0.6052		
2007	79	3502602	SR	0.7239		
2009	1	3488053	SR	-0.3452		
2009	4	3487819	BCR_A	1.3917		
2009	5	3564186	BCR_B	2.1573	-2.6637	2.6637
2009	9	10000025153	SR	-3.5593		
2009	20	10000044142	BCR_A	-0.7600		
2009	21	3595499	BCR_B	1.7168	-2.1933	2.1933
2009	24	10000007116	SR	0.7504		
2009	28	3515642	BCR_A	2.6593		
2009	29	3985619	BCR_B	1.8365	-1.1225	1.1225
2009	35	3498610	SR	-1.7896		
2009	37	10000025158	SR	1.2922		
2009	38	100000201938	BCR_A	0.4797		

Table 1.49 (continued)

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2
2009	39	3985620	BCR_B	2.4328	-2.8528	2.8528
2009	44	3515807	BCR_A	-0.2644		
2009	45	3564165	BCR_B	2.1333	-1.6175	1.6175
2009	46	3497865	SR	0.4883		
2009	48	10000025156	SR	-0.8555		
2009	51	3488145	BCR_A	0.1552		
2009	52	3564189	BCR_B	1.5957	-2.3378	2.3378
2009	53	3551477	SR	1.2590		
2009	56	100000201942	SR	0.3220		
2009	57	100000201852	SR	-0.9014		
2009	70	100000201939	SR	-1.9724		
2009	73	100000201940	BCR_A	0.4107		
2009	74	3985623	BCR_B	0.6834	0.0238	-0.0238
2009	77	100000212986	SR	0.8914		
2009	79	3502602	SR	0.8642		

Note. Rasch item and step difficulties are on a common scale.

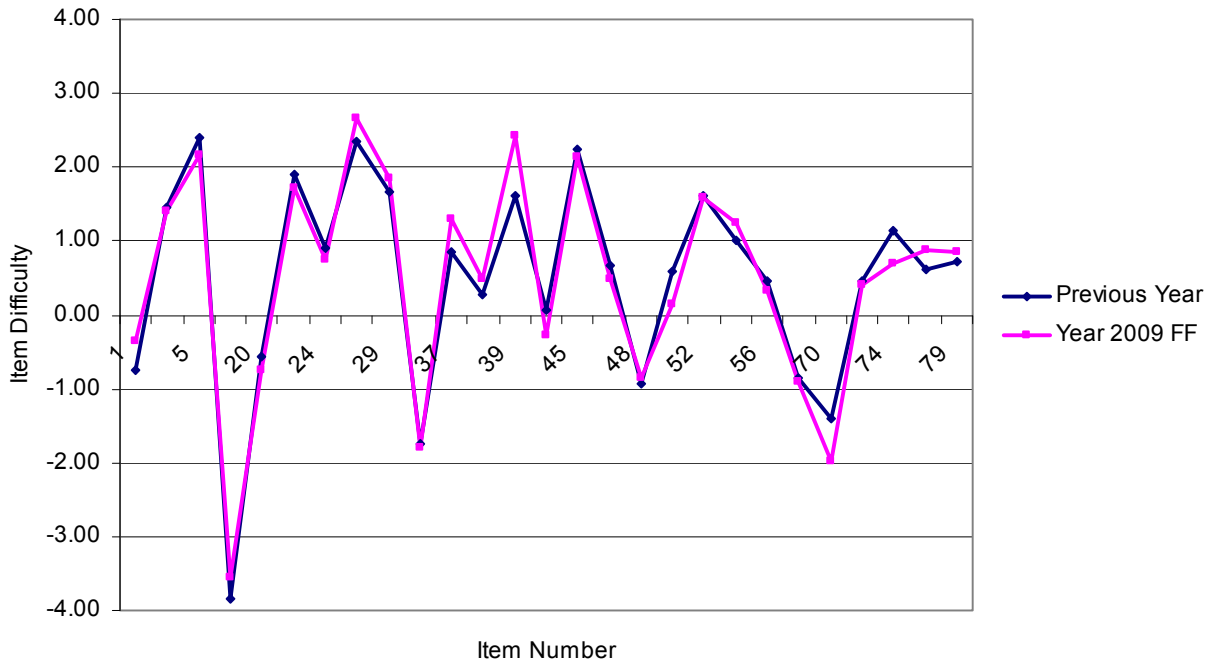


Figure 1.6 Rasch Item Difficulty Comparisons of Core Items for Previous Year vs. Year 2009: Grade 4 Form F

Table 1.50 P-Value Comparisons of Core Items for Previous Year vs. Year 2009: Grade 5 Form A

Item CID	Previous Year	Year 09 Form A	Item CID	Previous Year	Year 09 Form A
3488443	0.42	0.42	3548429	0.69	0.68
3492139	0.48	0.54	3564047	0.60	0.63
3488471	0.24	0.31	3488375	0.92	0.90
3564052	0.34	0.42	100000028274	0.83	0.86
3488391	0.84	0.88	3488347	0.42	0.45
100000022548	0.48	0.52	3564046	0.38	0.42
3488331	0.80	0.80	3488393	0.93	0.91
3488507	0.76	0.78	3511572	0.39	0.48
3492130	0.51	0.54	3512712	0.81	0.9
3512698	0.91	0.92	3488277	0.36	0.47
3488461	0.46	0.50	3564193	0.32	0.45
3564055	0.68	0.73	100000022555	0.45	0.48
3488522	0.60	0.65	3488406	0.49	0.56
3564059	0.77	0.80	3563998	0.48	0.52
3488419	0.77	0.72	3488326	0.68	0.65
100000028276	0.86	0.84	3488348	0.65	0.68
			3464056	0.36	0.47

Note. Bold-faced number indicates that it is Brief Constructed Response (BCR) item or Extended Constructed Response (ECR) item.

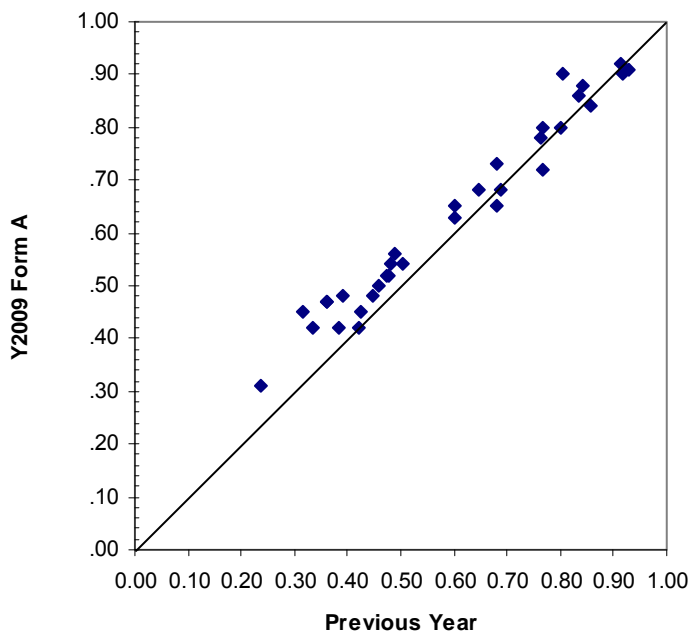


Table 1.51 Score-Point Distribution Comparisons of Constructed Response Core Items for Previous Year vs. Year 2009: Grade 5 Form A

Year	Item CID	Item Type	N	Mean	SD	Score-Point Distribution (%)				
						0	1	2	3	Omit
2007	3488471	BCR	2,171	0.24	0.43	72.78	23.77			3.45
2007	3564052	BCR	2,171	0.67	0.65	38.09	46.98	10.00		4.93
2007	3488461	BCR	2,125	0.46	0.50	52.52	45.98			1.51
2007	3564055	BCR	2,125	1.36	0.75	14.54	31.62	52.09		1.74
2007	3488522	BCR	2,161	0.60	0.49	38.87	60.02			1.11
2007	3564059	BCR	2,161	1.53	0.65	7.27	29.20	62.05		1.48
2007	3548429	ECR	2,125	0.69	0.46	28.52	68.75			2.73
2007	3564047	ECR	2,125	1.81	1.06	13.50	18.2	33.4	31.9	2.82
2007	3488347	BCR	2,164	0.42	0.49	56.61	42.28			1.11
2007	3564046	BCR	2,164	0.77	0.90	52.73	14.33	31.15		1.80
2007	3488277	BCR	2,164	0.36	0.48	56.01	36.18			7.81
2007	3564193	BCR	2,164	0.63	0.72	42.24	35.07	14.09		8.60
2007	3488406	BCR	2,188	0.49	0.50	47.94	48.67			3.38
2007	3563998	BCR	2,188	0.95	0.68	22.12	54.11	20.43		3.34
2007	3488348	BCR	2,178	0.65	0.48	30.44	64.51			5.05
2007	3464056	BCR	2,178	0.72	0.82	45.30	24.90	23.5		6.20
2009	3488471	BCR	30,344	0.31	0.46	66.91	31.44			1.66
2009	3564052	BCR	30,344	0.84	0.59	23.93	63.09	10.55		2.44
2009	3488461	BCR	30,344	0.50	0.50	49.36	49.61			1.03
2009	3564055	BCR	30,344	1.46	0.70	10.79	30.01	57.95		1.25
2009	3488522	BCR	30,344	0.65	0.48	34.01	65.10			0.90
2009	3564059	BCR	30,344	1.59	0.60	4.84	28.22	65.60		1.34
2009	3548429	ECR	30,344	0.68	0.47	30.00	68.26			1.74
2009	3564047	ECR	30,344	1.89	1.06	11.92	20.92	27.54	37.53	2.09
2009	3488347	BCR	30,344	0.45	0.50	53.65	44.93			1.42
2009	3564046	BCR	30,344	0.84	0.92	49.26	12.77	35.74		2.23
2009	3488277	BCR	30,344	0.47	0.50	48.79	46.81			4.40
2009	3564193	BCR	30,344	0.90	0.75	28.93	42.89	23.71		4.47
2009	3488406	BCR	30,344	0.56	0.50	42.02	56.21			1.77
2009	3563998	BCR	30,344	1.05	0.68	19.15	53.39	25.66		1.80
2009	3488348	BCR	30,344	0.68	0.47	28.58	67.81			3.61
2009	3464056	BCR	30,344	0.95	0.78	28.77	38.57	28.08		4.58

Table 1.52 Rasch Item and Step Difficulty Comparisons of Core Items for Previous Year vs. Year 2009: Grade 5 Form A

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2	Step 2-3
2007	1	3488443	SR	1.4475			
2007	3	3492139	SR	1.1965			
2007	4	3488471	BCR_A	2.4670			
2007	5	3564052	BCR_B	2.0114	-1.4070	1.4070	
2007	6	3488391	SR	-1.0187			
2008	7	10000022548	SR	1.2992			
2008	9	3488331	SR	-0.5933			
2007	10	3488507	SR	-0.5534			
2007	17	3492130	SR	0.8800			
2006	22	3512698	SR	-1.8140			
2007	24	3488461	BCR_A	1.2389			
2007	25	3564055	BCR_B	0.0582	-0.5915	0.5915	
2007	35	3488522	BCR_A	0.4908			
2007	36	3564059	BCR_B	-0.5136	-0.7535	0.7535	
2008	40	3488419	SR	-0.3660			
2008	41	10000028276	SR	-0.9757			
2007	45	3548429	ECR_A	-0.0549			
2007	46	3564047	ECR_B	0.4862	-0.7464	-0.3761	1.1225
2008	50	3488375	SR	-1.7634			
2008	51	10000028274	SR	-0.8644			
2007	52	3488347	BCR_A	1.3491			
2007	53	3564046	BCR_B	1.4474	0.6192	-0.6192	
2007	54	3488393	SR	-1.9476			
2006	57	3511572	SR	1.5079			
2006	59	3512712	SR	-0.7681			
2007	62	3488277	BCR_A	1.5848			
2007	63	3564193	BCR_B	1.9023	-0.8832	0.8832	
2008	65	10000022555	SR	1.4943			
2007	73	3488406	BCR_A	1.0165			
2007	74	3563998	BCR_B	1.1030	-1.4333	1.4333	
2007	79	3488326	SR	0.1850			
2007	80	3488348	BCR_A	0.0886			
2007	81	3464056	BCR_B	1.6146	-0.2041	0.2041	
2009	1	3488443	SR	1.6277			
2009	3	3492139	SR	0.9589			
2009	4	3488471	BCR_A	2.2862			
2009	5	3564052	BCR_B	1.8914	-2.0216	2.0216	
2009	6	3488391	SR	-1.2591			
2009	7	10000022548	SR	1.0761			
2009	9	3488331	SR	-0.6848			
2009	10	3488507	SR	-0.4448			
2009	17	3492130	SR	0.9322			
2009	22	3512698	SR	-1.7862			

Table 1.52 (continued)

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2	Step 2-3
2009	24	3488461	BCR_A	1.1765			
2009	25	3564055	BCR_B	-0.1442	-0.4881	0.4881	
2009	35	3488522	BCR_A	0.3599			
2009	36	3564059	BCR_B	-0.6893	-0.8147	0.8147	
2009	40	3488419	SR	-0.0825			
2009	41	10000028276	SR	-0.9996			
2009	45	3548429	ECR_A	0.1442			
2009	46	3564047	ECR_B	0.4382	-0.9888	0.1966	0.7922
2009	50	3488375	SR	-1.6090			
2009	51	10000028274	SR	-1.3725			
2009	52	3488347	BCR_A	1.4298			
2009	53	3564046	BCR_B	1.5002	0.8247	-0.8247	
2009	54	3488393	SR	-1.8559			
2009	57	3511572	SR	1.2621			
2009	59	3512712	SR	-1.6307			
2009	62	3488277	BCR_A	1.2616			
2009	63	3564193	BCR_B	1.3546	-1.0498	1.0498	
2009	65	10000022555	SR	1.1820			
2009	73	3488406	BCR_A	0.7860			
2009	74	3563998	BCR_B	0.9340	-1.4162	1.4162	
2009	79	3488326	SR	0.2463			
2009	80	3488348	BCR_A	0.0277			
2009	81	3464056	BCR_B	1.1386	-0.8486	0.8486	

Note. Rasch item and step difficulties are on a common scale.

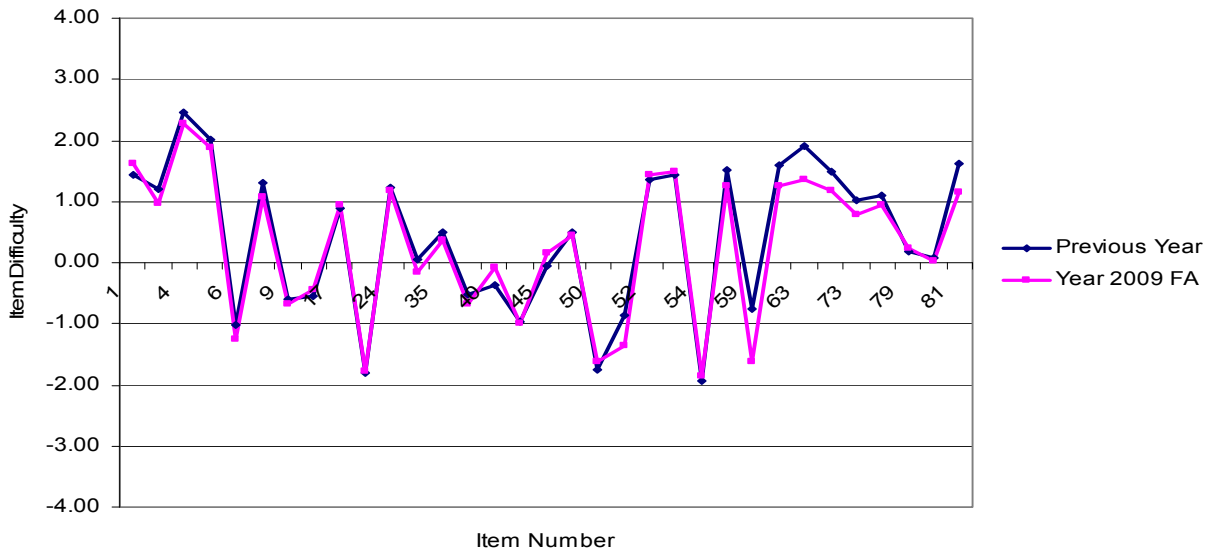


Figure 1.7 Rasch Item Difficulty Comparisons of Core Items for Previous Year vs. Year 2009: Grade 5 Form A

Table 1.53 P-Value Comparisons of Core Items for Previous Year vs. Year 2009: Grade 5 Form F

Item CID	Previous Year	Year 09 Form F	Item CID	Previous Year	Year 09 Form F
3492123	0.47	0.54	3488525	0.80	0.82
3492117	0.94	0.95	3564053	0.44	0.50
3511531	0.69	0.70	3492126	0.85	0.86
3563986	0.59	0.59	100000028274	0.83	0.88
3492128	0.50	0.54	3488347	0.42	0.46
100000022548	0.48	0.53	3564046	0.38	0.43
100000022547	0.84	0.83	3488393	0.93	0.92
100000028251	0.53	0.63	3488509	0.81	0.8
100000028253	0.45	0.46	3512712	0.81	0.91
3488515	0.86	0.83	3548459	0.69	0.75
3488461	0.46	0.50	3564051	0.62	0.68
3564055	0.68	0.74	3488275	0.44	0.49
3488495	0.88	0.88	3512649	0.27	0.28
3492140	0.86	0.89	3563989	0.34	0.38
3512615	0.79	0.78	3492134	0.61	0.64
3595439	0.55	0.58	3488259	0.18	0.19
3488240	0.68	0.69	3564048	0.36	0.33

Note. Bold-faced number indicates that it is Brief Constructed Response (BCR) item or Extended Constructed Response (ECR) item.

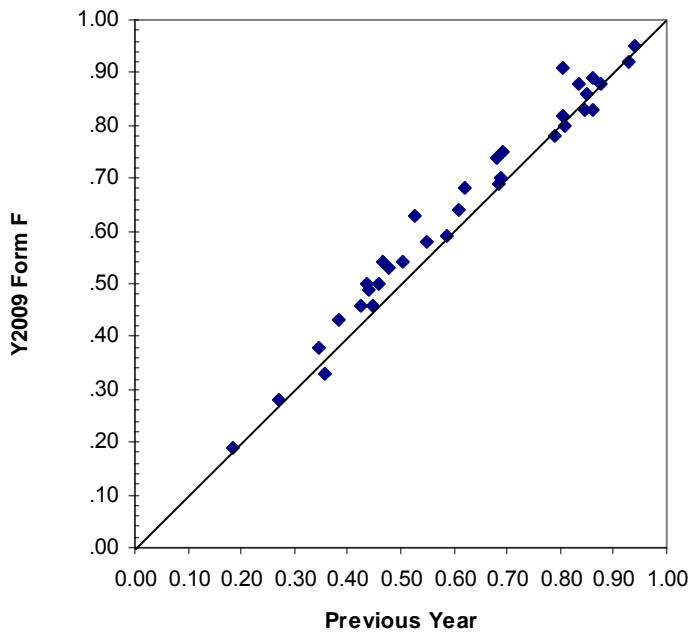


Table 1.54 Score-Point Distribution Comparisons of Constructed Response Core Items for Previous Year vs. Year 2009: Grade 5 Form F

Year	Item CID	Item Type	N	Mean	SD	Score-Point Distribution (%)				
						0	1	2	3	Omit
2008	3511531	BCR	30,537	0.69	0.46	30.23	68.94			0.84
2008	3563986	BCR	30,537	1.18	0.68	13.87	51.27	33.19		1.68
2007	3488461	BCR	2,125	0.46	0.50	52.52	45.98			1.51
2007	3564055	BCR	2,125	1.36	0.75	14.54	31.62	52.09		1.74
2008	3512615	BCR	30,537	0.79	0.41	19.92	78.87			1.21
2008	3595439	BCR	30,537	1.10	0.68	16.68	53.00	28.44		1.88
2007	3488525	ECR	2,315	0.80	0.40	18.88	80.26			0.86
2007	3564053	ECR	2,315	1.31	0.83	12.30	48.60	27.60	8.85	2.38
2007	3488347	BCR	2,164	0.42	0.49	56.61	42.28			1.11
2007	3564046	BCR	2,164	0.77	0.90	52.73	14.33	31.15		1.80
2007	3548459	BCR	2,171	0.69	0.46	25.70	69.00			5.30
2007	3564051	BCR	2,171	1.24	0.72	10.78	42.56	40.90		5.76
2007	3512649	BCR	31,083	0.27	0.44	66.35	27.13			6.52
2007	3563989	BCR	31,083	0.69	0.89	52.00	10.88	29.04		8.08
2007	3488259	BCR	2,315	0.18	0.39	78.49	18.40			3.11
2007	3564048	BCR	2,315	0.71	0.85	50.32	19.27	25.96		4.45
2009	3511531	BCR	30,103	0.7	0.46	29.59	69.82			0.58
2009	3563986	BCR	30,103	1.18	0.64	11.89	55.75	31.12		1.24
2009	3488461	BCR	30,103	0.50	0.50	48.47	50.27			1.26
2009	3564055	BCR	30,103	1.48	0.69	9.97	29.35	59.28		1.41
2009	3512615	BCR	30,103	0.78	0.41	20.34	77.95			1.71
2009	3595439	BCR	30,103	1.16	0.63	10.76	57.99	28.97		2.28
2009	3488525	ECR	30,103	0.82	0.38	17.33	82.17			0.50
2009	3564053	ECR	30,103	1.51	0.86	9.91	39.93	35.24	13.67	1.26
2009	3488347	BCR	30,103	0.46	0.5	52.97	45.86			1.17
2009	3564046	BCR	30,103	0.86	0.92	48.34	13.75	36.11		1.80
2009	3548459	BCR	30,103	0.75	0.43	22.18	75.45			2.37
2009	3564051	BCR	30,103	1.36	0.67	8.54	41.70	47.33		2.42
2009	3512649	BCR	30,103	0.28	0.45	69.53	27.73			2.73
2009	3563989	BCR	30,103	0.76	0.88	49.94	17.41	29.40		3.25
2009	3488259	BCR	30,103	0.19	0.39	78.83	18.82			2.36
2009	3564048	BCR	30,103	0.66	0.85	55.41	15.61	25.19		3.79

**Table 1.55 Rasch Item and Step Difficulty Comparisons of Core Items for Previous Year vs. Year 2009:
Grade 5 Form F**

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2	Step 2-3
2007	1	3492123	SR	1.2035			
2008	3	3492117	SR	-2.1343			
2008	4	3511531	BCR_A	0.1259			
2008	5	3563986	BCR_B	0.5335	-1.3908	1.3908	
2008	6	3492128	SR	1.1464			
2008	7	10000022548	SR	1.2992			
2008	9	10000022547	SR	-0.9649			
2008	10	10000028251	SR	1.0867			
2008	17	10000028253	SR	1.4534			
2007	22	3488515	SR	-1.2030			
2007	24	3488461	BCR_A	1.2389			
2007	25	3564055	BCR_B	0.0582	-0.5915	0.5915	
2008	28	3488495	SR	-1.3420			
2007	34	3492140	SR	-1.3783			
2008	35	3512615	BCR_A	-0.5151			
2008	36	3595439	BCR_B	0.8697	-1.4537	1.4537	
2008	41	3488240	SR	0.1335			
2007	45	3488525	ECR_A	-0.8205			
2007	46	3564053	ECR_B	1.3543	-2.4417	0.4281	2.0136
2007	50	3492126	SR	-1.1530			
2008	51	10000028274	SR	-0.8644			
2007	52	3488347	BCR_A	1.3491			
2007	53	3564046	BCR_B	1.4474	0.6192	-0.6192	
2007	54	3488393	SR	-1.9476			
2008	57	3488509	SR	-0.6778			
2006	59	3512712	SR	-0.7681			
2007	62	3548459	BCR_A	-0.2421			
2007	63	3564051	BCR_B	0.0647	-1.1926	1.1926	
2008	65	3488275	SR	1.4453			
2007	73	3512649	BCR_A	2.3175			
2007	74	3563989	BCR_B	1.6549	0.7655	-0.7655	
2007	79	3492134	SR	0.4131			
2007	80	3488259	BCR_A	2.9215			
2007	81	3564048	BCR_B	1.6508	0.14900	-0.14900	
2009	1	3492123	SR	1.1181			
2009	3	3492117	SR	-2.4397			
2009	4	3511531	BCR_A	0.1282			
2009	5	3563986	BCR_B	0.5377	-1.5615	1.5615	
2009	6	3492128	SR	1.0153			
2009	7	10000022548	SR	1.0761			
2009	9	10000022547	SR	-0.7480			
2009	10	10000028251	SR	0.5516			
2009	17	10000028253	SR	1.4773			
2009	22	3488515	SR	-0.7556			

Table 1.55 (continued)

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2	Step 2-3
2009	24	3488461	BCR_A	1.1765			
2009	25	3564055	BCR_B	-0.1442	-0.4881	0.4881	
2009	28	3488495	SR	-1.2540			
2009	34	3492140	SR	-1.4589			
2009	35	3512615	BCR_A	-0.4877			
2009	36	3595439	BCR_B	0.5673	-1.6948	1.6948	
2009	41	3488240	SR	0.2496			
2009	45	3488525	ECR_A	-0.7202			
2009	46	3564053	ECR_B	1.1388	-2.2589	0.246	2.0128
2009	50	3492126	SR	-1.1318			
2009	51	10000028274	SR	-1.3725			
2009	52	3488347	BCR_A	1.4298			
2009	53	3564046	BCR_B	1.5002	0.8247	-0.8247	
2009	54	3488393	SR	-1.8559			
2009	57	3488509	SR	-0.5908			
2009	59	3512712	SR	-1.6307			
2009	62	3548459	BCR_A	-0.2124			
2009	63	3564051	BCR_B	0.0385	-1.2689	1.2689	
2009	65	3488275	SR	1.2554			
2009	73	3512649	BCR_A	2.5751			
2009	74	3563989	BCR_B	1.7474	0.2559	-0.2559	
2009	79	3492134	SR	0.5423			
2009	80	3488259	BCR_A	3.0327			
2009	81	3564048	BCR_B	1.9710	0.4950	-0.4950	

Note. Rasch item and step difficulties are on a common scale.

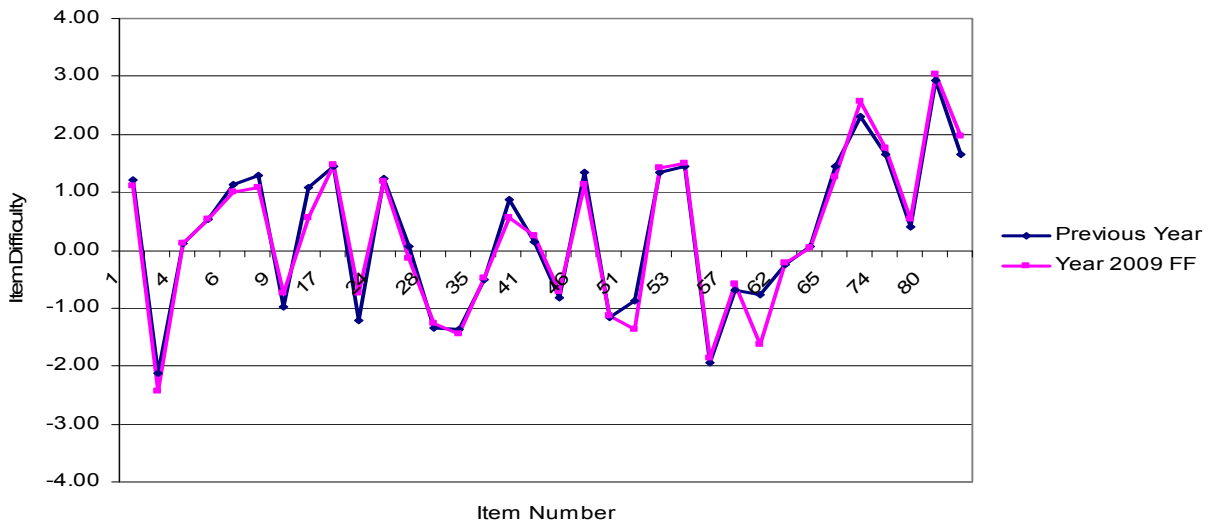


Figure 1.8 Rasch Item Difficulty Comparisons of Core Items for Previous Year vs. Year 2009: Grade 5 Form F

Table 1.56 P-Value Comparisons of Core Items for Previous Year vs. Year 2009: Grade 6 Form A

Item CID	Previous Year	Year 09 Form A	Item CID	Previous Year	Year 09 Form A
3492091	0.77	0.75	3488398	0.94	0.97
100000028397	0.79	0.80	3488358	0.61	0.67
3517004	0.89	0.93	3488302	0.57	0.55
3564010	0.63	0.66	100000012859	0.74	0.71
3488422	0.52	0.48	100000208906	0.68	0.88
100000012866	0.22	0.21	100000208909	0.38	0.46
3548404	0.50	0.53	3985730	0.36	0.48
3564013	0.46	0.47	3503954	0.83	0.83
3488296	0.85	0.81	3516616	0.42	0.44
100000208908	0.22	0.32	3564012	0.50	0.52
3488462	0.52	0.62	100000022470	0.49	0.51
3564075	0.45	0.52	100000208907	0.61	0.83
3503966	0.53	0.51	3488306	0.88	0.89
3516359	0.56	0.67	3488411	0.47	0.48
100000028408	0.89	0.85	3564014	0.51	0.55
3516333	0.62	0.67	3488258	0.77	0.79
3564008	0.59	0.66			

Note. Bold-faced number indicates that it is Brief Constructed Response (BCR) item or Extended Constructed Response (ECR) item.

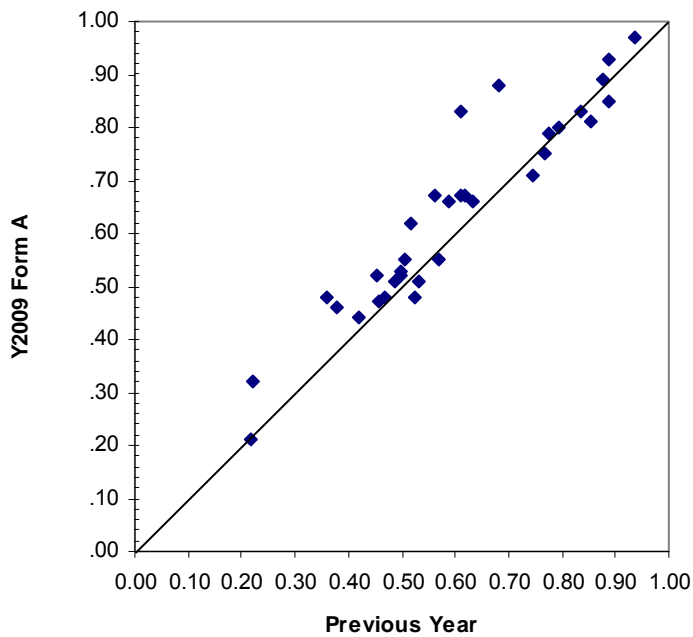


Table 1.57 Score-Point Distribution Comparisons of Constructed Response Core Items for Previous Year vs. Year 2009: Grade 6 Form A

Year	Item CID	Item Type	N	Mean	SD	Score-Point Distribution (%)				
						0	1	2	3	Omit
2008	3517004	ECR	31,060	0.89	0.32	10.64	88.75			0.61
2008	3564010	ECR	31,060	1.90	0.94	6.38	25.6	34.0	32.1	1.70
2007	3548404	BCR	2,049	0.50	0.50	48.80	49.68			1.51
2007	3564013	BCR	2,049	0.91	0.39	10.74	83.75	3.76		1.76
2007	3488462	BCR	2,051	0.52	0.50	45.69	51.78			2.54
2007	3564075	BCR	2,051	0.90	0.82	34.42	32.13	29.16		4.29
2008	3516333	BCR	31,060	0.62	0.49	36.21	61.65			2.14
2008	3564008	BCR	31,060	1.18	0.77	18.90	37.50	40.0		3.48
2004	100000208909	BCR	11,242	0.39	0.49	54.88	38.47			6.17
2004	3985730	BCR	11,242	0.72	0.85	45.71	19.76	26.12		7.34
2008	3516616	BCR	31,060	0.42	0.49	51.83	42.07			6.11
2008	3564012	BCR	31,060	0.99	0.62	12.77	61.83	18.73		6.67
2007	3488411	BCR	2,049	0.47	0.50	50.61	47.05			2.34
2007	3564014	BCR	2,049	1.01	0.71	21.57	49.73	25.77		2.93
2009	3517004	ECR	29,789	0.93	0.25	6.08	93.46			0.47
2009	3564010	ECR	29,789	1.99	0.88	4.04	23.74	37.97	33.14	1.10
2009	3548404	BCR	29,789	0.53	0.50	44.82	52.67			2.51
2009	3564013	BCR	29,789	0.95	0.42	8.21	82.27	6.31		3.21
2009	3488462	BCR	29,789	0.62	0.48	36.29	62.29			1.42
2009	3564075	BCR	29,789	1.04	0.78	25.82	38.86	32.46		2.85
2009	3516333	BCR	29,789	0.67	0.47	31.90	66.90			1.20
2009	3564008	BCR	29,789	1.32	0.80	19.61	25.45	53.10		1.84
2009	100000208909	BCR	29,789	0.46	0.50	51.68	45.65			2.67
2009	3985730	BCR	29,789	0.97	0.88	37.33	21.99	37.47		3.21
2009	3516616	BCR	29,789	0.44	0.5	52.26	43.62			4.12
2009	3564012	BCR	29,789	1.05	0.62	12.30	61.48	21.59		4.63
2009	3488411	BCR	29,789	0.48	0.50	50.50	48.10			1.40
2009	3564014	BCR	29,789	1.09	0.67	16.44	54.77	27.22		1.56

**Table 1.58 Rasch Item and Step Difficulty Comparisons of Core Items for Previous Year vs. Year 2009:
Grade 6 Form A**

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2	Step 2-3
2007	4	3492091	SR	-0.7205			
2008	5	10000028397	SR	-0.7086			
2008	7	3517004	ECR_A	-1.7891			
2008	8	3564010	ECR_B	0.1623	-1.8832	0.1382	1.745
2008	13	3488422	SR	0.9143			
2008	21	10000012866	SR	2.6975			
2007	22	3548404	BCR_A	0.6845			
2007	23	3564013	BCR_B	1.3882	-3.24110	3.24110	
2008	24	3488296	SR	-1.1250			
2004	28	100000208908	SR	1.5224			
2007	31	3488462	BCR_A	0.6027			
2007	32	3564075	BCR_B	0.9052	-0.4417	0.4417	
2008	33	3503966	SR	0.8698			
2006	44	3516359	SR	0.1259			
2008	46	10000028408	SR	-1.6132			
2008	47	3516333	BCR_A	0.1802			
2008	48	3564008	BCR_B	0.3670	-0.8656	0.8656	
2007	49	3488398	SR	-2.7376			
2007	51	3488358	SR	0.0051			
2007	52	3488302	SR	0.3811			
2008	53	10000012859	SR	-0.2946			
2004	58	100000208906	SR	-0.9310			
2004	59	100000208909	BCR_A	0.6056			
2004	60	3985730	BCR_B	0.6260	0.1263	-0.1263	
2008	62	3503954	SR	-0.9176			
2008	66	3516616	BCR_A	1.2017			
2008	67	3564012	BCR_B	0.6973	-2.0205	2.0205	
2008	69	10000022470	SR	0.9473			
2004	70	100000208907	SR	-0.5845			
2008	71	3488306	SR	-1.4753			
2007	77	3488411	BCR_A	0.8189			
2007	78	3564014	BCR_B	0.5966	-1.3083	1.3083	
2007	79	3488258	SR	-1.0397			
2009	4	3492091	SR	-0.4928			
2009	5	10000028397	SR	-0.9101			
2009	7	3517004	ECR_A	-2.4767			
2009	8	3564010	ECR_B	-0.2026	-1.9106	0.2374	1.6732
2009	13	3488422	SR	1.0056			
2009	21	10000012866	SR	2.8196			
2009	22	3548404	BCR_A	0.7098			
2009	23	3564013	BCR_B	1.2037	-3.0576	3.0576	
2009	24	3488296	SR	-1.0460			
2009	28	100000208908	SR	1.8806			

Table 1.58 (continued)

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2	Step 2-3
2009	31	3488462	BCR_A	0.2562			
2009	32	3564075	BCR_B	0.7929	-0.803	0.803	
2009	33	3503966	SR	0.8279			
2009	44	3516359	SR	0.0835			
2009	46	10000028408	SR	-1.4442			
2009	47	3516333	BCR_A	-0.0954			
2009	48	3564008	BCR_B	0.0294	-0.1519	0.1519	
2009	49	3488398	SR	-3.1672			
2009	51	3488358	SR	-0.0834			
2009	52	3488302	SR	0.6636			
2009	53	10000012859	SR	-0.2466			
2009	58	10000208906	SR	-1.5247			
2009	59	10000208909	BCR_A	1.1385			
2009	60	3985730	BCR_B	0.9849	0.1811	-0.1811	
2009	62	3503954	SR	-1.1222			
2009	66	3516616	BCR_A	1.1920			
2009	67	3564012	BCR_B	0.5835	-1.8963	1.8963	
2009	69	10000022470	SR	0.8821			
2009	70	10000208907	SR	-1.1677			
2009	71	3488306	SR	-1.7554			
2009	77	3488411	BCR_A	1.1054			
2009	78	3564014	BCR_B	0.6090	-1.4986	1.4986	
2009	79	3488258	SR	-0.8592			

Note. Rasch item and step difficulties are on a common scale.

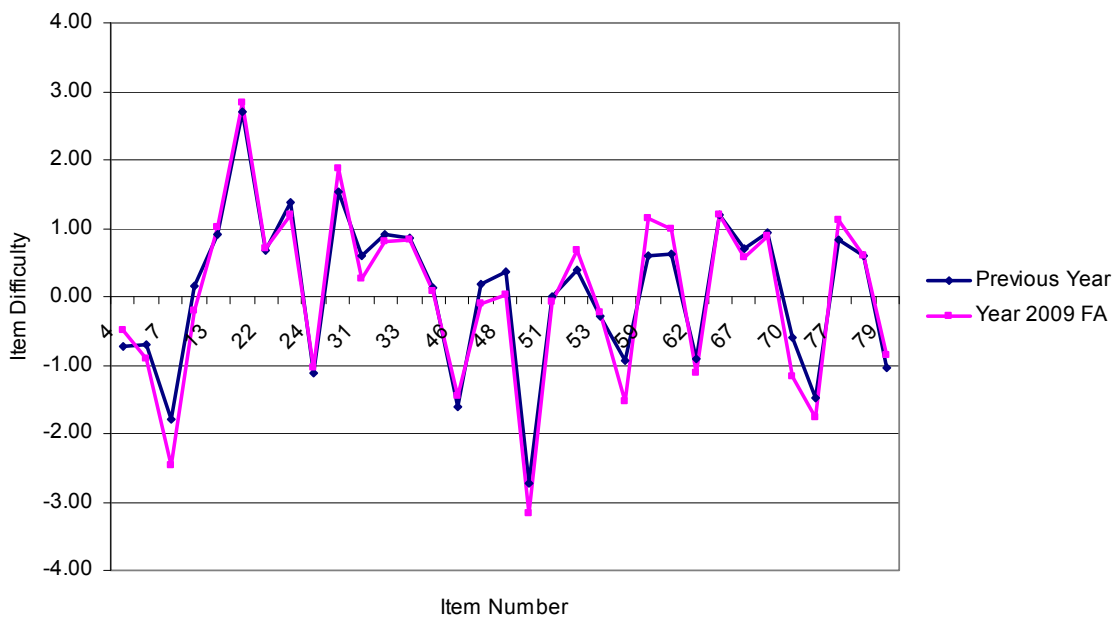


Figure 1.9 Rasch Item Difficulty Comparisons of Core Items for Previous Year vs. Year 2009: Grade 6 Form A

Table 1.59 P-Value Comparisons of Core Items for Previous Year vs. Year 2009: Grade 6 Form F

Item CID	Previous Year	Year 09 Form F	Item CID	Previous Year	Year 09 Form F
3488262	0.85	0.91	3492093	0.84	0.80
3548350	0.52	0.59	100000028419	0.73	0.76
3564015	0.43	0.50	100000004450	0.63	0.63
3488440	0.55	0.68	100000028416	0.56	0.49
3488307	0.67	0.68	3488489	0.72	0.71
3516627	0.48	0.51	100000208909	0.38	0.48
3564006	0.41	0.42	3985730	0.36	0.5
100000022483	0.58	0.54	3492087	0.77	0.8
3488424	0.89	0.81	3516616	0.42	0.40
100000028430	0.64	0.67	3564012	0.50	0.50
3488469	0.68	0.69	100000028409	0.57	0.63
3564071	0.72	0.74	3503961	0.91	0.93
3492099	0.90	0.92	3492120	0.62	0.63
3488260	0.59	0.63	3516913	0.40	0.42
100000004462	0.82	0.79	3985725	0.54	0.56
3516358	0.16	0.43	3488385	0.83	0.77
3985729	0.30	0.40			

Note. Bold-faced number indicates that it is Brief Constructed Response (BCR) item or Extended Constructed Response (ECR) item.

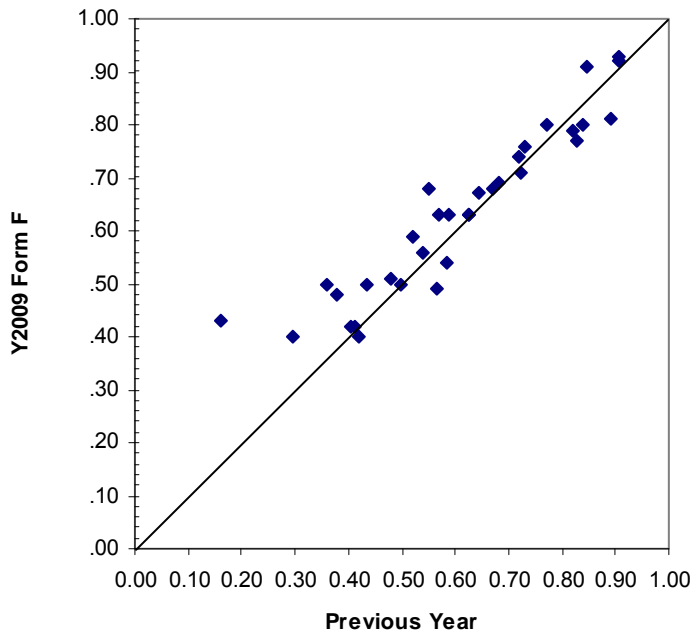


Table 1.60 Score-Point Distribution Comparisons of Constructed Response Core Items for Previous Year vs. Year 2009: Grade 6 Form F

Year	Item CID	Item Type	N	Mean	SD	Score-Point Distribution (%)				
						0	1	2	3	Omit
2007	3548350	ECR	2,049	0.52	0.50	43.63	51.93			4.44
2007	3564015	ECR	2,049	1.30	1.08	24.74	27.18	25.33	17.33	5.42
2008	3516627	BCR	31,060	0.48	0.50	45.52	47.79			6.69
2008	3564006	BCR	31,060	0.82	0.67	24.69	52.36	14.89		8.06
2007	3488469	BCR	2,024	0.68	0.47	31.32	68.03			0.64
2007	3564071	BCR	2,024	1.44	0.83	21.64	11.36	66.25		0.74
2006	3516358	BCR	3,289	0.16	0.37	78.38	16.11			5.50
2006	3985729	BCR	3,289	0.60	0.39	37.70	52.40	3.53		6.23
2004	100000208909	BCR	11,242	0.39	0.49	54.88	38.47			6.17
2004	3985730	BCR	11,242	0.72	0.85	45.71	19.76	26.12		7.34
2008	3516616	BCR	31,060	0.42	0.49	51.83	42.07			6.11
2008	3564012	BCR	31,060	0.99	0.62	12.77	61.83	18.73		6.67
2008	3516913	BCR	31,060	0.40	0.49	57.57	40.49			1.94
2008	3985725	BCR	31,060	1.08	0.66	15.50	55.50	26.20		2.59
2009	3548350	ECR	29,240	0.59	0.49	36.06	58.68			5.26
2009	3564015	ECR	29,240	1.49	1.13	20.13	21.99	27.08	24.36	6.43
2009	3516627	BCR	29,240	0.51	0.50	43.06	51.24			5.69
2009	3564006	BCR	29,240	0.83	0.60	21.27	61.48	10.83		6.42
2009	3488469	BCR	29,240	0.69	0.46	29.03	69.05			1.92
2009	3564071	BCR	29,240	1.49	0.82	18.61	9.55	69.53		2.31
2009	3516358	BCR	29,240	0.43	0.50	54.09	43.06			2.85
2009	3985729	BCR	29,240	0.79	0.70	33.67	47.15	16.04		3.14
2009	100000208909	BCR	29,240	0.48	0.5	48.62	47.99			3.39
2009	3985730	BCR	29,240	1.00	0.88	35.27	22.01	38.86		3.85
2009	3516616	BCR	29,240	0.4	0.49	53.72	39.87			6.42
2009	3564012	BCR	29,240	0.99	0.61	11.57	63.13	18.07		7.23
2009	3516913	BCR	29,240	0.42	0.49	56.78	41.57			1.66
2009	3985725	BCR	29,240	1.12	0.64	13.15	57.26	27.51		2.09

*Note. Bold type was used to indicate a visually significant outlier in both classical and Rasch item difficulty graphs.

**Table 1.61 Rasch Item and Step Difficulty Comparisons of Core Items for Previous Year vs. Year 2009:
Grade 6 Form F**

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2	Step 2-3
2007	5	3488262	SR	-1.5035			
2007	7	3548350	ECR_A	0.5054			
2007	8	3564015	ECR_B	0.9710	-1.0270	-0.0908	1.1178
2007	13	3488440	SR	0.4219			
2008	21	3488307	SR	0.1101			
2008	22	3516627	BCR_A	0.8724			
2008	23	3564006	BCR_B	1.4503	-1.6293	1.6293	
2008	24	100000022483	SR	0.4254			
2008	28	3488424	SR	-1.4785			
2008	29	100000028430	SR	0.3362			
2007	31	3488469	BCR_A	-0.2447			
2007	32	3564071	BCR_B	-0.2617	0.7667	-0.7667	
2008	33	3492099	SR	-1.7828			
2007	44	3488260	SR	0.1509			
2008	46	100000004462	SR	-0.8451			
2006	47	3516358	BCR_A	2.5213			
2006	48	3985729	BCR_B	2.1193	-2.0983	2.0983	
2008	49	3492093	SR	-1.0765			
2008	51	100000028419	SR	-0.4274			
2008	52	100000004450	SR	0.1826			
2008	53	100000028416	SR	0.7594			
2008	58	3488489	SR	-0.1343			
2004	59	100000208909	BCR_A	0.6056			
2004	60	3985730	BCR_B	0.6260	0.1263	-0.1263	
2008	62	3492087	SR	-0.5596			
2008	66	3516616	BCR_A	1.2017			
2008	67	3564012	BCR_B	0.6973	-2.0205	2.0205	
2008	69	100000028409	SR	0.4978			
2008	70	3503961	SR	-2.0081			
2008	71	3492120	SR	0.4607			
2008	77	3516913	BCR_A	1.3284			
2008	78	3985725	BCR_B	0.4845	-1.4754	1.4754	
2007	79	3488385	SR	-1.2026			
2009	5	3488262	SR	-2.1168			
2009	7	3548350	ECR_A	0.3475			
2009	8	3564015	ECR_B	0.8817	-0.7206	-0.1891	0.9097
2009	13	3488440	SR	-0.1323			
2009	21	3488307	SR	-0.1634			
2009	22	3516627	BCR_A	0.6268			
2009	23	3564006	BCR_B	1.3578	-1.9164	1.9164	
2009	24	100000022483	SR	0.6958			
2009	28	3488424	SR	-1.1816			
2009	29	100000028430	SR	0.0122			

Table 1.61 (continued)

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2	Step 2-3
2009	31	3488469	BCR_A	-0.1844			
2009	32	3564071	BCR_B	-0.2008	0.9385	-0.9385	
2009	33	3492099	SR	-2.1347			
2009	44	3488260	SR	0.1206			
2009	46	10000004462	SR	-0.6746			
2009	47	3516358	BCR_A	1.2893			
2009	48	3985729	BCR_B	1.5499	-1.2584	1.2584	
2009	49	3492093	SR	-0.7772			
2009	51	100000028419	SR	-0.6904			
2009	52	10000004450	SR	0.1537			
2009	53	100000028416	SR	1.0327			
2009	58	3488489	SR	-0.2639			
2009	59	100000208909	BCR_A	1.1385			
2009	60	3985730	BCR_B	0.9849	0.1811	-0.1811	
2009	62	3492087	SR	-0.8918			
2009	66	3516616	BCR_A	1.1920			
2009	67	3564012	BCR_B	0.5835	-1.8963	1.8963	
2009	69	100000028409	SR	0.2401			
2009	70	3503961	SR	-2.2456			
2009	71	3492120	SR	0.2830			
2009	77	3516913	BCR_A	1.2807			
2009	78	3985725	BCR_B	0.3129	-1.6336	1.6336	
2009	79	3488385	SR	-0.6632			

*Note. Bold type was used to indicate a visually significant outlier in both classical and Rasch item difficulty graphs. Note. These Rasch difficulties were based on a common scale.

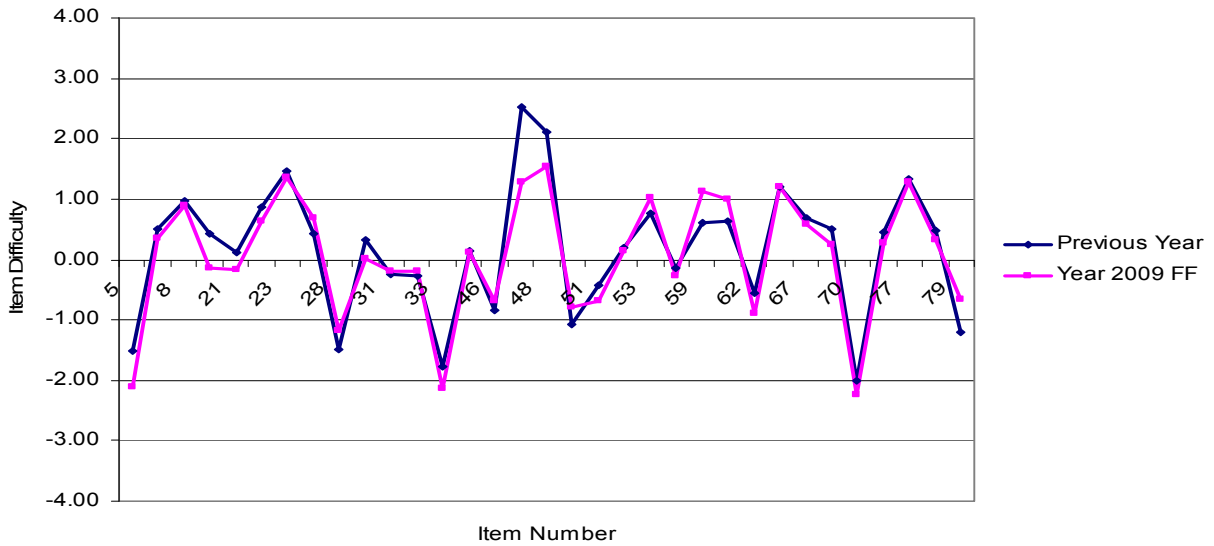


Figure 1.10 Rasch Item Difficulty Comparisons of Core Items for Previous Year vs. Year 2009: Grade 6 Form F

Table 1.62 P-Value Comparisons of Core Items for Previous Year vs. Year 2009: Grade 7 Form A

Item CID	Previous Year	Year 09 Form A	Item CID	Previous Year	Year 09 Form A
3487664	0.26	0.24	3517725	0.30	0.33
3517744	0.35	0.45	3564022	0.45	0.52
3564018	0.24	0.34	100000012796	0.49	0.56
3517677	0.61	0.67	100000043347	0.69	0.71
100000026796	0.87	0.83	3595366	0.30	0.41
3487922	0.73	0.68	3547777	0.25	0.33
100000018130	0.55	0.53	100000207793	0.33	0.62
3491692	0.39	0.45	3517648	0.67	0.67
3564159	0.41	0.47	3564027	0.64	0.73
3517668	0.34	0.37	3500155	0.19	0.22
100000043354	0.40	0.36	3517704	0.43	0.39
100000043350	0.57	0.6	100000004171	0.51	0.44
3487925	0.59	0.66	3487678	0.43	0.5
3564151	0.71	0.69	3564153	0.36	0.44
100000208466	0.45	0.55	100000018106	0.60	0.60
3547642	0.70	0.72	3492167	0.25	0.35
3487560	0.28	0.3			

Note. Bold-faced number indicates that it is Brief Constructed Response (BCR) item, Extended Constructed Response (ECR) item or Student Produced Response (SPR) item.

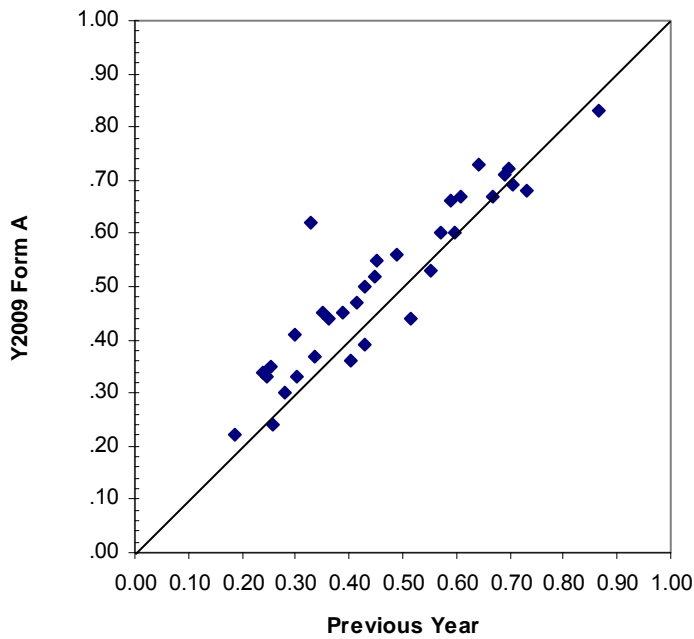


Table 1.63 Score-Point Distribution Comparisons of Constructed Response Core Items for Previous Year vs. Year 2009: Grade 7 Form A

Year	Item CID	Item Type	N	Mean	SD	Score-Point Distribution (%)				
						0	1	2	3	Omit
2007	3517744	BCR	32,264	0.35	0.48	57.42	35.11			7.48
2007	3564018	BCR	32,264	0.48	0.66	52.89	29.28	9.33		8.51
2007	3491692	ECR	2,173	0.39	0.49	58.21	38.84			2.95
2007	3564159	ECR	2,173	1.24	1.12	27.75	28.72	18.04	19.88	5.61
2007	3487925	BCR	2,214	0.59	0.49	38.08	58.76			3.16
2007	3564151	BCR	2,214	1.41	0.71	8.67	33.33	53.84		4.16
2008	3517725	BCR	31,804	0.30	0.46	66.31	30.25			3.44
2008	3564022	BCR	31,804	0.89	0.84	36.49	28.55	30.46		4.50
2008	100000043347	ECR	31,804	0.69	0.46	27.92	69.10			2.99
2008	3595366	ECR	31,804	0.89	0.55	15.77	69.82	9.23	0.35	4.82
2008	3517648	ECR	31,048	0.67	0.47	31.60	66.88			1.52
2008	3564027	ECR	31,048	1.93	0.85	8.05	9.71	57.19	22.85	2.19
2007	3487678	BCR	2,214	0.43	0.50	53.48	42.82			3.70
2007	3564153	BCR	2,214	0.73	0.62	31.48	54.29	9.12		5.10
2009	3517744	BCR	30,318	0.45	0.5	50.92	44.84			4.23
2009	3564018	BCR	30,318	0.69	0.72	41.68	37.99	15.41		4.91
2009	3491692	ECR	30,318	0.45	0.5	51.43	44.91			3.65
2009	3564159	ECR	30,318	1.40	1.11	19.65	30.48	19.98	23.25	6.64
2009	3487925	BCR	30,318	0.66	0.47	27.03	66.02			6.95
2009	3564151	BCR	30,318	1.37	0.76	9.42	28.05	54.60		7.93
2009	3517725	BCR	30,318	0.33	0.47	64.80	32.61			2.58
2009	3564022	BCR	30,318	1.05	0.78	25.01	39.58	32.67		2.74
2009	100000043347	ECR	30,318	0.71	0.45	26.79	71.03			2.19
2009	3595366	ECR	30,318	1.24	0.74	14.30	41.58	39.73	0.91	3.49
2009	3517648	ECR	30,318	0.67	0.47	32.00	66.76			1.24
2009	3564027	ECR	30,318	2.19	0.89	5.34	10.21	39.04	43.42	1.99
2009	3487678	BCR	30,318	0.50	0.50	47.36	50.27			2.36
2009	3564153	BCR	30,318	0.88	0.57	20.11	66.33	10.70		2.86

**Table 1.64 Rasch Item and Step Difficulty Comparisons of Core Items for Previous Year vs. Year 2009:
Grade 7 Form A**

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2	Step 2-3
2007	4	3487664	SR	1.8127			
2007	5	3517744	BCR_A	0.9733			
2007	6	3564018	BCR_B	1.8283	-0.88100	0.88100	
2006	9	3517677	SR	-0.3983			
2008	11	100000026796	SR	-1.7325			
2007	17	3487922	SR	-1.1436			
2008	21	100000018130	SPR	0.3646			
2007	22	3491692	ECR_A	0.7934			
2007	23	3564159	ECR_B	0.5566	-1.114	0.3367	0.7773
2007	24	3517668	SPR	1.1331			
2008	25	100000043354	SPR	1.0066			
2008	26	100000043350	SPR	-0.0987			
2007	27	3487925	BCR_A	-0.3798			
2007	28	3564151	BCR_B	-1.2247	-0.9516	0.9516	
2004	29	100000208466	SR	0.0047			
2008	38	3547642	SPR	-0.9166			
2008	39	3487560	SPR	1.7398			
2008	40	3517725	BCR_A	1.5045			
2008	41	3564022	BCR_B	0.5585	-0.4548	0.4548	
2008	44	100000012796	SR	0.6843			
2008	45	100000043347	ECR_A	-0.8969			
2008	46	3595366	ECR_B	2.6970	-4.3825	0.7102	3.6723
2007	47	3547777	SPR	1.6862			
2004	48	100000207793	SPR	0.4839			
2008	53	3517648	ECR_A	-0.536			
2008	54	3564027	ECR_B	-0.3195	-0.8801	-1.5639	2.444
2007	55	3500155	SPR	2.2178			
2007	56	3517704	SPR	0.4293			
2008	57	100000004171	SPR	0.6033			
2007	67	3487678	BCR_A	0.5190			
2007	68	3564153	BCR_B	1.1805	-1.8410	1.8410	
2008	71	100000018106	SR	-0.1775			
2007	78	3492167	SPR	1.5035			
2009	4	3487664	SR	2.2060			
2009	5	3517744	BCR_A	0.6921			
2009	6	3564018	BCR_B	1.4348	-1.1447	1.1447	
2009	9	3517677	SR	-0.3998			
2009	11	100000026796	SR	-1.4762			
2009	17	3487922	SR	-0.4981			
2009	21	100000018130	SPR	0.3886			
2009	22	3491692	ECR_A	0.7615			
2009	23	3564159	ECR_B	0.5864	-1.186	0.4071	0.7788
2009	24	3517668	SPR	1.0492			

Table 1.64 (continued)

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2	Step 2-3
2009	25	100000043354	SPR	1.2412			
2009	26	100000043350	SPR	-0.1607			
2009	27	3487925	BCR_A	-0.6335			
2009	28	3564151	BCR_B	-1.0291	-0.8589	0.8589	
2009	29	100000208466	SR	0.0546			
2009	38	3547642	SPR	-0.8342			
2009	39	3487560	SPR	1.6314			
2009	40	3517725	BCR_A	1.4747			
2009	41	3564022	BCR_B	0.1132	-1.1539	1.1539	
2009	44	100000012796	SR	0.2502			
2009	45	100000043347	ECR_A	-0.6646			
2009	46	3595366	ECR_B	1.6353	-3.0103	-0.6940	3.7043
2009	47	3547777	SPR	1.5096			
2009	48	100000207793	SPR	-0.2274			
2009	53	3517648	ECR_A	-0.4422			
2009	54	3564027	ECR_B	-0.8657	-0.9282	-0.5852	1.5135
2009	55	3500155	SPR	2.2489			
2009	56	3517704	SPR	1.0690			
2009	57	100000004171	SPR	0.8686			
2009	67	3487678	BCR_A	0.5631			
2009	68	3564153	BCR_B	0.9376	-2.0991	2.0991	
2009	71	100000018106	SR	0.0819			
2009	78	3492167	SPR	1.3391			

Note. These Rasch difficulties were based on a common scale.

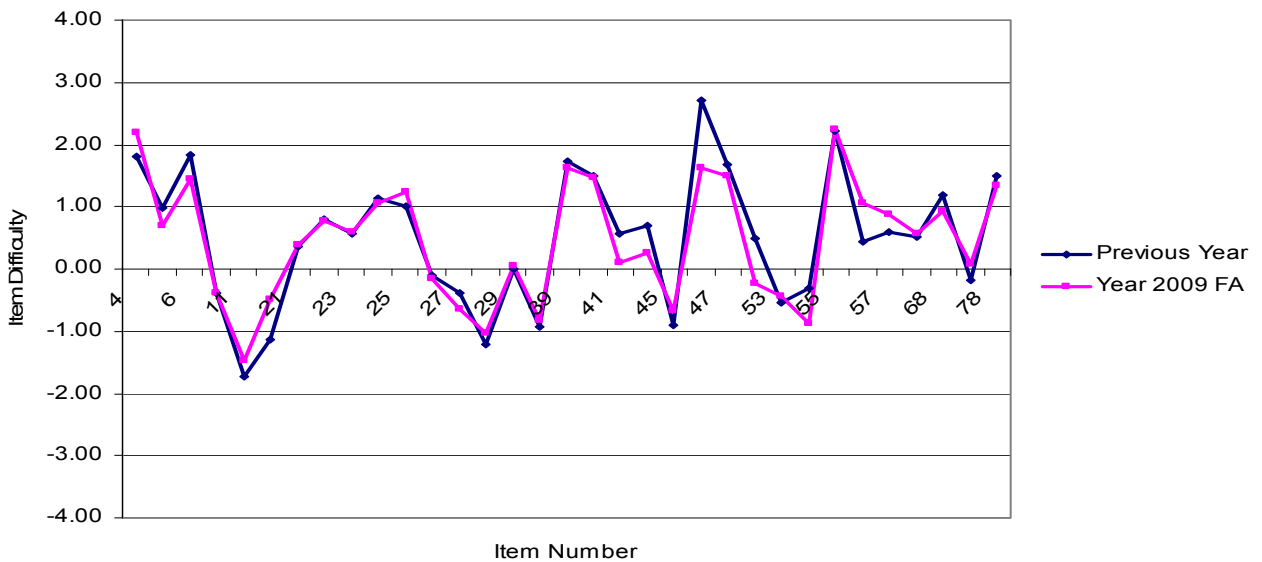


Figure 1.11 Rasch Item Difficulty Comparisons of Core Items for Previous Year vs. Year 2009: Grade 7 Form A

Table 1.65 P-Value Comparisons of Core Items for Previous Year vs. Year 2009: Grade 7 Form F

Item CID	Previous Year	Year 09 Form F	Item CID	Previous Year	Year 09 Form F
3487664	0.26	0.25	100000048821	0.64	0.54
3517744	0.35	0.46	3595371	0.37	0.32
3564018	0.24	0.35	100000012779	0.51	0.53
3517677	0.61	0.68	3595378	0.34	0.36
100000026796	0.87	0.83	100000207795	0.33	0.65
3487605	0.63	0.61	3517683	0.46	0.58
100000043344	0.36	0.37	3517648	0.67	0.68
3487765	0.42	0.50	3564027	0.64	0.74
3564141	0.50	0.53	3492169	0.38	0.39
3517668	0.34	0.38	100000043342	0.67	0.63
3547893	0.23	0.25	3492156	0.35	0.41
100000043350	0.57	0.6	100000012810	0.27	0.28
3487925	0.59	0.67	3595375	0.32	0.39
3564151	0.71	0.70	3487748	0.61	0.60
100000208467	0.53	0.59	100000018133	0.30	0.32
3555865	0.34	0.35			
100000043360	0.55	0.58			

Note. Bold-faced number indicates that it is Brief Constructed Response (BCR) item, Extended Constructed Response (ECR) item or Student-Produced Response (SPR) item.

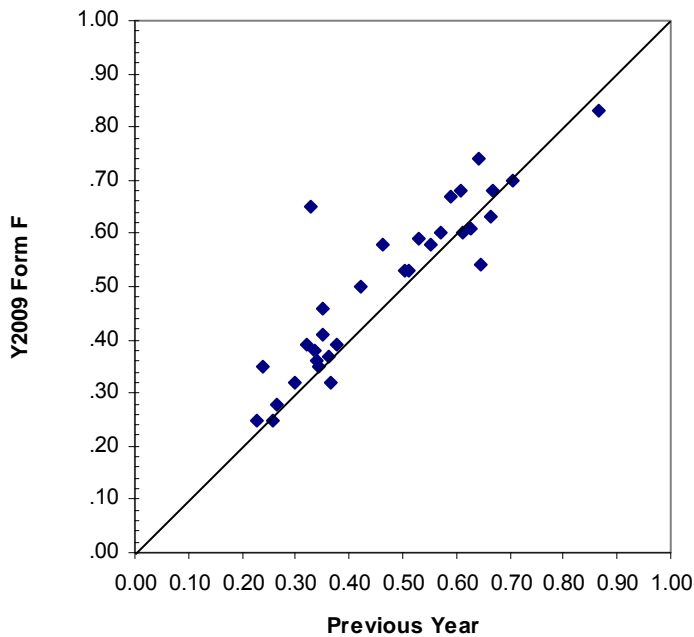


Table 1.66 Score-Point Distribution Comparisons of Constructed Response Core Items for Previous Year vs. Year 2009: Grade 7 Form F

Year	Item CID	Item Type	N	Mean	SD	Score-Point Distribution (%)				
						0	1	2	3	Omit
2007	3517744	BCR	32,264	0.35	0.48	57.42	35.11			7.48
2007	3564018	BCR	32,264	0.48	0.66	52.89	29.28	9.33		8.51
2008	3487765	ECR	31,048	0.42	0.49	54.91	42.35			2.75
2008	3564141	ECR	31,048	1.51	0.80	8.29	29.32	50.91	6.52	4.96
2007	3487925	BCR	2,214	0.59	0.49	38.08	58.76			3.16
2007	3564151	BCR	2,214	1.41	0.71	8.67	33.33	53.84		4.16
2008	100000048821	BCR	31,048	0.64	0.48	32.78	64.45			2.78
2008	3595371	BCR	31,048	0.73	0.52	25.16	66.09	3.70		5.05
2008	100000012779	ECR	2,631	0.51	0.50	46.37	51.12			2.51
2008	3595378	ECR	2,631	1.02	0.77	20.90	49.87	21.28	3.15	4.79
2008	3517648	ECR	31,048	0.67	0.47	31.60	66.88			1.52
2008	3564027	ECR	31,048	1.93	0.85	8.05	9.71	57.19	22.85	2.19
2008	100000012810	BCR	2,635	0.27	0.44	60.53	26.64			12.83
2008	3595375	BCR	2,635	0.64	0.56	25.31	56.09	4.14		14.46
2009	3517744	BCR	29,596	0.46	0.5	49.83	46.17			4.00
2009	3564018	BCR	29,596	0.71	0.73	40.57	38.41	16.11		4.92
2009	3487765	ECR	29,596	0.50	0.50	47.94	49.86			2.20
2009	3564141	ECR	29,596	1.59	0.79	7.66	23.81	57.03	7.13	4.37
2009	3487925	BCR	29,596	0.67	0.47	26.30	67.22			6.47
2009	3564151	BCR	29,596	1.40	0.75	9.04	27.61	55.95		7.41
2009	100000048821	BCR	29,596	0.54	0.5	44.92	54.33			0.74
2009	3595371	BCR	29,596	0.64	0.53	38.01	58.63	2.62		0.74
2009	100000012779	ECR	29,596	0.53	0.5	44.53	53.03			2.44
2009	3595378	ECR	29,596	1.08	0.79	20.85	49.25	23.48	4.02	2.40
2009	3517648	ECR	29,596	0.68	0.47	31.09	67.74			1.17
2009	3564027	ECR	29,596	2.21	0.88	4.88	10.09	38.57	44.61	1.85
2009	100000012810	BCR	29,596	0.28	0.45	63.90	27.65			8.45
2009	3595375	BCR	29,596	0.77	0.52	18.57	67.43	4.83		9.16

**Table 1.67 Rasch Item and Step Difficulty Comparisons of Core Items for Previous Year vs. Year 2009:
Grade 7 Form F**

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2	Step 2-3
2007	4	3487664	SR	1.8127			
2007	5	3517744	BCR_A	0.9733			
2007	6	3564018	BCR_B	1.8283	-0.8810	0.8810	
2006	9	3517677	SR	-0.3983			
2008	11	100000026796	SR	-1.7325			
2007	17	3487605	SR	-0.4674			
2008	21	100000043344	SPR	1.2419			
2008	22	3487765	ECR_A	0.8535			
2008	23	3564141	ECR_B	0.5148	-2.3799	-0.926	3.3059
2007	24	3517668	SPR	1.1331			
2007	25	3547893	SPR	1.9012			
2008	26	100000043350	SPR	-0.0987			
2007	27	3487925	BCR_A	-0.3798			
2007	28	3564151	BCR_B	-1.2247	-0.9516	0.9516	
2004	29	100000208467	SR	-0.4135			
2007	38	3555865	SPR	1.0579			
2008	39	100000043360	SPR	0.1275			
2008	40	100000048821	BCR_A	-0.4202			
2008	41	3595371	BCR_B	1.8783	-2.7673	2.7673	
2008	45	100000012779	ECR_A	0.3568			
2008	46	3595378	ECR_B	1.6372	-2.6078	0.2235	2.3843
2004	47	100000207795	SPR	0.4116			
2007	48	3517683	SPR	0.2733			
2008	53	3517648	ECR_A	-0.5360			
2008	54	3564027	ECR_B	-0.3195	-0.8801	-1.5639	2.444
2008	55	3492169	SPR	1.1079			
2008	56	100000043342	SPR	-0.5518			
2008	57	3492156	SPR	1.2944			
2008	67	100000012810	BCR_A	1.5293			
2008	68	3595375	BCR_B	1.7097	-2.4467	2.4467	
2008	71	3487748	SR	0.0836			
2008	78	100000018133	SPR	1.7903			
2009	4	3487664	SR	2.206			
2009	5	3517744	BCR_A	0.6921			
2009	6	3564018	BCR_B	1.4348	-1.1447	1.1447	
2009	9	3517677	SR	-0.3998			
2009	11	100000026796	SR	-1.4762			
2009	17	3487605	SR	0.0261			
2009	21	100000043344	SPR	1.3744			
2009	22	3487765	ECR_A	0.5452			
2009	23	3564141	ECR_B	0.5905	-2.1342	-1.1123	3.2465
2009	24	3517668	SPR	1.0492			

Table 1.67 (continued)

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2	Step 2-3
2009	25	3547893	SPR	2.1319			
2009	26	100000043350	SPR	-0.1607			
2009	27	3487925	BCR_A	-0.6335			
2009	28	3564151	BCR_B	-1.0291	-0.8589	0.8589	
2009	29	100000208467	SR	-0.0362			
2009	38	3555865	SPR	1.4240			
2009	39	100000043360	SPR	0.0968			
2009	40	100000048821	BCR_A	0.2601			
2009	41	3595371	BCR_B	2.1656	-2.2964	2.2964	
2009	45	100000012779	ECR_A	0.3215			
2009	46	3595378	ECR_B	1.5606	-2.5425	0.2773	2.2652
2009	47	100000207795	SPR	-0.2841			
2009	48	3517683	SPR	0.2289			
2009	53	3517648	ECR_A	-0.4422			
2009	54	3564027	ECR_B	-0.8657	-0.9282	-0.5852	1.5135
2009	55	3492169	SPR	1.1920			
2009	56	100000043342	SPR	-0.1596			
2009	57	3492156	SPR	1.0662			
2009	67	100000012810	BCR_A	1.8858			
2009	68	3595375	BCR_B	1.5793	-2.5264	2.5264	
2009	71	3487748	SR	0.1268			
2009	78	100000018133	SPR	1.6464			

*Note. These Rasch difficulties were based on a common scale.

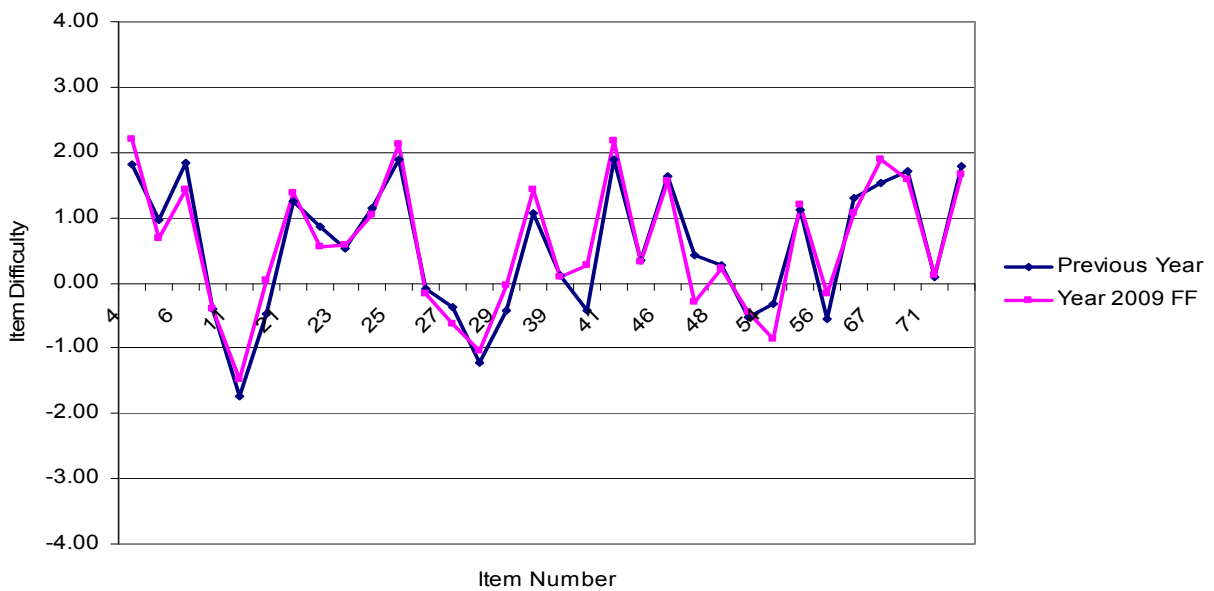


Figure 1.12 Rasch Item Difficulty Comparisons of Core Items for Previous Year vs. Year 2009: Grade 7 Form F

Table 1.68 P-Value Comparisons of Core Items for Previous Year vs. Year 2009: Grade 8 Form A

Item CID	Previous Year	Year 09 Form A	Item CID	Previous Year	Year 09 Form A
3514013	0.47	0.50	3487934	0.51	0.51
3564107	0.65	0.68	3564122	0.38	0.38
100000018156	0.67	0.68	100000049037	0.65	0.65
100000018174	0.54	0.52	3487633	0.62	0.67
3487680	0.25	0.31	3564123	0.49	0.49
3564133	0.28	0.35	3514164	0.55	0.57
3514065	0.82	0.91	3564117	0.45	0.51
100000026780	0.37	0.38	100000043326	0.45	0.45
100000043325	0.57	0.56	3514083	0.24	0.28
100000004108	0.56	0.53	3519734	0.23	0.24
100000012754	0.63	0.65	100000004118	0.58	0.54
3487759	0.24	0.30	3487906	0.24	0.22
3564128	0.41	0.51	3500160	0.29	0.26
100000004078	0.50	0.52	3487939	0.41	0.44
3514117	0.37	0.41	3564124	0.27	0.29
3564111	0.40	0.46	100000004091	0.67	0.52
3513646	0.45	0.46			
3514597	0.84	0.88			

Note. Bold-faced number indicates that it is Brief Constructed Response (BCR) item, Extended Constructed Response (ECR) item or Student-Produced Response (SPR) item.

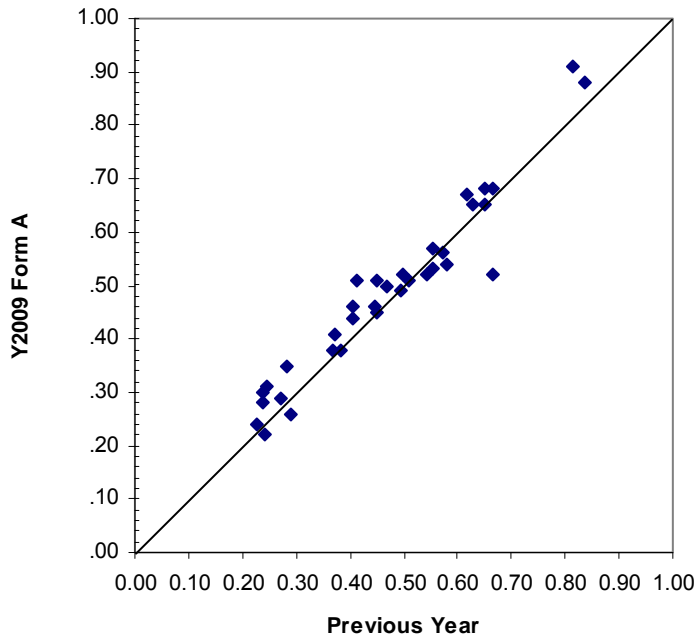


Table 1.69 Score-Point Distribution Comparisons of Constructed Response Core Items for Previous Year vs. Year 2009: Grade 8 Form A

Year	Item CID	Item Type	N	Mean	SD	Score-Point Distribution (%)				
						0	1	2	3	Omit
2008	3514013	BCR	32,318	0.47	0.50	50.68	47.01			2.31
2008	3564107	BCR	32,318	1.30	0.69	9.99	43.80	43.23		2.99
2007	3487680	ECR	2,430	0.25	0.43	67.28	24.61			8.11
2007	3564133	ECR	2,430	0.85	1.18	48.89	13.17	8.48	18.27	11.19
2007	3487759	BCR	2,157	0.24	0.43	71.86	23.69			4.45
2007	3564128	BCR	2,157	0.83	0.76	33.10	39.73	21.42		5.75
2008	3514117	BCR	32,318	0.37	0.48	55.99	36.99			7.02
2008	3564111	BCR	32,318	0.81	0.79	33.68	34.31	23.22		8.79
2007	3487934	ECR	2,277	0.51	0.50	43.17	51.12			5.71
2007	3564122	ECR	2,277	1.15	1.02	26.39	20.11	34.34	8.83	10.32
2007	3487633	BCR	2,277	0.62	0.49	34.74	61.66			3.60
2007	3564123	BCR	2,277	0.99	0.83	30.13	30.43	34.08		5.36
2007	3514164	ECR	32,480	0.55	0.50	39.18	55.39			5.43
2007	3564117	ECR	32,480	1.35	0.88	9.54	45.66	26.64	11.97	6.18
2007	3487939	BCR	2,277	0.41	0.49	52.48	40.71			6.81
2007	3564124	BCR	2,277	0.54	0.64	46.07	37.64	8.26		8.04
2009	3514013	BCR	30,760	0.5	0.5	47.48	50.44			2.08
2009	3564107	BCR	30,760	1.36	0.67	8.24	42.04	47.04		2.68
2009	3487680	ECR	30,760	0.31	0.46	64.81	30.59			4.61
2009	3564133	ECR	30,760	1.05	1.21	43.46	18.94	10.04	21.90	5.67
2009	3487759	BCR	30,760	0.30	0.46	65.48	30.18			4.34
2009	3564128	BCR	30,760	1.01	0.77	24.44	40.05	30.52		4.98
2009	3514117	BCR	30,760	0.41	0.49	53.15	40.69			6.16
2009	3564111	BCR	30,760	0.93	0.76	23.29	42.42	25.29		9.01
2009	3487934	ECR	30,760	0.51	0.5	43.69	51.46			4.84
2009	3564122	ECR	30,760	1.13	1.01	29.64	19.20	35.55	7.69	7.93
2009	3487633	BCR	30,760	0.67	0.47	29.05	67.41			3.54
2009	3564123	BCR	30,760	0.98	0.88	34.06	23.29	37.38		5.26
2009	3514164	ECR	30,760	0.57	0.49	39.20	57.44			3.36
2009	3564117	ECR	30,760	1.53	0.93	10.09	37.57	31.24	17.51	3.59
2009	3487939	BCR	30,760	0.44	0.5	45.97	43.69			10.34
2009	3564124	BCR	30,760	0.58	0.63	38.42	43.16	7.57		10.85

**Table 1.70 Rasch Item and Step Difficulty Comparisons of Core Items for Previous Year vs. Year 2009:
Grade 8 Form A**

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2	Step 2-3
2008	3	3514013	BCR_A	0.2481			
2008	4	3564107	BCR_B	-0.9490	-1.2905	1.2905	
2008	6	100000018156	SR	-0.6970			
2008	15	100000018174	SPR	0.0706			
2007	16	3487680	ECR_A	1.4000			
2007	17	3564133	ECR_B	0.8595	0.1923	0.0792	-0.2715
2006	18	3514065	SPR	-2.2105			
2008	19	100000026780	SPR	0.7914			
2008	20	100000043325	SPR	-0.4508			
2008	21	100000004108	SPR	-0.1193			
2008	23	100000012754	SR	-0.4903			
2007	24	3487759	BCR_A	1.5680			
2007	25	3564128	BCR_B	0.4439	-0.9715	0.9715	
2008	26	100000004078	SPR	0.1312			
2008	34	3514117	BCR_A	0.7094			
2008	35	3564111	BCR_B	0.5525	-0.7657	0.7657	
2007	36	3513646	SPR	0.2873			
2006	37	3514597	SPR	-2.2009			
2007	39	3487934	ECR_A	-0.2738			
2007	40	3564122	ECR_B	0.5911	-1.0085	-1.0017	2.0102
2008	43	100000049037	SR	-0.4956			
2007	44	3487633	BCR_A	-0.8219			
2007	45	3564123	BCR_B	-0.1502	-0.4588	0.4588	
2007	54	3514164	ECR_A	-0.4257			
2007	55	3564117	ECR_B	0.1001	-2.4484	0.5623	1.8861
2008	56	100000043326	SPR	0.3297			
2007	57	3514083	SPR	1.4236			
2007	72	3519734	SR	1.6876			
2008	73	100000004118	SR	-0.1435			
2007	74	3487906	SPR	1.4345			
2008	75	3500160	SPR	1.3250			
2007	76	3487939	BCR_A	0.3023			
2007	77	3564124	BCR_B	1.3855	-1.3070	1.3070	
2008	80	100000004091	SR	-0.5899			
2009	3	3514013	BCR_A	0.1810			
2009	4	3564107	BCR_B	-0.9848	-1.1835	1.1835	
2009	6	100000018156	SR	-0.7550			
2009	15	100000018174	SPR	0.0671			
2009	16	3487680	ECR_A	1.2610			
2009	17	3564133	ECR_B	0.8697	-0.111	0.3415	-0.2305
2009	18	3514065	SPR	-2.9220			
2009	19	100000026780	SPR	0.7842			

Table 1.70 (continued)

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2	Step 2-3
2009	20	100000043325	SPR	-0.2713			
2009	21	100000004108	SPR	0.0206			
2009	23	100000012754	SR	-0.6096			
2009	24	3487759	BCR_A	1.2982			
2009	25	3564128	BCR_B	0.0944	-1.0009	1.0009	
2009	26	100000004078	SPR	0.0720			
2009	34	3514117	BCR_A	0.7346			
2009	35	3564111	BCR_B	0.2987	-1.0752	1.0752	
2009	36	3513646	SPR	0.4579			
2009	37	3514597	SPR	-2.3874			
2009	39	3487934	ECR_A	0.0273			
2009	40	3564122	ECR_B	0.9667	-0.9274	-1.0424	1.9698
2009	43	100000049037	SR	-0.5927			
2009	44	3487633	BCR_A	-0.8046			
2009	45	3564123	BCR_B	0.2204	0.0018	-0.0018	
2009	54	3514164	ECR_A	-0.2697			
2009	55	3564117	ECR_B	0.0215	-2.0897	0.3751	1.7146
2009	56	100000043326	SPR	0.3680			
2009	57	3514083	SPR	1.2566			
2009	72	3519734	SR	1.7460			
2009	73	100000004118	SR	0.0905			
2009	74	3487906	SPR	1.7189			
2009	75	3500160	SPR	1.5068			
2009	76	3487939	BCR_A	0.3153			
2009	77	3564124	BCR_B	1.5079	-1.5771	1.5771	
2009	80	100000004091	SR	0.0638			

Note. Rasch item and step difficulties are on a common scale.



Figure 1.13 Rasch Item Difficulty Comparisons of Core Items for Previous Year vs. Year 2009: Grade 8 Form A

Table 1.71 P-Value Comparisons of Core Items for Previous Year vs. Year 2009: Grade 8 Form F

Item CID	Previous Year	Year 09 Form F	Item CID	Previous Year	Year 09 Form F
100000018154	0.63	0.69	3487934	0.51	0.51
3500167	0.21	0.21	3564122	0.38	0.37
3514283	0.40	0.44	3487545	0.67	0.7
3564116	0.55	0.58	3519815	0.48	0.57
3492049	0.59	0.61	3564138	0.35	0.41
100000004107	0.50	0.52	3514705	0.30	0.26
100000199104	0.23	0.42	100000043313	0.59	0.64
3514161	0.19	0.23	3595407	0.70	0.77
100000018159	0.89	0.88	100000012732	0.26	0.27
3488841	0.61	0.68	3514167	0.55	0.60
3491681	0.19	0.28	100000018153	0.60	0.65
3564126	0.31	0.36	100000004114	0.33	0.33
3513650	0.32	0.36	100000018151	0.55	0.55
100000026754	0.67	0.67	3487712	0.58	0.61
3514117	0.37	0.43	100000018179	0.29	0.34
3564111	0.40	0.47	3500164	0.45	0.45
3492059	0.44	0.42	3487939	0.41	0.44
3514279	0.21	0.27	3564124	0.27	0.29
			3487902	0.80	0.81

Note. Bold-faced number indicates that it is Brief Constructed Response (BCR) item, Extended Constructed Response (ECR) item or Student-Produced Response (SPR) item.

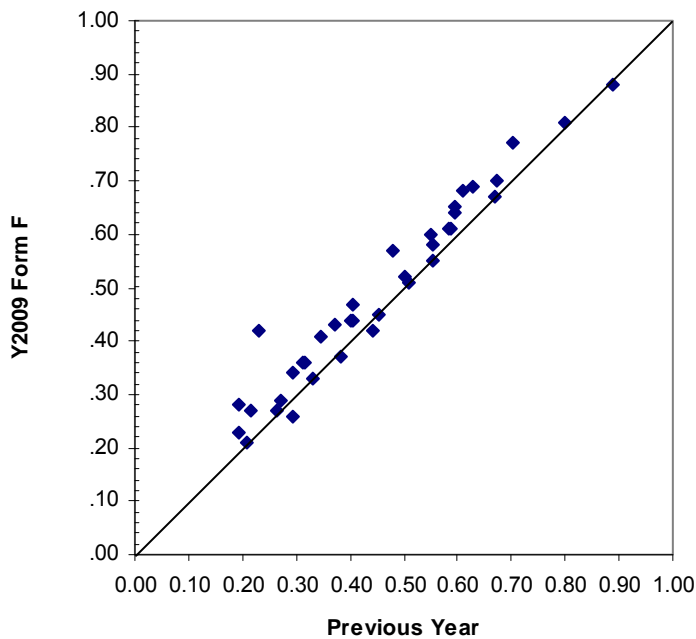


Table 1.72 Score-Point Distribution Comparisons of Constructed Response Core Items for Previous Year vs. Year 2009: Grade 8 Form F

Year	Item CID	Item Type	N	Mean	SD	Score-Point Distribution (%)				
						0	1	2	3	Omit
2008	3514283	ECR	31,743	0.40	0.49	57.00	40.29			2.71
2008	3564116	ECR	31,743	1.66	0.98	4.88	44.63	18.27	28.15	4.07
2007	3491681	BCR	2,206	0.19	0.39	74.21	19.27			6.53
2007	3564126	BCR	2,206	0.62	0.62	40.71	46.92	7.62		4.76
2008	3514117	BCR	32,318	0.37	0.48	55.99	36.99			7.02
2008	3564111	BCR	32,318	0.81	0.79	33.68	34.31	23.22		8.79
2007	3487934	ECR	2,277	0.51	0.50	43.17	51.12			5.71
2007	3564122	ECR	2,277	1.15	1.02	26.39	20.11	34.34	8.83	10.32
2007	3519815	BCR	2,223	0.48	0.50	47.86	48.13			4.00
2007	3564138	BCR	2,223	0.69	0.70	39.27	41.07	14.13		5.53
2008	100000043313	ECR	32,318	0.59	0.49	37.84	59.42			2.74
2008	3595407	ECR	32,318	2.11	1.04	6.87	17.2	22.0	49.9	3.86
2007	3487939	BCR	2,277	0.41	0.49	52.48	40.71			6.81
2007	3564124	BCR	2,277	0.54	0.64	46.07	37.64	8.26		8.04
2009	3514283	ECR	30,282	0.44	0.50	53.72	44.32			1.97
2009	3564116	ECR	30,282	1.73	0.98	4.35	44.10	18.02	31.03	2.51
2009	3491681	BCR	30,282	0.28	0.45	68.20	27.86			3.94
2009	3564126	BCR	30,282	0.73	0.62	33.57	54.31	9.35		2.77
2009	3514117	BCR	30,282	0.43	0.49	51.62	42.78			5.59
2009	3564111	BCR	30,282	0.95	0.77	23.94	41.07	26.81		8.18
2009	3487934	ECR	30,282	0.51	0.50	43.61	51.35			5.04
2009	3564122	ECR	30,282	1.12	1.00	30.07	18.72	36.11	7.01	8.08
2009	3519815	BCR	30,282	0.57	0.49	39.26	57.35			3.38
2009	3564138	BCR	30,282	0.82	0.68	29.23	50.42	15.74		4.61
2009	100000043313	ECR	30,282	0.64	0.48	33.66	63.87			2.47
2009	3595407	ECR	30,282	2.30	0.96	4.77	12.47	21.87	57.91	2.99
2009	3487939	BCR	30,282	0.44	0.5	47.28	43.97			8.74
2009	3564124	BCR	30,282	0.59	0.65	40.98	40.95	8.86		9.20

**Table 1.73 Rasch Item and Step Difficulty Comparisons of Core Items for Previous Year vs. Year 2009:
Grade 8 Form F**

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2	Step 2-3
2008	6	100000018154	SR	-0.5902			
2007	15	3500167	SPR	1.6931			
2008	16	3514283	ECR_A	0.7105			
2008	17	3564116	ECR_B	-0.5004	-2.4388	1.4114	1.0274
2008	18	3492049	SPR	-0.3910			
2008	19	100000004107	SPR	0.0548			
2004	20	100000199104	SPR	1.1363			
2007	21	3514161	SPR	1.9454			
2008	22	100000018159	SR	-2.3300			
2007	23	3488841	SR	-0.5225			
2007	24	3491681	BCR_A	1.9208			
2007	25	3564126	BCR_B	1.3892	-1.6181	1.6181	
2008	26	3513650	SPR	1.1148			
2008	27	100000026754	SR	-0.6449			
2008	34	3514117	BCR_A	0.7094			
2008	35	3564111	BCR_B	0.5525	-0.7657	0.7657	
2008	36	3492059	SPR	0.3553			
2007	37	3514279	SPR	1.6979			
2007	39	3487934	ECR_A	-0.2738			
2007	40	3564122	ECR_B	0.5911	-1.0085	-1.0017	2.0102
2007	43	3487545	SR	-0.9210			
2007	44	3519815	BCR_A	0.0451			
2007	45	3564138	BCR_B	0.8852	-1.1130	1.1130	
2006	49	3514705	SR	1.1032			
2008	54	100000043313	ECR_A	-0.5034			
2008	55	3595407	ECR_B	-1.1346	-0.8613	0.1993	0.6621
2008	56	100000012732	SPR	1.5001			
2008	57	3514167	SPR	-0.2011			
2008	63	100000018153	SR	-0.4406			
2008	64	100000004114	SR	1.1309			
2008	66	100000018151	SR	0.0194			
2007	72	3487712	SR	-0.4925			
2008	74	100000018179	SPR	1.2452			
2007	75	3500164	SPR	0.2389			
2007	76	3487939	BCR_A	0.3023			
2007	77	3564124	BCR_B	1.3855	-1.3070	1.3070	
2007	80	3487902	SR	-1.8380			
2009	6	100000018154	SR	-0.6627			
2009	15	3500167	SPR	1.8723			
2009	16	3514283	ECR_A	0.5874			
2009	17	3564116	ECR_B	-0.5358	-2.4564	1.4718	0.9846
2009	18	3492049	SPR	-0.4824			
2009	19	100000004107	SPR	0.1624			

Table 1.73 (continued)

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2	Step 2-3
2009	20	100000199104	SPR	0.6409			
2009	21	3514161	SPR	1.7775			
2009	22	100000018159	SR	-2.1690			
2009	23	3488841	SR	-0.7247			
2009	24	3491681	BCR_A	1.4238			
2009	25	3564126	BCR_B	1.1318	-1.6837	1.6837	
2009	26	3513650	SPR	1.0321			
2009	27	100000026754	SR	-0.5765			
2009	34	3514117	BCR_A	0.7346			
2009	35	3564111	BCR_B	0.2987	-1.0752	1.0752	
2009	36	3492059	SPR	0.5743			
2009	37	3514279	SPR	1.5561			
2009	39	3487934	ECR_A	0.0273			
2009	40	3564122	ECR_B	0.9667	-0.9274	-1.0424	1.9698
2009	43	3487545	SR	-0.8828			
2009	44	3519815	BCR_A	-0.2045			
2009	45	3564138	BCR_B	0.7170	-1.3017	1.3017	
2009	49	3514705	SR	1.5905			
2009	54	100000043313	ECR_A	-0.5323			
2009	55	3595407	ECR_B	-1.2176	-0.7351	0.1474	0.5877
2009	56	100000012732	SPR	1.5351			
2009	57	3514167	SPR	-0.3043			
2009	63	100000018153	SR	-0.5150			
2009	64	100000004114	SR	1.2076			
2009	66	100000018151	SR	0.0346			
2009	72	3487712	SR	-0.3805			
2009	74	100000018179	SPR	1.0936			
2009	75	3500164	SPR	0.5224			
2009	76	3487939	BCR_A	0.3153			
2009	77	3564124	BCR_B	1.5079	-1.5771	1.5771	
2009	80	3487902	SR	-1.8764			

Note. Rasch item and step difficulties are on a common scale.

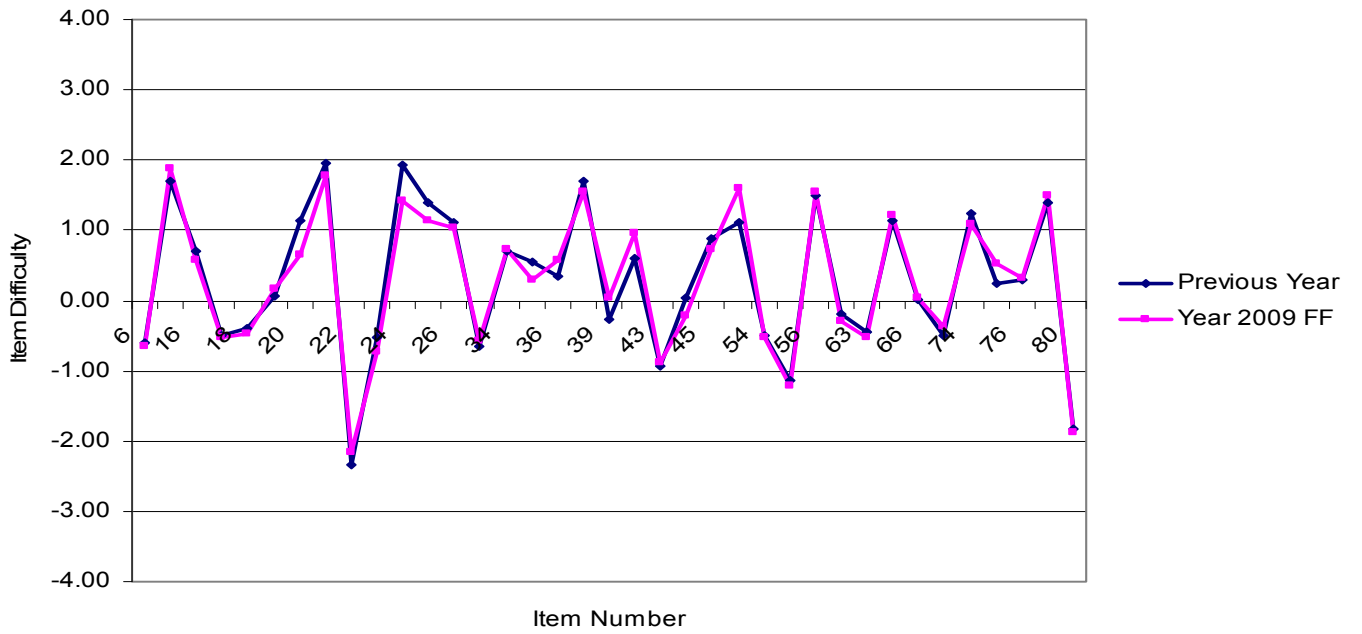


Figure 1.14 Rasch Item Difficulty Comparisons of Core Items for Previous Year vs. Year 2009: Grade 8 Form F

1.9 Linking, Equating, and Scaling Procedures of the 2009 MSA-Math

For the purpose of year-to-year linking and equating, we constructed a 2009 linking pool: only operational selected-response (SR) items (i.e., multiple-choice items) were included in the linking pool. It should be noted that these SR items appeared both in current and previous years' assessments and were used as either core or core link item in previous years' assessments (i.e., in any assessment before 2009). After setting up the linking pool, we conducted a stability check of linking items and decided which items should be excluded from or which items should remain in the linking pool. During the calibration and equating process, we kept and fixed the original operational Rasch item difficulty parameters of any linking items that remained through the stability check to put the 2009 assessment on a common scale. Accordingly, scale scores of the 2009 assessment were linked back to the 2006 assessment and all the scale scores of different years were comparable within each content and grade. It should be noted that Rasch recalibration was conducted using the 2006 MSA-Math data in 2007 due to the IRT model transition (i.e., from 3-PL to the Rasch). Detailed information on the 2006 Rasch recalibration and results can be obtained in the 2007 MSA-Math technical report.

Stratified Random Sampling Procedures

To select equating samples, a stratified random sampling method was applied to the 2009 state examinee population. To verify that the sample was representative of the statewide examinee population, the distributions of LEA, gender, and ethnicity of the 2009 sample were compared with those of the 2009 population. Appendix A, *The 2009 MSA-Math Stratified Random Sampling*, provides the results of 2009 sampling. The results indicated that the equating samples were well representative of the statewide examinee population in terms of LEA, gender, and ethnicity.

Robust Z Procedures

After selecting equating samples, each operational form was independently calibrated to estimate Rasch item difficulty of each item. Then Robust z values of all anchor items were calculated using the following calculations (South Carolina Department of Education, 2001):

- The mean and standard deviation of the linking pool's item difficulties for each operational form
- The ratio of the standard deviations between operational form A and form F
- The correlation between operational form A and F item difficulties
- The difference between operational form A and F for each item in the linking pool
- The mean of the differences calculated above
- The median of the differences calculated above
- The interquartile range of the differences calculated above
- The robust z is defined as (the difference between the test form1 and other test form item difficulty minus the median of the differences) / (interquartile range multiplied by 0.74).

Guidelines for Selecting Form-to-Form or Year-to-Year Linking Items

Once the above calculations were made, the following guidelines were followed in determining form-to-form or year-to-year common items used for Rasch linking and equating:

- Conform to the following “Protocol Criteria:” A correlation greater than 0.95 and a standard deviation ratio between 0.9 and 1.1. For example, use all the possible linking items as anchors if an original set of linking items meets these two criteria.
- Try not to include items with an absolute value of robust z exceeding 1.645.
- If one item difficulty on one form of the current year is eliminated from the linking pool, other item difficulties of the other forms should not be included.
- Should not eliminate more than 20 percent of the linking pool items.

Figure 1.15 depicts how we applied the anchor stability guidelines into the 2009 MSA-Math equating.

Form-to-Form Linking Procedures

The stability of the common items appearing on both operational forms was verified at each grade level:

- Calibrate the two operational test forms separately
- Calculate robust z values of Rasch item difficulties for forms A and F
- Correlate Rasch item difficulties between form A and form F
- Calculate standard deviation ratio between two forms

After examining the robust z values, correlation coefficient, and standard deviation ratio between the two separate calibrations, it was determined that the common item difficulties were consistent across the two forms for all items and could be included as form-to-form linking items in the fixed calibration of the two forms.

Year-to-Year Linking Procedures

The two 2009 operational forms included a set of year-to-year linking common items that appeared on both current and previous operational forms. We utilized the Rasch item fixed equating method for all of the operational items to be placed on a common scale within each grade.

The stability of the linking common items was evaluated using robust z values, correlation coefficients, and standard deviation ratios.

Tables 1.74 through 1.79 include Rasch item difficulties used for calculating robust z values, correlation coefficients, and standard deviations. Figures 1.16 through 1.27 depict item difficulty plots between current and previous years. It should be noted that the item difficulties of the 2009 operational forms were obtained from independent calibration, and those of previous assessments were on a common scale (i.e., linked to the 2006 assessment).

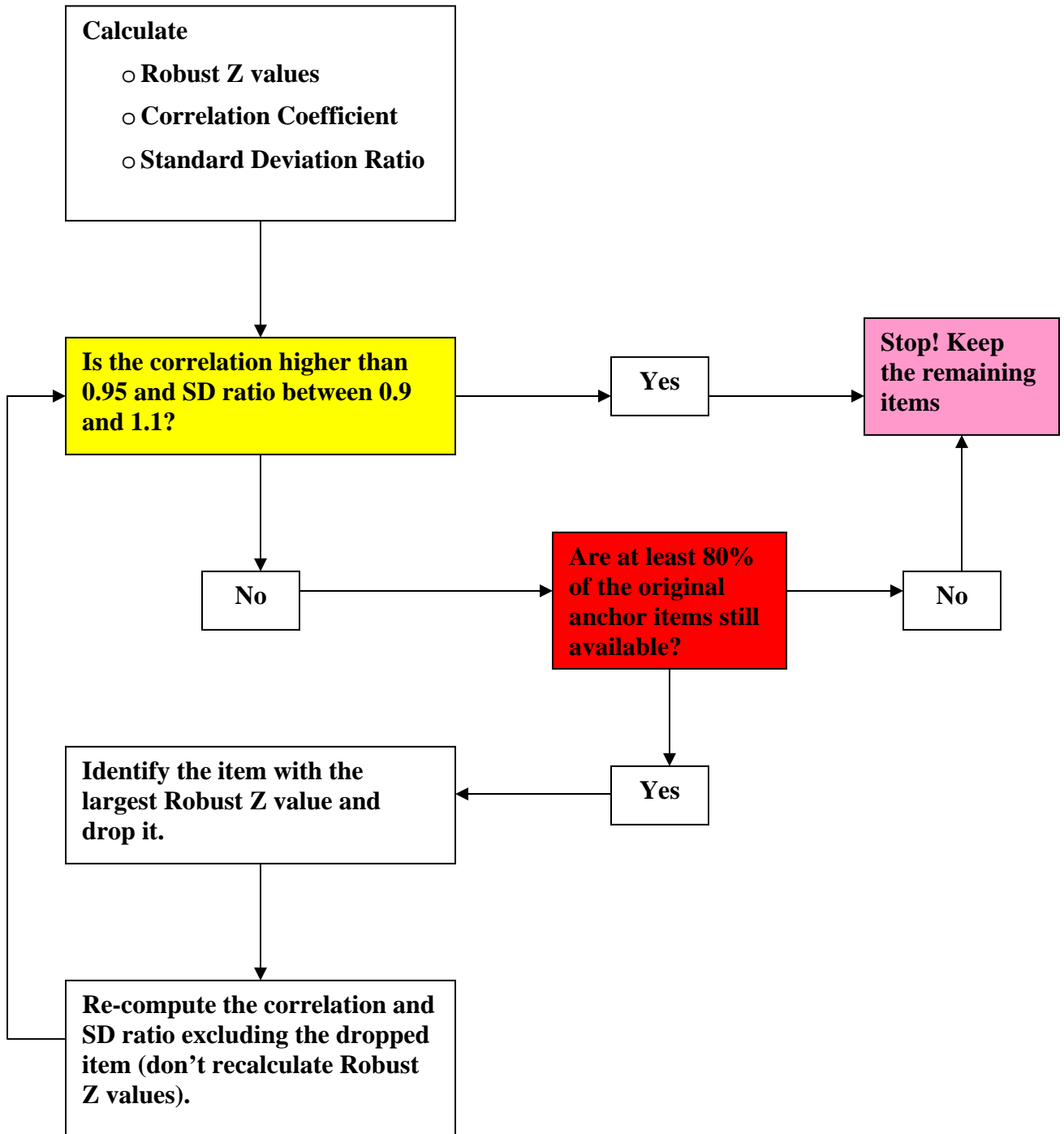


Figure 1.15 Anchor Evaluation Steps Chart for MSA-Math

Table 1.74 Rasch Item Difficulties and Robust Z values for Previous Year vs. Year 2009: Grade 3

Item Seq No.	Previous Form A	Y2009 Form A	Robust Z	Item Seq No.	Previous Form F	Y2009 Form F	Robust Z
1	0.9627	0.8909	.1368	1	0.9627	0.8673	.5730
2	-2.4386	-2.5066	.1517	2	-2.4386	-2.7836	-.1652
5	0.0690	-0.3436	-1.2010	5	0.0690	-0.3587	-.4098
7	-1.7100	-1.8678	-.2008	7	-1.7100	-2.3004	-.8909
14	-1.1315	-1.5370	-1.1731	14	-1.1315	-1.4469	-.0776
15	1.2257	1.5659	1.7541	15	1.2257	1.4639	1.5596
16	0.3981	0.1324	-.6243	16	0.3981	0.1382	.0865
17	-0.0360	0.2301	1.4632	17	-0.0360	0.1873	1.5156
21	-1.1470	-1.4508	-.7739	21	-1.1470	-1.4345	.0049
22	2.0077	1.6140	-1.1268	22	2.0077	1.5829	-.4012
23	0.4123	0.2607	-.1765	23	0.4123	0.6682	1.6120
32	0.5005	0.7292	1.3164	32	0.5005	0.5203	.9137
33	-2.6459	-3.0984	-1.3576	33	-2.6459	-3.1202	-.5476
41	0.4861	0.1676	-.8316	41	0.4861	0.0941	-.3042
45	2.4187	1.8902	-1.6560	45	2.4187	1.9468	-.5405
48	-2.1822	-1.7810	1.9936	48	-2.1822	-1.9312	1.5975
49	-1.3667	-1.3268	.5753	49	-1.3667	-1.6754	-.0578
51	0.2953	0.1403	-.1898	51	0.2953	-0.0511	-.1693
52	-0.6165	-0.5658	.6177	52	-0.6165	-0.7707	.3991
55	1.2952	1.3208	.5191	55	1.2952	1.1661	.4733
56	-0.6059	-0.7473	-.1364	56	-0.6059	-0.8967	-.0049
62	0.9229	0.7393	-.3021	62	0.9229	0.5466	-.2577
63	-0.2691	-0.3309	.1761	63	-0.2691	-0.4972	.1806
64	-1.8190	-1.4738	1.7737	64	-1.8190	-1.6845	1.2529
65	1.4814	1.6108	.9266	65	1.4814	1.5589	1.0844
66	1.8021	1.7302	.1364	66	1.8021	1.5638	.1504
67	1.5719	1.3010	-.6448	67	1.5719	1.1515	-.3882
68	0.0473	-0.2789	-.8618	68	0.0473	-0.4505	-.6171
69	0.0444	0.4099	1.8534	69	0.0444	0.1354	1.1243
72	-0.6247	-0.8357	-.4096	72	-0.6247	-1.2487	-.9903
82	-0.5397	-0.4788	.6577	82	-0.5397	-0.5998	.6774
29A	-0.3652	-.2406	.9078	8F	-0.0209	-0.6868	-1.1142
46A	-0.2784	-0.5693	-.7233	24F	-0.6271	-1.7911	-2.5874
50A	-0.4990	-0.4578	.5804	47F	-0.4817	0.3005	3.1685
				70F	0.0993	0.1655	1.0509
				80F	0.8475	0.3453	-.6301

Note. The 2009 item sequence number was used to indicate that it was the same item appearing across years.

Note. Each item parameter was generated with a live, stratified random sample (i.e., about 3,000 students) of the year.

Note. Item parameters of previous years were on a common scale.

Note. The 2009 items were independently calibrated with the 2009 stratified random sample.

Form Statistics

	Previous	2009	Previous	2009
Form Statistics	Base Form	Form A	Base Form	Form F
Mean	-.069	-.152	-.038	-.259
SD	1.278	1.264	1.252	1.304

Correlation and Standard Deviation Ratio

	2009	2009
With Base Form	Form A	Form F
Correlation	.980	.963
SD Ratio	99%	104%

Values Used for Robust Z Statistics

	2009	2009
With Base Form	Form A	Form F
Mean Diff	-.083	-.221
Median Diff	-.107	-.289
IQR Diff	.344	.457

Based on correlation coefficients and SD ratios, none of the linking common items were dropped from the linking pool.

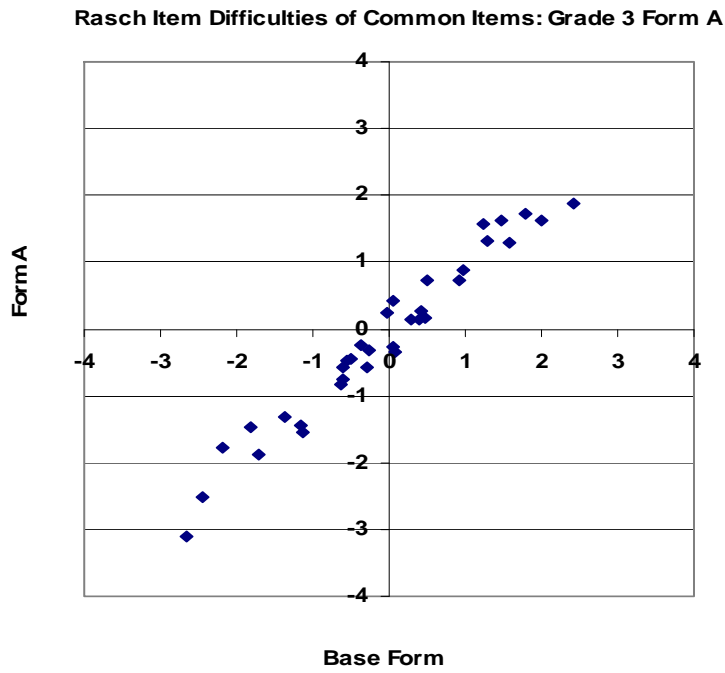


Figure 1.16 Item Difficulty Plot of Previous Year Form (Base Form) vs. Current Year (2009) Form: Grade 3 Form A

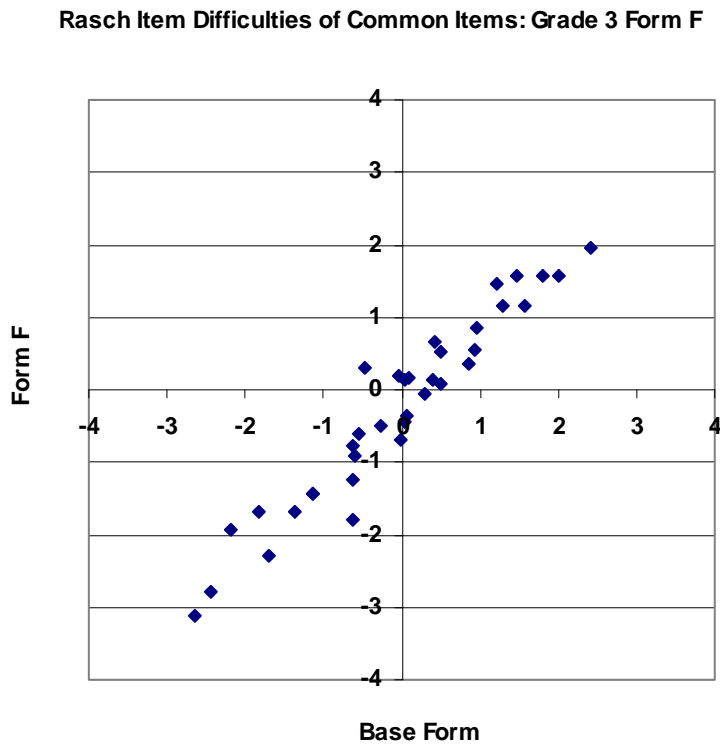


Figure 1.17 Item Difficulty Plot of Previous Year Form (Base Form) vs. Current Year (2009) Form: Grade 3 Form F

Table 1.75 Rasch Item Difficulties and Robust Z values for Previous Year vs. Year 2009: Grade 4

Item Seq No.	Previous Form A	Y2009 Form A	Robust Z	Item Seq No.	Previous Form F	Y2009 Form F	Robust Z
2	-0.7990	-0.9394	-.5298	2	-0.7990	-1.1520	-.7858
3	-1.8595	-1.8166	.2708	3	-1.8595	-1.7505	.8079
6	0.1763	-0.3630	-2.2722	6	0.1763	-0.3432	-1.3601
7	-0.8522	-0.4720	1.7441	7	-0.8522	-0.6672	1.0700
8	-1.0550	-1.2807	-.9024	8	-1.0550	-1.3842	-.7037
10	0.9009	0.7322	-.6535	10	0.9009	0.6678	-.3722
18	-1.1317	-1.2300	-.3459	18	-1.1317	-1.2499	.0241
19	1.4979	1.3332	-.6360	19	1.4979	1.1892	-.6330
22	0.3940	0.3282	-.2040	22	0.3940	0.2909	.0762
23	-0.7461	-0.5709	.8487	23	-0.7461	-0.6706	.6923
25	0.0797	0.1991	.6050	25	0.0797	0.0586	.3591
26	1.7570	1.6901	-.2088	26	1.7570	1.5140	-.4064
32	-0.9395	-0.7697	.8251	32	-0.9395	-0.9757	.3070
33	-2.7781	-2.4959	1.3161	33	-2.7781	-2.6854	.7517
34	-0.6701	-0.8879	-.8679	34	-0.6701	-1.0409	-.8472
47*	-0.1077	-1.4578	-5.8138	47*	-0.1077	-1.6107	-4.7528
49	-0.9767	-1.0012	-.0236	49	-0.9767	-0.9677	.4629
50	0.9291	1.0590	.6508	50	0.9291	1.0143	.7258
54	-0.7839	-0.7475	.2424	54	-0.7839	-0.9161	-.0241
55	-0.4674	-0.2193	1.1671	55	-0.4674	-0.2638	1.1342
62	1.0327	1.4872	2.0687	62	1.0327	1.7511	2.9100
63	-0.2743	-0.4293	-.5936	63	-0.2743	-0.5587	-.5492
64	-0.1060	-0.3060	-.7902	64	-0.1060	-0.6616	-1.4847
66	0.6282	1.3886	3.4049	66	0.6282	1.1709	2.3039
67	-0.3619	-0.2163	.7194	67	-0.3619	-0.5128	-.0887
68	-0.6898	-0.9813	-1.1898	68	-0.6898	-1.1114	-1.0224
69	0.5626	0.6502	.4661	69	0.5626	0.5354	.3381
71	-0.2943	-0.3755	-.2713	71	-0.2943	-0.5384	-.4101
78	-1.2169	-1.4517	-.9422	78	-1.2169	-1.5823	-.8286
80	-0.0118	0.2772	1.3458	80	-0.0118	0.2180	1.2246
81	-0.1831	-0.1844	.0778	81	-0.1831	-0.3494	-.1418
1A	0.7943	0.5864	-.8247	11F	1.3222	1.2926	.3298
24A	0.5508	0.5465	.0646	27F	-0.1920	-0.3944	-.2663
65A	-0.5937	-0.6074	.0236	31F	-1.6415	-1.5985	.5802
				36F	0.0868	0.2692	1.0611
				65F	0.1771	-0.3287	-1.3129

Note. The 2009 item sequence number was used to indicate that it was the same item appearing across years.

Note. Each item parameter was generated with a live, stratified random sample (i.e., about 3,000 cases) of the year.

Note. Item parameters of previous years were on a common scale.

Note. The 2008 items were independently calibrated with the 2009 stratified random sample.

Form Statistics

	Previous	2009	Previous	2009
Form Statistics	Base Form	Form A	Base Form	Form F
Mean	-.223	-.251	-.239	-.371
SD	.945	.998	.962	1.034

Correlation and Standard Deviation Ratio

	2009	2009
With Base Form	Form A	Form F
Correlation	.940	.936
SD Ratio	106%	107%

Values Used for Robust Z Statistics

	2009	2009
With Base Form	Form A	Form F
Mean Diff	-.027	-.132
Median Diff	-.019	-.125
IQR Diff	.309	.392

Based on correlation coefficients, SD ratios, robust z, and item difficulty plot, item number 47 appearing on both forms was dropped from the linking pool.

The following correlation coefficients and SD ratios were calculated after dropping that item:

	2009	2009
With Base Form	Form A	Form F
Correlation	.967	.961
SD Ratio	103%	105%

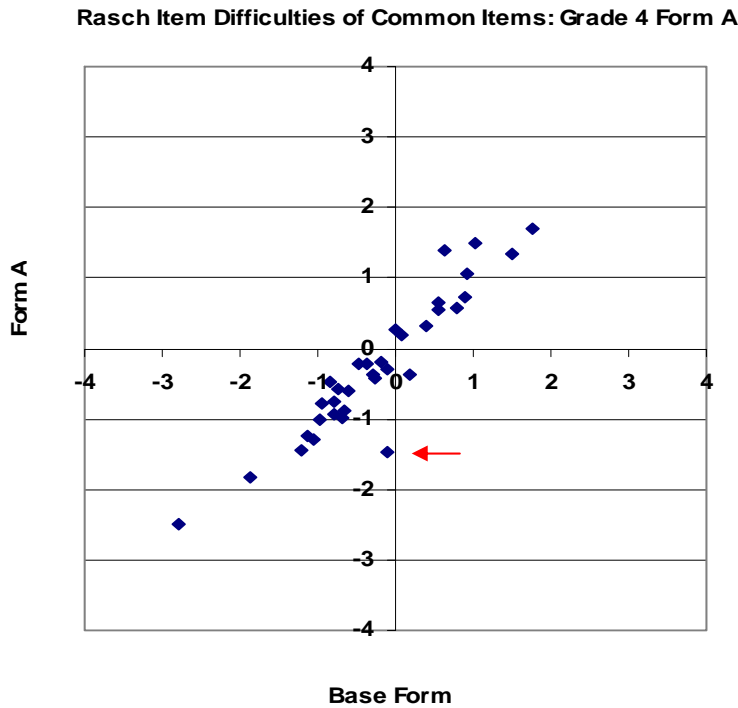


Figure 1.18 Item Difficulty Plot of Previous Year Form (Base Form) vs. Current Year (2009) Form: Grade 4 Form A

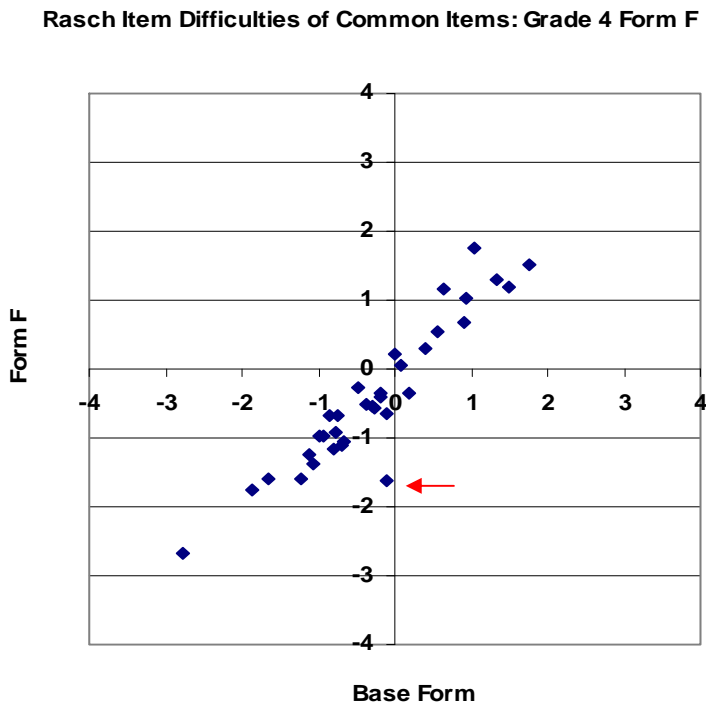


Figure 1.19 Item Difficulty Plot of Previous Year Form (Base Form) vs. Current Year (2009) Form: Grade 4 Form F

Table 1.76 Rasch Item Difficulties and Robust Z values for Previous Year vs. Year 2009: Grade 5

Item Seq No.	Previous Form A	Y2009 Form A	Robust Z	Item Seq No.	Previous Form F	Y2009 Form F	Robust Z
2	-1.0850	-1.3600	-1.1707	2	-1.0845	-1.2391	-.6121
8*	-1.3086	-1.8631	-2.4574	8*	-1.3086	-2.1339	-3.0660
16	0.6094	0.7629	.8077	16	0.6094	0.8464	.8207
18	0.1790	0.0949	-.2880	18	0.1790	0.0446	-.5382
19	-0.9090	-1.0086	-.3581	19	-0.9093	-0.8966	.0000
20	0.4459	0.7249	1.3865	20	0.4459	0.6939	.8609
21	0.4633	0.3471	-.4360	21	0.4633	0.4054	-.2583
23	0.3350	0.1300	-.8456	23	0.3350	0.0919	-.9359
26	0.2030	0.1878	.0297	26	0.2030	0.5211	1.1174
27	0.2606	0.0602	-.8243	27	0.2606	-0.1852	-1.6775
37	-0.2850	-0.4292	-.5647	37	-0.2851	-0.5397	-.9780
38	-0.3310	-0.5894	-1.0918	38	-0.3310	-0.4252	-.3911
39*	-1.7040	-1.7267	-.0039	39*	-1.7042	-2.3770	-2.5081
42	0.1548	0.2672	.6182	42	0.1548	0.4121	.8949
43	-1.1290	-1.0875	.2926	43	-1.1293	-1.1610	-.1624
47	0.0148	0.1865	.8917	47	0.0148	0.1432	.4233
48	-0.2130	-0.2227	.0551	48	-0.2130	-0.1631	.1361
49	-0.6900	-0.9724	-1.2034	49	-0.6898	-1.0759	-1.4591
55	-0.6830	-0.4623	1.1167	55	-0.6828	-0.4448	.8243
56	-1.7930	-1.9641	-.6901	56	-1.7928	-1.8245	-.1624
58	-0.9440	-0.8536	.5163	58	-0.9439	-0.9003	.1131
60	-1.1520	-1.1159	.2645	60	-1.1516	-0.9917	.5386
61	-0.5030	-0.4589	.3009	61	-0.5025	-0.2812	.7632
64	-0.9260	-1.1646	-1.0005	64	-0.9260	-1.2516	-1.2377
70	-0.3860	-0.5802	-.7948	70	-0.3862	-0.5892	-.7892
71	0.5581	0.4044	-.6090	71	0.5581	0.5058	-.2378
72	-0.5780	-0.4509	.6855	72	-0.5779	-0.3567	.7628
82	-0.0720	-0.0925	.0039	82	-0.0717	-0.0411	.0655
83	-0.6840	-0.4320	1.2615	83	-0.6839	-0.5336	.5034
28A	0.1746	0.4756	1.4880	40F	1.2809	1.3850	.3344
34A	1.7536	1.6853	-.21510	44F*	2.4411	3.1433	2.5227
44A	0.8010	1.0378	1.1919				

Note. The 2009 item sequence number was used to indicate that it was the same item appearing across years.

Note. Each item parameter was generated with a live, stratified random sample (i.e., about 3,000 cases) of the year.

Note. Item parameters of previous years were on a common scale.

Note. The 2009 items were independently calibrated with the 2009 stratified random sample.

Form Statistics

Form Statistics	Previous Base Form	2009 Form A	Previous Base Form	2009 Form F
Mean	-.294	-.327	-.272	-.297
SD	.781	.855	.880	1.072

Correlation and Standard Deviation Ratio

	2009 Form A	2009 Form F
with Base Form		
Correlation	.975	.970
SD Ratio	109%	122%

Values Used for Robust Z Statistics

	2009 Form A	2009 Form F
With Base Form		
Mean Diff	-.033	-.026
Median Diff	-.022	.013
IQR Diff	.293	.369

Item number 8 and 39 on both forms were dropped from the linking pool based on correlation coefficients, SR ratios, robust z, and item difficulty plot. In addition, item number 44 appearing only on Form F was dropped from the linking pool.

The following correlation coefficients and SD ratios are based on dropping those items:

	2009 Form A	2009 Form F
With Base Form		
Correlation	.975	.960
SD Ratio	107%	108%

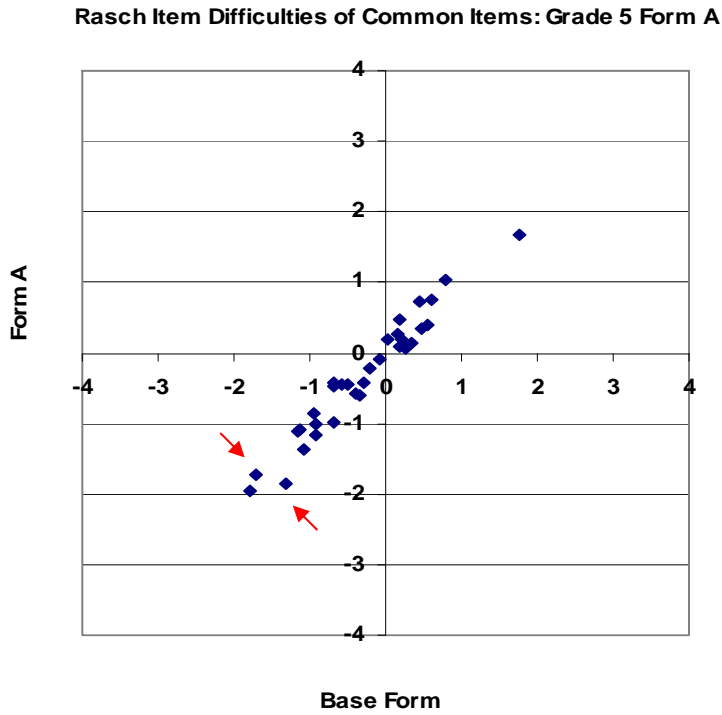


Figure 1.20 Item Difficulty Plot of Previous Year Form (Base Form) vs. Current Year (2009) Form: Grade 5 Form A

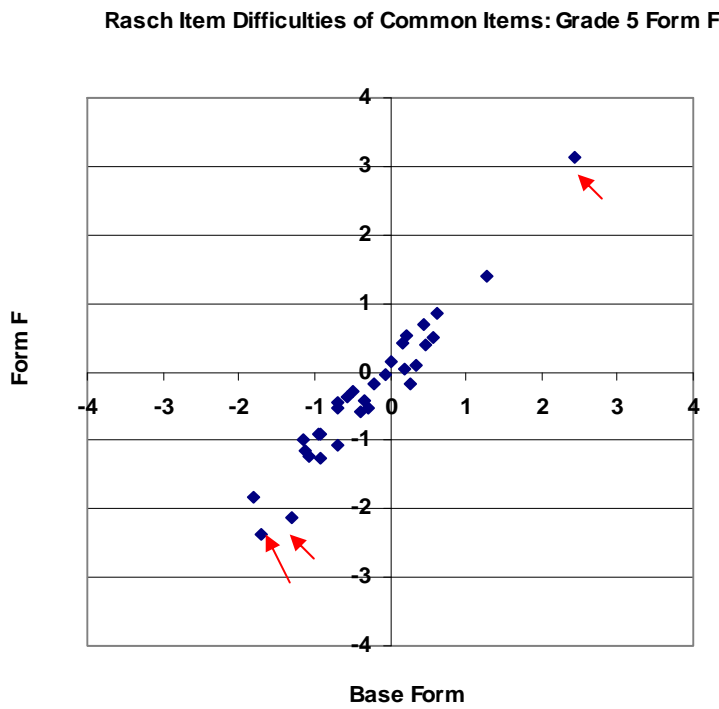


Figure 1.21 Item Difficulty Plot of Previous Year Form (Base Form) vs. Current Year (2009) Form: Grade 5 Form F

Table 1.77 Rasch Item Difficulties and Robust Z values for Previous Year vs. Year 2009: Grade 6

Item Seq No.	Previous Form A	Y2009 Form A	Robust Z	Item Seq No.	Previous Form F	Y2009 Form F	Robust Z
1*	-1.2053	-1.7693	-2.3677	1*	-1.2053	-1.6311	-1.3638
3	0.6406	0.7691	.6569	3	0.6406	0.7010	.4715
6	-0.2844	-0.2783	.1223	6	-0.2844	-0.4437	-.3578
9*	-0.7278	-1.2723	-2.2825	9*	-0.7278	-1.0840	-1.1011
10*	-1.4432	-2.0707	-2.6450	10*	-1.4432	-2.0368	-1.9972
11	-0.4703	-0.5566	-.2813	11	-0.4703	-0.5429	-.0306
12	0.3254	0.2112	-.4031	12	0.3254	0.1825	-.2959
19	0.2409	0.0116	-.9059	19	0.2409	-0.0208	-.7444
20	0.4042	0.4881	.4621	20	0.4042	0.5394	.7538
25	0.4777	0.9367	2.1004	25	0.4777	0.9356	1.9719
26	-0.1396	-0.1893	-.12140	26	-0.1396	-0.2041	.0000
27	0.2101	0.2381	.2179	27	0.2101	0.2458	.3782
30	0.7262	0.6486	-.2433	30	0.7262	0.7374	.2857
34	1.1378	0.9123	-.8893	34	1.1378	0.9081	-.6236
35	-1.4702	-1.3927	.4341	35	-1.4702	-1.5113	.0883
36	0.3674	0.3455	.0000	36	0.3674	0.2637	-.1480
37*	0.5144	-0.2472	-3.2308	37*	0.5144	0.1394	-1.1721
38	-0.1849	-0.2188	-.0524	38	-0.1849	-0.2098	.1495
45	-0.9261	-0.8525	.4171	45	-0.9261	-0.7479	.9161
50	0.0810	-0.2742	-1.4557	50	0.0810	-0.2682	-1.0747
54	0.2864	0.4210	.6835	54	0.2864	0.1854	-.1378
55	0.5885	0.8930	1.4256	55	0.5885	0.7904	1.0056
56	0.1350	0.2684	.6783	56	0.1350	0.3146	.9214
57	-0.4092	-0.2116	.9587	57	-0.4092	-0.1570	1.1955
61	0.2607	0.3220	.3634	61	0.2607	0.3890	.7278
68	0.4071	0.5731	.8207	68	0.4071	0.5706	.8606
80	0.6580	0.7211	.3713	80	0.6580	0.6756	.3099
2A*	-0.3185	-1.0116	-2.9316	2F*	-0.7946	-1.4436	-2.2063
29A	0.8496	0.7664	-.2677	4F	-0.6658	-0.7634	-.1249

Note. The 2009 item sequence number was used to indicate that it was the same item appearing across years.

Note. Each item parameter was generated with a live, stratified random sample (i.e., about 3,000 cases) of the year.

Note. Item parameters of previous years were on a common scale.

Note. The 2009 items were independently calibrated with the 2009 stratified random sample.

Form Statistics

Form Statistics	Previous Base Form	2009 Form A	Previous Base Form	2009 Form F
Mean	.025	-.063	-.043	-.120
SD	.675	.824	.681	.816

Correlation and Standard Deviation Ratio

With Base Form	2009 Form A	2009 Form F
Correlation	.938	.958
SD Ratio	122%	120%

Values Calculated for Robust Z Statistics

With Base Form	2009 Form A	2009 Form F
Mean Diff	-.088	-.077
Median Diff	-.022	-.065
IQR Diff	.309	.358

Based on correlation coefficients, SD ratio, robust z, and item difficulty plot, item numbers 1, 9, 10, and 37 appearing on both forms were dropped from the linking pool. In addition, the unique core linking item in position on 2 on Form A and the unique core linking item in position 2 on Form F were dropped from the linking pool (although these linking items appeared in the same position on each form they are unique items).

The following correlation coefficients and SD ratios were calculated after dropping those items:

With Base Form	2009 Form A	2009 Form F
Correlation	.956	.954
SD Ratio	103%	105%

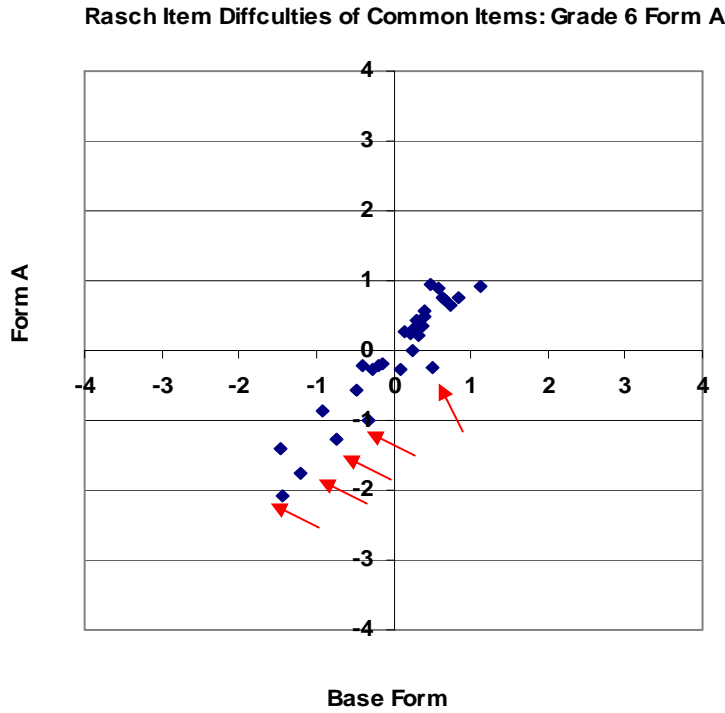


Figure 1.22 Item Difficulty Plot of Previous Year Form (Base Form) vs. Current Year (2009) Form: Grade 6 Form A

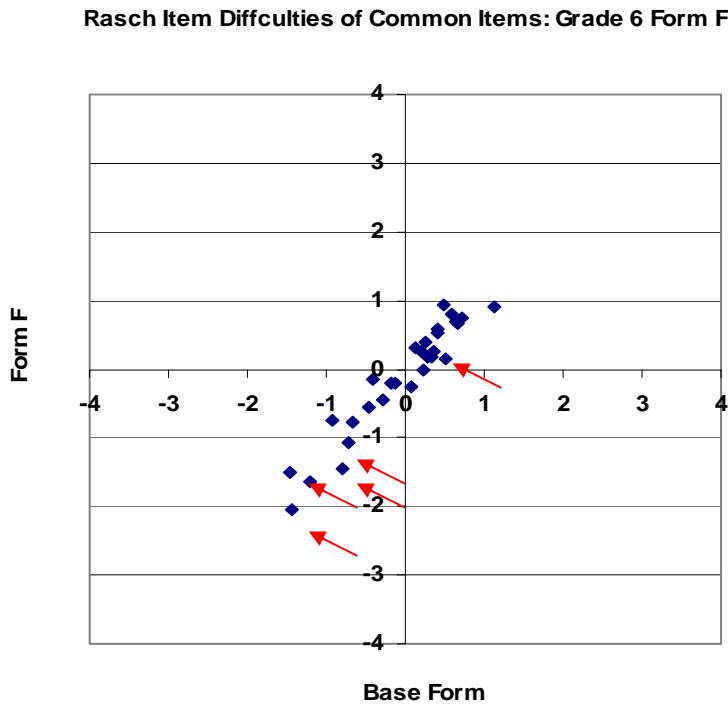


Figure 1.23 Item Difficulty Plot of Previous Year Form (Base Form) vs. Current Year (2009) Form: Grade 6 Form F

Table 1.78 Rasch Item Difficulties and Robust Z values for Previous Year vs. Year 2009: Grade 7

Item Seq No.	Previous Form A	Y2009 Form A	Robust Z	Item Seq No.	Previous Form F	Y2009 Form F	Robust Z
1	1.0539	1.3179	1.9392	1	1.0539	1.2073	2.8523
2	0.4455	0.1965	-.4505	2	0.4455	0.1233	-.4268
3	0.1508	-0.1525	-.7034	3	0.1508	-0.1628	-.3675
7	-0.1398	-0.5871	-1.3742	7	-0.1398	-0.5428	-.9839
8	-0.4706	-0.7600	-.6386	8	-0.4706	-0.7637	-.2261
10	-1.1551	-1.3149	-.0349	10	-1.1551	-1.3943	.1455
12	-0.4683	-0.6507	-.1402	12	-0.4683	-0.7150	.0938
18	-0.6359	-1.0764	-1.3425	18	-0.6359	-1.2132	-2.1856
19	-1.1243	-1.7113	-2.0249	19	-1.1243	-1.8325	-3.0881
20	1.5825	1.2198	-.9801	20	1.5825	1.2638	-.4026
30	-0.5147	-0.1199	2.5485	30	-0.5147	-0.0428	5.0483
31	-2.6820	-3.1414	-1.4305	31	-2.6820	-3.2279	-1.9691
32	0.0227	-0.1181	.0536	32	0.0227	-0.2249	.0876
42	1.3415	1.3879	.9256	42	1.3415	1.3091	1.5713
43	-0.4094	-0.5108	.2371	43	-0.4094	-0.6188	.3509
50	1.4392	1.4118	.5818	50	1.4392	1.2160	.2558
51	-0.0583	-0.1570	.2497	51	-0.0583	-0.2511	.4654
52	-1.4991	-1.8211	-.7905	52	-1.4991	-1.8879	-.8860
63	0.5663	0.5770	.7593	63	0.5663	0.373	.4619
64	0.0092	-0.1324	.0498	64	0.0092	-0.2843	-.2289
65	-0.4333	-0.6919	-.4952	65	-0.4333	-0.6936	.0000
66	-0.2963	-0.8359	-1.8041	66	-0.2963	-0.9359	-2.6151
69	0.5231	0.3113	-.2772	69	0.5231	0.1077	-1.0694
70	-0.2784	-0.4232	.0349	70	-0.2784	-0.7068	-1.1590
72	0.6673	0.7031	.8762	72	0.6673	0.4886	.5626
79	-1.4603	-1.3173	1.3756	79	-1.4603	-1.3477	2.5710
80	-0.5723	-0.5045	1.0253	80	-0.5723	-0.656	1.2176
81	-0.0385	-0.1187	.3359	81	-0.0385	-0.0600	1.6464
				44F	1.7720	1.4161	-.6591

Note. The 2009 item sequence number was used to indicate that it was the same item appearing across years.

Note. Each item parameter was generated with a live, stratified random sample (i.e., about 3,000 cases) of the year.

Note. Item parameters of previous years were on a common scale.

Note. The 2009 items were independently calibrated with the 2009 stratified random sample.

Form Statistics

Form Statistics	Previous Base Form	2009 Form A	Previous Base Form	2009 Base Form
Mean	-.158	-.322	-.092	-.347
SD	.947	1.041	.996	1.070

Correlation and Standard Deviation Ratio

With Base Form	2009 Form A	2009 Form F
Correlation	.977	.975
SD Ratio	110%	107%

Values Used for Robust Z Statistics

With Base Form	2009 Form A	2009 Form F
Mean Diff	-.164	-.255
Median Diff	-.152	-.260
IQR Diff	.290	.196

Based on correlation coefficients and SD ratios, none of the linking common items were dropped from the linking pool.

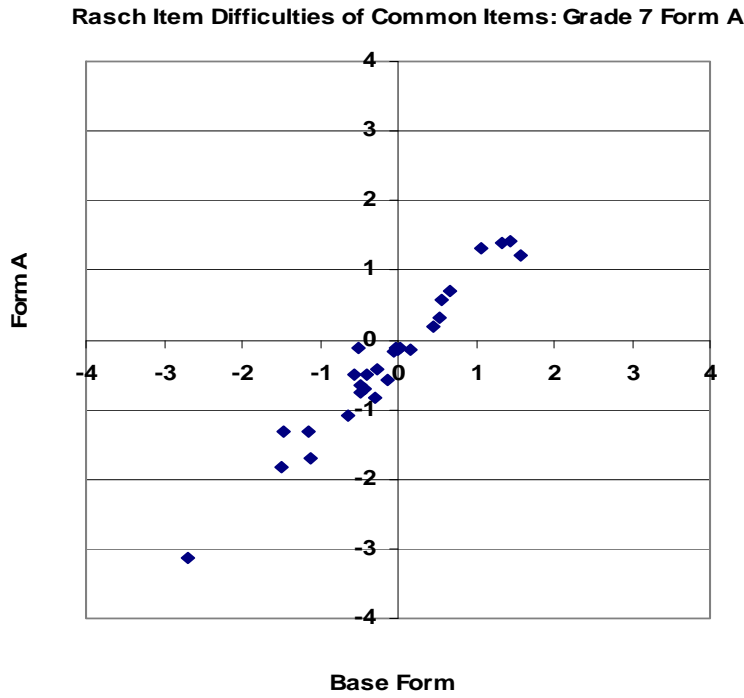


Figure 1.24 Item Difficulty Plot of Previous Year Form (Base Form) vs. Current Year (2009) Form: Grade 7 Form A

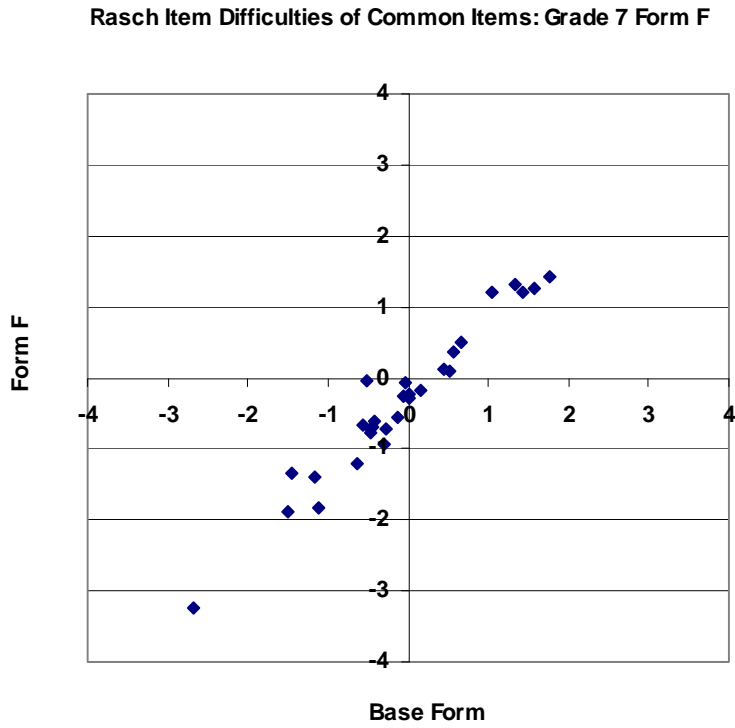


Figure 1.25 Item Difficulty Plot of Previous Year Form (Base Form) vs. Current Year (2009) Form: Grade 7 Form F

Table 1.79 Rasch Item Difficulties and Robust Z values for Previous Year vs. Year 2009: Grade 8

Item Seq No.	Previous Form A	Y2009 Form A	Robust Z	Item Seq No.	Previous Form F	Y2009 Form F	Robust Z
1	1.4965	1.4366	.3019	1	1.4965	1.4069	.4767
2	-0.2177	-0.2601	.4482	2	-0.2177	-0.3646	-.2079
5	-1.3613	-1.6916	-1.9593	5	-1.3613	-1.8797	-4.6467
7	-1.2003	-1.4748	-1.4927	7	-1.2003	-1.4356	-1.2641
8	0.3621	0.2940	.2333	8	0.3621	0.1906	-.5018
14	0.3158	0.1330	-.7258	14	0.3158	0.1960	.1159
32	1.0306	0.9528	.1522	32	1.0306	0.9998	1.1793
33	0.5139	0.3732	-.3738	33	0.5139	0.3521	-.3859
38	-1.4579	-1.3942	1.3355	38	-1.4579	-1.3088	3.3288
41	0.5661	0.0594	-3.4344	41	0.5661	0.1094	-3.9095
42	-1.4001	-1.7531	-2.1491	42	-1.4001	-1.6853	-1.8603
46	-0.2581	-0.3520	.0176	46	-0.2581	-0.3602	.3274
47	-0.1085	-0.0427	1.3530	47	-0.1085	-0.0781	1.9105
48	-0.6178	-0.6275	.7217	48	-0.6178	-0.6889	.6978
50	0.0551	-0.0417	-.0067	50	0.0551	-0.0415	.3931
51	-0.7102	-0.7862	.1672	51	-0.7102	-0.7696	.8376
52	0.3257	0.3439	.9550	52	0.3257	0.2765	.9594
53	-0.6275	-0.8368	-.9475	53	-0.6275	-0.7604	-.0406
62	1.2102	1.0490	-.5452	62	1.2102	1.0250	-.6655
65	-0.5330	-0.9743	-2.8875	65	-0.5330	-1.1330	-5.6217
78	-0.0934	-0.1124	.6439	78	-0.0934	-0.2229	.0000
79	-0.1424	-0.3442	-.8847	79	-0.1424	-0.3016	-.3549
22A	-0.8540	-1.0332	-.6957	73F	1.0119	1.3186	5.2118
27A	0.2581	0.3247	1.3597				
49A	0.8435	0.7475	.0000				
63A	2.0087	2.0240	.9307				
66A	1.3321	1.1916	-.3721				

Note. The 2009 item sequence number was used to indicate that it was the same item appearing across years.

Note. Each item parameter was generated with a live, stratified random sample (i.e., about 3,000 cases) of the year.

Note. Item parameters of previous years were on a common scale.

Note. The 2009 items were independently calibrated with the 2009 stratified random sample.

Form Statistics

	Previous	2009	Previous	2009
Form Statistics	Base Form	Form A	Base Form	Form F
Mean	.027	-.104	-.080	-.224
SD	.922	.969	.844	.914

Correlation and Standard Deviation Ratio

	2009	2009
With Base Form	Form A	Form F
Correlation	.989	.978
SD Ratio	105%	108%

Values Used for Robust Z Statistics

	2009	2009
With Base Form	Form A	Form F
Mean Diff	-.131	-.144
Median Diff	-.096	-.130
IQR Diff	.162	.113

Based on correlation coefficients and SD ratios, none of the linking common items were dropped from the linking pool.

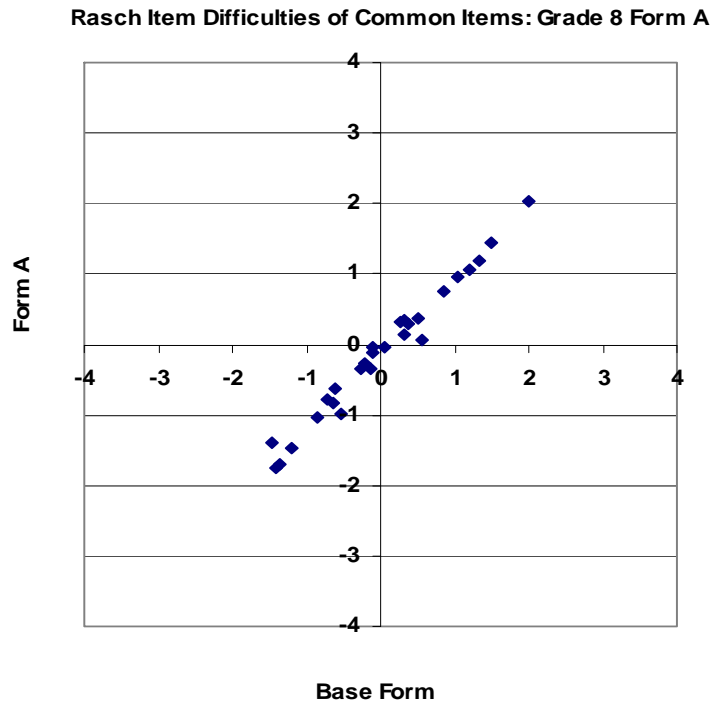


Figure 1.26 Item Difficulty Plot of Previous Year Form (Base Form) vs. Current Year (2009) Form: Grade 8 Form A

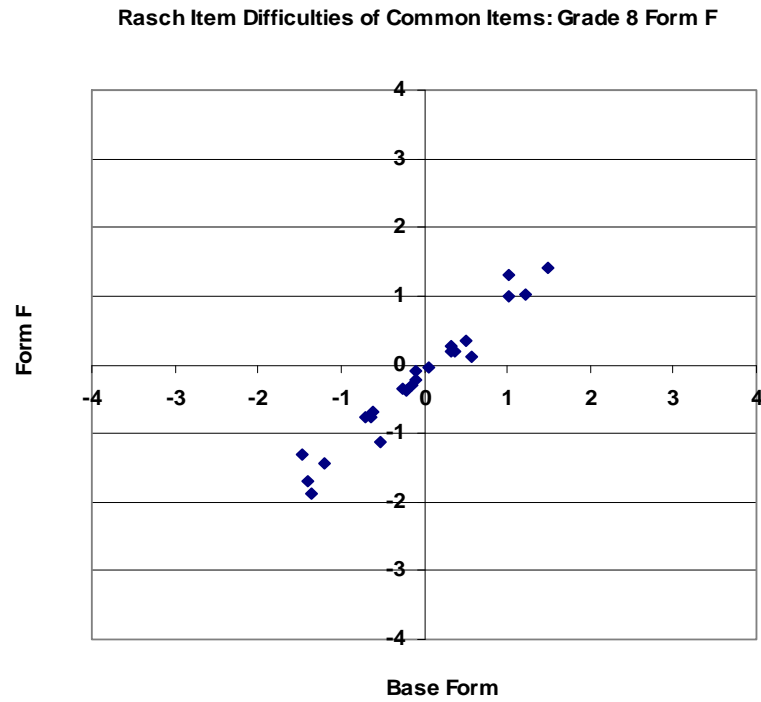


Figure 1.27 Item Difficulty Plot of Previous Year Form (Base Form) vs. Current Year (2009) Form: Grade 8 Form F

Reporting Scale Scores

In order to facilitate the use and interpretation of the results of the 2009 MSA-Math, the following formula was used to convert each student's ability or theta to the reporting scale score:

$$\text{ReportingAbilityScaleScore} = 32.8398 \cdot \text{theta} + 380.2954$$

$$\text{ReportingSE} = 32.8398 \cdot \text{SE}$$

where

theta = the Rasch (i.e., 1-PL IRT) ability estimate, and

SE = the conditional standard error of the ability estimate.

The following table contains information about the slopes and intercepts used to generate the 2009 scale scores. First of all, it should be noted that the slopes and intercepts were obtained during the 2006 recalibration. The same slopes and intercepts have been used since the 2006 assessment.

Table 1.80 The 2009 MSA-Mathematic Slope and Intercept: Grades 3 through 8

Grade	Slope	Intercept
3	32.6935	352.2959
4	32.8398	380.2954
5	30.7057	390.2866
6	29.6236	398.5595
7	28.1690	405.9549
8	28.3634	418.4843

1.10 Score Interpretation

To help provide appropriate interpretation of the 2009 MSA-Math test scores, two types of scores were created: 240-650 scale scores, and performance levels and descriptions.

240-650 Scale Scores

As explained in section 1.9, *Linking, Equating, and Scaling Procedures*, the 2009 scale scores were placed on a common scale (i.e., 2006 assessment) within the same grade and ranged from 240 to 260. As a result, these scale scores have the same meaning and are comparable across different years' assessments. However, it should be noted that they are not comparable across grade levels.

For scale scores, a higher score simply means a higher performance on math tests. Thus, performance levels and descriptions can give a specific interpretation other than a simple interpretation because they were developed to bring meaning to those scale scores.

Performance Level Descriptors

As previously explained, performance level descriptors provide specific information about students' performance levels and help interpret the 2009 MSA-Math scale scores. They describe what students at a particular level generally know and can be applicable to all students within each grade level.

Maryland standards are divided into three levels of achievement (www.marylandpublicschools.org):

- Advanced is a highly challenging and exemplary level of achievement indicating outstanding accomplishment in meeting the needs of students.
- Proficient is a realistic and rigorous level of achievement indicating proficiency in meeting the needs of students.
- Basic is a level of achievement indicating that more work is needed to attain proficiency in meeting the needs of students.

Table 2.1 shows a range of scale scores at each performance level; for example, grade 4 math scale scores from 374 to 432 indicate the level of *Proficient*. Students in this level passed the MSA-Math standard. This level is considered a realistic and rigorous level of achievement. Further information about the 2009 MSA-Math score interpretation can be obtained from MSDE.

1.11 Test Validity of the 2009 MSA-Math

As noted in the *Standards for Educational and Psychological Testing* (AERA, APA, & NCME, 1999), “validity is the most important consideration in test evaluation.”

Messick (1989) defined validity as follows:

Validity is an integrated evaluative judgment of the degree to which empirical evidence and theoretical rationales support the adequacy and appropriateness of inferences and actions based on test scores or other modes of assessment. (p.5)

This definition implies that test validation is the process of accumulating evidence to support intended use of test scores. Consequently, test validation is a series of ongoing and independent processes that are essential investigations of the appropriate use or interpretation of test scores from a particular measurement procedure (Suen, 1990).

In addition, test validation embraces all of the experimental, statistical, and philosophical means by which hypotheses and scientific theories can be evaluated. This is the reason that validity is now recognized as a unitary concept (Messick, 1989).

To investigate the validity evidence of the 2009 MSA-Math, content-related evidence, item development procedures, differential item functioning (DIF) analysis on gender and ethnicity, and evidence from internal structure were collected.

Content-Related Evidence

Content validity is frequently defined in terms of the sampling adequacy of test items. That is, content validity is the extent to which the items in a test adequately represent the domain of items or the construct of interest (Suen, 1990). Consequently, content validity provides judgmental evidence in support of the domain relevance and representativeness of the content in the test (Messick, 1989).

The 2009 MSA-Math blueprints provide extensive evidence regarding the alignment between the content in the 2009 MSA-Math and the *VSC*. It should be noted that the 2009 MSA-Math operational test forms were built exclusively using a Maryland item bank program which contained both content and statistical information about both operational and field-tested items. Information on the item composition of the operational test forms can be obtained from section 1.4, *Test Form Design, Specifications, Item Type, and Item Roles*. In addition, the 2009 MSA-Math blueprints are presented in Appendix D.

Item Development

Test development for MSA-Math is ongoing and continuous. Content specialists, teachers from across Maryland, Pearson, and MSDE were greatly involved in developing and reviewing items. Committees such as content review, bias review, and vision review reviewed all of the items, which were finally stored in a Maryland item bank. Specifically, an internal review by MSDE and Pearson staff for content alignment and quality required a great deal of time and energy. More specific information on item (test) development and review can be obtained in section 1.3, *Development and Review of the 2009 MSA-Math Items and Test*.

Field test items were embedded and administered in one of ten test forms. Once these items were scored, MSDE and Pearson conducted additional item analysis and content review. Any field test items that exhibited statistical results that suggested potential problems were carefully reviewed by both MSDE and Pearson content specialists. A determination was then made as to whether an item should be eliminated, revised, or field-tested again. Information on statistical analyses for field test items can be obtained in section 1.13, *Field Test Analyses and Item Bank Construction*.

Differential Item Functioning (DIF)

1) Bias Review of Items

A separate Bias Review Committee examined each math item, with looking for indications of bias that could impact the performance of an identifiable group of students. They discussed or rejected items biased on gender, ethnic, religious, or geographical bias.

2) *DIF* Statistics

For DIF analyses, subgroups were first identified according to either reference or focal groups. For the 2009 MSA-Math, males and whites were assigned to the reference group and females and African-Americans were assigned to the focal group.

While the Mantel-Haenszel procedure was used for SR and SPR items, the standardized mean difference (SMD) and the standard deviation (SD), along with the Mantel statistic, were calculated for BCR and ECR items. All of the items were classified based on Educational Testing Service (ETS) guidelines. All *DIF* results were kept in the 2009 Maryland item bank. More information on *DIF* analyses can be obtained in section 3.7, *Differential Item Functioning*.

Evidence from Internal Structure

The 2009 MSA-Math has five reporting math standards: *Algebra, Geometry and Measurement, Statistics and Probability, Numbers and Computations, and Process*. Tables 4.3 through 4.8 show the correlations among the math standards.

1.12 Unidimensionality Analyses of the 2009 MSA-Math

Measurement implies order and magnitude along a single dimension (Andrich, 1989). Consequently, in the case of scholastic achievement, one-dimensional scale is required to reflect this idea of measurement (Andrich, 1988, 1989). However, unidimensionality cannot be strictly met in a real testing situation because students' cognitive, personality, and test-taking factors usually have a unique influence on their test performance to some level (Andrich, 1988; Hambleton, Swaminathan, & Rogers, 1991). Consequently, what is required for unidimensionality to be met is an investigation of the presence of a dominant factor that influences test performance. This dominant factor is considered as the ability measured by the test (Andrich, 1988; Hambleton et al., 1991; Ryan, 1983).

To check the unidimensionality of the 2009 MSA-Math, we examined the relative sizes of the eigenvalues associated with a principal component analysis of the item set. First, polychoric correlation coefficients were computed with *LISREL 8.5* (Jöreskog & Sörbom, 1993) because they were polytomously scored on math items. Principal component analysis was then applied to produce eigenvalues. The first and the second principal component eigenvalues were compared *without rotation*. Table 1.81 summarizes the results of the first and second principal component eigenvalues of the 2009 MSA-Math.

A general rule of thumb in exploratory factor analysis suggests that a set of items may represent as many factors as there are eigenvalues greater than 1 in this analysis because there is one unit of information per item and the eigenvalues sum to the total number of items. However, a set of items may have multiple eigenvalues greater than 1 and still be sufficiently unidimensional for analysis with IRT (Loehlin, 1987; Orlando, 2004). As seen from the following table, the first component extracted substantially larger eigenvalues across all grades: the size of the eigenvalue of the first component was over ten times greater than the second eigenvalue for each form at each grade. As a result, we could conclude that the assumption of unidimensionality for the 2009 MSA-Math was met.

Table 1.81 The 2009 MSA-Math Eigenvalues between the First and Second Components

Grade	Form	Number of Items	First Eigenvalue	Second Eigenvalue
3	A	65	23.95	2.34
	F	65	23.31	2.47
4	A	64	23.18	2.07
	F	64	23.07	1.92
5	A	65	23.11	1.99
	F	65	23.05	2.28
6	A	62	22.28	2.05
	F	62	21.46	1.74
7	A	62	25.12	2.08
	F	62	25.46	1.93
8	A	61	24.18	2.25
	F	60	21.97	2.06

Note. Form A designates the operational portion of Forms A, B, C, D, and E, which is identical. Form F designates the operational portion of Forms F, G, H, J, and K, which is identical.

Note. Analysis was conducted with a statewide population.

1.13 Field Test Analyses and Item Bank Construction

All field test items embedded in operational forms were subjected to rigorous statistical analyses for their properties in order to provide information about which items may be included as operational items in the future. All statistical results concerning field test items were preserved in the 2009 Maryland item bank. The following field test analyses were conducted:

- Classical item analyses for *SR*, *SPR*, *BCR*, and *ECR* items
- *Differential item functioning (DIF)* analyses
- *IRT* analyses

Classical Item Analyses for *SR*, *SPR*, *BCR*, and *ECR* items

Classical item analyses for *SR*, *SPR*, *BCR*, and *ECR* items were conducted within each field test form.

SR items were flagged for further scrutiny if:

- An item distractor was not selected by any students (i.e., nonfunctional distractor)
- An item was selected by a high proportion of high-ability students while being selected by a low proportion of low-ability students (i.e., ambiguous distractor)
- An item p -value was less than .20 or greater than .90.
- An item point-biserial was less than .10 (i.e., poorly discriminating). If an item point-biserial was close to zero or negative, the item was checked for a miskeyed answer.

SPR items were flagged for further scrutiny if:

- An item p -value was less than .20 or greater than .90.
- An item point-biserial was less than .10 (i.e., poorly discriminating). If an item point-biserial was close to zero or negative, the item was checked for a miskeyed answer.

BCR and *ECR* items were flagged for further scrutiny if:

- An item did not elicit the full range of rubric scores.
- The ratio of mean item score to maximum score (i.e., adjusted p -value) was less than .20 or greater than .90.
- An item-total correlation was less than .10.

All items required a careful decision. For example, an item that was flagged as being difficult (p -value less than .20) and poorly discriminating (point-biserial less than .10) was considered for being dropped as a possible operational item. However, if the item represented important content that had not been extensively taught, a justification could have been made for including it in an operational test form.

Differential Item Functioning Analyses

Analyses of *Differential item functioning (DIF)* are intended to compare the performance of different subgroups of the population on specific items, when the group have been statistically matched on their tested proficiency.

In present analyses, the gender reference group was males, and the ethnic reference group was Caucasians. The gender focal group was females and the ethnic focal group was African-Americans. For each operational form, the student's total score was used as the matching variable.

Any *SR*, *SPR*, *BCR*, and *ECR* items that were flagged as showing *DIF* were subjected to further examination. For each of these items, for example, math experts judged whether the differential difficulty of the item was unfairly related to group membership using the following criteria:

- If the differential difficulty of the item is related to group membership, and the difference is deemed unfair, then the item should not be used at all.
- If the differential difficulty of the item is related to group membership, but the difference is not deemed unfair, then the item should only be used if there is no other item matching the test blueprint.

It should be noted that *DIF* analysis results for all the field test items were archived in the 2009 Maryland item bank. Detailed information about the *DIF* procedures can be found in section 3.7, *Differential Item Functioning*.

Item Response Theory (IRT) Analyses

To put the 2009 field test items on a common scale (i.e., the 2006 scale), each field test item was freely calibrated after fixing Rasch item and step difficulty parameters of the 2009 operational items that had been already placed on the base scale during the 2009 operational calibration and equating. For example, each unique field test item appearing on one of five math test forms (i.e., A, B, C, D, and E) was independently calibrated after fixing the same operational items appearing across the field test forms with the same Rasch item and step difficulties because these unique field test forms all correspond to the same operational form (i.e., operational form A).

It should be noted that all the Rasch item difficulties, step difficulties, and fit statistics (i.e., Rasch Infit and Outfit indices) of the field test items were archived in the 2009 Maryland item bank. These field test items are eligible to be used as operational items in subsequent years.

Item Bank Construction

The number of test forms constructed each year and the need to replace items that are released to the public necessitates the availability of a large pool of items. The 2009 MSA-Math item bank continues to be maintained by Pearson in the form of computer files and paper copies. This enables the test items to be readily available to both Pearson and MSDE staff for reference, test construction, test book design, and printing.

1.14 Quality Control Procedures

A standard quality procedure at Pearson was to create a test deck for MSA programs. The test deck began when Quality Assurance entered mock data into the enrollment system, which was transferred to the materials requisition system; the order was packaged by our Distribution Center, and shipped to the Quality Assurance Department. We then reviewed the packing list against the data entered, the materials algorithms applied, the materials packaged against the packing list, and the actual packaging of the documents. These documents were then used to create a test deck of mock data, along with advance copies of documents that were received from the printer. Advance printer copies were inclusive of documents throughout the print run to assure we were randomly testing printed documents. The Maryland test deck was a comprehensive set of all documents that:

- Verified all scan positions for item responses and demographics to verify scanning setup and scan densities
- Verified all constructed response score points, zoning of image, reader scoring, reader resolution, and reader check scores
- Verified the handling of blank documents through the system
- Test all demographic and item edits
- Verified pre-id bar code read, match and no-match
- Verified attemptedness rules applied by subtest
- Verified duplicate student handling (same test duplicate, different test duplicate)
- Verified duplicate student with different demographics ruedles applied
- Verified the document counts to the enrollment, pre-id and actual document receipt
- Verified pre-id matching and application to student record
- Verified various raw score points and access to dummy and live scoring tables
- Verified cut scores applied
- Verified valid score on one subtest and invalid score on other subtest
- Verified scoring applied to Braille and Large Print
- Verified valid multiple choice and invalid constructed response
- Verified valid constructed response and invalid multiple choice
- Verified all special scoring rules
- Verified all summary programs for rounding
- Verified summary inclusion and exclusion (Braille, standard and non-standard student summarization)
- Verified each scoring level for group reporting
- Verified all reporting programs for accuracy in all text and data presented
- Verified class, school, district, and state summary data on home reports
- Verified all data file programs to assure valid information in every field

- Verified data descriptions for accuracy against data file
- Created compare programs to allow for update of files

The Maryland test deck was the first order processed through the Maryland system to verify all aspects of the materials packaging, scanning, editing, scoring, summary, and reporting. Pre-determined conditions were included in the test deck to assure the programs were processing all data to meet the requirements of the program with zero defects. Processing of live orders could not proceed until each phase of the test deck had been approved by our Quality Assurance Department. An Issues Log with sign-off approvals was utilized to assure we were addressing any issues that arose in the review of the test deck data across all functional groups at Pearson.

Prior to release of any order for reporting we received a preliminary file from Scoring Operations to run a key check TRIAN to assure that all scoring keys had been determined and applied accurately. Any item that was not performing as expected was flagged and reviewed by our content specialist and psychometrician. Upon completion of the key check, we proceeded to run the pilot level reports.

We ran the pilot district utilizing live data. The pilot district included multiple buildings, all grades, and any unique accommodations. A formal pilot review process was conducted with Pearson staff experts prior to release of the information to MSDE.

Upon completion of the processing of all district-level data, Pearson Scoring Operations provided the Quality Assurance Department with one or more state-level data files, along with state data for review and approval. Pearson Quality Assurance programmers duplicated all data independently to ensure accurate interpretation of the expected results. A series of SAS programs were run on these files to ensure 100% accuracy. These included but were not limited to:

- Statewide Duplicate Student
- Statewide FD of Demographic Variables
- District/Building/N-Count
- Statewide RS/SS/Cut Score tables
- Proc Means to verify summary statistics
- Item Response listing to verify all constructed responses were scored and within the valid range
- Normative data check for all raw scores
- Reader Resolution report to verify all readings and resolution combinations

Upon complete review and approval by Quality Assurance, we posted the statewide student files to a secure FTP site for review by MSDE.

2. CURRENT PERFORMANCE RESULTS OF THE 2009 MSA-MATH

This section provides information about academic achievement results of Maryland students in grades 3 through 8. Table 2.1 contains information about the cutoff score of each performance level, and Table 2.2 contains information about the pass rate of each grade. It should be noted that the same cutoff scores have been applied since 2003 (for grades 3, 5, and 8) and 2004 (for grades 4, 6, and 7).

We also analyzed the performance rate of each grade based on key student subgroups such as gender, ethnicity, and LEA. Tables 2.3 through 2.10 contain information about the pass rate of each subgroup.

Table 2.1 MSA-Math Cut Scores: Grades 3 through 8

Grade	Cut Score of Performance Level	
	Proficient	Advanced
3	379	441
4	374	433
5	392	453
6	396	447
7	396	451
8	407	444

Note. Performance level cuts have been applied since 2003 (grades 3, 5, and 8) and 2004 (grades 4, 6, and 7).

Table 2.2 The 2009 MSA- Mathematics Pass Rates: Grades 3 through 8

Grade	N	Percentage of Performance Level			
		Basic	Proficient	Advanced	Proficient + Advanced
3	59,963	15.80	55.40	28.80	84.20
4	59,008	10.92	44.26	44.83	89.09
5	60,447	18.86	56.01	25.13	81.14
6	59,029	22.96	47.52	29.52	77.04
7	59,914	26.96	49.53	23.51	73.04
8	61,042	32.76	37.78	29.46	67.24

Note. Percentages may not add up to 100% due to rounding.

Note. Analysis was conducted with a statewide population.

Table 2.3 The 2009 MSA- Mathematics Pass Rates by Gender: Grades 3 through 8

Grade	Gender	N	Basic	Proficient	Advanced	Proficient + Advanced
3	Male	30,735	16.78	55.23	27.99	83.22
	Female	29,228	14.77	55.58	29.66	85.24
4	Male	30,316	11.78	43.38	44.84	88.22
	Female	28,688	10.00	45.19	44.82	90.01
5	Male	30,842	19.97	54.53	25.49	80.02
	Female	29,603	17.69	57.55	24.75	82.30
6	Male	30,165	24.49	45.72	29.79	75.51
	Female	28,859	21.36	49.40	29.24	78.64
7	Male	30,286	29.25	47.60	23.15	70.75
	Female	29,627	24.62	51.52	23.87	75.39
8	Male	31,073	34.56	36.56	28.88	65.44
	Female	29,967	30.88	39.05	30.06	69.11

Table 2.4 The 2009 MSA- Mathematics Pass Rates by Ethnicity: Grades 3 through 8

Grade	Ethnic	N	Basic	Proficient	Advanced	Proficient + Advanced
3	American Indian	248	14.92	54.84	30.24	85.08
	Asian/Pacific Islander	3,858	6.69	43.44	49.87	93.31
	African American	22,389	24.91	58.97	16.12	75.09
	White	27,486	8.32	52.63	39.06	91.69
	Hispanic	5,982	22.00	62.49	15.51	78.00
4	American Indian	228	9.21	51.75	39.04	90.79
	Asian/Pacific Islander	3,572	3.42	28.22	68.37	96.59
	African American	22,441	17.79	53.11	29.10	82.21
	White	27,177	5.22	37.16	57.62	94.78
	Hispanic	5,587	15.86	53.18	30.96	84.14
5	American Indian	225	18.67	57.33	24.00	81.33
	Asian/Pacific Islander	3,685	5.86	42.09	52.05	94.14
	African American	22,932	29.31	58.42	12.27	70.69
	White	28,070	10.59	55.09	34.32	89.41
	Hispanic	5,532	26.10	59.94	13.96	73.90
6	American Indian	221	22.62	50.23	27.15	77.38
	Asian/Pacific Islander	3,638	7.45	36.89	55.66	92.55
	African American	22,069	35.69	49.72	14.59	64.31
	White	27,609	13.16	46.34	40.50	86.84
	Hispanic	5,487	31.35	51.52	17.13	68.65
7	American Indian	186	27.42	56.45	16.13	72.58
	Asian/Pacific Islander	3,597	8.90	39.70	51.40	91.10
	African American	22,124	44.18	47.80	8.02	55.82
	White	28,563	13.74	52.05	34.21	86.26
	Hispanic	5,443	38.25	49.68	12.07	61.75
8	American Indian	233	35.62	39.91	24.46	64.37
	Asian/Pacific Islander	3,536	9.95	27.97	62.08	90.05
	African American	22,764	51.98	35.99	12.03	48.02
	White	29,304	18.70	39.84	41.46	81.30
	Hispanic	5,205	43.19	40.61	16.20	56.81

Table 2.5 The 2009 MSA- Mathematics Pass Rates by LEA: Grades 3

LEA	N	Basic	Proficient	Advanced	Proficient + Advanced
01	644	13.20	57.14	29.66	86.80
02	5,422	10.37	51.24	38.40	89.64
03	7,411	14.29	57.52	28.19	85.71
04	1,153	6.85	51.26	41.89	93.15
05	407	14.25	56.76	28.99	85.75
06	1,944	8.64	55.20	36.16	91.36
07	1,132	21.20	62.10	16.70	78.80
08	1,783	19.01	58.55	22.43	80.98
09	328	35.06	55.49	9.45	64.94
10	2,853	10.90	59.24	29.86	89.10
11	319	19.75	64.58	15.67	80.25
12	2,850	12.84	56.88	30.28	87.16
13	3,479	10.26	50.93	38.80	89.73
14	163	13.50	59.51	26.99	86.50
15	10,011	13.55	52.79	33.66	86.45
16	8,635	25.84	58.07	16.10	74.17
17	545	10.46	54.31	35.23	89.54
18	1,147	13.25	51.35	35.40	86.75
19	210	19.05	62.86	18.10	80.96
20	293	15.70	60.07	24.23	84.30
21	1,644	12.10	52.80	35.10	87.90
22	1,168	16.87	57.02	26.11	83.13
23	431	4.87	41.07	54.06	95.13
24	90	87.78	12.22	0.00	12.22
30	5,901	21.56	57.36	21.08	78.44

Table 2.6 The 2009 MSA- Mathematics Pass Rates by LEA: Grades 4

LEA	N	Basic	Proficient	Advanced	Proficient + Advanced
01	628	7.96	40.13	51.91	92.04
02	5,307	6.44	36.97	56.59	93.56
03	7,459	9.84	46.64	43.52	90.16
04	1,201	4.58	28.73	66.69	95.42
05	351	9.12	46.15	44.73	90.88
06	1,880	5.48	41.33	53.19	94.52
07	1,157	14.95	52.46	32.58	85.04
08	1,699	10.89	46.62	42.50	89.12
09	293	15.02	52.56	32.42	84.98
10	2,796	8.98	47.46	43.56	91.02
11	313	12.46	53.67	33.87	87.54
12	2,750	7.53	41.24	51.24	92.48
13	3,437	7.77	36.60	55.63	92.23
14	146	12.33	41.10	46.58	87.68
15	9,754	9.39	40.91	49.70	90.61
16	8,490	18.72	51.96	29.33	81.29
17	540	6.11	40.19	53.70	93.89
18	1,169	7.96	36.61	55.43	92.04
19	195	17.95	56.41	25.64	82.05
20	280	7.14	43.21	49.64	92.85
21	1,578	6.08	45.18	48.73	93.91
22	1,136	6.60	44.45	48.94	93.39
23	459	7.19	31.59	61.22	92.81
24	152	77.63	21.71	0.66	22.37
30	5,838	16.02	50.77	33.21	83.98

Table 2.7 The 2009 MSA- Mathematics Pass Rates by LEA: Grades 5

LEA	N	Basic	Proficient	Advanced	Proficient + Advanced
01	673	17.83	60.33	21.84	82.17
02	5,429	12.58	56.05	31.37	87.42
03	7,421	19.08	54.83	26.09	80.92
04	1,245	9.40	51.41	39.20	90.61
05	359	13.93	66.30	19.78	86.08
06	2,023	11.22	60.01	28.77	88.78
07	1,210	23.14	63.31	13.55	76.86
08	1,892	24.37	56.66	18.97	75.63
09	278	21.94	62.23	15.83	78.06
10	2,905	13.87	61.82	24.30	86.12
11	311	16.72	68.17	15.11	83.28
12	2,890	13.43	59.65	26.92	86.57
13	3,745	12.31	50.92	36.77	87.69
14	143	22.38	58.04	19.58	77.62
15	9,932	14.78	50.44	34.78	85.22
16	8,742	31.32	56.42	12.26	68.68
17	534	12.17	60.86	26.97	87.83
18	1,162	14.80	56.54	28.66	85.20
19	164	19.51	62.80	17.68	80.48
20	289	23.53	55.71	20.76	76.47
21	1,607	13.44	62.60	23.96	86.56
22	1,131	20.78	55.79	23.43	79.22
23	459	16.99	58.61	24.40	83.01
24	185	87.03	12.97	0.00	12.97
30	5,718	24.75	59.39	15.86	75.25

Table 2.8 The 2009 MSA- Mathematics Pass Rates by LEA: Grades 6

LEA	N	Basic	Proficient	Advanced	Proficient + Advanced
01	660	20.45	53.79	25.76	79.55
02	5,232	17.20	44.21	38.59	82.80
03	7,083	26.26	51.07	22.67	73.74
04	1,280	16.17	44.53	39.30	83.83
05	411	26.03	48.91	25.06	73.97
06	1,981	9.74	49.32	40.94	90.26
07	1,164	29.30	51.46	19.24	70.70
08	1,979	25.47	45.43	29.11	74.54
09	358	34.92	46.09	18.99	65.08
10	2,907	13.69	50.19	36.12	86.31
11	293	22.18	51.19	26.62	77.81
12	2,847	21.71	48.26	30.03	78.29
13	3,673	10.73	43.70	45.58	89.28
14	163	19.63	48.47	31.90	80.37
15	9,770	19.22	44.76	36.02	80.78
16	8,561	31.28	51.33	17.39	68.72
17	563	14.74	52.04	33.21	85.25
18	1,199	13.59	42.12	44.29	86.41
19	186	22.04	60.22	17.74	77.96
20	304	25.66	45.72	28.62	74.34
21	1,637	12.28	48.38	39.34	87.72
22	989	29.32	50.56	20.12	70.68
23	460	9.13	46.74	44.13	90.87
24	147	89.12	10.20	0.68	10.88
30	5,112	40.24	45.38	14.38	59.76
32	70	48.57	38.57	12.86	51.43

Table 2.9 The 2009 MSA- Mathematics Pass Rates by LEA: Grades 7

LEA	N	Basic	Proficient	Advanced	Proficient + Advanced
01	613	28.55	53.51	17.94	71.45
02	5,277	16.81	49.59	33.60	83.19
03	7,250	25.50	54.25	20.25	74.50
04	1,285	15.02	57.74	27.24	84.98
05	347	18.16	49.57	32.28	81.85
06	2,102	14.61	53.62	31.78	85.40
07	1,167	27.76	55.78	16.45	72.23
08	1,976	26.57	53.44	19.99	73.43
09	313	31.31	55.91	12.78	68.69
10	2,946	18.30	54.92	26.78	81.70
11	320	12.81	60.31	26.88	87.19
12	2,911	20.44	56.92	22.64	79.56
13	3,805	11.51	49.51	38.98	88.49
14	132	31.06	55.30	13.64	68.94
15	10,090	20.40	46.11	33.50	79.61
16	8,688	45.30	46.08	8.62	54.70
17	616	19.16	61.20	19.64	80.84
18	1,198	18.53	48.16	33.31	81.47
19	203	33.99	56.16	9.85	66.01
20	319	31.66	52.98	15.36	68.34
21	1,619	15.50	53.37	31.13	84.50
22	924	29.11	50.76	20.13	70.89
23	461	10.41	51.63	37.96	89.59
24	199	85.93	11.06	3.02	14.08
30	5,153	55.02	38.17	6.81	44.98

Table 2.10 The 2009 MSA- Mathematics Pass Rates by LEA: Grades 8

LEA	N	Basic	Proficient	Advanced	Proficient + Advanced
01	649	29.74	47.61	22.65	70.26
02	5,485	23.99	38.74	37.27	76.01
03	7,472	32.33	41.15	26.51	67.66
04	1,376	17.08	48.04	34.88	82.92
05	386	23.32	46.11	30.57	76.68
06	2,121	21.17	43.52	35.31	78.83
07	1,191	32.49	46.60	20.91	67.51
08	2,074	29.75	41.90	28.35	70.25
09	298	36.58	44.30	19.13	63.43
10	3,079	24.07	41.12	34.82	75.94
11	350	28.00	41.71	30.29	72.00
12	2,993	31.01	39.99	29.00	68.99
13	4,034	14.38	35.99	49.63	85.62
14	154	47.40	33.12	19.48	52.60
15	10,060	23.80	36.25	39.95	76.20
16	8,748	54.94	32.88	12.19	45.07
17	564	23.23	45.74	31.03	76.77
18	1,161	19.38	42.46	38.16	80.62
19	221	53.39	33.48	13.12	46.60
20	312	28.21	42.31	29.49	71.80
21	1,542	19.52	41.05	39.43	80.48
22	898	39.09	33.74	27.17	60.91
23	461	9.76	34.27	55.97	90.24
24	301	92.03	5.65	2.33	7.98
30	5,112	59.23	30.01	10.76	40.77

3. OVERVIEW OF STATISTICAL SUMMARIES

This section provides general information about statistical and psychometric summaries used for the 2009 MSA-Math program. Actual statistical results described in this section appear in section 4 and appendices.

3.1 Classical Descriptive Statistics

Table 4.1 contains the classical descriptive statistics of each form for each grade and includes:

- Form number
- Number of items
- Numbers of students (These numbers were based on a whole population.)
- Means and standard deviations of raw scores
- Stratified Cronbach Alpha
- Standard error of measurement (SEM)

Stratified Cronbach Alpha

The 2009 MSA-Math tests included *SR*, *SPR*, *BCR*, and *ECR* items. Consequently, it was necessary to use an adequate reliability coefficient that addressed the important factor, different item type. The following formula depicts the reliability coefficient, *Stratified Cronbach Alpha*:

$$\text{Stratified } a = 1 - \frac{((\sigma_{SR}^2(1 - \rho_{SR}) + (\sigma_{CR}^2(1 - \rho_{CR})))}{\sigma_t^2}$$

where

σ_{SR}^2 = variance of score on SR and SPR items

σ_{CR}^2 = variance of score on BCR and ECR items

σ_t^2 = variance of total score

ρ_{SR} = reliability coefficient of score on SR and SPR items, and

ρ_{CR} = reliability coefficient of score on BCR and ECR items.

Standard Error of Measurement (Based on Classical Test Theory)

The *standard error of measurement (SEM)* is commonly used in interpreting and reporting individual test scores and score differences on tests (Harvill, 1991).

Classical test theory is based on the following assumptions (Andrich & Luo, 2004):

- Each person v has a true score on the construct, usually denoted by the variable T_v
- The best overall indicator of the person's true score is the sum of the scores on the items and is usually denoted by the variable X_v
- This observed score will have an error for each person which is usually denoted by E_v
- These errors are not correlated with the true score
- Across a population of people, the errors sum to 0 and they are normally distributed.

From these assumptions, the following equations can be derived:

$$X_v = T_v + E_v.$$

Therefore,

$$\sigma_x^2 = \sigma_t^2 + \sigma_e^2$$

where

σ_x^2 = the variance of the observed score in a population of persons,

σ_t^2 = the variance of their true score variance, and

σ_e^2 = the error variance.

The reliability coefficient of the test can be calculated by the following formula:

$$\rho_x = \frac{\sigma_t^2}{\sigma_x^2} = \frac{\sigma_x^2 - \sigma_e^2}{\sigma_x^2}.$$

Thus, the *SEM* is calculated by the following formula:

$$\sigma_e = \sigma_x \sqrt{1 - \rho_x}.$$

For example, consider a student with a score of 90 from a sample of students with a mean score of 60 and variance of 225 on a test with reliability of 0.80. According to the formulas provided above, the obtained score is 90, and its *SEM* is 6.71. Thus, an approximate 68% score band for estimating this student's true score is from 83.29 (90 - 6.71) to 96.71 (90 + 6.71).

Note that this equation is only useful to estimate true score when the test reliability is reasonably high and the obtained score for the examinee is not an extreme deviate from the mean of the appropriate reference group. When we use this equation, consequently, we should be careful with statements so that they do not imply greater precision than is actually involved (Harvill, 1991).

Conditional Standard Error of Ability Estimate (Based on the Rasch Model)

Under the Rasch (i.e., 1-PL IRT) model, the *SE* for each person is as follows (Andrich & Luo, 2004):

$$\sigma_{\hat{\beta}} = \frac{1}{\sqrt{\sum_{i=1}^L p_{vi}(1-p_{vi})}}$$

where

v = subscript for a person,

i = subscript for an item,

L = length of the test,

$\hat{\beta}$ = ability estimate, and

p_{vi} = the probability that a person answers an item correctly and defined as follows:

$$p_{vi} = \frac{e^{\beta_v - \delta_i}}{1 + e^{\beta_v - \delta_i}} \text{ where } \beta_v \text{ is person's ability and } \delta_i \text{ is item's difficulty.}$$

A confidence band can be found for use in interpreting the ability estimate. For example, an approximate 68% confidence interval for $\hat{\beta}$ is given by

$$\hat{\beta} \pm SE$$

3.2 Scale Score Descriptive Statistics

Table 4.2 provides information about scale score descriptive statistics of each form for each grade and includes:

- Form number
- Numbers of students
- Mean and standard deviation of scale scores
- 10% quantile (P10), 25% quantile (Q1), median (P50), 75% quantile (Q3), 90% quantile, and IQR (Interquantile Range= Q3-Q1)
- Conditional *standard errors* (*SE*) at the cut scores (i.e., B/P and P/A)

In addition, Appendix B provides frequency distributions and histograms of the scale scores of the 2009 MSA-Math as well as the 2006 MSA-Math (i.e., base year assessment).

3.3 Classical and Rasch (1-Parameter Logistic IRT) Item Parameters

Appendix C provides both classical and Rasch item parameters and includes:

- Item type (*SR*, *SPR*, *BCR*, or *ECR*)

- *P*-value: in order for *p*-values of *BCR* and *ECR* items to be comparable with *p*-values of the *SR* and *SPR* items they were calculated as modified proportions of the maximum obtainable domain scores.
- Point-biserial correlation: a Pearson's *r* between the scored item and the total score
- Rasch item difficulty estimate (D_i)
- Conditional standard error of Rasch item difficulty estimate
- Rasch step difficulty estimate (or structure calibration estimate, F_{ij})
- Mean-square infit
- Mean-square outfit

First of all, it should be noted that all the Rasch item and step difficulty parameters were placed on a common scale (i.e., the 2006 assessment since the 2006 was recalibrated using the Rasch model).

Second, the following formula shows how structure measure estimate (D_{ij}) is calculated from both D_i and F_{ij} directly obtained from a run of Winsteps:

$$D_{ij} = D_i + F_{ij},$$

where D_{ij} = structure measure estimate

D_i = item difficulty estimate,

F_{ij} = structure calibration estimate (i.e., step difficulty estimate).

Finally, the following formulas show how conditional standard error (SE) of item difficulty estimate (D_i) and structure measure estimate (F_{ij}) were driven (Wright & Masters, 1982):

$$SE(D_i) = 1 / \sqrt{\sum_{n=1}^N [\sum_k^{m_i} k^2 p_{nik} - (\sum_k^{m_i} k p_{nik})^2]}$$

$$SE(F_{ij}) = 1 / \sqrt{\sum_{n=1}^N (\sum_{k=0}^j p_{nik} - (\sum_{k=j+1}^{m_i} p_{nik})^2)}$$

$$\text{where } P_{nix} = \exp \sum_{j=0}^x (\theta_n - D_{ij}) / \sum_{k=0}^{m_i} \left[\exp \sum_{j=0}^k (\theta_n - D_{ij}) \right]$$

$x = 0, 1, \dots, m_i$, and

$k = 1, 2, \dots, m_i$.

Fit Statistics for the Rasch Model

Fit statistics are used for evaluating the goodness-of-fit of a model to the data. Fit statistics are calculated by comparing the observed and expected trace lines obtained for an item after parameter estimates are obtained using a particular model. Winsteps provides two kinds of fit statistics called *mean-squares* that show the size of the randomness or amount of distortion of the measurement system.

Outfit mean-squares are influenced by outliers and are usually easy to diagnose and remedy. *Infit* mean-squares, on the other hand, are influenced by response patterns and are harder to diagnose and remedy. Table 3.1 provides a guideline for evaluating mean-square fit statistics (Linacre & Wright, 2000).

In general, mean-squares near 1.0 indicate little distortion of the measurement system, while values less than 1.0 indicate observations are too predictable (redundancy, model overfit). Values greater than 1.0 indicate unpredictability (unmodeled noise, model underfit).

Table 3.1 Criteria to Evaluate Mean-Square Fit Statistics

Mean-Square	Interpretation
> 2.0	Distorts or degrades the measurement system
1.5 – 2.0	Unproductive for construction of measurement, but not degraded
0.5 – 1.5	Productive for measurement
< 0.5	Unproductive for measurement, but not degrading. May produce misleadingly good reliabilities and separations

3.4 Inter-Rater Reliability

Tables 4.15 through 4.20 contain information about the scoring agreement between two ratings received for each item. When the two readers assigned the same score to a student's answer, the scores were in perfect agreement. Scores differed by one score point were adjacent, and scores differing by two or more score points were in discrepancy. For further information about inter-rater agreement, please see section 1.7, *Scoring Procedures of the 2009 MSA-Math*. While the perfect agreement rates of Step A were above 95%, those of Step B were above 73% for all items across all grades. It should also be noted that the agreement rates including both perfect and adjacent rates were above 97% for Step B for all items across all grades.

3.5 Correlations among Mathematics Standards

The 2009 MSA-Math consisted of five subscore reporting standards: *Algebra, Geometry and Measurement, Statistics and Probability, Numbers and Computations, and Process*. Tables 4.3 through 4.8 contain correlation coefficients among these math standards.

3.6 Decision Accuracy and Consistency at the Cut Scores

Tables 4.9 through 4.14 contain the results of analyses performed to estimate the accuracy and consistency of the decisions for passing (proficient) on the 2009 MSA-Math. The analyses make use of the methods outlined and implemented in Livingston and Lewis (1995), Haertel (1996), and Young and Yoon (1998).

The *accuracy* of a decision is the extent to which it would agree with the decisions that would be made if each student could somehow be tested with all possible parallel forms of the assessments. The *consistency* of a decision is the extent to which it would agree with the decisions that would be made if the students had taken a different form of the examination, equal in difficulty and covering the same content as the form they actually took.

Students can be misclassified in one of two ways. Students who were below the proficiency cut score, but were classified (on the basis of the assessment) as being above a cut score, are considered to be *false positives*. Students who were above the proficiency cut score, but were classified as being below a cut score, are considered to be *false negatives*.

For the 2009 MSA-Math, Tables 4.9 through 4.14 include:

- Performance level
- Accuracy classifications
- False positives
- False negatives
- Consistency classifications

The tables illustrate the general rule that decision consistency was less than decision accuracy.

3.7 Differential Item Functioning

This section provides information about *differential item functioning (DIF)* analyses used for the 2009 MSA-Math. While the *reference* group was either male or Caucasian students, the *focal* group was either female or African-American students. It should be noted that DIF analyses on the 2009 operational items indicated that all the items were satisfactory. All the DIF results were archived in the 2009 Maryland item bank.

Since the 2009 MSA-Math was a mixed-format examination, comprised of *SR*, *SPR*, *BCR*, and *ECR* items, the *DIF* procedure used consists of the Mantel Chi-square (Mantel, 1963) for the *BCR* and *ECR* items and the Mantel-Haenszel procedure (Mantel & Haenszel, 1959) for the *SR* and *SPR* items.

Brief Constructed Response (BCR) and Extended Constructed Response (ECR) Items

To help interpret the Mantel Chi-square (Mantel χ^2), the Educational Testing Service (ETS) *DIF* procedure uses the Mantel statistic in conjunction with the *standardized mean difference (SMD)*.

Mantel Statistic

The Mantel χ^2 is simply a conditional mean comparison of the ordered response categories for reference and focal groups combined over values of the matching variable score. By “ordered” we mean that a response of 1 on an item is higher than 0, a response of 2 is higher than 1, and so on. “Conditional,” on the other hand, refers to the comparison of members from the two groups who received the same score on the matching variable, i.e., the total test score in our analysis.

Table 3.2 shows a $2 \times T \times K$ contingency table, where T is the number of response categories and K is the number of levels of the matching variable. The values, y_1, y_2, \dots, y_T are the T scores that can be gained on the item. The values, n_{Ftk} and n_{Rtk} , represent the numbers of focal and reference groups who are at the k^{th} level of the matching variable and gain an item score of y_t . The “+” indicates total number over a particular index (Zwick, Donoghue, & Grima, 1993).

Table 3.2 $2 \times T$ Contingency Table at the k^{th} level

Group	Item Score				Total
	y_1	y_2	...	y_T	
Reference	n_{R1k}	n_{R2k}	...	n_{RTk}	n_{R+k}
Focal	n_{F1k}	n_{F2k}	...	n_{FTk}	n_{F+k}
Total	n_{+1k}	n_{+2k}	...	n_{+Tk}	n_{++k}

Note. This table was cited from Zwick, et al. (1993)

The Mantel statistic is defined as the following formula:

$$\text{Mantel } \chi^2 = \frac{(\sum_k F_k - \sum_k E(F_k))^2}{\sum_k \text{Var}(F_k)}$$

where

F_k = the sum of scores for the focal group at the k^{th} level of the matching variable and is defined as follows:

$$F_k = \sum_t y_t n_{Ftk}$$

The expectation of F_k under the null hypothesis is

$$E(F_k) = \frac{n_{F+k}}{n_{++k}} \sum_t y_t n_{+tk}.$$

And, the variance of F_k under the null hypothesis is as follows:

$$\text{Var}(F_k) = \frac{n_{R+k} n_{F+k}}{n_{++k}^2 (n_{++k} - 1)} \left[(n_{++k} \sum_t y_t^2 n_{+tk}) - (\sum_t y_t n_{+tk})^2 \right].$$

Under H_0 , the Mantel statistic has a chi-square distribution with one degree of freedom. In *DIF* applications, rejecting H_0 suggests that the students of the reference and focal groups who are similar in overall test performance tend to differ in their mean performance. In the case of dichotomous items, on the other hand, the statistic is identical to the Mantel-Haenszel (1959) statistic without the continuity correction (Zwick, Donoghue, & Grima, 1993).

Standardized Mean Difference (SMD)

A summary statistic to accompany the Mantel approach is the *standardized mean difference* (*SMD*) between the reference and focal groups proposed by Dorans and Schmitt (1991). This statistic compares the means of the reference and focal groups, adjusting for differences in the distribution of the reference and focal group members across the values of the matching variable.

$$SMD = \sum_k p_{Fk} m_{Fk} - \sum_k p_{Fk} m_{Rk}$$

where

$p_{Fk} = \frac{n_{F+k}}{n_{F++}}$, the proportion of the focal group members who are at the k^{th} level of the matching variable,

$m_{Rk} = \frac{1}{n_{F+k}} \times (\sum_t y_t n_{Ftk})$, the mean item score of the focal group members at the k^{th} level,

and

m_{Rk} = the analogous value for the reference group.

As can be seen from the equation above, the *SMD* is the difference between the unweighted item mean of the focal group and the weighted item mean of the reference group. The weights for the reference group are applied to make the weighted number of the reference group students the same as in the focal group within the same ability. A negative *SMD* value implies that the focal group has a lower mean item score than the reference group, conditional on the matching variable.

DIF classification for BCR and ECR items

The *SMD* is divided by the total group item standard deviation to obtain an effect-size value for the *SMD*. This effect-size *SMD* is then examined in conjunction with the Mantel χ^2 to obtain *DIF* classifications that are depicted in Table 3.3 below.

Table 3.3 DIF Classification for BCR and ECR Items

Category	Description	Criterion
AA	No <i>DIF</i>	Non-significant Mantel χ^2 or Significant Mantel χ^2 and $ SMD/SD \leq .17$
BB	Weak <i>DIF</i>	Significant Mantel χ^2 and $.17 < SMD/SD \leq .25$
CC	Strong <i>DIF</i>	Significant Mantel χ^2 and $.25 < SMD/SD $

Note. SD is the total group standard deviation of the item score in its original metric.

Selected Response (SR) and Student-Produced Response (SPR) Items

For the *SR* and *SPR* items, the Mantel-Haenszel Chi-square (M-H χ^2) is used in conjunction with the M-H odds ratio transferred to what ETS calls the *delta scale* (D).

The Odds Ratio

The odds of a correct response are P/Q or $P/(1-P)$. The odds ratio, on the other hand, is simply the odds of a correct response of the reference group divided by the odds of a correct response of the focal group.

For a given item, the odds ratio is defined as follows:

$$\alpha_{M-H} = \frac{P_r / Q_r}{P_f / Q_f}$$

The corresponding null hypothesis is that the odds of getting the item correct are equal for the two groups. Thus, the odds ratio is equal to 1:

$$H_0: \alpha_{M-H} = \frac{P_r / Q_r}{P_f / Q_f} = 1.$$

The Delta Scale

In order to make the odds ratio symmetrical around zero with its range being in the interval $-\infty$ to $+\infty$, the odds ratio is transformed into a log odds ratio as per the following:

$$\beta_{M-H} = \ln(\alpha_{M-H}).$$

The simple natural logarithm transformation of this odds ratio is symmetrical about zero in which zero has the interpretation of equal odds. This *DIF* measure is a signed index where a positive value signifies *DIF* in favor of the reference group while a negative value indicates *DIF* in favor of the focal group. β_{M-H} also has the advantage of being transformed linearly to other interval scale metrics (Camilli & Shepard, 1994). This fact is utilized by ETS in creating their delta scale (D), which is defined as follows:

$$D = -2.35 \cdot \beta_{M-H}.$$

DIF classification for *SR* and *SPR* items

The following table depicts *DIF* classifications for *SR* items to examine the M-H χ^2 in conjunction with the delta scale (D):

Table 3.4 *DIF* Classification for *SR* and *SPR* Items

Category	Description	Criterion
A	No <i>DIF</i>	Non-significant M-H χ^2 or $ D < 1.0$
C	Strong <i>DIF</i>	Significant M-H χ^2 and $ D \geq 1.5$
B	Weak <i>DIF</i>	Otherwise classified as B

3.8 Equating and Scaling

Tables 4.21 through 4.44 contain the 2009 MSA-Math total and subtotal raw score to scale score (RS/SS) conversion tables. Conditional standard errors for the total and subtotal scale scores are also included.

The Rasch and Partial Credit Models

The most basic expression of the Rasch model is in the *item characteristic curve* (ICC). It shows the probability of a correct response to an item as a function of the ability level. The probability of a correct response is bounded by 1 (certainty of a correct response) and 0 (certainty of an incorrect response).

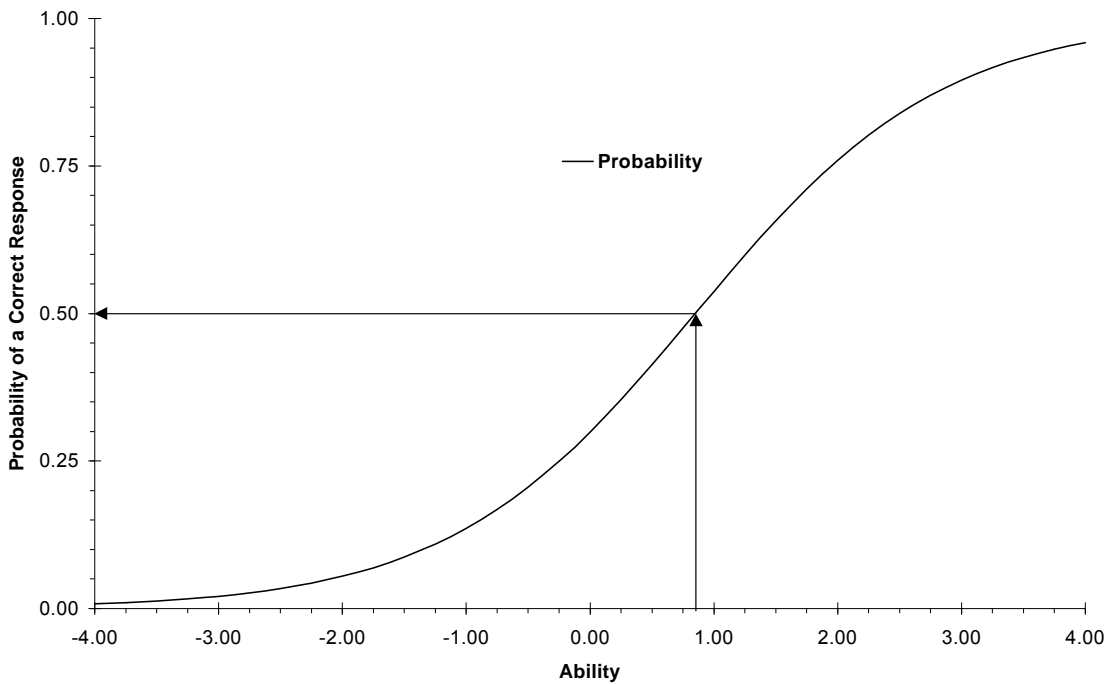


Figure 3.1 Item Characteristic Curve

As an example, consider Figure 3.1 which depicts an item that falls at approximately 0.85 on the ability (horizontal) scale. When a person answers an item at the same level as their ability, then that person has a probability of roughly 50% of answering the item correctly. Another way of expressing this is that if we have a group of 100 people, all of whom have an ability of 0.85, we would expect about 50% of them to answer the item correctly. A person whose ability was above 0.85 would have a higher probability of getting the item right, while a person whose ability is below 0.85 would have a lower probability of getting the item right. This makes intuitive sense and is the basic formulation of Rasch measurement for test items having only 2 possible categories (i.e., wrong or right).

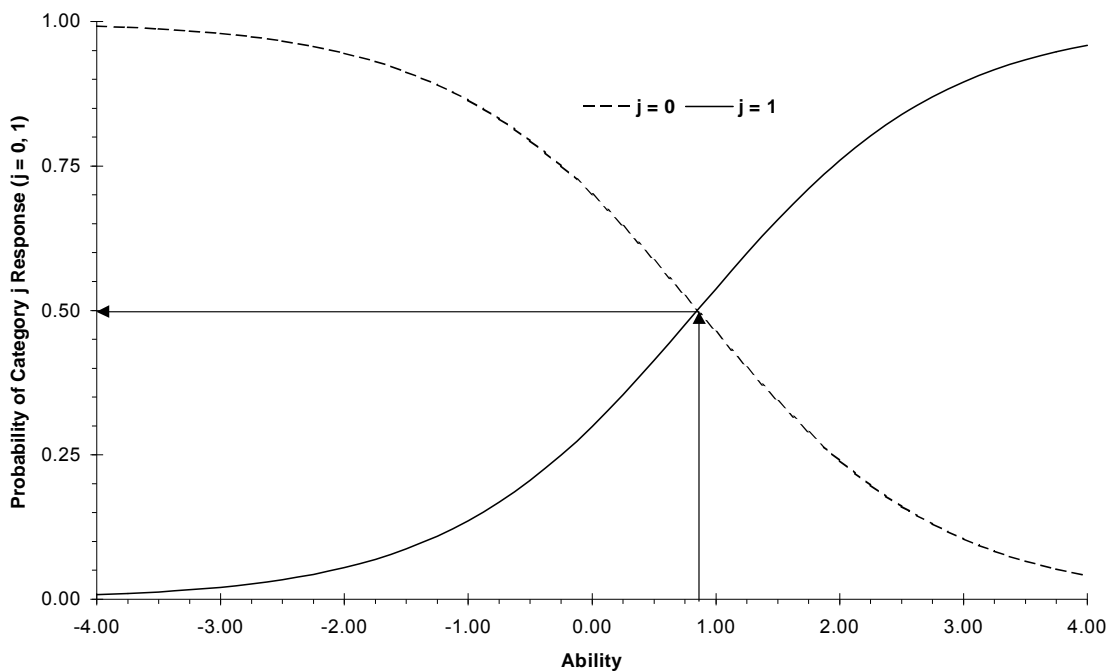


Figure 3.2 Category Response Curves for a One-Step Item

Figure 3.2 extends this formulation to show the probabilities of obtaining a wrong answer or a right answer. The curve on the left ($j = 0$) shows the probability of getting a score of “0” while the curve on the right ($j = 1$) shows the probability of getting a score of “1”. The point at which the two curves cross indicates the transition point on the ability scale where the most likely response changes from a “0” to a “1”. Here, the probability of answering the item correctly is 50%.

The key step in the formulation, and the point at which the Rasch dichotomous model merges with the PCM, requires us to assume an additional response category. Suppose that, rather than scoring items as completely wrong or completely right, we add a category representing answers that, though not totally correct, are still clearly not totally incorrect. These relationships are shown in Figure 3.3.

The left-most curve ($j = 0$) in Figure 3.3 represents the probability for all examinees getting a score of “0” (completely incorrect) on the item, given their ability. Those of very low ability (i.e., below -2) are very likely to be in this category and, in fact, are more likely to be in this category than the other two. Those receiving a “1” (partial credit) tend to fall in the middle range of abilities (the middle curve, $j = 1$). The final, right-most curve ($j = 2$) represents the probability for those receiving scores of “2” (completely correct). Very high-ability people are clearly more likely to be in this category than in any other, but there are still some of average and low ability that can get full credit for the item.

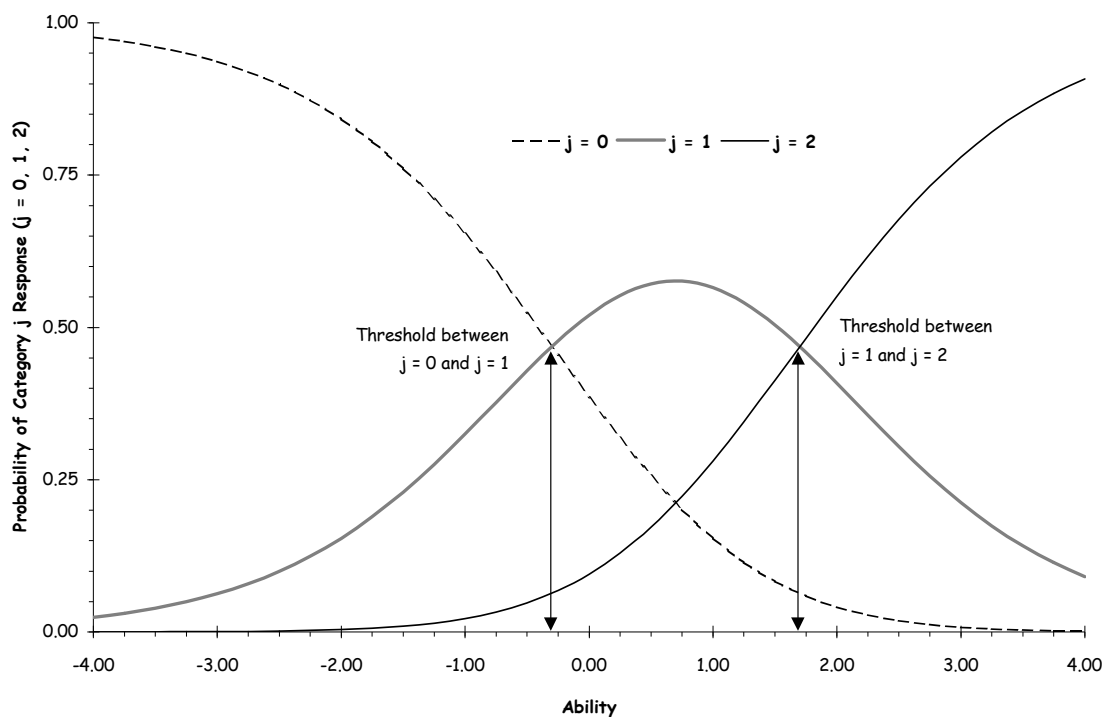


Figure 3.3 Category Response Curves for a Two-Step Item

Although the actual computations are quite complex, the points at which lines cross each other have a similar interpretation as for the dichotomous case. Consider the point at which the $j = 0$ line crosses the $j = 1$ line, indicated by the left arrow. For abilities to the left of (or less than) this point, the probability is greatest for a “0” response. To the right of (or above) this point, and up to the point at which the $j = 1$ and $j = 2$ lines cross (marked by the right arrow), the most likely response is a “1”. For abilities to the right of this point, the most likely response is a “2”.

Note that the probability of scoring a “1” response ($j = 1$) declines in both directions as ability decreases to the low extreme or increases to the high extreme. These points then may be thought of as the difficulties of crossing the *thresholds* between categories.

An important implication of the formulation can be summarized as follows: If the commonly used Rasch model applied to dichotomously (right/wrong) scored items can be thought of as simply a

special case of the PCM, then the act of scaling multiple-choice items together with polytomous items, whether they have three or more response categories, is a straightforward process of applying the measurement model. The quality of the scaling can then be assessed in terms of known procedures.

One important property of the PCM is its ability to separate the estimation of item/task parameters from the person parameters. With the PCM, as with the Rasch model, the total score given by the sum of the categories in which a person responds is a sufficient statistic for estimating person ability (i.e., no additional information need be estimated). The total number of responses across examinees in a particular category is a sufficient statistic for estimating the step difficulty for that category. Thus with PCM, the same total score will yield the same ability estimate for different examinees.

The PCM is a direct extension of the dichotomous one-parameter logistic *IRT* model developed by Rasch (Rasch, 1980). For an item/task involving m_i score categories, one general expression for the probability of scoring x on item/task i is given by

$$P_{mix} = \exp \sum_{j=0}^x (\theta_n - D_{ij}) / \sum_{k=0}^{m_i} \left[\exp \sum_{j=0}^k (\theta_n - D_{ij}) \right] \quad x = 0, 1, \dots, m_i,$$

where $\sum_{j=0}^0 (\theta - D_{ij}) = 0$ and

$$\exp \sum_{j=0}^0 (\theta - D_{ij}) = 1.$$

The above equation gives the probability of scoring x on the i -th test item as a function of ability (θ) and the difficulty of the m_i steps of the task (Masters, 1982).

According to this model, the probability of an examinee scoring in a particular category (step) is the sum of the logit (log-odds) differences between θ and D_{ij} of all the completed steps, divided by the sum of the differences of all the steps of a task. Thissen and Steinberg (1986) refers to this model as a divide-by-total model. The parameters estimated by this model are (1) an ability estimate for each person (or ability estimate at each raw score level) and (2) m_i threshold (difficulty) estimates for each task with $m_i + 1$ score categories.

4. THE 2009 MSA-MATH STATISTICAL SUMMARY

This chapter summarizes statistical results of the 2009 MSA-Math. It includes descriptive statistics of the 2009 math test based on raw scores and scale scores, accuracy and consistency of the 2009 math test, rater agreement rates, correlation coefficients among reporting standards, and total and substrand RS/SS conversion tables.

Table 4.1 The 2009 MSA-Math Classical Descriptive Statistics: Grades 3 through 8

Grade	Form	No. of Items	<i>N</i>	<i>M</i>	<i>SD</i>	Reliability	<i>SEM</i>
3	A	65	30,174	54.88	11.28	0.93	2.98
	F	65	29,789	53.97	11.18	0.93	2.96
4	A	64	29,532	49.36	12.56	0.94	3.08
	F	64	29,476	48.46	12.48	0.94	3.06
5	A	65	30,344	49.71	14.27	0.94	3.50
	F	65	30,103	49.78	13.52	0.94	3.31
6	A	62	29,789	45.03	13.96	0.94	3.42
	F	62	29,240	44.79	14.15	0.94	3.47
7	A	62	30,318	40.12	15.94	0.95	3.56
	F	62	29,596	39.79	15.54	0.95	3.47
8	A	61	30,760	36.09	16.17	0.95	3.62
	F	60	30,282	35.98	14.94	0.94	3.66

Note. Analysis was conducted with a statewide population.

Note. 62 items were originally developed for each operational form in grade 8. However, due to item development issues that affected two BCR items (i.e., scatter plot) on operational Form F caused MSDE and NPC to Do Not Score (DNS) the items. One probability SR item on operational Form A was deemed DNS.

Table 4.2 The 2009 MSA-Math Scale Score Descriptive Statistics: Grades 3 through 8

Grade	Form	N	M	SD	P10	Q1	Mdn	Q3	P90	IQR	SE at Cut-Points	
											Prof.	Adv.
3	A	30,174	419.1	43.4	367	391	418	446	474	55	9	14
	F	29,789	419.6	41.8	366	393	418	445	472	52	9	13
	Overall	59,963	419.4	42.6	366	391	418	446	472	55	N/A	N/A
4	A	29,532	425.9	43.7	370	394	426	454	485	60	9	11
	F	29,476	426.5	43.0	371	396	427	454	483	58	9	11
	Overall	59,008	426.2	43.3	371	396	426	454	483	58	N/A	N/A
5	A	30,344	425.5	39.1	376	399	425	450	476	51	8	10
	F	30,103	427.9	38.7	380	400	426	455	480	55	8	10
	Overall	60,447	426.7	38.9	377	400	425	454	476	54	N/A	N/A
6	A	29,789	426.2	38.6	377	397	423	453	479	56	8	9
	F	29,240	425.3	37.4	379	398	423	452	476	54	8	10
	Overall	59,029	425.7	38.0	379	398	423	452	476	54	N/A	N/A
7	A	30,318	420.5	38.5	371	391	420	449	471	58	8	9
	F	29,596	421.9	38.8	372	393	419	450	473	57	8	9
	Overall	59,914	421.2	38.7	371	393	420	449	473	56	N/A	N/A
8	A	30,760	424.5	36.5	379	398	422	449	473	51	8	8
	F	30,282	425.2	35.6	381	400	424	449	474	49	8	8
	Overall	61,042	424.8	36.0	381	398	422	449	474	51	N/A	N/A

Note. Analysis was conducted with a statewide population.

Table 4.3 The 2009 MSA-Math Standard Correlations: Grade 3

Form	N	Mean	SD	1	2	3	4	5
Form A								
1. Algebra	30,174	11.03	2.10	1.00				
2. Geometry and Measurement	30,174	11.65	2.56	0.65	1.00			
3. Statistics and Probability	30,174	11.56	2.46	0.72	0.69	1.00		
4. Numbers and Computation	30,174	12.54	3.04	0.73	0.72	0.76	1.00	
5. Process	30,174	8.10	2.82	0.62	0.66	0.65	0.70	1.00
Form F								
1. Algebra	29,789	10.98	1.97	1.00				
2. Geometry and Measurement	29,789	11.72	2.62	0.66	1.00			
3. Statistics and Probability	29,789	11.08	2.56	0.70	0.70	1.00		
4. Numbers and Computation	29,789	12.21	3.29	0.71	0.72	0.76	1.00	
5. Process	29,789	7.97	2.49	0.57	0.65	0.64	0.66	1.00

Note. Analysis was conducted with a statewide population.

Table 4.4 The 2009 MSA-Math Standard Correlations: Grade 4

Form	N	Mean	SD	1	2	3	4	5
Form A								
1. Algebra	29,532	10.88	2.65	1.00				
2. Geometry and Measurement	29,532	9.73	2.80	0.67	1.00			
3. Statistics and Probability	29,532	11.17	3.39	0.73	0.71	1.00		
4. Numbers and Computation	29,532	10.77	2.73	0.72	0.69	0.74	1.00	
5. Process	29,532	6.82	2.73	0.70	0.71	0.73	0.69	1.00
Form F								
1. Algebra	29,476	11.43	2.52	1.00				
2. Geometry and Measurement	29,476	9.26	2.76	0.67	1.00			
3. Statistics and Probability	29,476	11.04	3.38	0.72	0.71	1.00		
4. Numbers and Computation	29,476	10.22	2.96	0.72	0.70	0.73	1.00	
5. Process	29,476	6.51	2.66	0.70	0.69	0.71	0.68	1.00

Note. Analysis was conducted with a statewide population.

Table 4.5 The 2009 MSA-Math Standard Correlations: Grade 5

Form	N	Mean	SD	1	2	3	4	5
Form A								
1. Algebra	30,344	11.38	2.97	1.00				
2. Geometry and Measurement	30,344	9.27	3.04	0.73	1.00			
3. Statistics and Probability	30,344	9.38	2.57	0.71	0.70	1.00		
4. Numbers and Computation	30,344	10.15	3.36	0.74	0.74	0.69	1.00	
5. Process	30,344	9.52	4.08	0.79	0.75	0.72	0.79	1.00
Form F								
1. Algebra	30,103	11.42	2.62	1.00				
2. Geometry and Measurement	30,103	9.24	2.88	0.69	1.00			
3. Statistics and Probability	30,103	10.39	2.52	0.71	0.67	1.00		
4. Numbers and Computation	30,103	9.76	3.39	0.73	0.73	0.69	1.00	
5. Process	30,103	8.98	3.90	0.72	0.75	0.69	0.78	1.00

Note. Analysis was conducted with a statewide population.

Table 4.6 The 2009 MSA-Math Standard Correlations: Grade 6

Form	N	Mean	SD	1	2	3	4	5
Form A								
1. Algebra	29,789	10.41	2.84	1.00				
2. Geometry and Measurement	29,789	8.66	3.36	0.73	1.00			
3. Statistics and Probability	29,789	8.69	2.6	0.71	0.70	1.00		
4. Numbers and Computation	29,789	8.86	3.49	0.77	0.76	0.73	1.00	
5. Process	29,789	8.40	3.35	0.76	0.76	0.72	0.79	1.00
Form F								
1. Algebra	29,240	9.3	3.25	1.00				
2. Geometry and Measurement	29,240	8.99	3.38	0.75	1.00			
3. Statistics and Probability	29,240	10.09	2.39	0.68	0.67	1.00		
4. Numbers and Computation	29,240	8.70	3.34	0.76	0.73	0.64	1.00	
5. Process	29,240	7.71	3.59	0.78	0.78	0.68	0.77	1.00

Note. Analysis was conducted with a statewide population.

Table 4.7 The 2009 MSA-Math Standard Correlations: Grade 7

Form	N	Mean	SD	1	2	3	4	5
Form A								
1. Algebra	30,318	7.95	3.53	1.00				
2. Geometry and Measurement	30,318	6.28	3.49	0.76	1.00			
3. Statistics and Probability	30,318	8.91	3.55	0.76	0.73	1.00		
4. Numbers and Computation	30,318	8.17	3.39	0.80	0.76	0.74	1.00	
5. Process	30,318	8.81	3.76	0.78	0.77	0.80	0.73	1.00
Form F								
1. Algebra	29,596	7.66	3.52	1.00				
2. Geometry and Measurement	29,596	6.75	3.47	0.77	1.00			
3. Statistics and Probability	29,596	8.71	3.53	0.77	0.74	1.00		
4. Numbers and Computation	29,596	8.27	3.46	0.81	0.77	0.75	1.00	
5. Process	29,596	8.4	3.27	0.76	0.75	0.79	0.72	1.00

Note. Analysis was conducted with a statewide population.

Table 4.8 The 2009 MSA-Math Standard Correlations: Grade 8

Form	N	Mean	SD	1	2	3	4	5
Form A								
1. Algebra	30,760	8.02	3.71	1.00				
2. Geometry and Measurement	30,760	6.32	3.21	0.75	1.00			
3. Statistics and Probability	30,760	7.19	3.32	0.77	0.73	1.00		
4. Numbers and Computation	30,760	5.99	2.99	0.78	0.75	0.76	1.00	
5. Process	30,760	8.57	4.66	0.81	0.79	0.78	0.74	1.00
Form F								
1. Algebra	30,282	7.31	3.86	1.00				
2. Geometry and Measurement	30,282	6.26	3.06	0.74	1.00			
3. Statistics and Probability	30,282	7.34	3.04	0.72	0.69	1.00		
4. Numbers and Computation	30,282	6.83	2.98	0.77	0.73	0.72	1.00	
5. Process	30,282	8.23	3.82	0.79	0.76	0.75	0.73	1.00

Note. Analysis was conducted with a statewide population.

Table 4.9 The 2009 MSA-Math Decision Accuracy and Consistency Indices: Grade 3

Form	Performance Cut	Accuracy	False Positive	False Negative	Consistency
A	<i>B : PA</i>	0.94	0.02	0.03	0.92
	<i>BP : A</i>	0.93	0.04	0.03	0.90
F	<i>B : PA</i>	0.94	0.02	0.03	0.92
	<i>BP : A</i>	0.93	0.04	0.03	0.90

Note. B: PA denotes the cut between Basic and Proficient, while BP:A denotes the cut between Proficient and Advanced.

Table 4.10 The 2009 MSA- Mathematics Decision Accuracy and Consistency Indices: Grade 4

Form	Performance Cut	Accuracy	False Positive	False Negative	Consistency
A	<i>B : PA</i>	0.96	0.02	0.02	0.94
	<i>BP : A</i>	0.92	0.04	0.03	0.89
F	<i>B : PA</i>	0.96	0.02	0.02	0.94
	<i>BP : A</i>	0.92	0.04	0.04	0.89

Note. B: PA denotes the cut between Basic and Proficient, while BP:A denotes the cut between Proficient and Advanced.

Table 4.11 The 2009 MSA- Mathematics Decision Accuracy and Consistency Indices: Grade 5

Form	Performance Cut	Accuracy	False Positive	False Negative	Consistency
A	<i>B : PA</i>	0.94	0.03	0.03	0.92
	<i>BP : A</i>	0.94	0.03	0.02	0.92
F	<i>B : PA</i>	0.94	0.03	0.03	0.91
	<i>BP : A</i>	0.94	0.03	0.03	0.92

Note. B: PA denotes the cut between Basic and Proficient, while BP:A denotes the cut between Proficient and Advanced.

Table 4.12 The 2009 MSA- Mathematics Decision Accuracy and Consistency Indices: Grade 6

Form	Performance Cut	Accuracy	False Positive	False Negative	Consistency
A	<i>B : PA</i>	0.93	0.03	0.04	0.91
	<i>BP : A</i>	0.94	0.03	0.03	0.92
F	<i>B : PA</i>	0.93	0.03	0.04	0.91
	<i>BP : A</i>	0.94	0.03	0.03	0.92

Note. B: PA denotes the cut between Basic and Proficient, while BP:A denotes the cut between Proficient and Advanced.

Table 4.13 The 2009 MSA- Mathematics Decision Accuracy and Consistency Indices: Grade 7

Form	Performance Cut	Accuracy	False Positive	False Negative	Consistency
A	<i>B : PA</i>	0.94	0.03	0.03	0.92
	<i>BP : A</i>	0.95	0.03	0.02	0.93
F	<i>B : PA</i>	0.94	0.03	0.03	0.92
	<i>BP : A</i>	0.95	0.03	0.02	0.93

Note. B: PA denotes the cut between Basic and Proficient, while BP:A denotes the cut between Proficient and Advanced.

Table 4.14 The 2009 MSA- Mathematics Decision Accuracy and Consistency Indices: Grade 8

Form	Performance Cut	Accuracy	False Positive	False Negative	Consistency
A	<i>B : PA</i>	0.93	0.03	0.04	0.91
	<i>BP : A</i>	0.94	0.03	0.03	0.92
F	<i>B : PA</i>	0.93	0.04	0.03	0.90
	<i>BP : A</i>	0.94	0.03	0.03	0.92

Note. B: PA denotes the cut between Basic and Proficient, while BP:A denotes the cut between Proficient and Advanced.

Table 4.15 The 2009 MSA-Math Score Difference between Rater 1 and Rater 2: Grade 3

Form	Score Range	Item CID	Perfect		Adjacent		Discrepancy		Total	
			N	%	N	%	N	%	N	%
A	0-1	100000011184	29,835	98.88	339	1.12			30,174	100.00
	0-2	3595527	25,482	84.45	4,670	15.48	22	0.07	30,174	100.00
	0-1	3509941	29,844	98.91	330	1.09			30,174	100.00
	0-2	3595501	25,830	85.60	4,301	14.25	43	0.14	30,174	100.00
	0-1	100000025196	30,095	99.74	79	0.26			30,174	100.00
	0-2	3595519	23,994	79.52	6,119	20.28	61	0.20	30,174	100.00
	0-1	3488139	29,936	99.21	238	0.79			30,174	100.00
	0-2	3564095	23,282	77.16	6,834	22.65	58	0.19	30,174	100.00
	0-1	3510072	30,064	99.64	110	0.36			30,174	100.00
	0-2	3564080	23,822	78.95	6,162	20.42	190	0.63	30,174	100.00
	0-1	3509949	29,026	96.20	1,148	3.80			30,174	100.00
	0-2	3985609	26,349	87.32	3,732	12.37	93	0.31	30,174	100.00
	0-1	3547998	29,936	99.21	238	0.79			30,174	100.00
	0-2	3564094	27,227	90.23	2,911	9.65	36	0.12	30,174	100.00
F	0-1	100000011186	29,542	99.17	247	0.83			29,789	100.00
	0-2	3595529	26,199	87.95	3,572	11.99	18	0.06	29,789	100.00
	0-1	3509941	29,395	98.68	394	1.32			29,789	100.00
	0-2	3595501	25,587	85.89	4,167	13.99	35	0.12	29,789	100.00
	0-1	100000025196	29,692	99.67	97	0.33			29,789	100.00
	0-2	3595519	23,840	80.03	5,898	19.8	51	0.17	29,789	100.00
	0-1	3510067	29,614	99.41	175	0.59			29,789	100.00
	0-2	3564083	24,560	82.45	5,052	16.96	177	0.59	29,789	100.00
	0-1	3488087	29,437	98.82	352	1.18			29,789	100.00
	0-2	3564099	23,475	78.80	6,292	21.12	22	0.07	29,789	100.00
	0-1	3509978	29,204	98.04	585	1.96			29,789	100.00
	0-2	3985610	26,096	87.60	3,684	12.37	9	0.03	29,789	100.00
	0-1	3509932	29,634	99.48	155	0.52			29,789	100.00
	0-2	3564086	25,976	87.20	3,790	12.72	23	0.08	29,789	100.00

Note. Analysis was conducted with a statewide population.

Table 4.16 The 2009 MSA-Mathematics Score Difference between Rater 1 and Rater 2: Grade 4

Form	Score Range	Item CID	Perfect		Adjacent		Discrepancy		Total	
			N	%	N	%	N	%	N	%
A	0-1	3487819	28,967	98.09	565	1.91			29,532	100.00
	0-2	3564186	24,403	82.63	5,102	17.28	27	0.09	29,532	100.00
	0-1	100000044142	29,302	99.22	230	0.78			29,532	100.00
	0-2	3595499	27,041	91.57	2,457	8.32	34	0.12	29,532	100.00
	0-1	100000025172	29,365	99.43	167	0.57			29,532	100.00
	0-2	3985613	23,153	78.40	6,324	21.41	55	0.19	29,532	100.00
	0-1	3515823	29,184	98.82	348	1.18			29,532	100.00
	0-2	3595532	25,158	85.19	4,363	14.77	11	0.04	29,532	100.00
	0-1	3488150	29,342	99.36	190	0.64			29,532	100.00
	0-2	3564176	25,256	85.52	4,239	14.35	37	0.13	29,532	100.00
	0-1	3488145	29,110	98.57	422	1.43			29,532	100.00
	0-2	3564189	24,210	81.98	5,313	17.99	9	0.03	29,532	100.00
	0-1	3515783	28,933	97.97	599	2.03			29,532	100.00
	0-2	3595560	23,643	80.06	5,621	19.03	268	0.91	29,532	100.00
F	0-1	3487819	28,912	98.09	564	1.91			29,476	100.00
	0-2	3564186	24,512	83.16	4,937	16.75	27	0.09	29,476	100.00
	0-1	100000044142	29,228	99.16	248	0.84			29,476	100.00
	0-2	3595499	26,965	91.48	2,488	8.44	23	0.08	29,476	100.00
	0-1	3515642	29,150	98.89	326	1.11			29,476	100.00
	0-2	3985619	23,600	80.07	5,733	19.45	143	0.49	29,476	100.00
	0-1	100000201938	29,211	99.10	265	0.9			29,476	100.00
	0-2	3985620	26,003	88.22	3,467	11.76	6	0.02	29,476	100.00
	0-1	3515807	29,016	98.44	460	1.56			29,476	100.00
	0-2	3564165	23,881	81.02	5,564	18.88	31	0.11	29,476	100.00
	0-1	3488145	29,003	98.40	473	1.60			29,476	100.00
	0-2	3564189	24,313	82.48	5,151	17.48	12	0.04	29,476	100.00
	0-1	100000201940	29,149	98.89	327	1.11			29,476	100.00
	0-2	3985623	25,499	86.51	3,819	12.96	158	0.54	29,476	100.00

Note. Analysis was conducted with a statewide population.

Table 4.17 The 2009 MSA-Mathematics Score Difference between Rater 1 and Rater 2: Grade 5

Form	Score Range	Item CID	Perfect		Adjacent		Discrepancy		Total	
			N	%	N	%	N	%	N	%
A	0-1	3488471	30,033	98.98	311	1.02			30,344	100.00
	0-2	3564052	23,563	77.65	6,697	22.07	84	0.28	30,344	100.00
	0-1	3488461	30,060	99.06	284	0.94			30,344	100.00
	0-2	3564055	24,085	79.37	5,980	19.71	279	0.92	30,344	100.00
	0-1	3488522	30,166	99.41	178	0.59			30,344	100.00
	0-2	3564059	24,878	81.99	5,426	17.88	40	0.13	30,344	100.00
	0-1	3548429	30,003	98.88	341	1.12			30,344	100.00
	0-3	3564047	22,550	74.31	7,561	24.92	233	0.77	30,344	100.00
	0-1	3488347	29,939	98.67	405	1.33			30,344	100.00
	0-2	3564046	28,203	92.94	2,021	6.66	120	0.4	30,344	100.00
	0-1	3488277	29,392	96.86	952	3.14			30,344	100.00
	0-2	3564193	25,769	84.92	4,497	14.82	78	0.26	30,344	100.00
	0-1	3488406	28,992	95.54	1,352	4.46			30,344	100.00
	0-2	3563998	27,384	90.25	2,857	9.42	103	0.34	30,344	100.00
	0-1	3488348	30,038	98.99	306	1.01			30,344	100.00
	0-2	3464056	23,061	76.00	7,202	23.73	81	0.27	30,344	100.00
F	0-1	3511531	29,693	98.64	410	1.36			30,103	100.00
	0-2	3563986	25,496	84.7	4,588	15.24	19	0.06	30,103	100.00
	0-1	3488461	29,832	99.10	271	0.90			30,103	100.00
	0-2	3564055	23,824	79.14	6,032	20.04	247	0.82	30,103	100.00
	0-1	3512615	29,700	98.66	403	1.34			30,103	100.00
	0-2	3595439	24,115	80.11	5,959	19.8	29	0.10	30,103	100.00
	0-1	3488525	29,881	99.26	222	0.74			30,103	100.00
	0-3	3564053	24,793	82.36	5,089	16.91	221	0.73	30,103	100.00
	0-1	3488347	29,748	98.82	355	1.18			30,103	100.00
	0-2	3564046	27,877	92.61	2,093	6.95	133	0.44	30,103	100.00
	0-1	3548459	29,808	99.02	295	0.98			30,103	100.00
	0-2	3564051	27,377	90.94	2,678	8.90	48	0.16	30,103	100.00
	0-1	3512649	29,931	99.43	172	0.57			30,103	100.00
	0-2	3563989	26,169	86.93	3,606	11.98	328	1.09	30,103	100.00
	0-1	3488259	29,829	99.09	274	0.91			30,103	100.00
	0-2	3564048	26,263	87.24	3,413	11.34	427	1.42	30,103	100.00

Note. Analysis was conducted with a statewide population.

Note. Bold-faced item indicates an ECR item.

Table 4.18 The 2009 MSA-Mathematics Score Difference between Rater 1 and Rater 2: Grade 6

Form	Score Range	Item CID	Perfect		Adjacent		Discrepancy		Total	
			N	%	N	%	N	%	N	%
A	0-1	3517004	29,552	99.20	237	0.80			29,789	100.00
	0-3	3564010	19,709	66.16	9,447	31.71	633	2.12	29,789	100.00
	0-1	3548404	29,488	98.99	301	1.01			29,789	100.00
	0-2	3564013	25,833	86.72	3,941	13.23	15	0.05	29,789	100.00
	0-1	3488462	29,503	99.04	286	0.96			29,789	100.00
	0-2	3564075	25,715	86.32	3,978	13.35	96	0.32	29,789	100.00
	0-1	3516333	28,442	95.48	1,347	4.52			29,789	100.00
	0-2	3564008	22,556	75.72	6,541	21.96	692	2.32	29,789	100.00
	0-1	100000208909	29,426	98.78	363	1.22			29,789	100.00
	0-2	3985730	24,065	80.78	5,492	18.44	232	0.78	29,789	100.00
	0-1	3516616	29,315	98.41	474	1.59			29,789	100.00
	0-2	3564012	26,709	89.66	2,856	9.59	224	0.75	29,789	100.00
	0-1	3488411	29,371	98.60	418	1.40			29,789	100.00
	0-2	3564014	24,036	80.69	5,626	18.89	127	0.43	29,789	100.00
F	0-1	3548350	28,059	95.96	1,181	4.04			29,240	100.00
	0-3	3564015	23,900	81.74	5,047	17.26	293	1.00	29,240	100.00
	0-1	3516627	28,494	97.45	746	2.55			29,240	100.00
	0-2	3564006	23,898	81.73	5,273	18.03	69	0.24	29,240	100.00
	0-1	3488469	29,041	99.32	199	0.68			29,240	100.00
	0-2	3564071	27,748	94.90	1,407	4.81	85	0.29	29,240	100.00
	0-1	3516358	27,327	93.46	1,913	6.54			29,240	100.00
	0-2	3985729	23,209	79.37	5,950	20.35	81	0.28	29,240	100.00
	0-1	100000208909	28,838	98.63	402	1.37			29,240	100.00
	0-2	3985730	23,602	80.72	5,375	18.38	263	0.90	29,240	100.00
	0-1	3516616	28,767	98.38	473	1.62			29,240	100.00
	0-2	3564012	26,192	89.58	2,831	9.68	217	0.74	29,240	100.00
	0-1	3516913	28,946	98.99	294	1.01			29,240	100.00
	0-2	3985725	24,648	84.30	4,571	15.63	21	0.07	29,240	100.00

Note. Analysis was conducted with a statewide population.

Note. Bold-faced item indicates an ECR item.

Table 4.19 The 2007 MSA-Mathematics Score Difference between Rater 1 and Rater 2: Grade 7

Form	Score Range	Item CID	Perfect		Adjacent		Discrepancy		Total	
			N	%	N	%	N	%	N	%
A	0-1	3517744	30,099	99.28	219	0.72			30,318	100.00
	0-2	3564018	24,817	81.86	5,388	17.77	113	0.37	30,318	100.00
	0-1	3491692	30,144	99.43	174	0.57			30,318	100.00
	0-3	3564159	26,116	86.14	4,119	13.59	83	0.27	30,318	100.00
	0-1	3487925	29,847	98.45	471	1.55			30,318	100.00
	0-2	3564151	27,091	89.36	3,151	10.39	76	0.25	30,318	100.00
	0-1	3517725	30,178	99.54	140	0.46			30,318	100.00
	0-2	3564022	27,096	89.37	3,174	10.47	48	0.16	30,318	100.00
	0-1	100000043347	30,184	99.56	134	0.44			30,318	100.00
	0-3	3595366	27,283	89.99	2,999	9.89	36	0.12	30,318	100.00
	0-1	3517648	29,993	98.93	325	1.07			30,318	100.00
	0-3	3564027	25,226	83.2	4,716	15.56	376	1.24	30,318	100.00
	0-1	3487678	29,953	98.80	365	1.20			30,318	100.00
	0-2	3564153	28,439	93.80	1,871	6.17	8	0.03	30,318	100.00
F	0-1	3517744	29,357	99.19	239	0.81			29,596	100.00
	0-2	3564018	24,167	81.66	5,304	17.92	125	0.42	29,596	100.00
	0-1	3487765	29,263	98.87	333	1.13			29,596	100.00
	0-3	3564141	24,900	84.13	4,404	14.88	292	0.99	29,596	100.00
	0-1	3487925	29,118	98.38	478	1.62			29,596	100.00
	0-2	3564151	26,352	89.04	3,164	10.69	80	0.27	29,596	100.00
	0-1	100000048821	27,342	92.38	2,254	7.62			29,596	100.00
	0-2	3595371	25,665	86.72	3,904	13.19	27	0.09	29,596	100.00
	0-1	100000012779	28,177	95.21	1,419	4.79			29,596	100.00
	0-3	3595378	24,482	82.72	5,000	16.89	114	0.39	29,596	100.00
	0-1	3517648	29,266	98.88	330	1.12			29,596	100.00
	0-3	3564027	24,683	83.40	4,531	15.31	382	1.29	29,596	100.00
	0-1	100000012810	28,912	97.69	684	2.31			29,596	100.00
	0-2	3595375	27,082	91.51	2,477	8.37	37	0.13	29,596	100.00

Note. Analysis was conducted with a statewide population.

Note. Bold-faced item indicates an ECR item.

Table 4.20 The 2009 MSA-Mathematics Score Difference between Rater 1 and Rater 2: Grade 8

Form	Score Range	Item CID	Perfect		Adjacent		Discrepancy		Total	
			N	%	N	%	N	%	N	%
A	0-1	3514013	30,473	99.07	287	0.93			30,760	100.00
	0-2	3564107	26,618	86.53	4,091	13.30	51	0.17	30,760	100.00
	0-1	3487680	30,417	98.88	343	1.12			30,760	100.00
	0-3	3564133	25,232	82.03	5,266	17.12	262	0.85	30,760	100.00
	0-1	3487759	30,482	99.10	278	0.90			30,760	100.00
	0-2	3564128	27,669	89.95	3,080	10.01	11	0.04	30,760	100.00
	0-1	3514117	30,105	97.87	655	2.13			30,760	100.00
	0-2	3564111	24,884	80.90	5,784	18.80	92	0.30	30,760	100.00
	0-1	3487934	30,550	99.32	210	0.68			30,760	100.00
	0-3	3564122	24,938	81.07	5,480	17.82	342	1.11	30,760	100.00
	0-1	3487633	30,019	97.59	741	2.41			30,760	100.00
	0-2	3564123	24,953	81.12	5,186	16.86	621	2.02	30,760	100.00
	0-1	3514164	29,390	95.55	1,370	4.45			30,760	100.00
	0-3	3564117	22,534	73.26	7,824	25.44	402	1.31	30,760	100.00
	0-1	3487939	30,500	99.15	260	0.85			30,760	100.00
	0-2	3564124	29,630	96.33	1,111	3.61	19	0.06	30,760	100.00
F	0-1	3514283	30,043	99.21	239	0.79			30,282	100.00
	0-2	3564116	26,214	86.57	3,738	12.34	330	1.09	30,282	100.00
	0-1	3491681	29,380	97.02	902	2.98			30,282	100.00
	0-3	3564126	24,892	82.20	5,353	17.68	37	0.12	30,282	100.00
	0-1	3514117	29,653	97.92	629	2.08			30,282	100.00
	0-2	3564111	24,553	81.08	5,648	18.65	81	0.27	30,282	100.00
	0-1	3487934	30,084	99.35	198	0.65			30,282	100.00
	0-2	3564122	24,717	81.62	5,278	17.43	287	0.95	30,282	100.00
	0-1	3519815	29,886	98.69	396	1.31			30,282	100.00
	0-3	3564138	25,189	83.18	5,062	16.72	31	0.10	30,282	100.00
	0-1	100000043313	29,512	97.46	770	2.54			30,282	100.00
	0-2	3595407	24,188	79.88	5,462	18.04	632	2.09	30,282	100.00
	0-1	3487939	30,066	99.29	216	0.71			30,282	100.00
	0-3	3564124	29,184	96.37	1,082	3.57	16	0.05	30,282	100.00

Note. Analysis was conducted with a statewide population.

Note. Bold-faced item indicates an ECR item.

Table 4.21 The 2009 MSA-Math Total Raw Score to Scale Score Conversion Table: Grade 3 Form A

Raw Score	Scale Score (SS)	Standard Error (SE)
0	240 ^a	47
1	240 ^a	33
2	240 ^a	24
3	240 ^a	20
4	243	18
5	251	16
6	259	15
7	265	14
8	271	13
9	276	13
10	280	12
11	285	12
12	289	11
13	293	11
14	296	11
15	300	11
16	303	10
17	306	10
18	309	10
19	312	10
20	315	10
21	318	10
22	321	10
23	324	9
24	326	9
25	329	9
26	332	9
27	334	9
28	337	9
29	339	9
30	342	9
31	344	9
32	347	9
33	349	9
34	352	9
35	354	9
36	357	9
37	359	9
38	362	9
39	364	9
40	367	9
41	369	9
42	372	9
43	375	9
44	377	9
45	380	9

Table 4.21 (continued)

Raw Score	Scale Score (SS)	Standard Error (SE)
46	383	9
47	385	10
48	388	10
49	391	10
50	394	10
51	397	10
52	400	10
53	404	10
54	407	11
55	410	11
56	414	11
57	418	11
58	422	12
59	426	12
60	430	12
61	435	13
62	440	13
63	446	14
64	452	14
65	458	15
66	466	16
67	474	17
68	484	19
69	497	21
70	513	25
71	540	34
72	650 ^b	48

Note. ^aLOSS was set to 240.

Note. ^bHOSS was set to 650.

Table 4.22 The 2009 Total MSA-Math Total Raw Score to Scale Score Conversion Table: Grade 3 Form F

Raw Score	Scale Score (SS)	Standard Error (SE)
0	240 ^a	47
1	240 ^a	34
2	240 ^a	24
3	240 ^a	20
4	244	18
5	253	16
6	260	15
7	267	14
8	273	13
9	278	13
10	283	12
11	288	12
12	292	12
13	296	11
14	300	11
15	303	11
16	307	11
17	310	10
18	313	10
19	316	10
20	319	10
21	322	10
22	325	10
23	328	10
24	331	9
25	333	9
26	336	9
27	339	9
28	341	9
29	344	9
30	346	9
31	349	9
32	351	9
33	354	9
34	356	9
35	359	9
36	361	9
37	364	9
38	366	9
39	369	9
40	371	9
41	374	9
42	376	9
43	379	9
44	382	9
45	384	9

Table 4.22 (continued)

Raw Score	Scale Score (SS)	Standard Error (SE)
46	387	9
47	390	10
48	393	10
49	395	10
50	398	10
51	401	10
52	405	10
53	408	10
54	411	11
55	415	11
56	418	11
57	422	11
58	426	12
59	431	12
60	435	12
61	440	13
62	445	13
63	451	14
64	457	15
65	464	15
66	472	16
67	481	18
68	491	19
69	504	22
70	521	26
71	547	35
72	650 ^b	48

Note. ^aLOSS was set to 240.

Note. ^bHOSS was set to 650.

Table 4.23 The 2009 MSA-Math Subtotal Raw Score to Scale Score Conversion Table: Grade 3 Form A

Strand	Raw Score	Scale Score (SS)	Standard Error (SE)
AL	0	240	48
AL	1	244	35
AL	2	272	27
AL	3	291	23
AL	4	306	21
AL	5	320	20
AL	6	332	20
AL	7	344	20
AL	8	357	20
AL	9	370	21
AL	10	385	23
AL	11	403	26
AL	12	431	35
AL	13	650	48
GM	0	240	48
GM	1	253	35
GM	2	281	27
GM	3	300	23
GM	4	315	21
GM	5	328	20
GM	6	340	20
GM	7	351	19
GM	8	363	19
GM	9	375	20
GM	10	387	21
GM	11	400	22
GM	12	416	23
GM	13	435	27
GM	14	463	35
GM	15	650	48
SP	0	240	48
SP	1	240	36
SP	2	269	27
SP	3	288	23
SP	4	303	22
SP	5	317	21
SP	6	329	20
SP	7	341	20
SP	8	353	20
SP	9	366	21
SP	10	380	22
SP	11	395	24
SP	12	415	27
SP	13	443	35
SP	14	650	48
NC	0	240	48
NC	1	248	36
NC	2	276	27

Table 4.23 (continued)

Strand	Raw Score	Scale Score (SS)	Standard Error (SE)
NC	3	295	23
NC	4	310	21
NC	5	323	20
NC	6	335	19
NC	7	346	19
NC	8	357	19
NC	9	368	19
NC	10	379	19
NC	11	391	20
NC	12	404	21
NC	13	419	23
NC	14	437	27
NC	15	465	35
NC	16	650	48
PR	0	240	48
PR	1	286	36
PR	2	316	28
PR	3	336	24
PR	4	353	23
PR	5	369	22
PR	6	384	22
PR	7	399	22
PR	8	415	23
PR	9	431	24
PR	10	449	25
PR	11	469	26
PR	12	492	29
PR	13	524	37
PR	14	650	49

Note. ^aLOSS was set to 240.

Note. ^bHOSS was set to 650.

Note. AL=Algebra, GM=Geometry and Measurement, SP=Statistics and Probability, NC=Numbers and Computation, PR=Process.

Table 4.24 The 2009 MSA-Math Subtotal Raw Score to Scale Score Conversion Table: Grade 3 Form F

Strand	Raw Score	Scale Score (SS)	Standard Error (SE)
AL	0	240	49
AL	1	240	36
AL	2	263	28
AL	3	283	24
AL	4	300	22
AL	5	315	21
AL	6	328	21
AL	7	341	21
AL	8	355	21
AL	9	369	22
AL	10	386	24
AL	11	407	28
AL	12	438	37
AL	13	650	50
GM	0	240	48
GM	1	253	35
GM	2	281	27
GM	3	299	23
GM	4	314	21
GM	5	327	20
GM	6	338	19
GM	7	350	19
GM	8	361	19
GM	9	372	19
GM	10	384	20
GM	11	397	21
GM	12	412	23
GM	13	431	26
GM	14	458	35
GM	15	650	48
SP	0	240	49
SP	1	245	37
SP	2	276	28
SP	3	297	25
SP	4	314	22
SP	5	328	21
SP	6	341	20
SP	7	354	20
SP	8	366	20
SP	9	379	21
SP	10	393	22
SP	11	408	24
SP	12	428	27
SP	13	456	36
SP	14	650	48
NC	0	240	48
NC	1	264	35
NC	2	292	26

Table 4.24 (continued)

Strand	Raw Score	Scale Score (SS)	Standard Error (SE)
NC	3	310	23
NC	4	324	21
NC	5	336	19
NC	6	347	19
NC	7	358	18
NC	8	368	18
NC	9	378	18
NC	10	388	19
NC	11	399	19
NC	12	411	20
NC	13	425	22
NC	14	442	26
NC	15	469	35
NC	16	650	48
PR	0	240	49
PR	1	284	36
PR	2	314	28
PR	3	335	25
PR	4	352	23
PR	5	368	23
PR	6	384	23
PR	7	400	24
PR	8	418	25
PR	9	437	25
PR	10	457	26
PR	11	478	27
PR	12	501	29
PR	13	533	37
PR	14	650	49

Note. ^aLOSS was set to 240.

Note. ^bHOSS was set to 650.

AL=Algebra, GM=Geometry and Measurement, SP=Statistics and Probability, NC=Numbers and Computation, PR=Process.

Table 4.25 The 2009 MSA-Math Total Raw Score to Scale Score Conversion Table: Grade 4 Form A

Raw Score	Scale Score (SS)	Standard Error (SE)
0	240 ^a	47
1	240 ^a	34
2	244	24
3	258	20
4	269	18
5	278	16
6	285	15
7	291	14
8	297	13
9	302	13
10	307	12
11	311	12
12	315	11
13	319	11
14	322	11
15	326	11
16	329	10
17	332	10
18	335	10
19	338	10
20	341	10
21	344	10
22	347	9
23	349	9
24	352	9
25	355	9
26	357	9
27	360	9
28	362	9
29	365	9
30	367	9
31	370	9
32	372	9
33	375	9
34	377	9
35	380	9
36	382	9
37	384	9
38	387	9
39	389	9
40	392	9
41	394	9
42	397	9
43	400	9
44	402	9
45	405	9

Table 4.25 (continued)

Raw Score	Scale Score (SS)	Standard Error (SE)
46	408	10
47	411	10
48	414	10
49	417	10
50	420	10
51	423	10
52	426	11
53	430	11
54	433	11
55	437	11
56	441	12
57	445	12
58	450	12
59	454	13
60	459	13
61	465	14
62	471	14
63	478	15
64	485	16
65	494	17
66	503	18
67	515	20
68	528	22
69	546	26
70	574	35
71	650 ^b	48

Note. ^aLOSS was set to 240.

Note. ^bHOSS was set to 650.

Table 4.26 The 2009 MSA-Math Total Raw Score to Scale Score Conversion Table: Grade 4 Form F

Raw Score	Scale Score (SS)	Standard Error (SE)
0	240 ^a	47
1	240 ^a	34
2	243	25
3	259	21
4	270	18
5	279	16
6	287	15
7	293	14
8	299	13
9	304	13
10	309	12
11	314	12
12	318	12
13	322	11
14	325	11
15	329	11
16	332	10
17	336	10
18	339	10
19	342	10
20	345	10
21	347	10
22	350	10
23	353	9
24	356	9
25	358	9
26	361	9
27	364	9
28	366	9
29	369	9
30	371	9
31	374	9
32	376	9
33	379	9
34	381	9
35	383	9
36	386	9
37	388	9
38	391	9
39	393	9
40	396	9
41	398	9
42	401	9
43	404	9
44	406	9
45	409	9

Table 4.26 (continued)

Raw Score	Scale Score (SS)	Standard Error (SE)
46	412	10
47	415	10
48	417	10
49	420	10
50	424	10
51	427	10
52	430	11
53	433	11
54	437	11
55	441	11
56	445	12
57	449	12
58	454	12
59	458	13
60	464	13
61	469	14
62	476	15
63	483	16
64	491	16
65	499	18
66	509	19
67	521	21
68	536	23
69	555	27
70	583	36
71	650 ^b	49

Note. ^aLOSS was set to 240.

Note. ^bHOSS was set to 650.

Table 4.27 The 2009 MSA-Math Subtotal Raw Score to Scale Score Conversion Table: Grade 4 Form A

Strand	Raw Score	Scale Score (SS)	Standard Error (SE)
AL	0	240	49
AL	1	267	36
AL	2	296	27
AL	3	315	23
AL	4	330	22
AL	5	343	20
AL	6	356	20
AL	7	367	20
AL	8	379	20
AL	9	391	20
AL	10	404	21
AL	11	419	23
AL	12	437	27
AL	13	465	35
AL	14	650	48
GM	0	240	48
GM	1	274	35
GM	2	302	27
GM	3	322	24
GM	4	338	22
GM	5	353	22
GM	6	367	21
GM	7	380	21
GM	8	393	21
GM	9	406	21
GM	10	421	22
GM	11	436	24
GM	12	456	27
GM	13	484	36
GM	14	650	48
SP	0	240	48
SP	1	281	35
SP	2	307	26
SP	3	324	22
SP	4	338	20
SP	5	350	19
SP	6	361	19
SP	7	371	19
SP	8	382	19
SP	9	393	19
SP	10	404	20
SP	11	417	21
SP	12	431	23
SP	13	449	26
SP	14	477	35
SP	15	650	48
NC	0	240	49
NC	1	268	36

Table 4.27 (continued)

Strand	Raw Score	Scale Score (SS)	Standard Error (SE)
NC	2	297	27
NC	3	316	24
NC	4	332	21
NC	5	345	20
NC	6	357	20
NC	7	368	19
NC	8	380	19
NC	9	391	20
NC	10	404	21
NC	11	418	23
NC	12	436	26
NC	13	464	35
NC	14	650	48
PR	0	240	48
PR	1	313	35
PR	2	341	27
PR	3	360	24
PR	4	376	23
PR	5	392	22
PR	6	408	23
PR	7	425	25
PR	8	445	26
PR	9	466	27
PR	10	487	26
PR	11	509	27
PR	12	532	29
PR	13	564	37
PR	14	650	49

Note. ^aLOSS was set to 240.

Note. ^bHOSS was set to 650.

Note. AL=Algebra, GM=Geometry and Measurement, SP=Statistics and Probability, NC=Numbers and Computation, PR=Process.

Table 4.28 The 2009 MSA-Math Subtotal Raw Score to Scale Score Conversion Table: Grade 4 Form F

Strand	Raw Score	Scale Score (SS)	Standard Error (SE)
AL	0	240	48
AL	1	260	35
AL	2	288	27
AL	3	307	23
AL	4	322	21
AL	5	335	20
AL	6	347	20
AL	7	358	19
AL	8	369	19
AL	9	381	20
AL	10	394	21
AL	11	408	23
AL	12	426	26
AL	13	453	35
AL	14	650	48
GM	0	240	52
GM	1	266	40
GM	2	302	30
GM	3	326	26
GM	4	344	23
GM	5	360	22
GM	6	374	21
GM	7	388	21
GM	8	401	21
GM	9	414	21
GM	10	429	22
GM	11	445	24
GM	12	464	27
GM	13	493	36
GM	14	650	49
SP	0	240	48
SP	1	284	35
SP	2	310	26
SP	3	328	22
SP	4	341	20
SP	5	353	19
SP	6	364	19
SP	7	374	18
SP	8	385	19
SP	9	395	19
SP	10	406	20
SP	11	419	21
SP	12	433	23
SP	13	451	26
SP	14	479	35
SP	15	650	48
NC	0	240	48
NC	1	285	35

Table 4.28 (continued)

Strand	Raw Score	Scale Score (SS)	Standard Error (SE)
NC	2	313	27
NC	3	332	23
NC	4	346	21
NC	5	359	20
NC	6	371	19
NC	7	382	19
NC	8	393	19
NC	9	404	20
NC	10	417	21
NC	11	431	23
NC	12	449	26
NC	13	476	35
NC	14	650	48
PR	0	240	48
PR	1	316	36
PR	2	345	28
PR	3	365	24
PR	4	382	23
PR	5	398	23
PR	6	413	23
PR	7	431	25
PR	8	451	26
PR	9	473	27
PR	10	495	27
PR	11	517	27
PR	12	542	30
PR	13	575	37
PR	14	650	49

Note. ^aLOSS was set to 240.

Note. ^bHOSS was set to 650.

Note. AL=Algebra, GM=Geometry and Measurement, SP=Statistics and Probability, NC=Numbers and Computation, PR=Process.

Table 4.29 The 2009 MSA-Math Total Raw Score to Scale Score Conversion Table: Grade 5 Form A

Raw Score	Scale Score (SS)	Standard Error (SE)
0	240 ^a	44
1	245	31
2	267	22
3	281	18
4	290	16
5	298	15
6	305	14
7	310	13
8	315	12
9	320	12
10	324	11
11	328	11
12	331	10
13	335	10
14	338	10
15	341	10
16	344	9
17	347	9
18	350	9
19	352	9
20	355	9
21	357	9
22	360	9
23	362	9
24	365	8
25	367	8
26	369	8
27	371	8
28	374	8
29	376	8
30	378	8
31	380	8
32	382	8
33	384	8
34	386	8
35	388	8
36	390	8
37	393	8
38	395	8
39	397	8
40	399	8
41	401	8
42	403	8
43	405	8
44	407	8
45	409	8

Table 4.29 (continued)

Raw Score	Scale Score (SS)	Standard Error (SE)
46	412	8
47	414	8
48	416	8
49	418	8
50	421	8
51	423	9
52	425	9
53	428	9
54	430	9
55	433	9
56	435	9
57	438	9
58	441	9
59	444	10
60	447	10
61	450	10
62	454	10
63	457	11
64	461	11
65	466	12
66	470	12
67	476	13
68	482	14
69	489	15
70	497	17
71	507	19
72	522	23
73	545	32
74	650 ^b	44

Note. ^aLOSS was set to 240.

Note. ^bHOSS was set to 650.

Table 4.30 The 2009 MSA-Math Total Raw Score to Scale Score Conversion Table: Grade 5 Form F

Raw Score	Scale Score (SS)	Standard Error (SE)
0	240 ^a	44
1	242	31
2	265	22
3	278	19
4	288	16
5	296	15
6	302	14
7	308	13
8	313	12
9	318	12
10	322	11
11	326	11
12	329	10
13	333	10
14	336	10
15	339	10
16	342	10
17	345	9
18	348	9
19	351	9
20	353	9
21	356	9
22	358	9
23	361	9
24	363	9
25	366	9
26	368	9
27	371	8
28	373	8
29	375	8
30	377	8
31	380	8
32	382	8
33	384	8
34	387	8
35	389	8
36	391	8
37	393	8
38	396	8
39	398	8
40	400	8
41	402	8
42	405	8
43	407	8
44	409	8
45	412	9

Table 4.30 (continued)

Raw Score	Scale Score (SS)	Standard Error (SE)
46	414	9
47	416	9
48	419	9
49	421	9
50	424	9
51	426	9
52	429	9
53	432	9
54	434	9
55	437	9
56	440	9
57	442	9
58	445	10
59	448	10
60	452	10
61	455	10
62	458	10
63	462	11
64	466	11
65	470	12
66	475	12
67	480	13
68	486	14
69	493	15
70	501	17
71	511	19
72	525	23
73	547	31
74	650 ^b	44

Note. ^aLOSS was set to 240.

Note. ^bHOSS was set to 650.

Table 4.31 The 2009 MSA-Math Subtotal Raw Score to Scale Score Conversion Table: Grade 5 Form A

Strand	Raw Score	Scale Score (SS)	Standard Error (SE)
AL	0	240	45
AL	1	280	32
AL	2	305	24
AL	3	322	21
AL	4	335	19
AL	5	347	18
AL	6	357	18
AL	7	368	18
AL	8	378	18
AL	9	388	18
AL	10	399	19
AL	11	411	20
AL	12	425	21
AL	13	442	25
AL	14	467	33
AL	15	650	45
GM	0	240	45
GM	1	296	33
GM	2	323	25
GM	3	341	22
GM	4	356	21
GM	5	369	20
GM	6	382	19
GM	7	393	19
GM	8	405	19
GM	9	417	19
GM	10	430	20
GM	11	444	22
GM	12	461	25
GM	13	487	33
GM	14	650	45
SP	0	240	45
SP	1	300	33
SP	2	325	25
SP	3	342	21
SP	4	355	20
SP	5	367	19
SP	6	379	19
SP	7	390	19
SP	8	402	19
SP	9	414	20
SP	10	429	22
SP	11	447	26
SP	12	475	34
SP	13	650	46
NC	0	240	44
NC	1	308	32
NC	2	332	24

Table 4.31 (continued)

Strand	Raw Score	Scale Score (SS)	Standard Error (SE)
NC	3	348	21
NC	4	360	19
NC	5	371	18
NC	6	381	17
NC	7	390	17
NC	8	399	17
NC	9	409	17
NC	10	418	18
NC	11	429	19
NC	12	442	21
NC	13	458	24
NC	14	482	32
NC	15	650	45
PR	0	240	45
PR	1	316	32
PR	2	341	24
PR	3	358	21
PR	4	370	19
PR	5	381	18
PR	6	391	17
PR	7	400	17
PR	8	409	16
PR	9	418	16
PR	10	426	16
PR	11	435	17
PR	12	445	18
PR	13	456	19
PR	14	470	22
PR	15	488	26
PR	16	517	35
PR	17	650	47

Note. ^aLOSS was set to 240.

Note. ^bHOSS was set to 650.

Note. AL=Algebra, GM=Geometry and Measurement, SP=Statistics and Probability, NC=Numbers and Computation, PR=Process.

Table 4.32 The 2009 MSA-Math Subtotal Raw Score to Scale Score Conversion Table: Grade 5 Form F

Strand	Raw Score	Scale Score (SS)	Standard Error (SE)
AL	0	240	45
AL	1	276	33
AL	2	302	25
AL	3	319	21
AL	4	333	20
AL	5	344	19
AL	6	355	18
AL	7	366	18
AL	8	377	18
AL	9	387	18
AL	10	399	19
AL	11	412	21
AL	12	427	23
AL	13	448	28
AL	14	481	37
AL	15	650	49
GM	0	240	45
GM	1	299	33
GM	2	325	25
GM	3	343	22
GM	4	358	21
GM	5	371	20
GM	6	383	19
GM	7	396	19
GM	8	408	19
GM	9	420	20
GM	10	433	21
GM	11	448	22
GM	12	467	25
GM	13	494	33
GM	14	650	45
SP	0	240	45
SP	1	292	32
SP	2	317	24
SP	3	333	21
SP	4	346	19
SP	5	358	18
SP	6	368	18
SP	7	378	18
SP	8	389	18
SP	9	400	19
SP	10	413	21
SP	11	430	24
SP	12	454	32
SP	13	650	45
NC	0	240	45
NC	1	309	32
NC	2	334	24

Table 4.32 (continued)

Strand	Raw Score	Scale Score (SS)	Standard Error (SE)
NC	3	350	21
NC	4	363	19
NC	5	374	18
NC	6	385	18
NC	7	394	17
NC	8	404	17
NC	9	414	18
NC	10	425	19
NC	11	437	20
NC	12	451	22
NC	13	470	26
NC	14	497	34
NC	15	650	46
PR	0	240	45
PR	1	313	33
PR	2	340	26
PR	3	359	23
PR	4	374	21
PR	5	388	20
PR	6	400	19
PR	7	411	18
PR	8	421	17
PR	9	429	16
PR	10	438	16
PR	11	446	16
PR	12	454	16
PR	13	463	17
PR	14	474	19
PR	15	488	23
PR	16	512	32
PR	17	650	44

Note. ^aLOSS was set to 240.

Note. ^bHOSS was set to 650.

Note. AL=Algebra, GM=Geometry and Measurement, SP=Statistics and Probability, NC=Numbers and Computation, PR=Process.

Table 4.33 The 2009 MSA-Math Total Raw Score to Scale Score Conversion Table: Grade 6 Form A

Raw Score	Scale Score (SS)	Standard Error (SE)
0	240 ^a	42
1	253	30
2	275	22
3	288	18
4	298	16
5	306	15
6	313	14
7	318	13
8	324	12
9	328	12
10	333	11
11	337	11
12	340	10
13	344	10
14	347	10
15	350	10
16	354	9
17	356	9
18	359	9
19	362	9
20	365	9
21	367	9
22	370	9
23	372	9
24	375	8
25	377	8
26	379	8
27	382	8
28	384	8
29	386	8
30	389	8
31	391	8
32	393	8
33	395	8
34	397	8
35	399	8
36	401	8
37	404	8
38	406	8
39	408	8
40	410	8
41	412	8
42	414	8
43	417	8
44	419	8
45	421	8

Table 4.33 (continued)

Raw Score	Scale Score (SS)	Standard Error (SE)
46	423	8
47	426	8
48	428	8
49	430	9
50	433	9
51	436	9
52	438	9
53	441	9
54	444	9
55	447	9
56	450	10
57	453	10
58	457	10
59	460	11
60	464	11
61	469	12
62	474	12
63	479	13
64	485	14
65	492	15
66	501	17
67	511	19
68	526	23
69	550	31
70	650 ^b	43

Note. ^aLOSS was set to 240.

Note. ^bHOSS was set to 650.

Table 4.34 The 2009 MSA-Math Total Raw Score to Scale Score Conversion Table: Grade 6 Form F

Raw Score	Scale Score (SS)	Standard Error (SE)
0	240 ^a	42
1	259	30
2	281	22
3	294	18
4	304	16
5	311	14
6	318	13
7	323	13
8	328	12
9	333	11
10	337	11
11	341	11
12	345	10
13	348	10
14	351	10
15	354	9
16	357	9
17	360	9
18	363	9
19	365	9
20	368	9
21	370	8
22	373	8
23	375	8
24	377	8
25	379	8
26	382	8
27	384	8
28	386	8
29	388	8
30	390	8
31	392	8
32	394	8
33	396	8
34	398	8
35	400	8
36	402	8
37	404	8
38	406	8
39	408	8
40	410	8
41	412	8
42	414	8
43	416	8
44	419	8
45	421	8

Table 4.34 (continued)

Raw Score	Scale Score (SS)	Standard Error (SE)
46	423	8
47	425	8
48	427	8
49	430	8
50	432	8
51	435	9
52	437	9
53	440	9
54	442	9
55	445	9
56	448	10
57	452	10
58	455	10
59	458	10
60	462	11
61	466	11
62	471	12
63	476	13
64	482	14
65	489	15
66	497	16
67	507	18
68	520	22
69	542	30
70	650 ^b	43

Note. ^aLOSS was set to 240.

Note. ^bHOSS was set to 650.

Table 4.35 The 2009 MSA-Math Subtotal Raw Score to Scale Score Conversion Table: Grade 6 Form A

Strand	Raw Score	Scale Score (SS)	Standard Error (SE)
AL	0	240	44
AL	1	284	33
AL	2	310	25
AL	3	328	22
AL	4	343	20
AL	5	355	19
AL	6	367	18
AL	7	378	18
AL	8	389	18
AL	9	400	18
AL	10	412	19
AL	11	426	21
AL	12	443	24
AL	13	468	32
AL	14	650	43
GM	0	240	43
GM	1	325	31
GM	2	349	23
GM	3	365	20
GM	4	378	18
GM	5	388	17
GM	6	398	17
GM	7	407	17
GM	8	417	17
GM	9	426	17
GM	10	437	18
GM	11	449	20
GM	12	464	23
GM	13	488	31
GM	14	650	43
SP	0	240	44
SP	1	301	32
SP	2	327	25
SP	3	344	22
SP	4	359	20
SP	5	372	20
SP	6	385	19
SP	7	398	20
SP	8	411	20
SP	9	425	21
SP	10	442	23
SP	11	462	26
SP	12	492	34
SP	13	650	45
NC	0	240	43
NC	1	320	32
NC	2	344	24
NC	3	360	20

Table 4.35 (continued)

Strand	Raw Score	Scale Score (SS)	Standard Error (SE)
NC	4	373	19
NC	5	384	18
NC	6	394	17
NC	7	403	17
NC	8	413	17
NC	9	423	17
NC	10	433	18
NC	11	445	20
NC	12	461	23
NC	13	484	31
NC	14	650	43
PR	0	240	44
PR	1	312	33
PR	2	339	25
PR	3	358	22
PR	4	373	20
PR	5	386	19
PR	6	397	18
PR	7	408	18
PR	8	418	18
PR	9	429	18
PR	10	440	19
PR	11	453	20
PR	12	468	23
PR	13	489	27
PR	14	522	36
PR	15	650	47

Note. ^aLOSS was set to 240.

Note. ^bHOSS was set to 650.

Note. AL=Algebra, GM=Geometry and Measurement, SP=Statistics and Probability, NC=Numbers and Computation, PR=Process.

Table 4.36 The 2009 MSA-Math Subtotal Raw Score to Scale Score Conversion Table: Grade 6 Form F

Strand	Raw Score	Scale Score (SS)	Standard Error (SE)
AL	0	240	44
AL	1	308	32
AL	2	333	24
AL	3	350	21
AL	4	364	19
AL	5	375	18
AL	6	386	17
AL	7	396	17
AL	8	406	17
AL	9	416	18
AL	10	427	19
AL	11	440	20
AL	12	455	23
AL	13	479	31
AL	14	650	43
GM	0	240	43
GM	1	321	31
GM	2	345	23
GM	3	361	20
GM	4	373	18
GM	5	383	17
GM	6	393	17
GM	7	402	17
GM	8	411	17
GM	9	421	17
GM	10	432	18
GM	11	444	20
GM	12	459	23
GM	13	483	31
GM	14	650	43
SP	0	240	43
SP	1	288	32
SP	2	313	24
SP	3	329	21
SP	4	343	19
SP	5	355	18
SP	6	366	18
SP	7	377	18
SP	8	388	18
SP	9	400	19
SP	10	413	21
SP	11	430	24
SP	12	455	32
SP	13	650	43
NC	0	240	43
NC	1	324	32
NC	2	348	24
NC	3	364	20

Table 4.36 (continued)

Strand	Raw Score	Scale Score (SS)	Standard Error (SE)
NC	4	377	18
NC	5	388	17
NC	6	397	17
NC	7	407	17
NC	8	416	17
NC	9	426	17
NC	10	436	18
NC	11	448	20
NC	12	464	23
NC	13	487	31
NC	14	650	43
PR	0	240	44
PR	1	332	32
PR	2	357	24
PR	3	373	20
PR	4	385	18
PR	5	396	17
PR	6	405	17
PR	7	415	17
PR	8	424	17
PR	9	434	17
PR	10	445	18
PR	11	457	20
PR	12	472	22
PR	13	491	25
PR	14	518	33
PR	15	650	44

Note. ^aLOSS was set to 240.

Note. ^bHOSS was set to 650.

Note. AL=Algebra, GM=Geometry and Measurement, SP=Statistics and Probability, NC=Numbers and Computation, PR=Process.

Table 4.37 The 2009 MSA-Math Total Raw Score to Scale Score Conversion Table: Grade 7 Form A

Raw Score	Scale Score (SS)	Standard Error (SE)
0	240 ^a	40
1	275	29
2	295	21
3	308	17
4	317	15
5	324	14
6	330	12
7	335	12
8	340	11
9	344	11
10	348	10
11	351	10
12	354	10
13	358	9
14	361	9
15	363	9
16	366	9
17	369	9
18	371	8
19	374	8
20	376	8
21	378	8
22	381	8
23	383	8
24	385	8
25	387	8
26	389	8
27	391	8
28	394	8
29	396	8
30	398	8
31	400	8
32	402	8
33	404	8
34	406	7
35	408	7
36	410	7
37	412	7
38	414	8
39	416	8
40	418	8
41	420	8
42	422	8
43	424	8
44	426	8
45	428	8

Table 4.37 (continued)

Raw Score	Scale Score (SS)	Standard Error (SE)
46	430	8
47	432	8
48	435	8
49	437	8
50	439	8
51	441	8
52	444	8
53	446	8
54	449	9
55	452	9
56	454	9
57	457	9
58	460	9
59	463	10
60	467	10
61	471	10
62	474	11
63	479	11
64	483	12
65	489	13
66	495	13
67	502	15
68	510	16
69	521	19
70	537	23
71	562	32
72	650 ^b	43

Note. ^aLOSS was set to 240.

Note. ^bHOSS was set to 650.

Table 4.38 The 2009 MSA-Math Total Raw Score to Scale Score Conversion Table: Grade 7 Form F

Raw Score	Scale Score (SS)	Standard Error (SE)
0	240 ^a	40
1	276	29
2	296	21
3	309	17
4	318	15
5	325	14
6	331	12
7	336	12
8	341	11
9	345	11
10	348	10
11	352	10
12	355	10
13	358	9
14	361	9
15	364	9
16	367	9
17	370	9
18	372	8
19	375	8
20	377	8
21	379	8
22	382	8
23	384	8
24	386	8
25	388	8
26	390	8
27	393	8
28	395	8
29	397	8
30	399	8
31	401	8
32	403	8
33	405	8
34	407	8
35	409	8
36	411	8
37	413	8
38	415	8
39	417	8
40	419	8
41	422	8
42	424	8
43	426	8
44	428	8
45	430	8

Table 4.38 (continued)

Raw Score	Scale Score (SS)	Standard Error (SE)
46	433	8
47	435	8
48	437	8
49	440	8
50	442	8
51	445	9
52	448	9
53	450	9
54	453	9
55	456	9
56	459	9
57	462	10
58	466	10
59	469	10
60	473	11
61	477	11
62	482	11
63	486	12
64	492	12
65	498	13
66	504	14
67	512	15
68	521	17
69	531	19
70	546	22
71	569	30
72	650 ^b	41

Note. ^aLOSS was set to 240.

Note. ^bHOSS was set to 650.

Table 4.39 The 2009 MSA-Math Subtotal Raw Score to Scale Score Conversion Table: Grade 7 Form A

Strand	Raw Score	Scale Score (SS)	Standard Error (SE)
AL	0	240	41
AL	1	330	30
AL	2	353	22
AL	3	368	19
AL	4	380	18
AL	5	390	17
AL	6	400	16
AL	7	410	16
AL	8	419	17
AL	9	429	17
AL	10	441	18
AL	11	453	20
AL	12	470	23
AL	13	494	31
AL	14	650	42
GM	0	240	42
GM	1	340	31
GM	2	365	23
GM	3	382	20
GM	4	395	19
GM	5	407	18
GM	6	418	17
GM	7	429	17
GM	8	439	18
GM	9	451	18
GM	10	464	20
GM	11	480	23
GM	12	503	30
GM	13	650	41
SP	0	240	41
SP	1	318	30
SP	2	341	22
SP	3	355	19
SP	4	367	18
SP	5	378	17
SP	6	387	16
SP	7	396	16
SP	8	405	16
SP	9	415	17
SP	10	426	18
SP	11	438	19
SP	12	453	22
SP	13	476	30
SP	14	650	41
NC	0	240	43
NC	1	319	32
NC	2	346	24
NC	3	363	21

Table 4.39 (continued)

Strand	Raw Score	Scale Score (SS)	Standard Error (SE)
NC	4	377	19
NC	5	389	18
NC	6	399	17
NC	7	409	17
NC	8	419	17
NC	9	429	17
NC	10	440	18
NC	11	452	19
NC	12	467	22
NC	13	491	30
NC	14	650	41
PR	0	240	41
PR	1	317	29
PR	2	339	22
PR	3	354	19
PR	4	366	18
PR	5	377	17
PR	6	387	17
PR	7	397	17
PR	8	407	17
PR	9	417	17
PR	10	427	17
PR	11	438	18
PR	12	449	19
PR	13	463	20
PR	14	479	23
PR	15	503	28
PR	16	540	38
PR	17	650	47

Note. ^aLOSS was set to 240.

Note. ^bHOSS was set to 650.

Note. AL=Algebra, GM=Geometry and Measurement, SP=Statistics and Probability, NC=Numbers and Computation, PR=Process.

Table 4.40 The 2009 MSA-Math Subtotal Raw Score to Scale Score Conversion Table: Grade 7 Form F

Strand	Raw Score	Scale Score (SS)	Standard Error (SE)
AL	0	240	41
AL	1	334	30
AL	2	357	22
AL	3	373	19
AL	4	385	18
AL	5	396	17
AL	6	406	17
AL	7	415	17
AL	8	425	17
AL	9	435	17
AL	10	446	18
AL	11	459	20
AL	12	475	23
AL	13	498	30
AL	14	650	41
GM	0	240	41
GM	1	337	30
GM	2	361	23
GM	3	377	20
GM	4	390	18
GM	5	402	18
GM	6	412	17
GM	7	423	17
GM	8	434	18
GM	9	446	19
GM	10	459	20
GM	11	476	23
GM	12	501	31
GM	13	650	42
SP	0	240	41
SP	1	320	30
SP	2	343	22
SP	3	358	19
SP	4	370	18
SP	5	381	17
SP	6	390	16
SP	7	400	16
SP	8	409	16
SP	9	419	17
SP	10	429	18
SP	11	442	19
SP	12	457	23
SP	13	481	30
SP	14	650	41
NC	0	240	43
NC	1	319	32
NC	2	345	24
NC	3	363	21

Table 4.40 (continued)

Strand	Raw Score	Scale Score (SS)	Standard Error (SE)
NC	4	377	19
NC	5	389	18
NC	6	399	17
NC	7	409	17
NC	8	419	17
NC	9	429	17
NC	10	440	18
NC	11	453	20
NC	12	468	23
NC	13	492	30
NC	14	650	41
PR	0	240	40
PR	1	318	29
PR	2	340	22
PR	3	354	19
PR	4	366	18
PR	5	377	17
PR	6	387	17
PR	7	398	18
PR	8	409	18
PR	9	422	19
PR	10	436	21
PR	11	452	22
PR	12	469	23
PR	13	488	23
PR	14	507	24
PR	15	528	25
PR	16	555	32
PR	17	650	42

Note. ^aLOSS was set to 240.

Note. ^bHOSS was set to 650.

Note. AL=Algebra, GM=Geometry and Measurement, SP=Statistics and Probability, NC=Numbers and Computation, PR=Process.

Table 4.41 The 2009 MSA-Math Total Raw Score to Scale Score Conversion Table: Grade 8 Form A

Raw Score	Scale Score (SS)	Standard Error (SE)
0	240 ^a	41
1	286	29
2	307	21
3	320	17
4	329	15
5	337	14
6	343	13
7	349	12
8	354	11
9	358	11
10	362	11
11	366	10
12	369	10
13	373	10
14	376	9
15	379	9
16	381	9
17	384	9
18	387	8
19	389	8
20	392	8
21	394	8
22	396	8
23	398	8
24	400	8
25	403	8
26	405	8
27	407	8
28	409	8
29	411	7
30	413	7
31	415	7
32	416	7
33	418	7
34	420	7
35	422	7
36	424	7
37	426	7
38	428	7
39	430	7
40	431	7
41	433	7
42	435	7
43	437	7
44	439	7
45	441	7

Table 4.41 (continued)

Raw Score	Scale Score (SS)	Standard Error (SE)
46	443	7
47	445	8
48	447	8
49	449	8
50	451	8
51	453	8
52	455	8
53	458	8
54	460	8
55	462	8
56	465	9
57	468	9
58	470	9
59	473	9
60	476	10
61	480	10
62	483	10
63	487	11
64	492	11
65	496	12
66	502	13
67	508	14
68	515	15
69	525	17
70	538	21
71	558	29
72	650 ^b	41

Note. ^aLOSS was set to 240.

Note. ^bHOSS was set to 650.

Table 4.42 The 2009 MSA-Math Total Raw Score to Scale Score Conversion Table: Grade 8 Form F

Raw Score	Scale Score (SS)	Standard Error (SE)
0	240 ^a	41
1	287	29
2	308	21
3	320	17
4	330	15
5	337	14
6	343	13
7	349	12
8	353	11
9	358	11
10	362	10
11	365	10
12	369	10
13	372	9
14	375	9
15	378	9
16	381	9
17	383	9
18	386	8
19	388	8
20	391	8
21	393	8
22	395	8
23	397	8
24	400	8
25	402	8
26	404	8
27	406	8
28	408	8
29	410	8
30	412	8
31	414	8
32	416	8
33	418	8
34	420	8
35	422	8
36	424	8
37	426	8
38	428	8
39	430	8
40	432	8
41	434	8
42	436	8
43	438	8
44	441	8
45	443	8

Table 4.42 (continued)

Raw Score	Scale Score (SS)	Standard Error (SE)
46	445	8
47	447	8
48	449	8
49	452	8
50	454	8
51	457	8
52	459	9
53	462	9
54	465	9
55	468	9
56	471	9
57	474	10
58	477	10
59	481	10
60	484	11
61	489	11
62	493	12
63	498	12
64	504	13
65	510	14
66	518	15
67	527	18
68	540	21
69	561	29
70	650 ^b	41

Note. ^aLOSS was set to 240.

Note. ^bHOSS was set to 650.

Table 4.43 The 2009 MSA-Math Subtotal Raw Score to Scale Score Conversion Table: Grade 8 Form A

Strand	Raw Score	Scale Score (SS)	Standard Error (SE)
AL	0	240	43
AL	1	326	32
AL	2	353	24
AL	3	370	20
AL	4	383	18
AL	5	394	17
AL	6	404	16
AL	7	414	16
AL	8	423	16
AL	9	432	16
AL	10	441	17
AL	11	452	18
AL	12	464	19
AL	13	479	22
AL	14	502	30
AL	15	650	41
GM	0	240	43
GM	1	339	32
GM	2	366	24
GM	3	384	21
GM	4	398	19
GM	5	411	18
GM	6	422	18
GM	7	433	17
GM	8	444	18
GM	9	455	18
GM	10	468	20
GM	11	483	23
GM	12	507	30
GM	13	650	41
SP	0	240	41
SP	1	339	30
SP	2	363	23
SP	3	378	20
SP	4	390	18
SP	5	401	17
SP	6	412	17
SP	7	422	17
SP	8	432	17
SP	9	443	18
SP	10	455	20
SP	11	471	23
SP	12	495	30
SP	13	650	42
NC	0	240	41
NC	1	348	30
NC	2	372	23
NC	3	388	20

Table 4.43 (continued)

Strand	Raw Score	Scale Score (SS)	Standard Error (SE)
NC	4	401	19
NC	5	413	18
NC	6	424	18
NC	7	436	18
NC	8	448	19
NC	9	462	21
NC	10	479	23
NC	11	504	31
NC	12	650	42
PR	0	240	42
PR	1	333	31
PR	2	358	23
PR	3	375	20
PR	4	387	18
PR	5	397	16
PR	6	406	15
PR	7	414	14
PR	8	421	14
PR	9	428	14
PR	10	434	14
PR	11	441	14
PR	12	447	14
PR	13	454	15
PR	14	463	16
PR	15	472	17
PR	16	484	20
PR	17	501	24
PR	18	527	31
PR	19	650	42

Note. ^aLOSS was set to 240.

Note. ^bHOSS was set to 650.

Note. AL=Algebra, GM=Geometry and Measurement, SP=Statistics and Probability, NC=Numbers and Computation, PR=Process.

Table 4.44 The 2009 MSA-Math Subtotal Raw Score to Scale Score Conversion Table: Grade 8 Form F

Strand	Raw Score	Scale Score (SS)	Standard Error (SE)
AL	0	240	41
AL	1	345	30
AL	2	368	22
AL	3	383	19
AL	4	395	18
AL	5	405	17
AL	6	414	16
AL	7	423	16
AL	8	431	16
AL	9	440	16
AL	10	449	16
AL	11	459	17
AL	12	471	19
AL	13	486	22
AL	14	509	30
AL	15	650	41
GM	0	240	42
GM	1	349	30
GM	2	373	23
GM	3	389	20
GM	4	402	18
GM	5	413	18
GM	6	424	17
GM	7	435	17
GM	8	445	18
GM	9	457	19
GM	10	470	20
GM	11	486	23
GM	12	510	30
GM	13	650	41
SP	0	240	42
SP	1	332	30
SP	2	356	23
SP	3	372	20
SP	4	385	19
SP	5	397	18
SP	6	408	18
SP	7	419	18
SP	8	430	18
SP	9	442	19
SP	10	455	20
SP	11	472	23
SP	12	497	31
SP	13	650	42
NC	0	240	42
NC	1	336	31
NC	2	361	23
NC	3	378	20

Table 4.44 (continued)

Strand	Raw Score	Scale Score (SS)	Standard Error (SE)
NC	4	391	19
NC	5	403	18
NC	6	415	18
NC	7	426	18
NC	8	438	19
NC	9	451	20
NC	10	467	23
NC	11	491	30
NC	12	650	42
PR	0	240	43
PR	1	326	32
PR	2	353	24
PR	3	369	20
PR	4	382	18
PR	5	392	17
PR	6	402	16
PR	7	411	16
PR	8	420	16
PR	9	429	16
PR	10	438	16
PR	11	448	17
PR	12	459	18
PR	13	472	20
PR	14	487	22
PR	15	506	25
PR	16	533	32
PR	17	650	42

Note. ^aLOSS was set to 240.

Note. ^bHOSS was set to 650.

Note. AL=Algebra, GM=Geometry and Measurement, SP=Statistics and Probability, NC=Numbers and Computation, PR=Process.

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APPENDIX A: THE 2009 MSA-MATH STRATIFIED RANDOM SAMPLING

Since the deadline for the students' score reports made it difficult for Pearson to use almost 100% of the 2009 population as the calibration and equating data set, MSDE and NPC recommended that Pearson use equating samples instead of the 2009 population. Pearson chose Local Education Agency (LEA) as one of the most important variables for random stratification. It should be noted that this method has been applied since the 2006 assessment.

Based on each LEA percentage of the 2009 population, Pearson randomly selected nearly 3,000 students from the first-wave documents (i.e., 30% of the statewide population) within each grade, and the item responses of these selected students were used for the 2009 calibration and equating. It should be acknowledged that each student's answer document from the first-wave were randomly distributed and completely scored in the Pearson performance scoring system (i.e., E-Pen scoring system). Please refer to section 1.7 for detailed information about performance scoring procedures.

To verify that the equating sample was representative of the statewide examinee population in terms of LEA, gender, and ethnicity, the distributions of LEA, gender, and ethnicity of the 2009 samples were compared with those of the 2009 population. The results are shown in this appendix. The percentages of students from the LEAs were all within 2.8 percentage points of the target values across all grades. The percentages of students from the five major ethnic groups were all within 3.5 percentage points of the target values across all grades. The percentages of male and female students were within 1.5 percentage points of the target values across all grades. Consequently, we concluded that the 2009 equating samples were representative of the 2009 statewide examinee population in terms of LEA, gender, and ethnicity.

Table A.1 2009 MSA-Math Population and Stratified Random Sampling (S.R.S.): Grade 3 LEA

LEA	Operational Form A				Operational Form F			
	2009 Pop.	2009	% of 2009	% of	2009 Pop.	2009	% of 2009	% of
	%	S. R. S.	S. R. S.	Differ.	%	S. R. S.	S. R. S.	Differ.
1	1.08	32	1.08	0.00	1.08	32	1.07	0.01
2	8.73	262	8.86	-0.13	8.73	262	8.76	-0.03
3	12.39	372	12.58	-0.19	12.39	372	12.43	-0.04
4	1.93	58	1.96	-0.03	1.93	58	1.94	-0.01
5	0.68	20	0.68	0.00	0.68	20	0.67	0.01
6	3.28	98	3.32	-0.04	3.28	98	3.28	0.00
7	1.89	57	1.93	-0.04	1.89	57	1.91	-0.02
8	2.98	89	3.01	-0.03	2.98	89	2.97	0.01
9	0.55	16	0.54	0.01	0.55	16	0.53	0.02
10	4.77	143	4.84	-0.07	4.77	143	4.78	-0.01
11	0.53	16	0.54	-0.01	0.53	16	0.53	0.00
12	4.76	143	4.84	-0.08	4.76	143	4.78	-0.02
13	5.81	174	5.89	-0.08	5.81	174	5.82	-0.01
14	0.27	8	0.27	0.00	0.27	8	0.27	0.00
15	16.75	502	16.98	-0.23	16.75	502	16.78	-0.03
16	14.52	436	14.75	-0.23	14.52	436	14.57	-0.05
17	0.91	27	0.91	0.00	0.91	27	0.90	0.01
18	1.92	57	1.93	-0.01	1.92	57	1.91	0.01
19	0.35	11	0.37	-0.02	0.35	11	0.37	-0.02
20	0.49	15	0.51	-0.02	0.49	15	0.50	-0.01
21	2.76	40	1.35	1.41	2.76	78	2.61	0.15
22	1.96	59	2.00	-0.04	1.96	59	1.97	-0.01
23	0.72	22	0.74	-0.02	0.72	22	0.74	-0.02
24	0.06	2	0.07	-0.01	0.06	0	0.00	0.06
30	9.91	297	10.05	-0.14	9.91	297	9.93	-0.02
Total	100.00	2,956	100.00	0.00	100.00	2,992	100.00	0.00

Note. 1. Allegany; 2. Anne Arundel; 3. Baltimore; 4. Calvert; 5. Caroline; 6. Carroll; 7. Cecil; 8. Charles; 9. Dorchester; 10. Frederick; 11. Garrett; 12. Harford; 13. Howard; 14. Kent; 15. Montgomery; 16. Prince George's; 17. Queen Anne's; 18. St. Mary's; 19. Somerset; 20. Talbot; 21. Washington; 22. Wicomico; 23. Worcester; 24. LEA 24; 30. Baltimore City

Table A.2 2009 MSA-Math Population and Stratified Random Sampling (S.R.S.): Grade 3 Ethnicity

Race	Operational Form A				Operational Form F			
	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.
1	0.42	13	0.44	-0.02	0.42	7	0.23	0.18
2	6.44	166	5.62	0.82	6.44	185	6.18	0.25
3	37.56	1,072	36.27	1.30	37.56	1,165	38.94	-1.38
4	45.46	1,431	48.41	-2.95	45.46	1,355	45.29	0.17
5	10.02	270	9.13	0.89	10.02	279	9.32	0.69
Miss	0.10	4	0.14	-0.03	0.10	1	0.03	0.07
Total	100.00	2,956	100.00	0.00	100.00	2,992	100.00	0.00

Note. 1. American Indian; 2. Asian American; 3. African American; 4. White; 5. Hispanic; Miss: Missing

Table A.3 2009 MSA- Mathematics Population and Stratified Random Sampling (S.R.S.): Grade 3 Gender

Gender	Operational Form A				Operational Form F			
	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.
F	51.21	1,526	51.62	-0.42	51.21	1,561	52.17	-0.96
M	48.72	1,430	48.38	0.35	48.72	1,430	47.79	0.93
Miss	0.07	0	0.00	0.07	0.07	1	0.03	0.03
Total	100.00	2,956	100.00	0.00	100.00	2,992	100.00	0.00

Note. F. Female; M. Male; Miss: Missing

Table A.4 2009 MSA- Mathematics Population and Stratified Random Sampling (S.R.S.): Grade 4 LEA

LEA	Operational Form A				Operational Form F			
	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.
1	1.07	32	1.07	0.00	1.07	32	1.07	0.00
2	8.74	262	8.73	0.01	8.74	262	8.73	0.01
3	12.69	381	12.70	-0.01	12.69	381	12.70	-0.01
4	2.04	61	2.03	0.01	2.04	61	2.03	0.01
5	0.59	18	0.60	-0.01	0.59	18	0.60	-0.01
6	3.19	96	3.20	-0.01	3.19	96	3.20	-0.01
7	1.96	59	1.97	-0.01	1.96	59	1.97	-0.01
8	2.89	87	2.90	-0.01	2.89	87	2.90	-0.01
9	0.50	15	0.50	0.00	0.50	15	0.50	0.00
10	4.74	142	4.73	0.01	4.74	142	4.73	0.01
11	0.53	16	0.53	0.00	0.53	16	0.53	0.00
12	4.67	140	4.67	0.00	4.67	140	4.67	0.00
13	5.83	175	5.83	0.00	5.83	175	5.83	0.00
14	0.25	7	0.23	0.02	0.25	7	0.23	0.02
15	16.58	497	16.57	0.01	16.58	497	16.57	0.01
16	14.51	435	14.50	0.01	14.51	435	14.50	0.01
17	0.92	28	0.93	-0.01	0.92	28	0.93	-0.01
18	1.99	60	2.00	-0.01	1.99	60	2.00	-0.01
19	0.33	10	0.33	0.00	0.33	10	0.33	0.00
20	0.47	14	0.47	0.00	0.47	14	0.47	0.00
21	2.69	81	2.70	-0.01	2.69	81	2.70	-0.01
22	1.94	58	1.93	0.01	1.94	58	1.93	0.01
23	0.78	23	0.77	0.01	0.78	23	0.77	0.01
24	0.12	4	0.13	-0.01	0.12	4	0.13	-0.01
30	9.97	299	9.97	0.00	9.97	299	9.97	0.00
Total	100.00	3,000	100.00	0.00	100.00	3,000	100.00	0.00

Note. 1. Allegany; 2. Anne Arundel; 3. Baltimore; 4. Calvert; 5. Caroline; 6. Carroll; 7. Cecil; 8. Charles; 9. Dorchester; 10. Frederick; 11. Garrett; 12. Harford; 13. Howard; 14. Kent; 15. Montgomery; 16. Prince George's; 17. Queen Anne's; 18. St. Mary's; 19. Somerset; 20. Talbot; 21. Washington; 22. Wicomico; 23. Worcester; 24. LEA 24; 30. Baltimore City

Table A.5 2009 MSA- Mathematics Population and Stratified Random Sampling (S.R.S.): Grade 4 Ethnicity

Race	Operational Form A				Operational Form F			
	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.
1	0.39	10	0.33	0.06	0.39	9	0.30	0.09
2	6.07	160	5.33	0.74	6.07	182	6.07	0.00
3	38.20	1,151	38.37	-0.16	38.20	1,178	39.27	-1.06
4	45.65	1,384	46.13	-0.48	45.65	1,349	44.97	0.69
5	9.55	290	9.67	-0.12	9.55	278	9.27	0.28
Miss	0.14	5	0.17	-0.03	0.14	4	0.13	0.00
Total	100.00	3,000	100.00	0.00	100.00	3,000	100.00	0.00

Note. 1. American Indian; 2. Asian American; 3. African American; 4. White; 5. Hispanic; Miss: Missing

Table A.6 2009 MSA- Mathematics Population and Stratified Random Sampling (S.R.S.): Grade 4 Gender

Gender	Operational Form A				Operational Form F			
	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.
F	51.26	1,516	50.53	0.73	51.26	1,515	50.50	0.76
M	48.63	1,478	49.27	-0.64	48.63	1,482	49.40	-0.77
Miss	0.11	6	0.20	-0.09	0.11	3	0.10	0.01
Total	100.00	3,000	100.00	0.00	100.00	3,000	100.00	0.00

Note. F. Female; M. Male; Miss: Missing

Table A.7 2009 MSA-Math Population and Stratified Random Sampling (S.R.S.): Grade 5 LEA

LEA	Operational Form A				Operational Form F			
	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.
1	1.12	33	1.15	-0.03	1.12	33	1.14	-0.02
2	8.72	262	9.12	-0.40	8.72	262	9.01	-0.29
3	12.31	369	12.84	-0.53	12.31	369	12.69	-0.38
4	2.06	62	2.16	-0.10	2.06	62	2.13	-0.07
5	0.59	18	0.63	-0.04	0.59	18	0.62	-0.03
6	3.37	101	3.51	-0.14	3.37	101	3.47	-0.10
7	2.01	60	2.09	-0.08	2.01	60	2.06	-0.05
8	3.14	94	3.27	-0.13	3.14	94	3.23	-0.09
9	0.46	14	0.49	-0.03	0.46	14	0.48	-0.02
10	4.82	145	5.05	-0.23	4.82	145	4.99	-0.17
11	0.51	10	0.35	0.16	0.51	15	0.52	-0.01
12	4.80	144	5.01	-0.21	4.80	144	4.95	-0.15
13	6.21	186	6.47	-0.26	6.21	186	6.40	-0.19
14	0.24	7	0.24	0.00	0.24	7	0.24	0.00
15	16.49	495	17.22	-0.73	16.49	495	17.03	-0.54
16	14.59	438	15.24	-0.65	14.59	438	15.07	-0.48
17	0.88	27	0.94	-0.06	0.88	27	0.93	-0.05
18	1.93	58	2.02	-0.09	1.93	58	2.00	-0.07
19	0.27	8	0.28	-0.01	0.27	8	0.28	-0.01
20	0.48	14	0.49	-0.01	0.48	14	0.48	0.00
21	2.67	0	0.00	2.67	2.67	11	0.38	2.29
22	1.88	56	1.95	-0.07	1.88	56	1.93	-0.05
23	0.76	23	0.80	-0.04	0.76	23	0.79	-0.03
24	0.14	4	0.14	0.00	0.14	0	0.00	0.14
30	9.54	246	8.56	0.98	9.54	267	9.18	0.36
Total	100.00	2,874	100.00	0.00	100.00	2,907	100.00	0.00

Note. 1. Allegany; 2. Anne Arundel; 3. Baltimore; 4. Calvert; 5. Caroline; 6. Carroll; 7. Cecil; 8. Charles; 9. Dorchester; 10. Frederick; 11. Garrett; 12. Harford; 13. Howard; 14. Kent; 15. Montgomery; 16. Prince George's; 17. Queen Anne's; 18. St. Mary's; 19. Somerset; 20. Talbot; 21. Washington; 22. Wicomico; 23. Worcester; 24. LEA 24; 30. Baltimore City

Table A.8 2009 MSA- Mathematics Population and Stratified Random Sampling (S.R.S.): Grade 5 Ethnicity

Race	Operational Form A				Operational Form F			
	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.
1	0.36	8	0.28	0.08	0.36	6	0.21	0.15
2	6.15	183	6.37	-0.21	6.15	183	6.30	-0.14
3	38.18	1,090	37.93	0.25	38.18	1,121	38.56	-0.38
4	46.00	1,344	46.76	-0.76	46.00	1,339	46.06	-0.06
5	9.21	245	8.52	0.69	9.21	255	8.77	0.44
Miss	0.09	4	0.14	-0.05	0.09	3	0.10	-0.02
Total	100.00	2,874	100.00	0.00	100.00	2,907	100.00	0.00

Note. 1. American Indian; 2. Asian American; 3. African American; 4. White; 5. Hispanic; Miss: Missing

Table A.9 2009 MSA- Mathematics Population and Stratified Random Sampling (S.R.S.): Grade 5 Gender

Gender	Operational Form A				Operational Form F			
	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.
F	50.95	1,502	52.26	-1.32	50.95	1,455	50.05	0.89
M	48.97	1,366	47.53	1.44	48.97	1,448	49.81	-0.84
Miss	0.08	6	0.21	-0.13	0.08	4	0.14	-0.06
Total	100.00	2,874	100.00	0.00	100.00	2,907	100.00	0.00

Note. F. Female; M. Male; Miss: Missing

Table A.10 2009 MSA- Mathematics Population and Stratified Random Sampling (S.R.S.): Grade 6 LEA

LEA	Operational Form A				Operational Form F			
	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.
1	0.83	25	0.83	0.00	0.83	25	0.83	0.00
2	8.89	267	8.91	-0.02	8.89	267	8.91	-0.02
3	12.03	361	12.05	-0.02	12.03	361	12.05	-0.02
4	2.17	65	2.17	0.00	2.17	65	2.17	0.00
5	0.70	21	0.70	0.00	0.70	21	0.70	0.00
6	3.36	101	3.37	-0.01	3.36	101	3.37	-0.01
7	1.98	59	1.97	0.01	1.98	59	1.97	0.01
8	3.37	101	3.37	0.00	3.37	101	3.37	0.00
9	0.61	18	0.60	0.01	0.61	18	0.60	0.01
10	4.93	148	4.94	-0.01	4.93	148	4.94	-0.01
11	0.50	15	0.50	0.00	0.50	15	0.50	0.00
12	4.83	145	4.84	-0.01	4.83	145	4.84	-0.01
13	6.23	187	6.24	-0.01	6.23	187	6.24	-0.01
14	0.28	8	0.27	0.01	0.28	8	0.27	0.01
15	16.59	498	16.62	-0.03	16.59	498	16.62	-0.03
16	14.67	440	14.69	-0.02	14.67	440	14.69	-0.02
17	0.96	29	0.97	-0.01	0.96	29	0.97	-0.01
18	2.04	61	2.04	0.00	2.04	61	2.04	0.00
19	0.32	9	0.30	0.02	0.32	9	0.30	0.02
20	0.51	15	0.50	0.01	0.51	15	0.50	0.01
21	2.79	84	2.80	-0.01	2.79	84	2.80	-0.01
22	1.69	51	1.70	-0.01	1.69	51	1.70	-0.01
23	0.78	23	0.77	0.01	0.78	23	0.77	0.01
24	0.13	4	0.13	0.00	0.13	4	0.13	0.00
30	8.70	261	8.71	-0.01	8.70	261	8.71	-0.01
32	0.13	0	0.00	0.13	0.13	0	0.00	0.13
Total	100.00	2,996	100.00	0.00	100.00	2,996	100.00	0.00

Note. 1. Allegany; 2. Anne Arundel; 3. Baltimore; 4. Calvert; 5. Caroline; 6. Carroll; 7. Cecil; 8. Charles; 9. Dorchester; 10. Frederick; 11. Garrett; 12. Harford; 13. Howard; 14. Kent; 15. Montgomery; 16. Prince George's; 17. Queen Anne's; 18. St. Mary's; 19. Somerset; 20. Talbot; 21. Washington; 22. Wicomico; 23. Worcester; 24. LEA 24; 30. Baltimore City; 32. The Seed school

Table A.11 2009 MSA- Mathematics Population and Stratified Random Sampling (S.R.S.): Grade 6 Ethnicity

Race	Operational Form A				Operational Form F			
	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.
1	0.38	16	0.53	-0.15	0.38	12	0.40	-0.02
2	6.27	196	6.54	-0.28	6.27	181	6.04	0.23
3	37.74	1,058	35.31	2.43	37.74	1,071	35.75	2.00
4	45.98	1,435	47.90	-1.91	45.98	1,476	49.27	-3.28
5	9.44	286	9.55	-0.11	9.44	250	8.34	1.09
Miss	0.18	5	0.17	0.02	0.18	6	0.20	-0.02
Total	100.00	2,996	100.00	0.00	100.00	2,996	100.00	0.00

Note. 1. American Indian; 2. Asian American; 3. African American; 4. White; 5. Hispanic; Miss: Missing

Table A.12 2009 MSA- Mathematics Population and Stratified Random Sampling (S.R.S.): Grade 6 Gender

Gender	Operational Form A				Operational Form F			
	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.
F	50.98	1,534	51.20	-0.22	50.98	1,485	49.57	1.41
M	48.90	1,458	48.66	0.23	48.90	1,507	50.30	-1.40
Miss	0.12	4	0.13	-0.01	0.12	4	0.13	-0.01
Total	100.00	2,996	100.00	0.00	100.00	2,996	100.00	0.00

Note. F. Female; M. Male; Miss: Missing

Table A.13 2009 MSA-Math Population and Stratified Random Sampling (S.R.S.): Grade 7 LEA

LEA	Operational Form A				Operational Form F			
	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.
1	0.69	21	0.74	-0.05	0.69	21	0.74	-0.05
2	8.86	266	9.38	-0.52	8.86	266	9.38	-0.52
3	12.15	365	12.87	-0.72	12.15	365	12.87	-0.72
4	2.15	65	2.29	-0.14	2.15	65	2.29	-0.14
5	0.58	17	0.60	-0.02	0.58	17	0.60	-0.02
6	3.52	106	3.74	-0.22	3.52	106	3.74	-0.22
7	1.95	59	2.08	-0.13	1.95	59	2.08	-0.13
8	3.32	100	3.53	-0.21	3.32	100	3.52	-0.20
9	0.53	16	0.56	-0.03	0.53	16	0.56	-0.03
10	4.94	148	5.22	-0.28	4.94	148	5.22	-0.28
11	0.54	16	0.56	-0.02	0.54	16	0.56	-0.02
12	4.88	146	5.15	-0.27	4.88	146	5.15	-0.27
13	6.36	191	6.74	-0.38	6.36	191	6.73	-0.37
14	0.22	7	0.25	-0.03	0.22	7	0.25	-0.03
15	16.89	507	17.88	-0.99	16.89	507	17.87	-0.98
16	14.68	440	15.52	-0.84	14.68	440	15.51	-0.83
17	1.03	31	1.09	-0.06	1.03	31	1.09	-0.06
18	2.02	60	2.12	-0.10	2.02	60	2.11	-0.09
19	0.34	0	0.00	0.34	0.34	1	0.04	0.30
20	0.53	16	0.56	-0.03	0.53	16	0.56	-0.03
21	2.71	0	0.00	2.71	2.71	0	0.00	2.71
22	1.55	46	1.62	-0.07	1.55	46	1.62	-0.07
23	0.77	23	0.81	-0.04	0.77	23	0.81	-0.04
24	0.18	5	0.18	0.00	0.18	5	0.18	0.00
30	8.61	184	6.49	2.12	8.61	185	6.52	2.09
Total	100.00	2,835	100.00	0.00	100.00	2,837	100.00	0.00

Note. 1. Allegany; 2. Anne Arundel; 3. Baltimore; 4. Calvert; 5. Caroline; 6. Carroll; 7. Cecil; 8. Charles; 9. Dorchester; 10. Frederick; 11. Garrett; 12. Harford; 13. Howard; 14. Kent; 15. Montgomery; 16. Prince George's; 17. Queen Anne's; 18. St. Mary's; 19. Somerset; 20. Talbot; 21. Washington; 22. Wicomico; 23. Worcester; 24. LEA 24; 30. Baltimore City

Table A.14 2009 MSA- Mathematics Population and Stratified Random Sampling (S.R.S.): Grade 7 Ethnicity

Race	Operational Form A				Operational Form F			
	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.
1	0.33	12	0.42	-0.09	0.33	9	0.32	0.01
2	6.11	139	4.90	1.21	6.11	152	5.36	0.75
3	37.27	1,054	37.18	0.09	37.27	1,056	37.22	0.05
4	46.84	1,336	47.13	-0.29	46.84	1,323	46.63	0.20
5	9.24	293	10.34	-1.09	9.24	294	10.36	-1.12
Miss	0.21	1	0.04	0.18	0.21	3	0.11	0.10
Total	100.00	2,835	100.00	0.00	100.00	2,837	100.00	0.00

Note. 1. American Indian; 2. Asian American; 3. African American; 4. White; 5. Hispanic; Miss: Missing

Table A.15 2009 MSA- Mathematics Population and Stratified Random Sampling (S.R.S.): Grade 7 Gender

Gender	Operational Form A				Operational Form F			
	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.
F	50.38	1,399	49.35	1.04	50.38	1,457	51.36	-0.97
M	49.47	1,435	50.62	-1.15	49.47	1,377	48.54	0.93
Miss	0.15	1	0.04	0.12	0.15	3	0.11	0.04
Total	100.00	2,835	100.00	0.00	100.00	2,837	100.00	0.00

Note. F. Female; M. Male; Miss: Missing

Table A.16 2009 MSA- Mathematics Population and Stratified Random Sampling (S.R.S.): Grade 8 LEA

LEA	Operational Form A				Operational Form F			
	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.
1	0.72	21	0.72	0.00	0.72	21	0.72	0.00
2	9.05	271	9.27	-0.22	9.05	271	9.27	-0.22
3	12.32	369	12.62	-0.30	12.32	369	12.62	-0.30
4	2.27	68	2.33	-0.06	2.27	68	2.33	-0.06
5	0.63	19	0.65	-0.02	0.63	19	0.65	-0.02
6	3.49	105	3.59	-0.10	3.49	105	3.59	-0.10
7	1.98	59	2.02	-0.04	1.98	59	2.02	-0.04
8	3.43	103	3.52	-0.09	3.43	103	3.52	-0.09
9	0.51	15	0.51	0.00	0.51	15	0.51	0.00
10	5.07	152	5.20	-0.13	5.07	152	5.20	-0.13
11	0.57	17	0.58	-0.01	0.57	17	0.58	-0.01
12	4.93	148	5.06	-0.13	4.93	148	5.06	-0.13
13	6.63	199	6.81	-0.18	6.63	199	6.81	-0.18
14	0.25	8	0.27	-0.02	0.25	8	0.27	-0.02
15	16.57	497	17.00	-0.43	16.57	497	17.00	-0.43
16	14.48	434	14.85	-0.37	14.48	434	14.85	-0.37
17	0.93	28	0.96	-0.03	0.93	28	0.96	-0.03
18	1.91	57	1.95	-0.04	1.91	57	1.95	-0.04
19	0.36	11	0.38	-0.02	0.36	11	0.38	-0.02
20	0.52	15	0.51	0.01	0.52	15	0.51	0.01
21	2.54	0	0.00	2.54	2.54	0	0.00	2.54
22	1.49	45	1.54	-0.05	1.49	45	1.54	-0.05
23	0.76	23	0.79	-0.03	0.76	23	0.79	-0.03
24	0.26	8	0.27	-0.01	0.26	8	0.27	-0.01
30	8.35	251	8.59	-0.24	8.35	251	8.59	-0.24
Total	100.00	2,923	100.00	0.00	100.00	2,923	100.00	0.00

Note. 1. Allegany; 2. Anne Arundel; 3. Baltimore; 4. Calvert; 5. Caroline; 6. Carroll; 7. Cecil; 8. Charles; 9. Dorchester; 10. Frederick; 11. Garrett; 12. Harford; 13. Howard; 14. Kent; 15. Montgomery; 16. Prince George's; 17. Queen Anne's; 18. St. Mary's; 19. Somerset; 20. Talbot; 21. Washington; 22. Wicomico; 23. Worcester; 24. LEA 24; 30. Baltimore City

Table A.17 2009 MSA- Mathematics Population and Stratified Random Sampling (S.R.S.): Grade 8 Ethnicity

Race	Operational Form A				Operational Form F			
	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.
1	0.39	16	0.55	-0.16	0.39	17	0.58	-0.19
2	5.92	148	5.06	0.85	5.92	169	5.78	0.13
3	37.50	1,088	37.22	0.28	37.50	1,103	37.74	-0.24
4	47.34	1,351	46.22	1.12	47.34	1,344	45.98	1.36
5	8.70	315	10.78	-2.07	8.70	287	9.82	-1.12
Miss	0.15	5	0.17	-0.02	0.15	3	0.10	0.05
Total	100.00	2,923	100.00	0.00	100.00	2,923	100.00	0.00

Note. 1. American Indian; 2. Asian American; 3. African American; 4. White; 5. Hispanic; Miss: Missing

Table A.18 2009 MSA- Mathematics Population and Stratified Random Sampling (S.R.S.): Grade 8 Gender

Gender	Operational Form A				Operational Form F			
	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.	2009 Pop. %	2009 S. R. S.	% of 2009 S. R. S.	% of Differ.
F	50.78	1,463	50.05	0.73	50.78	1,464	50.09	0.70
M	49.12	1,456	49.81	-0.70	49.12	1,458	49.88	-0.76
Miss	0.10	4	0.14	-0.04	0.10	1	0.03	0.07
Total	100.00	2,923	100.00	0.00	100.00	2,923	100.00	0.00

Note. F. Female; M. Male; Miss: Missing

APPENDIX B: SCALE SCORE HISTOGRAMS AND TUKEY CHARTS

Year 2006 Grade=3

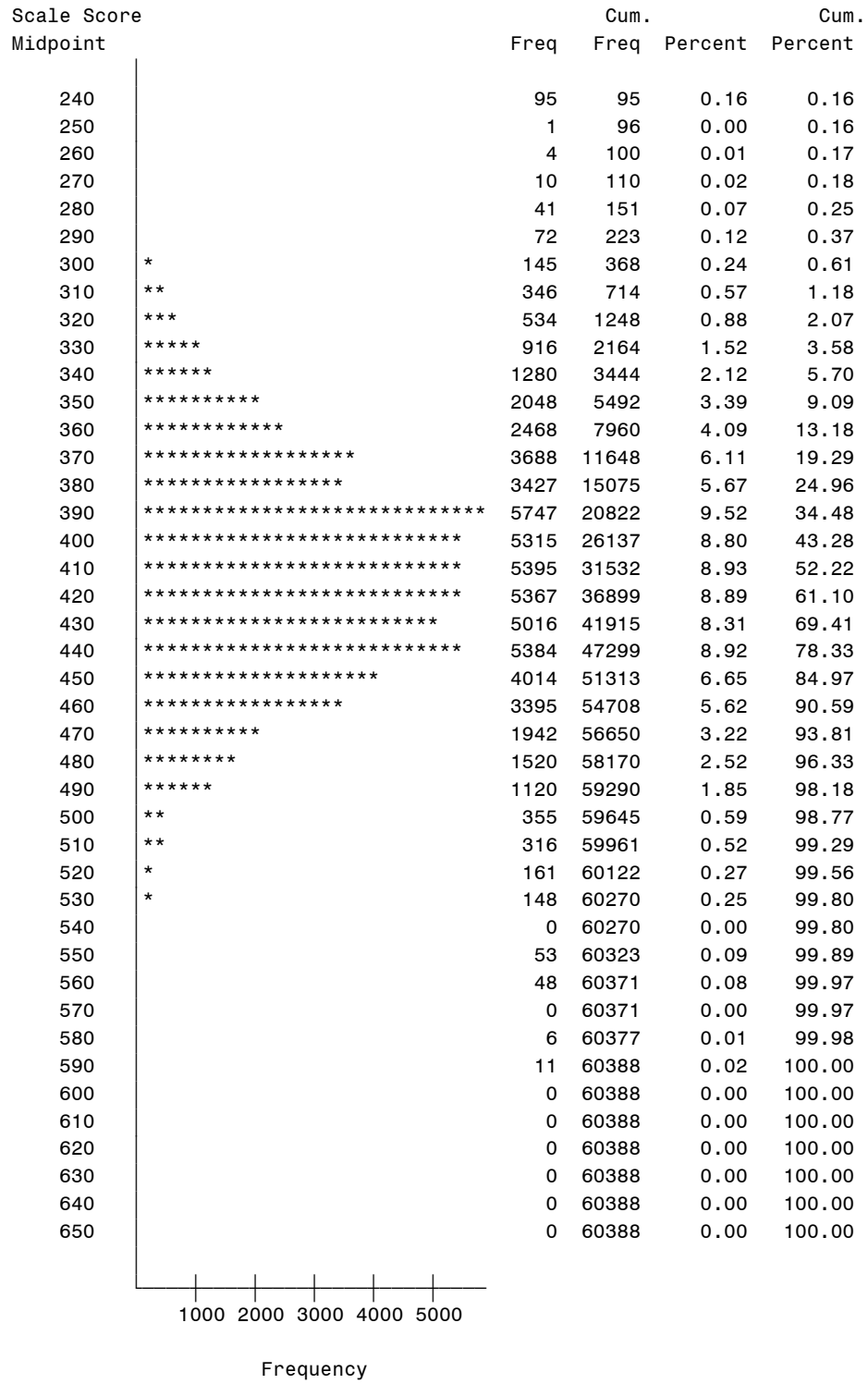


Figure B.1 Year 2006 Scale Score Distribution: Grade 3

Year 2009 Grade=3 Form=A

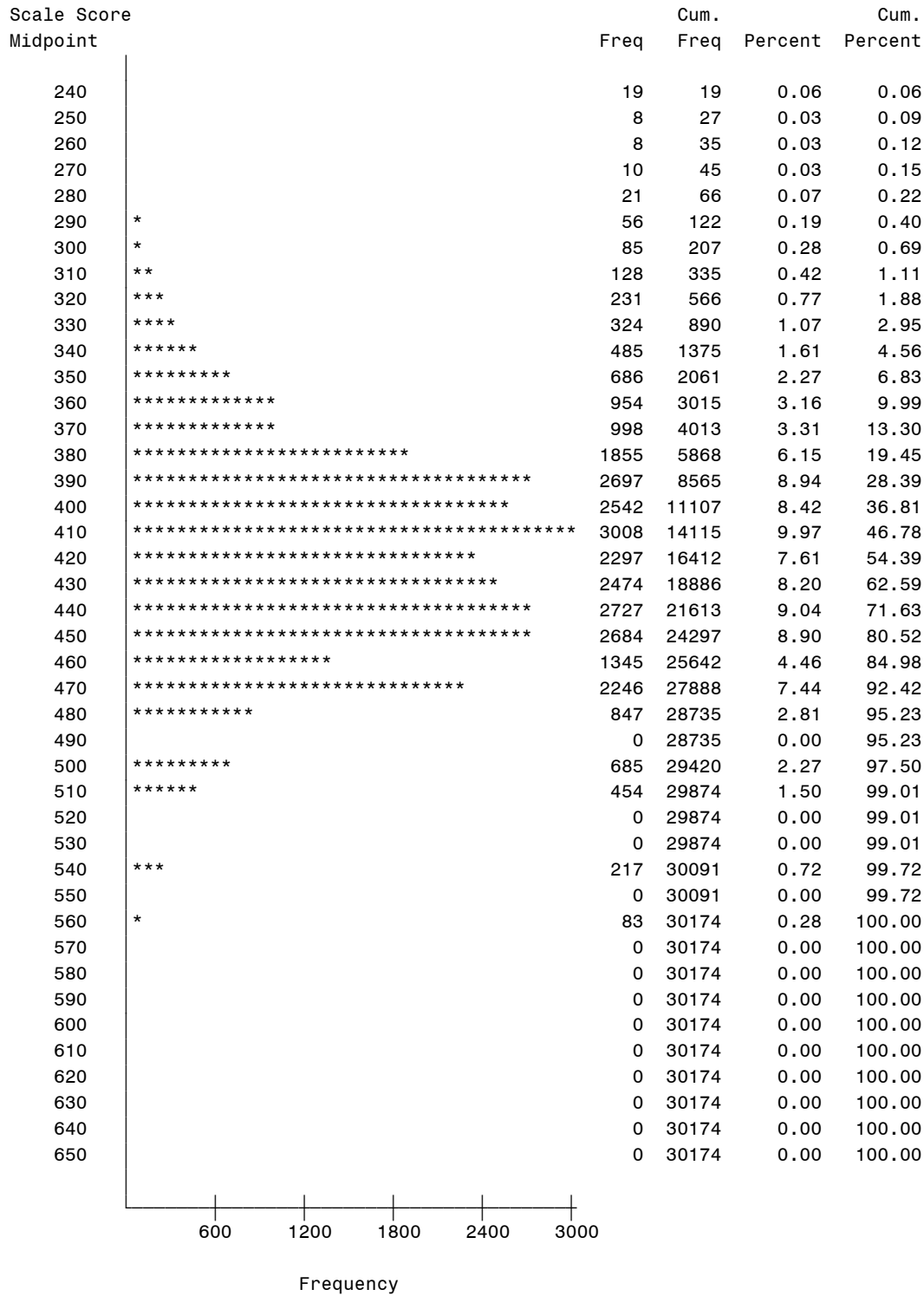


Figure B.2 Year 2009 Scale Score Distribution: Grade 3 Form A

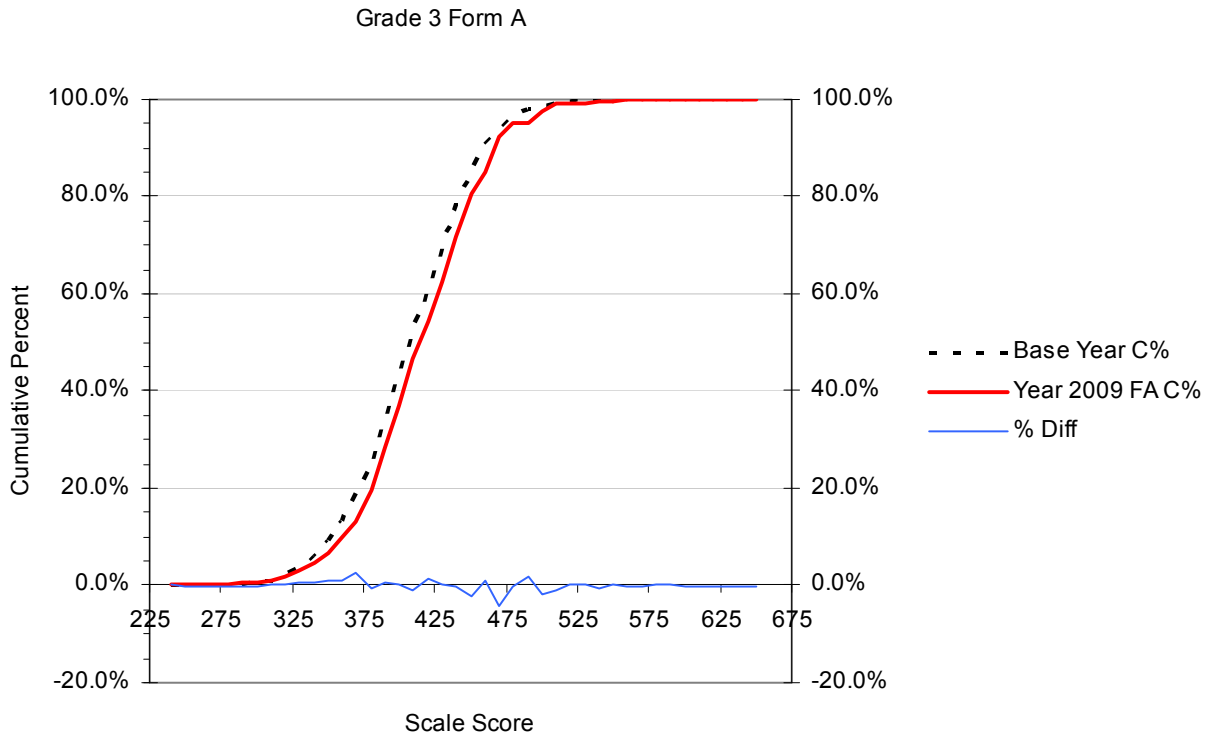


Figure B.3 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2009 Scale Scores with the Percent Differences between CDFs: Grade 3 Form A

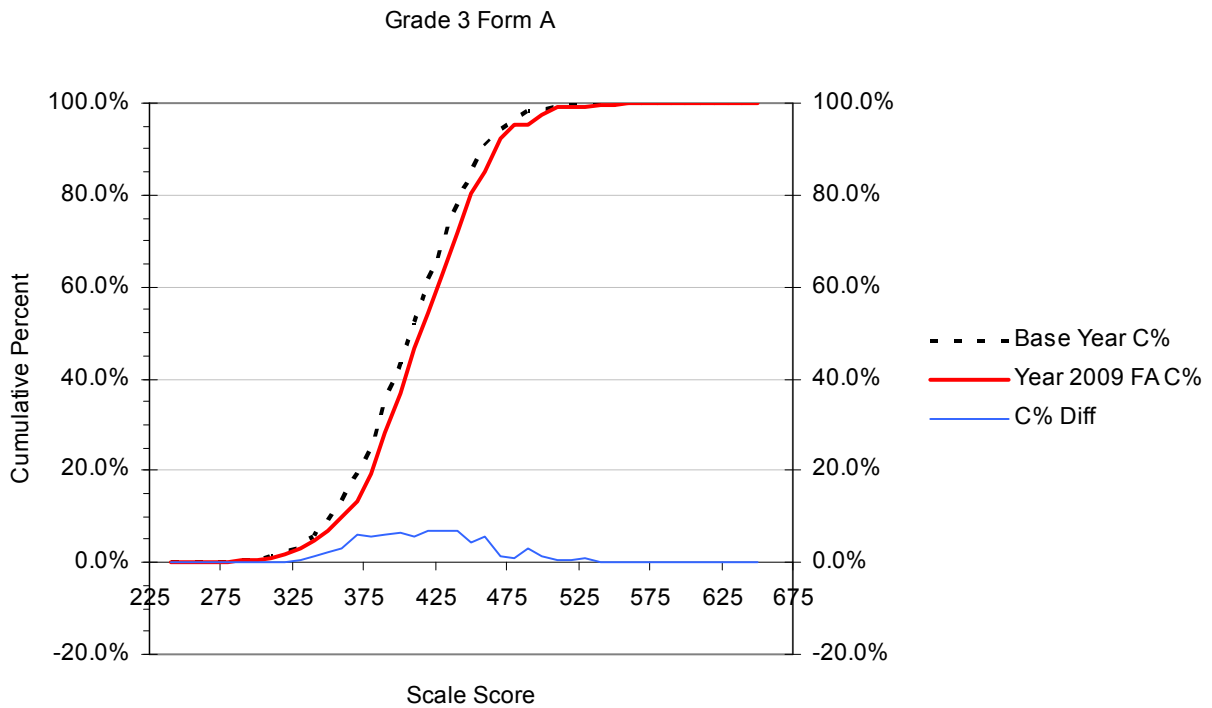


Figure B.4 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2009 Scale Scores with the Cumulative Percent Differences between CDFs: Grade 3 Form A

Year 2009 Grade=3 Form=F

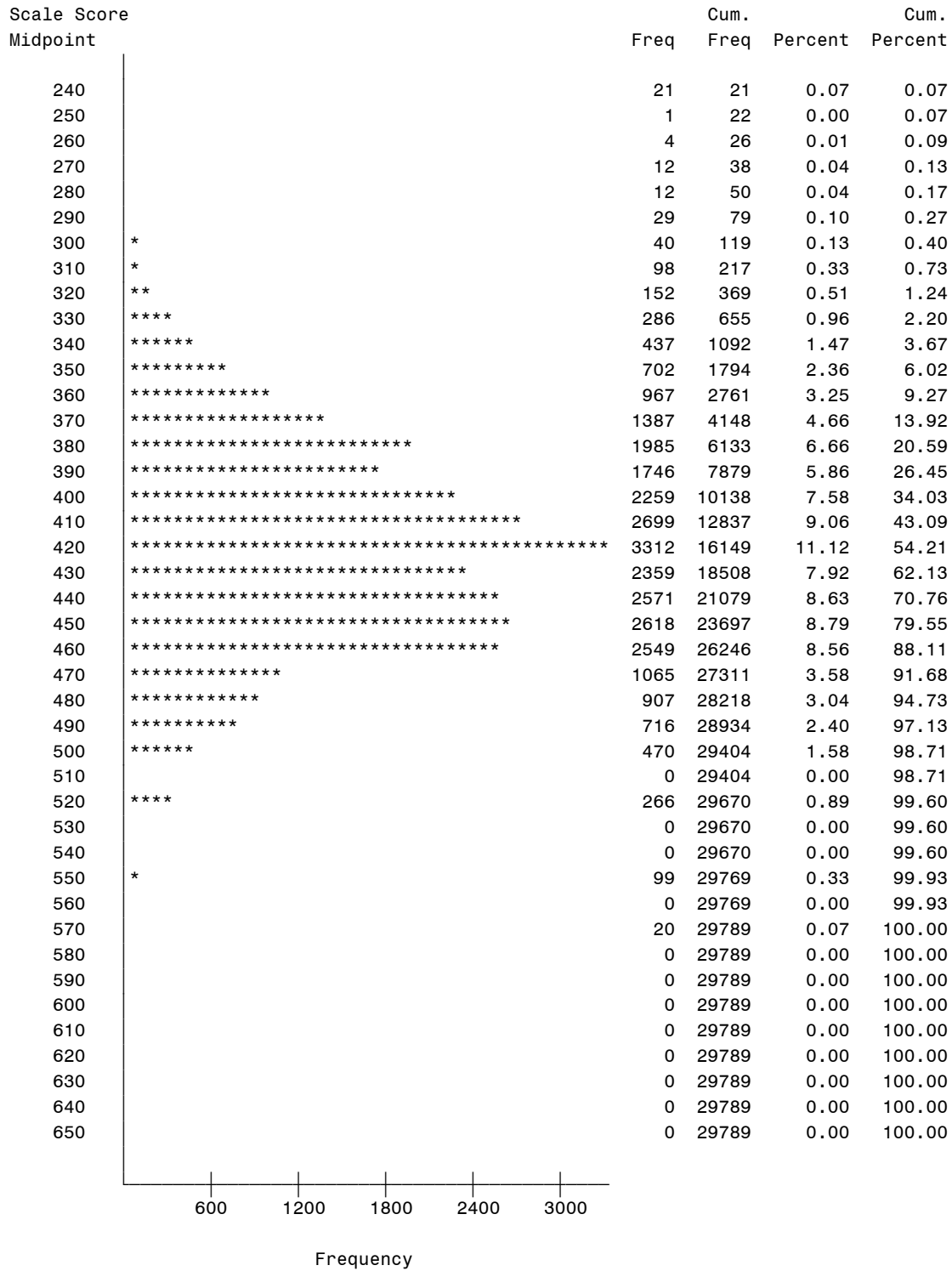


Figure B.5 Year 2009 Scale Score Distribution: Grade 3 Form F

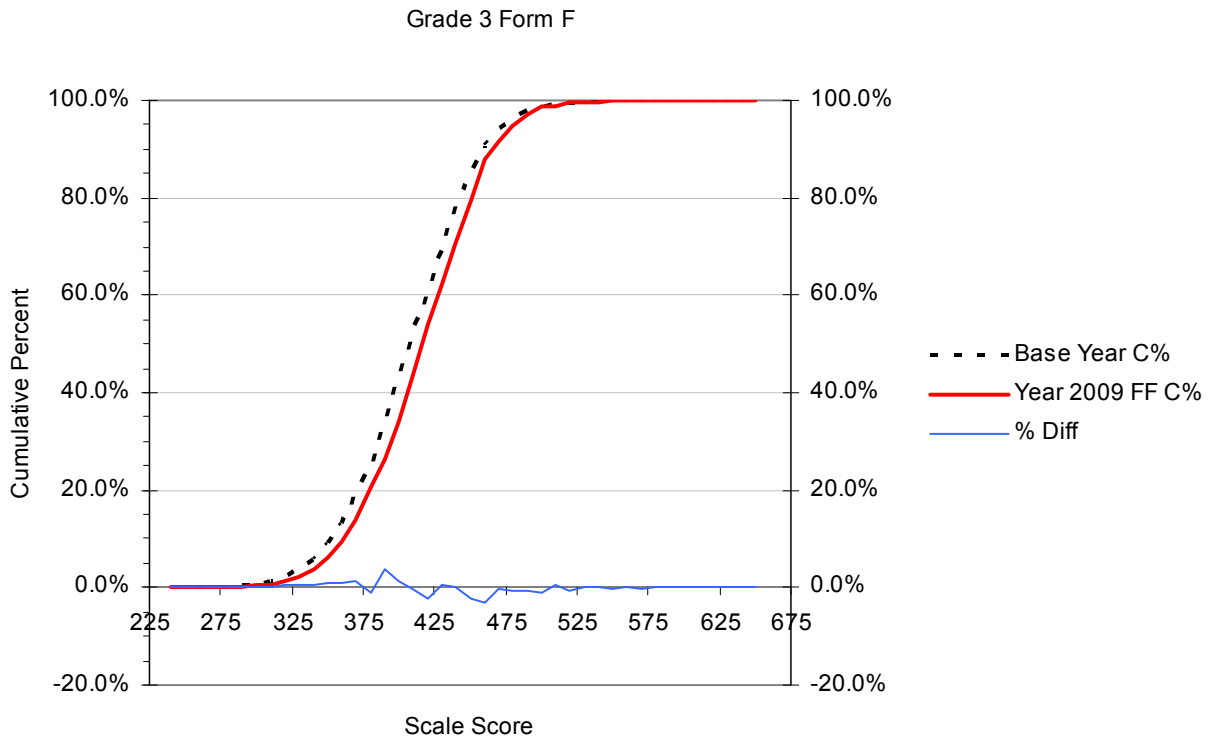


Figure B.6 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2009 Scale Scores with the Percent Differences between CDFs: Grade 3 Form F

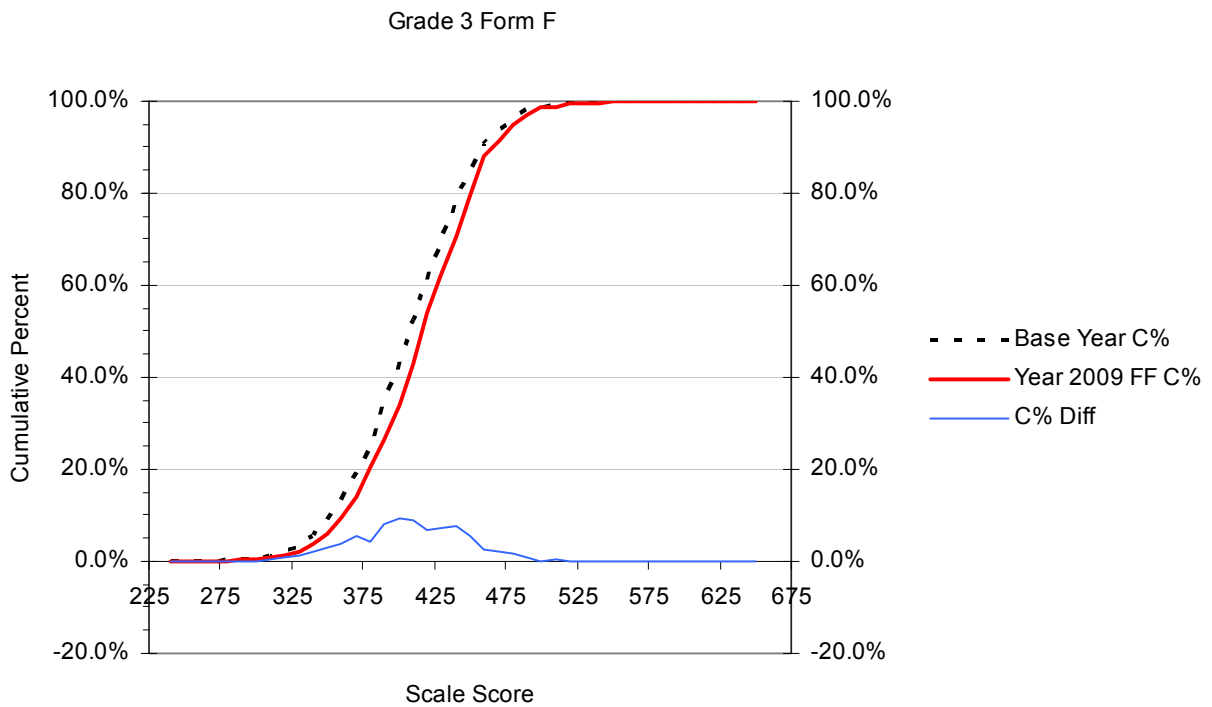


Figure B.7 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2009 Scale Scores with the Cumulative Percent Differences between CDFs: Grade 3 Form F

Year 2006 Grade=4

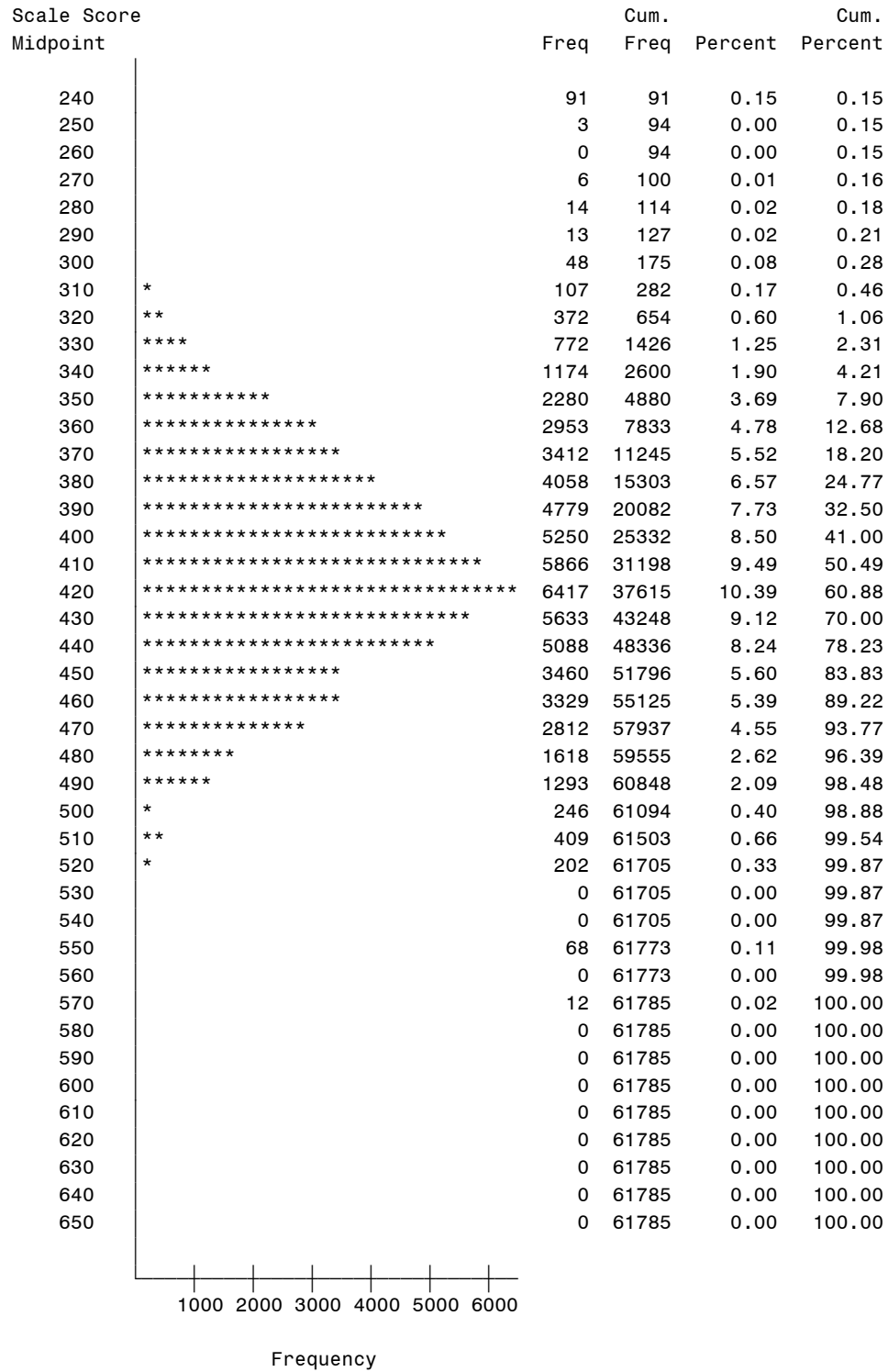


Figure B.8 Year 2006 Scale Score Distribution: Grade 4

Year 2009 Grade=4 Form=A

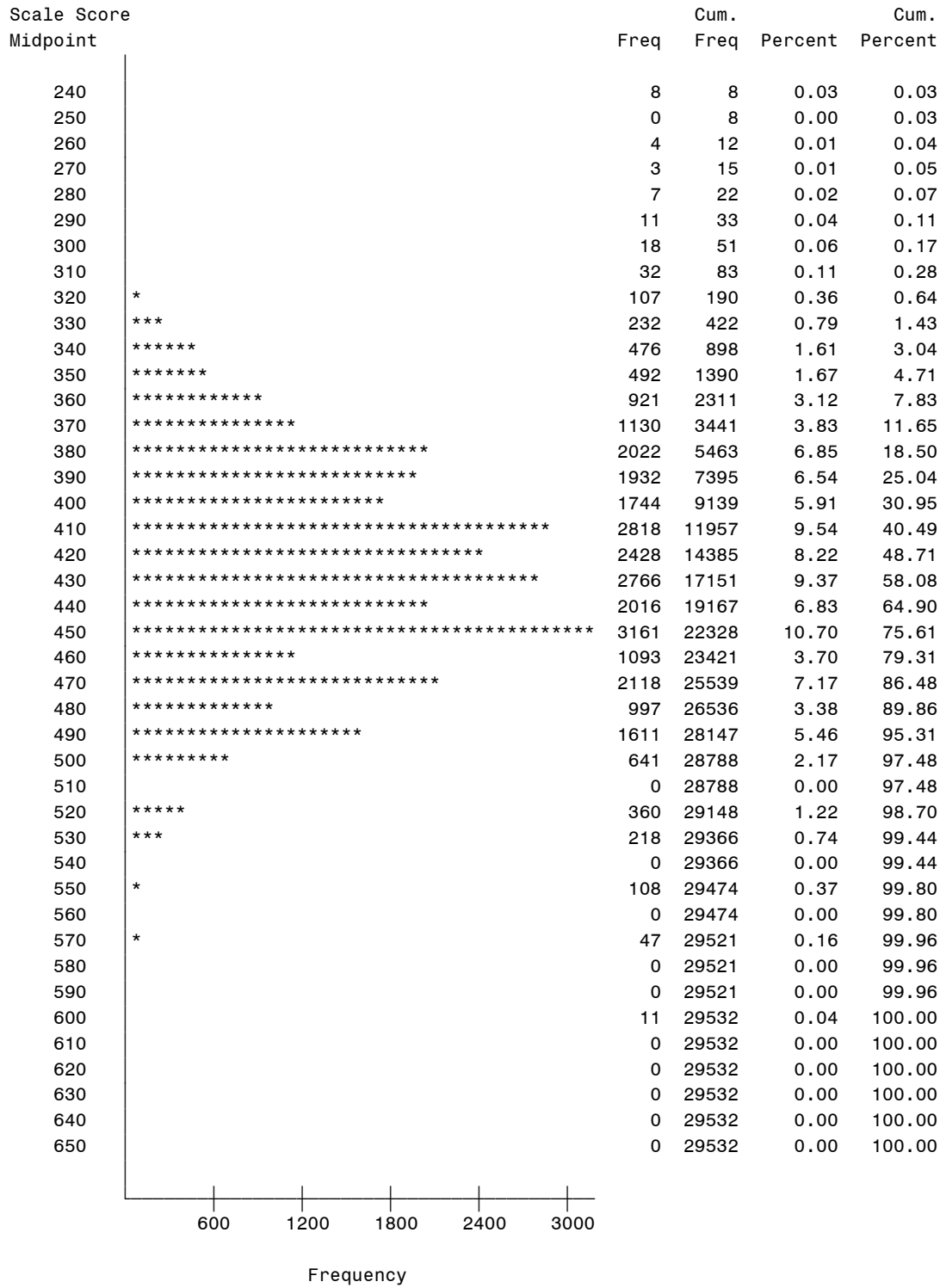


Figure B.9 Year 2009 Scale Score Distribution: Grade 4 Form A

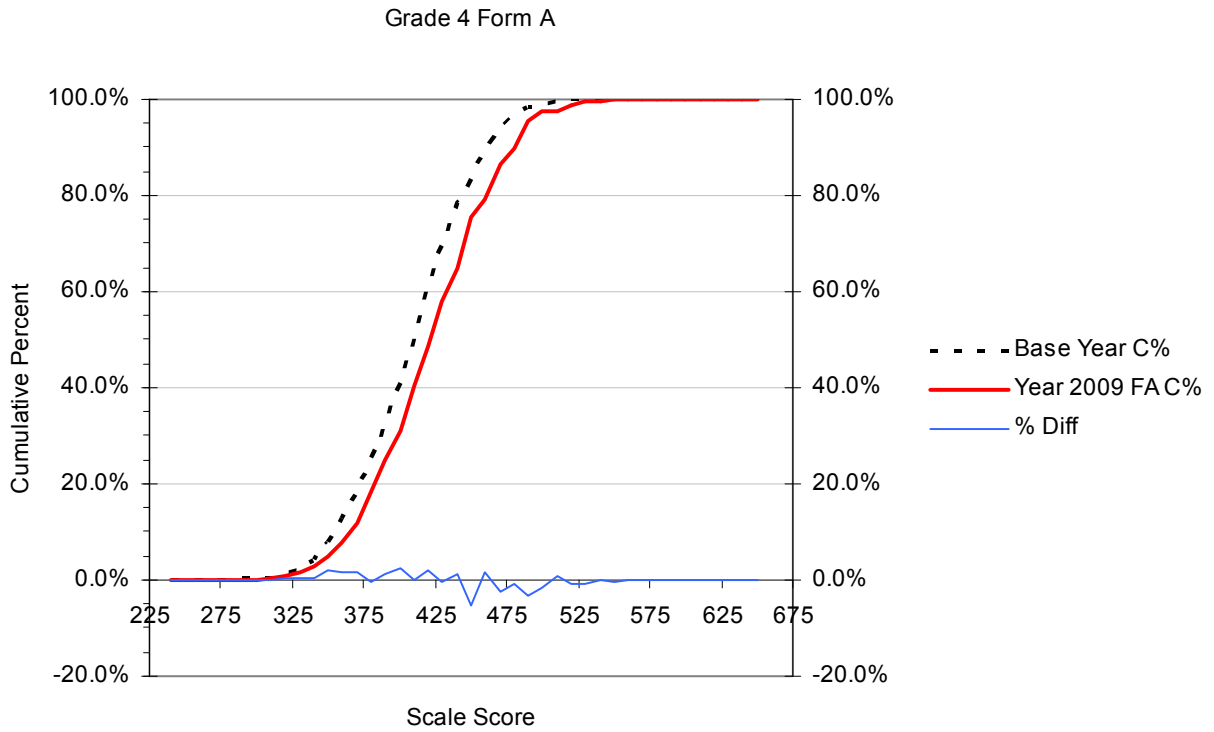


Figure B.10 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2009 Scale Scores with the Percent Differences between CDFs: Grade 4 Form A

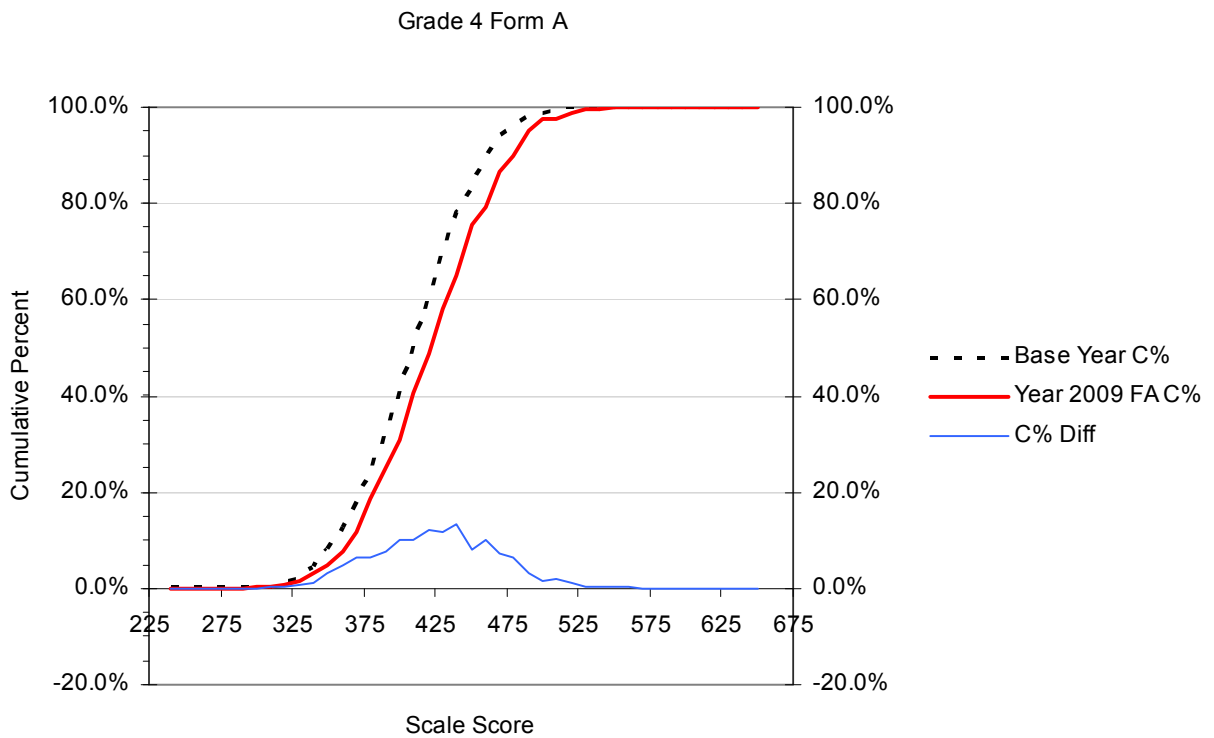


Figure B.11 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2009 Scale Scores with the Cumulative Percent Differences between CDFs: Grade 4 Form A

Year 2009 Grade=4 Form=F

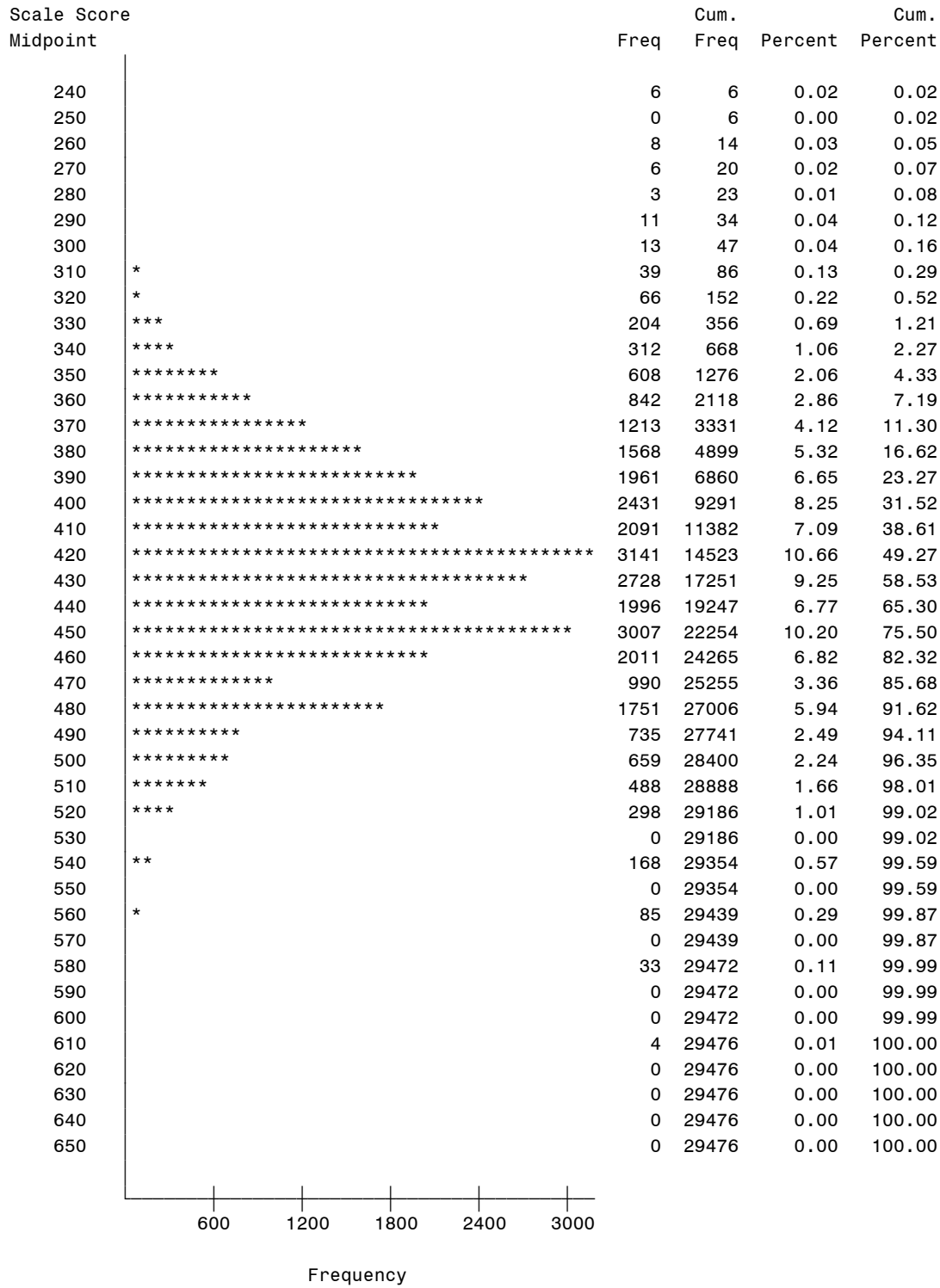


Figure B.12 Year 2009 Scale Score Distribution: Grade 4 Form F

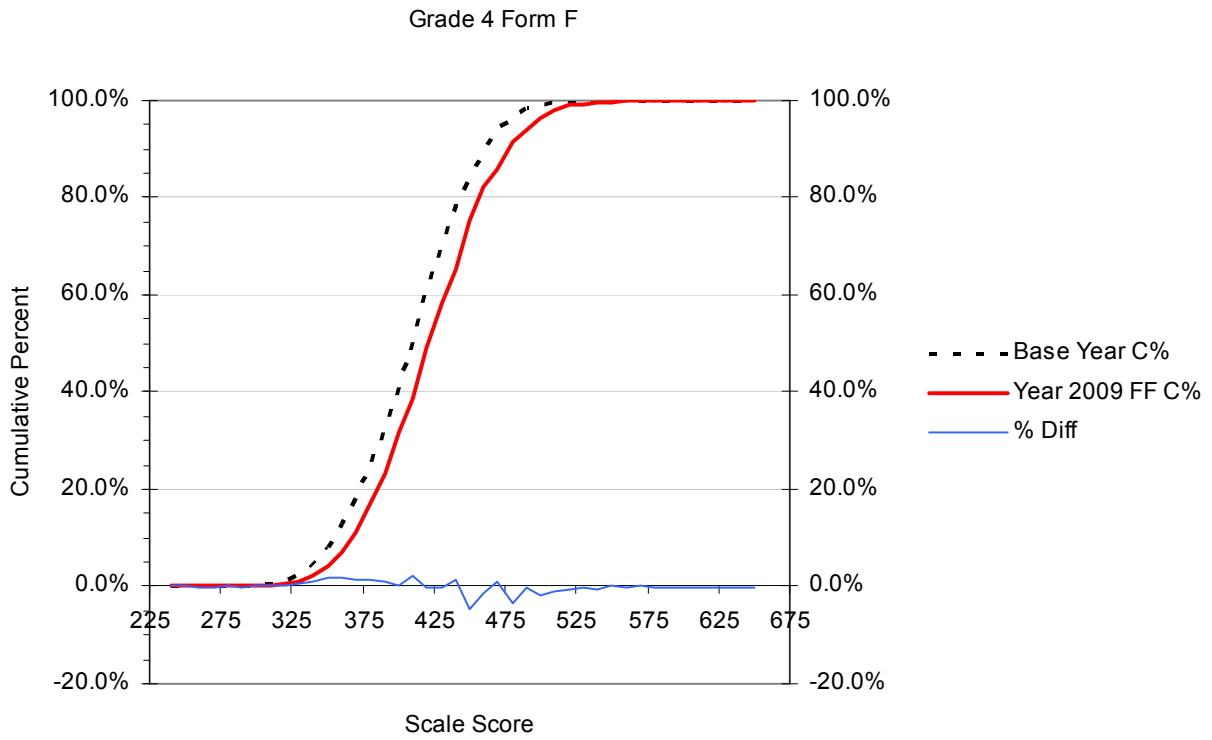


Figure B.13 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2009 Scale Scores with the Percent Differences between CDFs: Grade 4 Form F

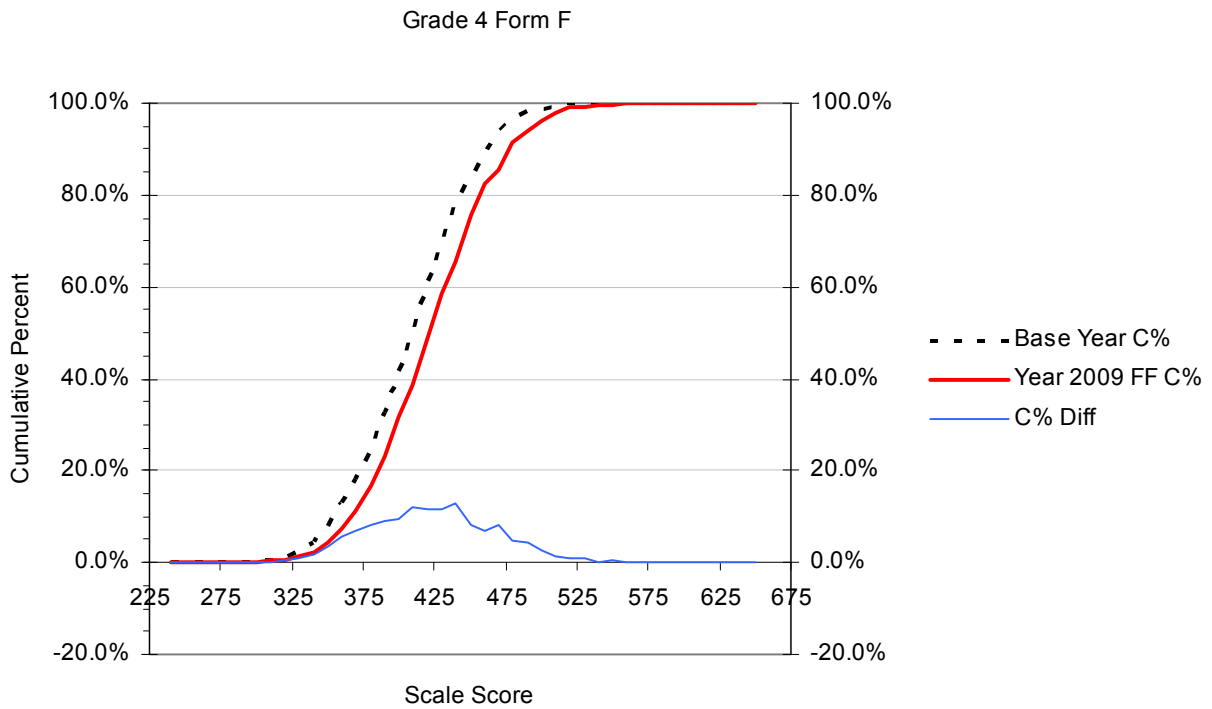


Figure B.14 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2009 Scale Scores with the Cumulative Percent Differences between CDFs: Grade 4 Form F

Year 2006 Grade=5

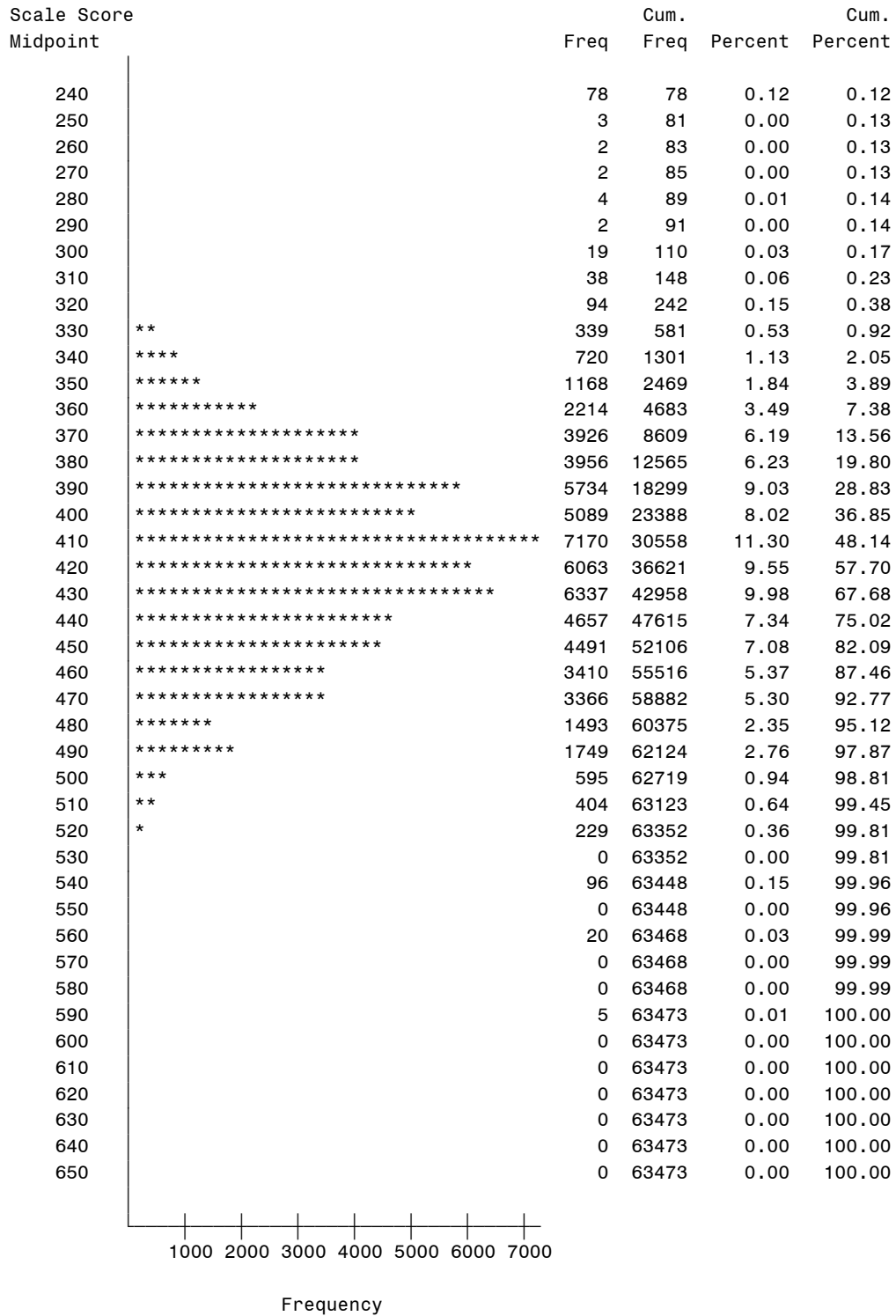


Figure B.15 Year 2006 Scale Score Distribution: Grade 5

Year 2009 Grade=5 Form=A

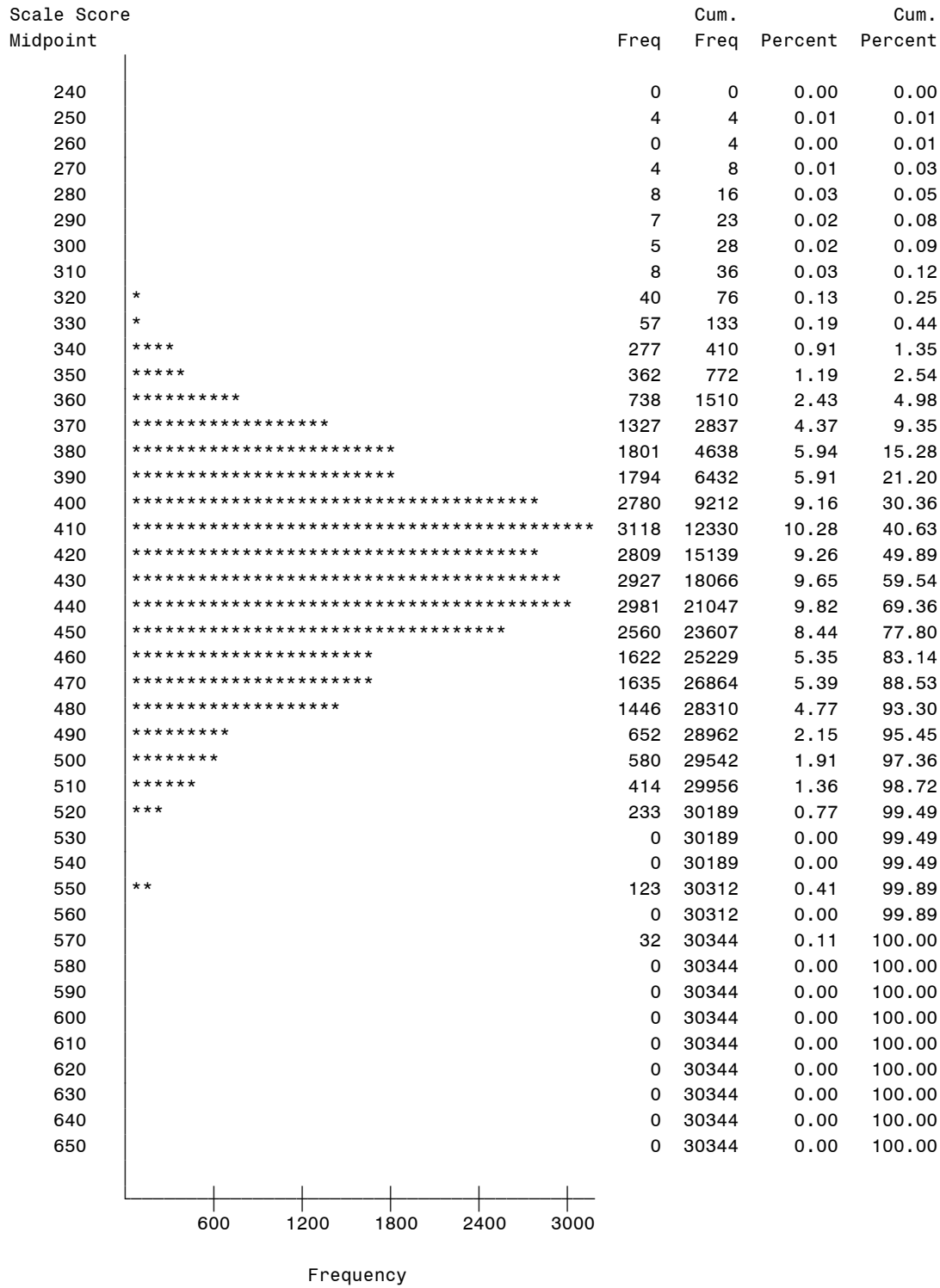


Figure B.16 Year 2009 Scale Score Distribution: Grade 5 Form A

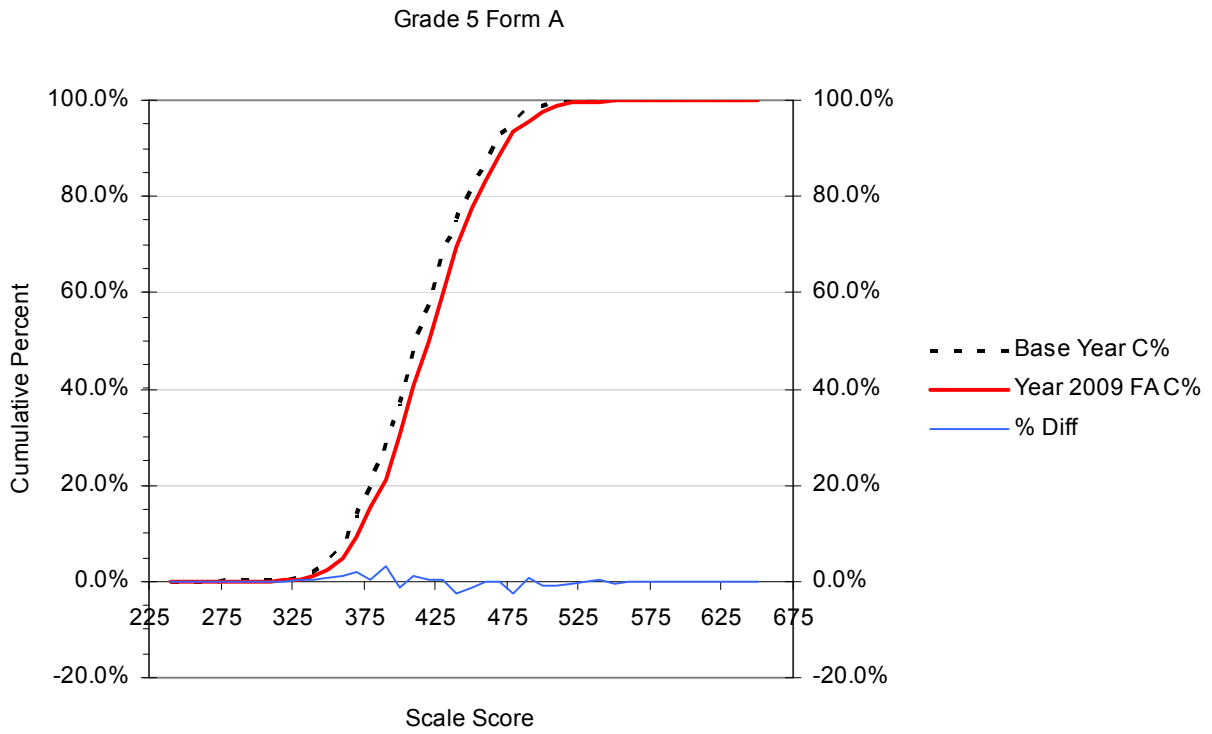


Figure B.17 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2009 Scale Scores with the Percent Differences between CDFs: Grade 5 Form A

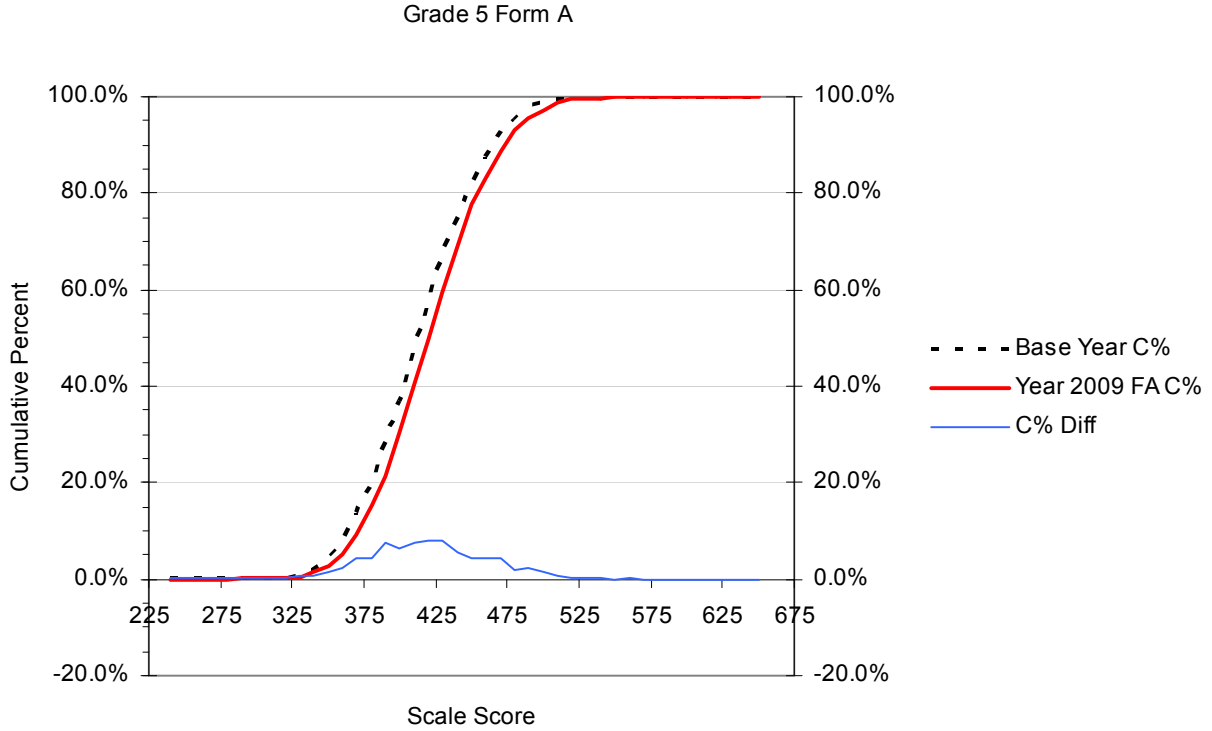


Figure B.18 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2009 Scale Scores with the Cumulative Percent Differences between CDFs: Grade 5 Form A

Year 2009 Grade=5 Form=F

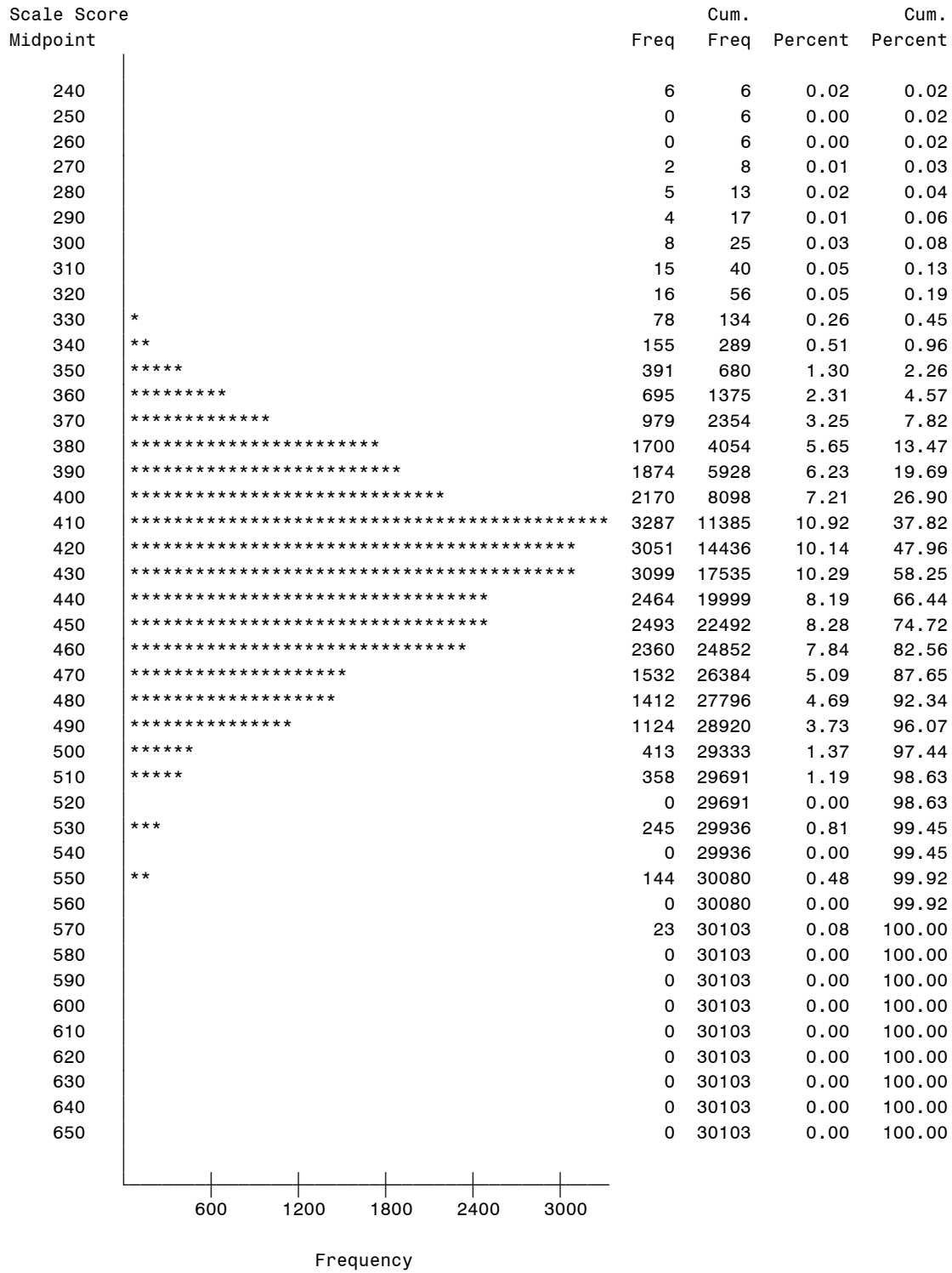


Figure B.19 Year 2009 Scale Score Distribution: Grade 5 Form F

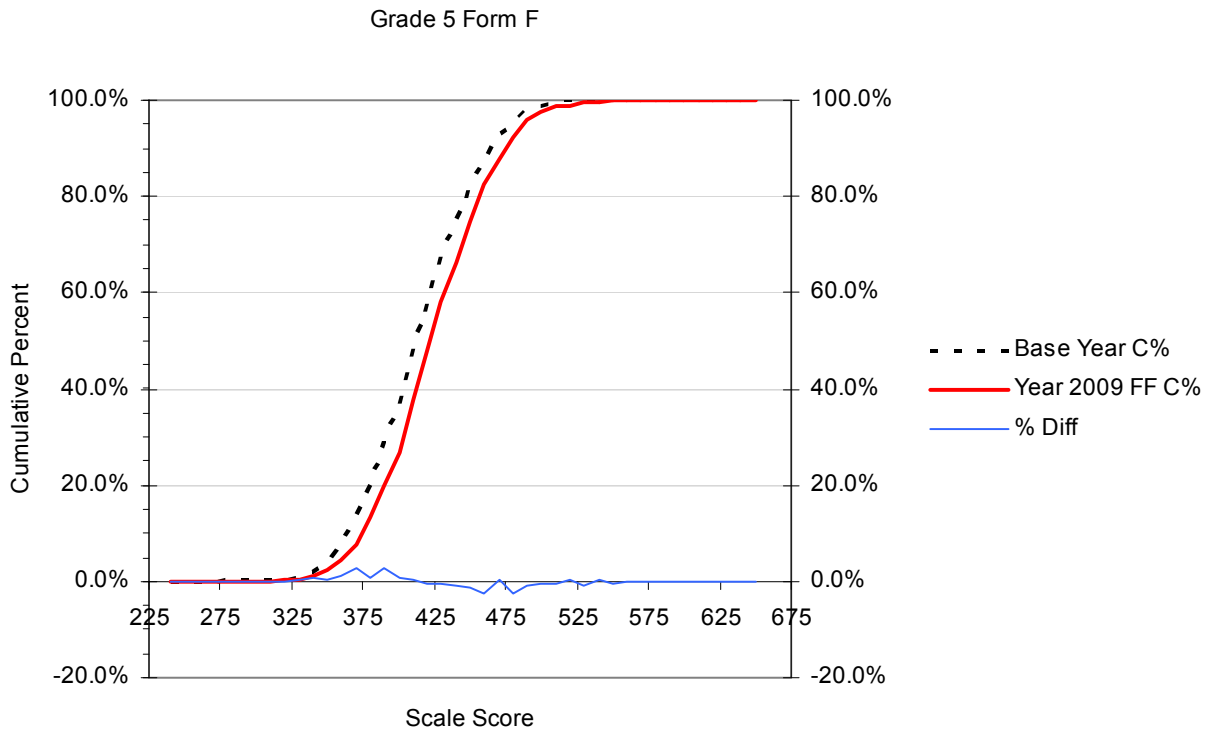


Figure B.20 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2009 Scale Scores with the Percent Differences between CDFs: Grade 5 Form F

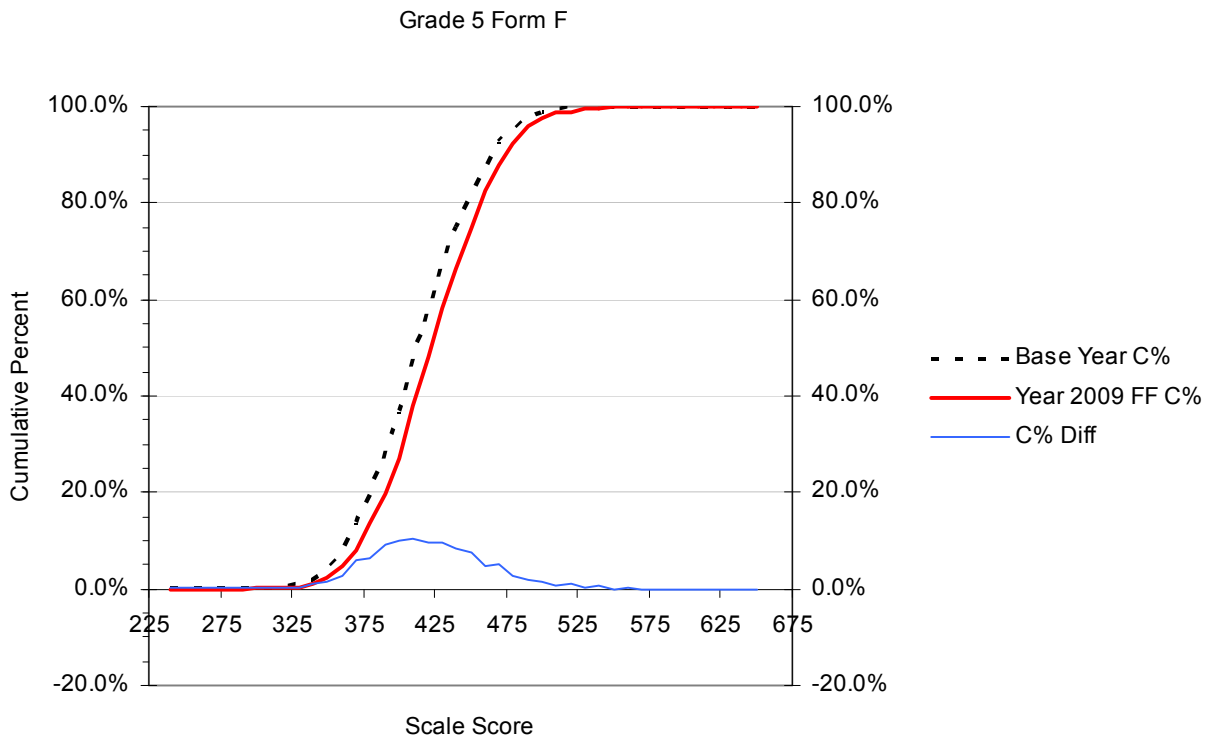


Figure B.21 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2009 Scale Scores with the Cumulative Percent Differences between CDFs: Grade 5 Form F

Year 2006 Grade=6

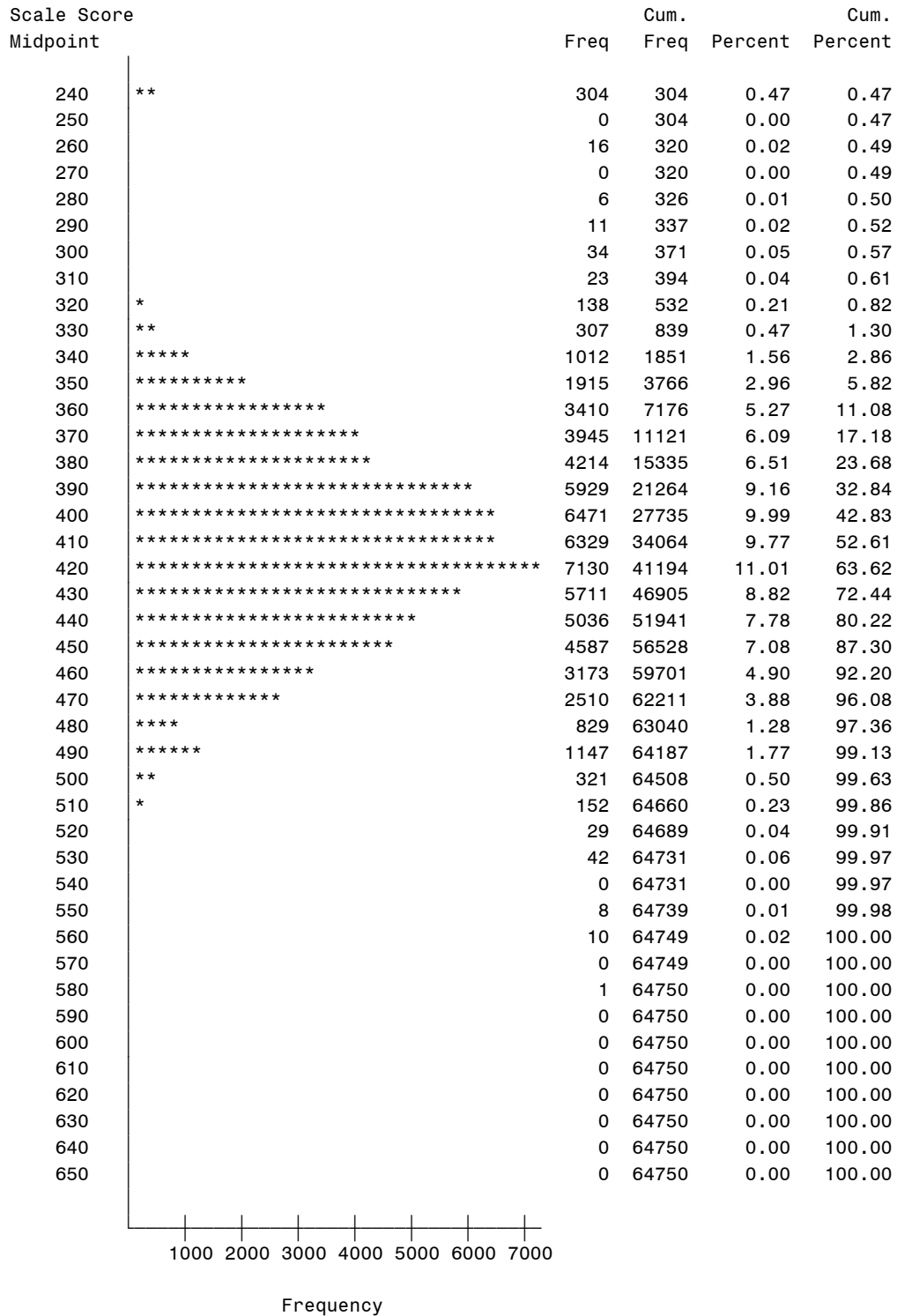


Figure B.22 Year 2006 Scale Score Distribution: Grade 6

Year 2009 Grade=6 Form=A

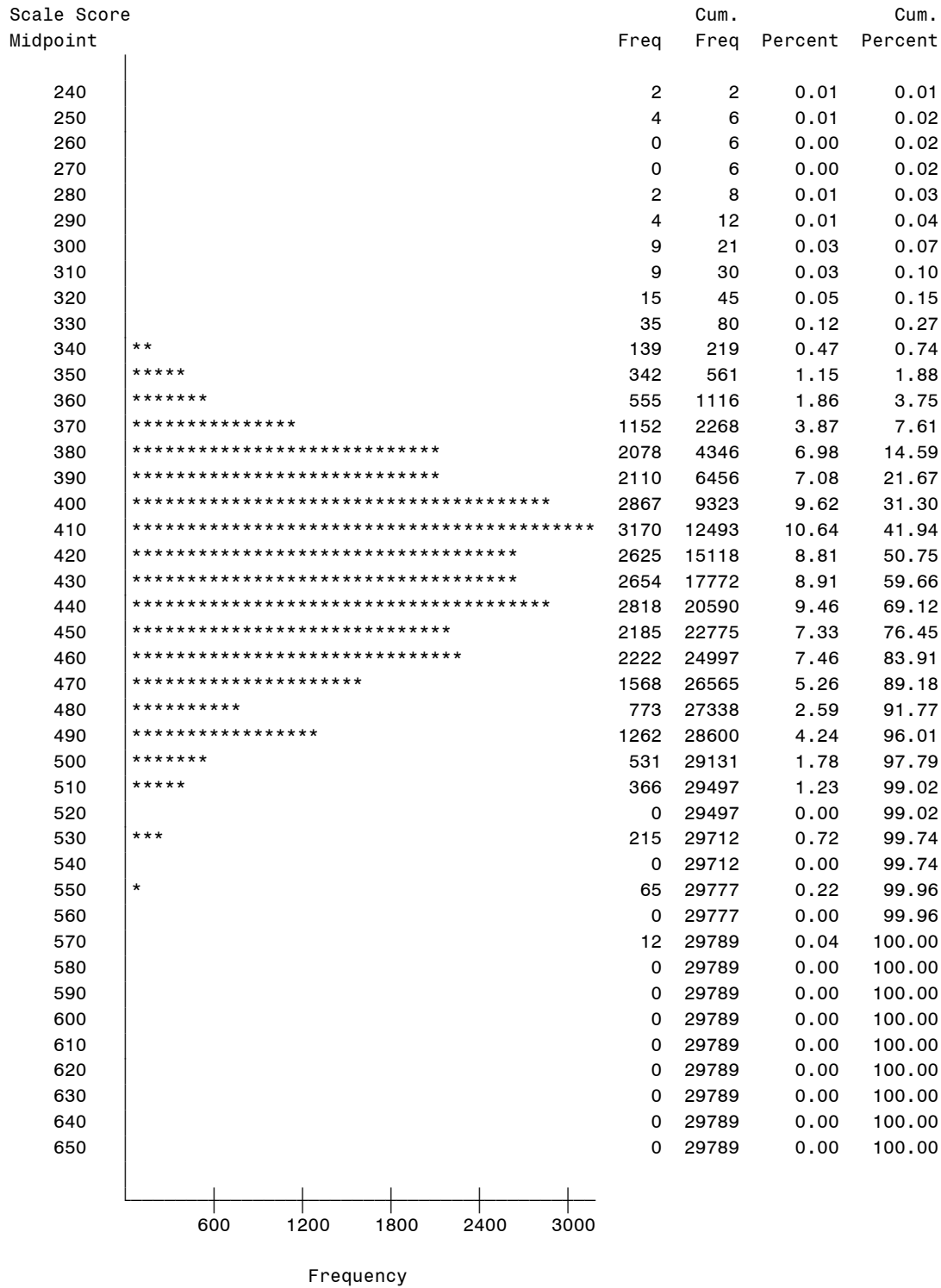


Figure B.23 Year 2009 Scale Score Distribution: Grade 6 Form A

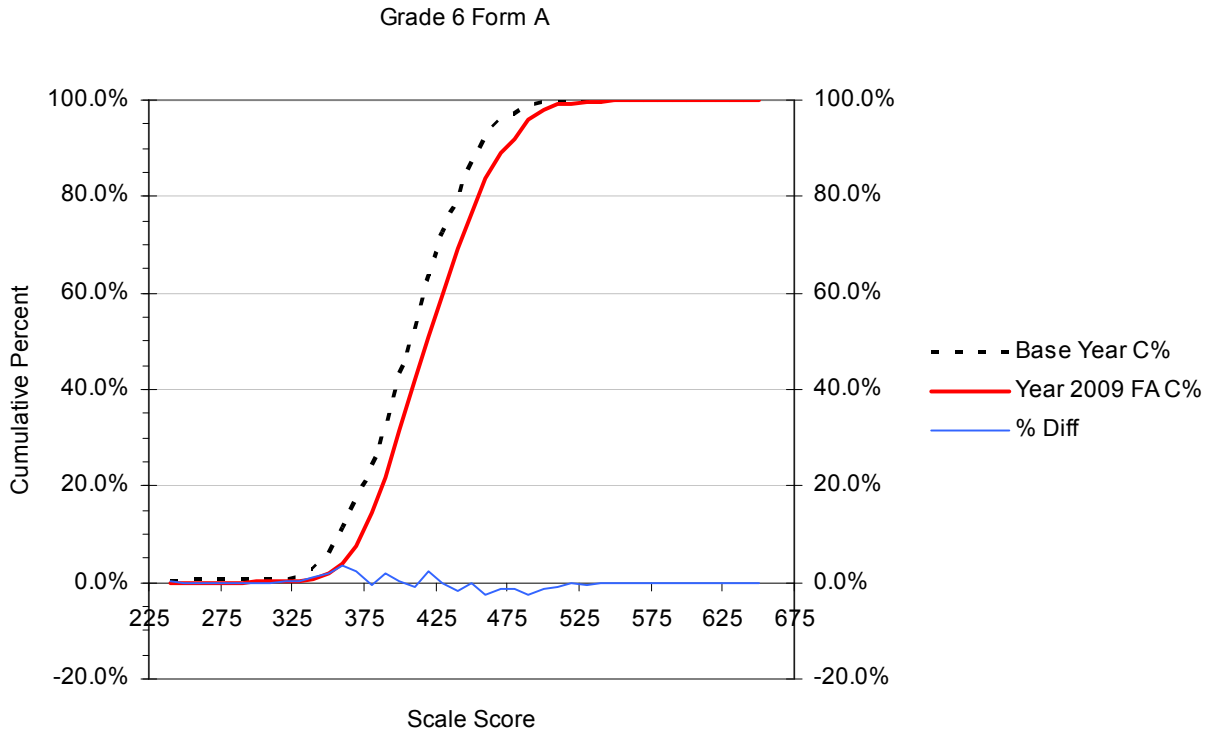


Figure C.24 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2009 Scale Scores with the Percent Differences between CDFs: Grade 6 Form A

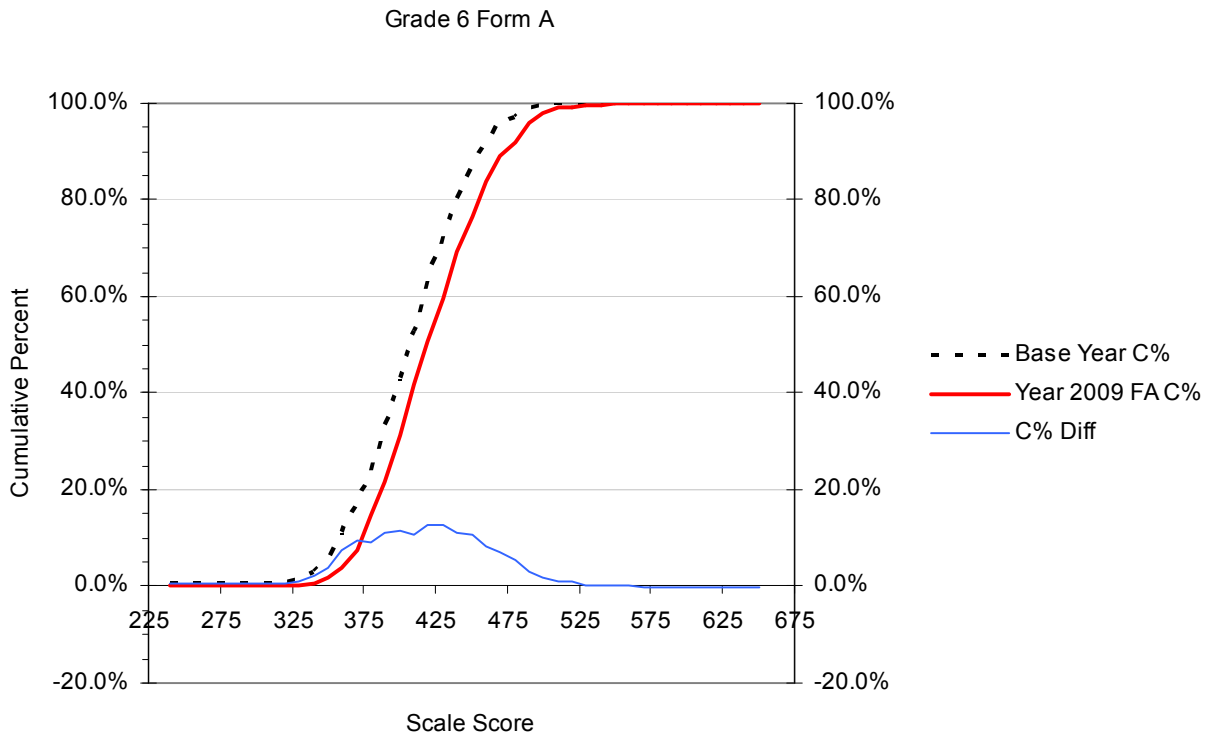


Figure B.25 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2009 Scale Scores with the Cumulative Percent Differences between CDFs: Grade 6 Form A

Year 2009 Grade=6 Form=F

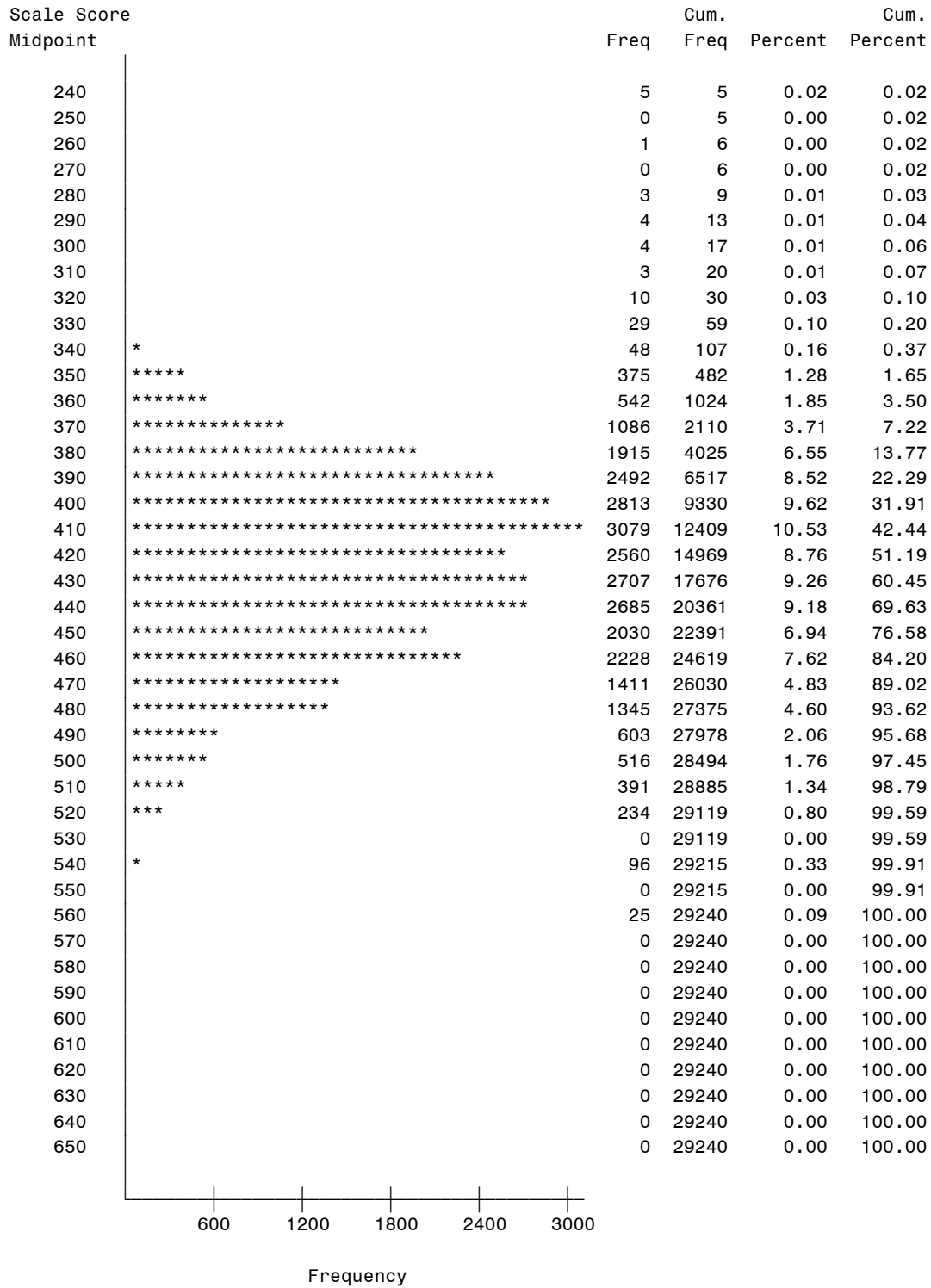


Figure B.26 Year 2009 Scale Score Distribution: Grade 6 Form F

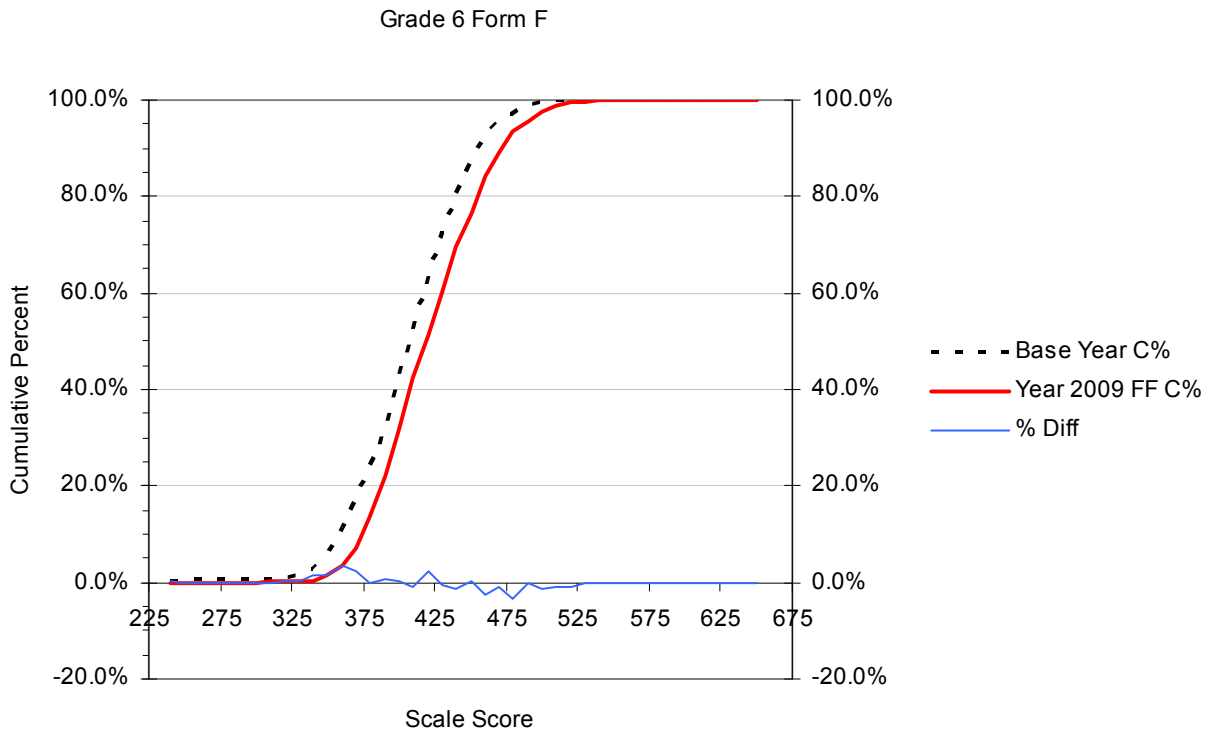


Figure C.27 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2009 Scale Scores with the Percent Differences between CDFs: Grade 6 Form F

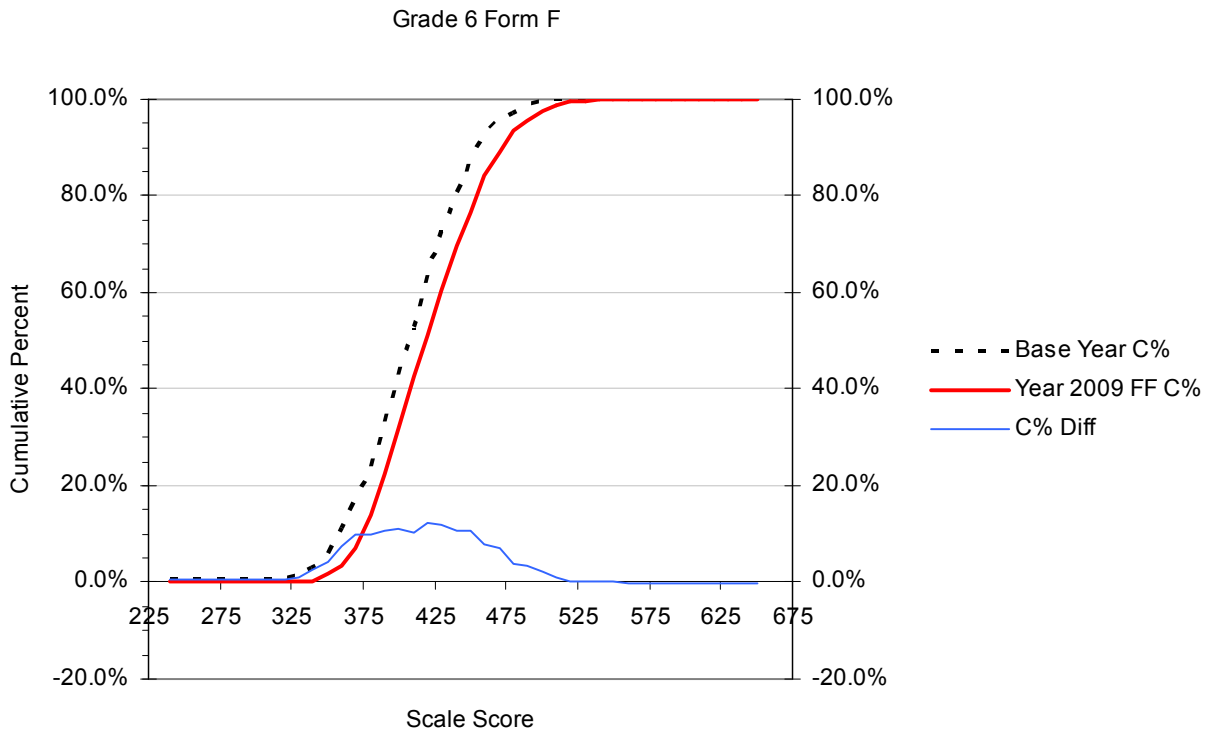


Figure B.28 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2009 Scale Scores with the Cumulative Percent Differences between CDFs: Grade 6 Form F

Year 2006 Grade=7

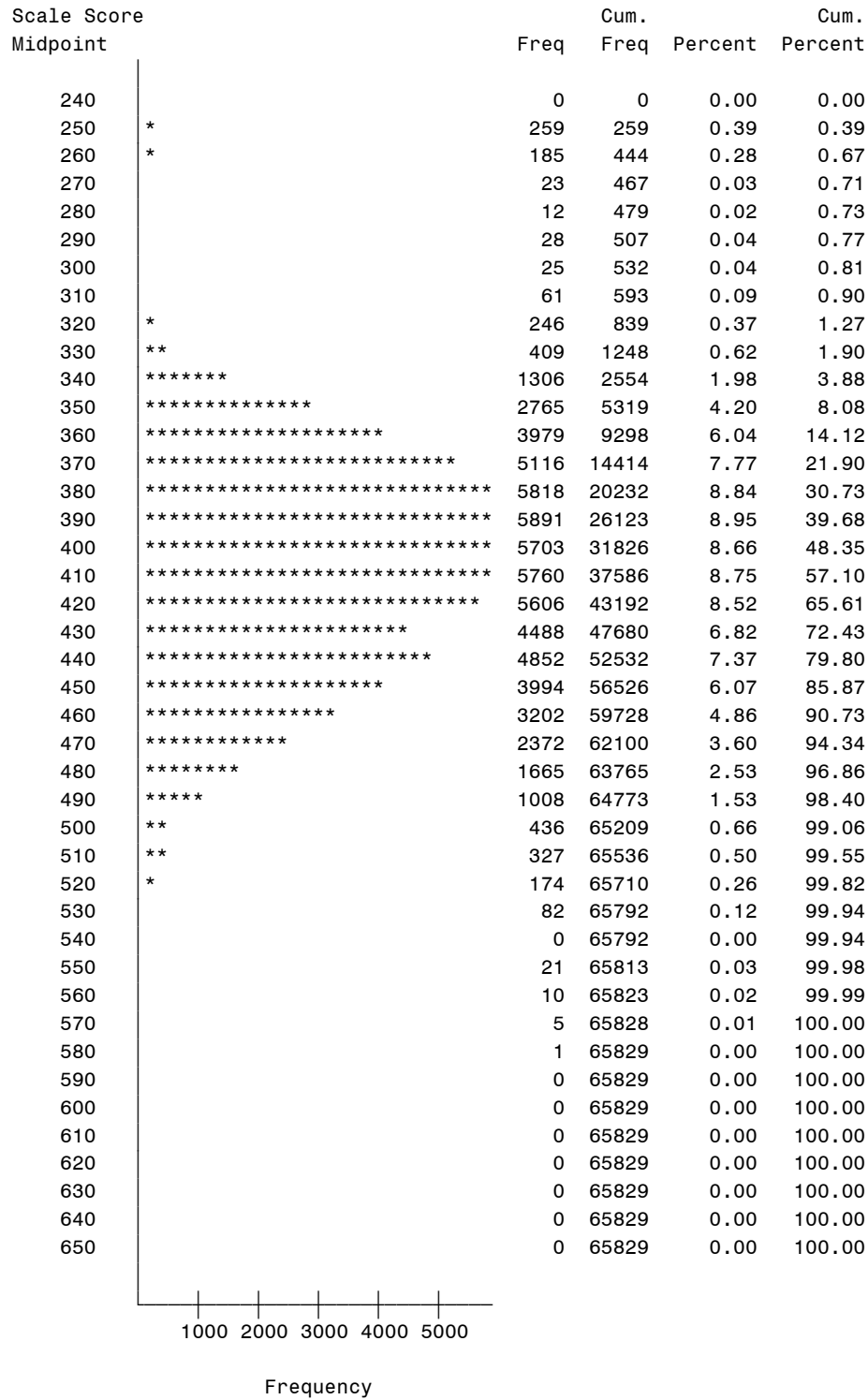


Figure B.29 Year 2006 Scale Score Distribution: Grade 7

Year 2009 Grade=7 Form=A

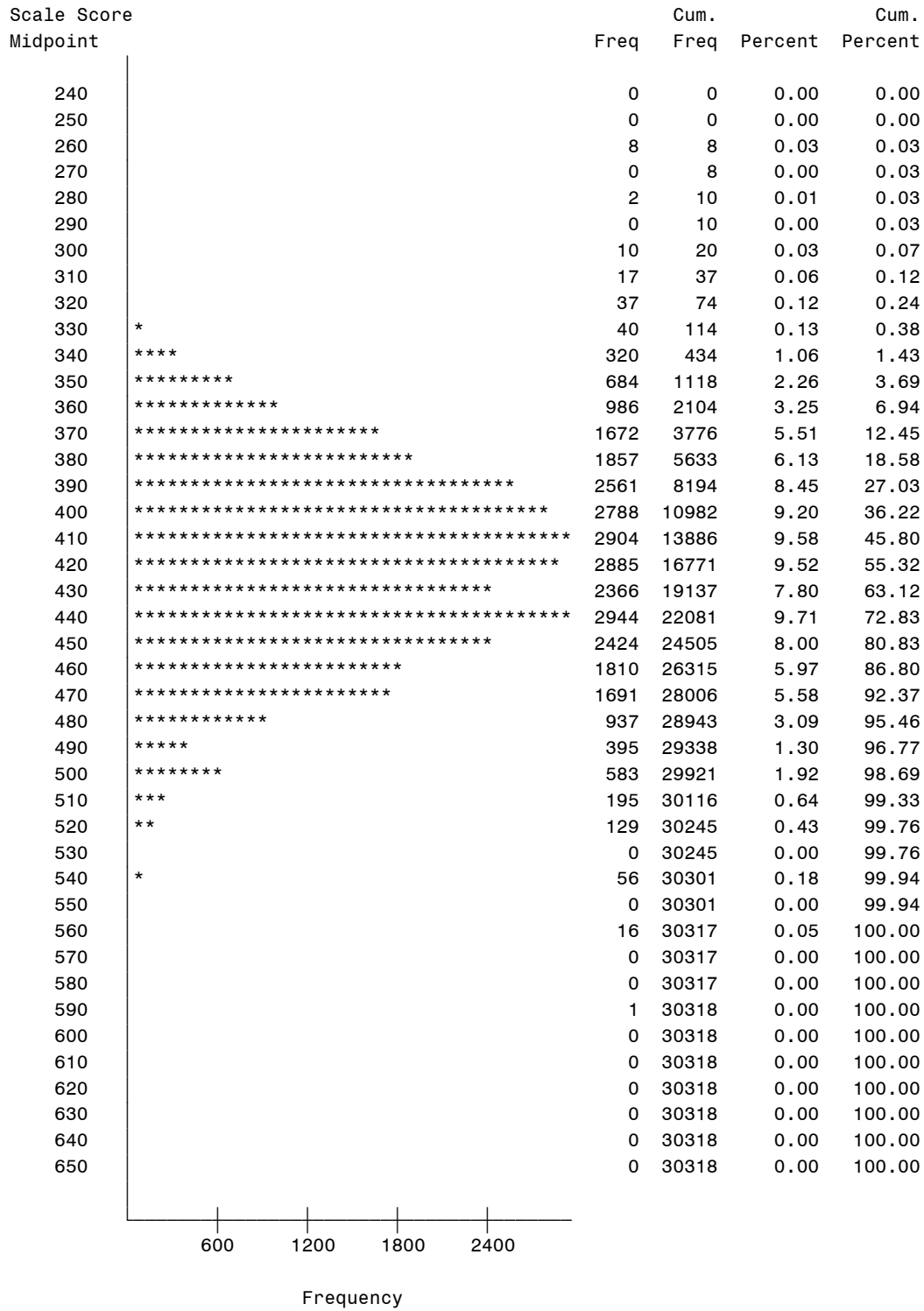


Figure B.30 Year 2009 Scale Score Distribution: Grade 7 Form A

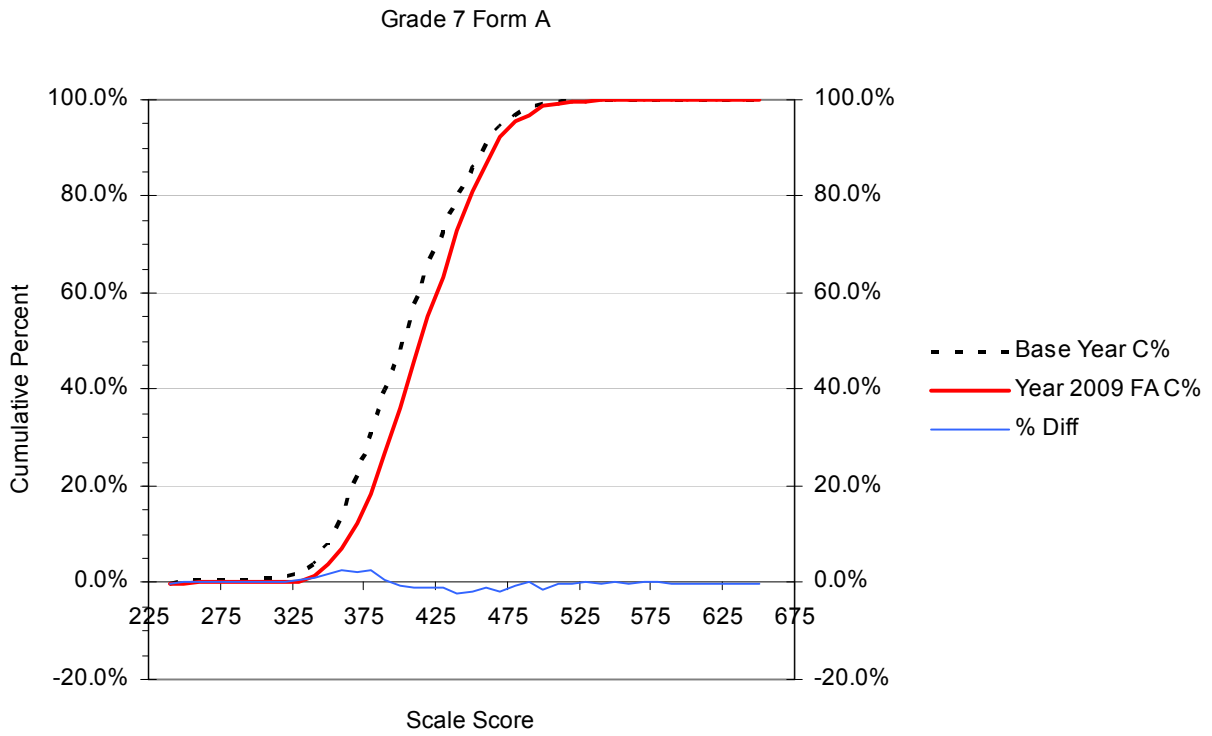


Figure B.31 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2009 Scale Scores with the Percent Differences between CDFs: Grade 7 Form A

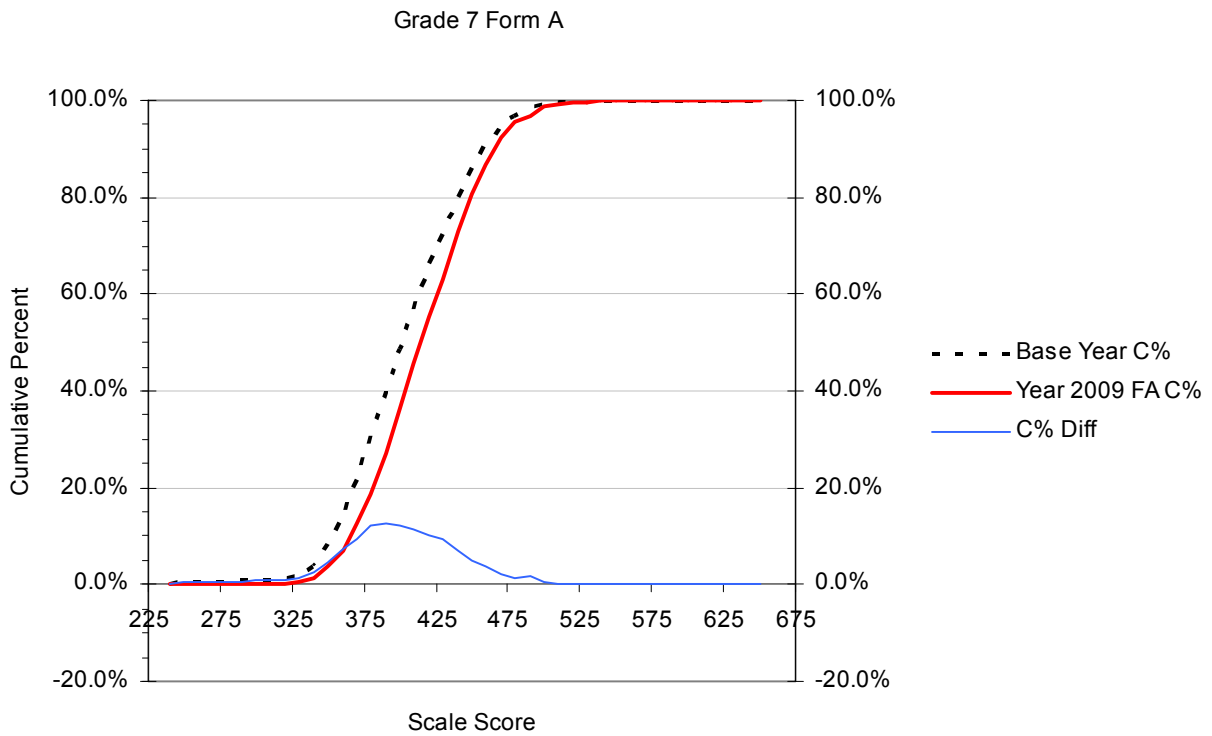


Figure B.32 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2009 Scale Scores with the Cumulative Percent Differences between CDFs: Grade 7 Form A

Year 2009 Grade=7 Form=F

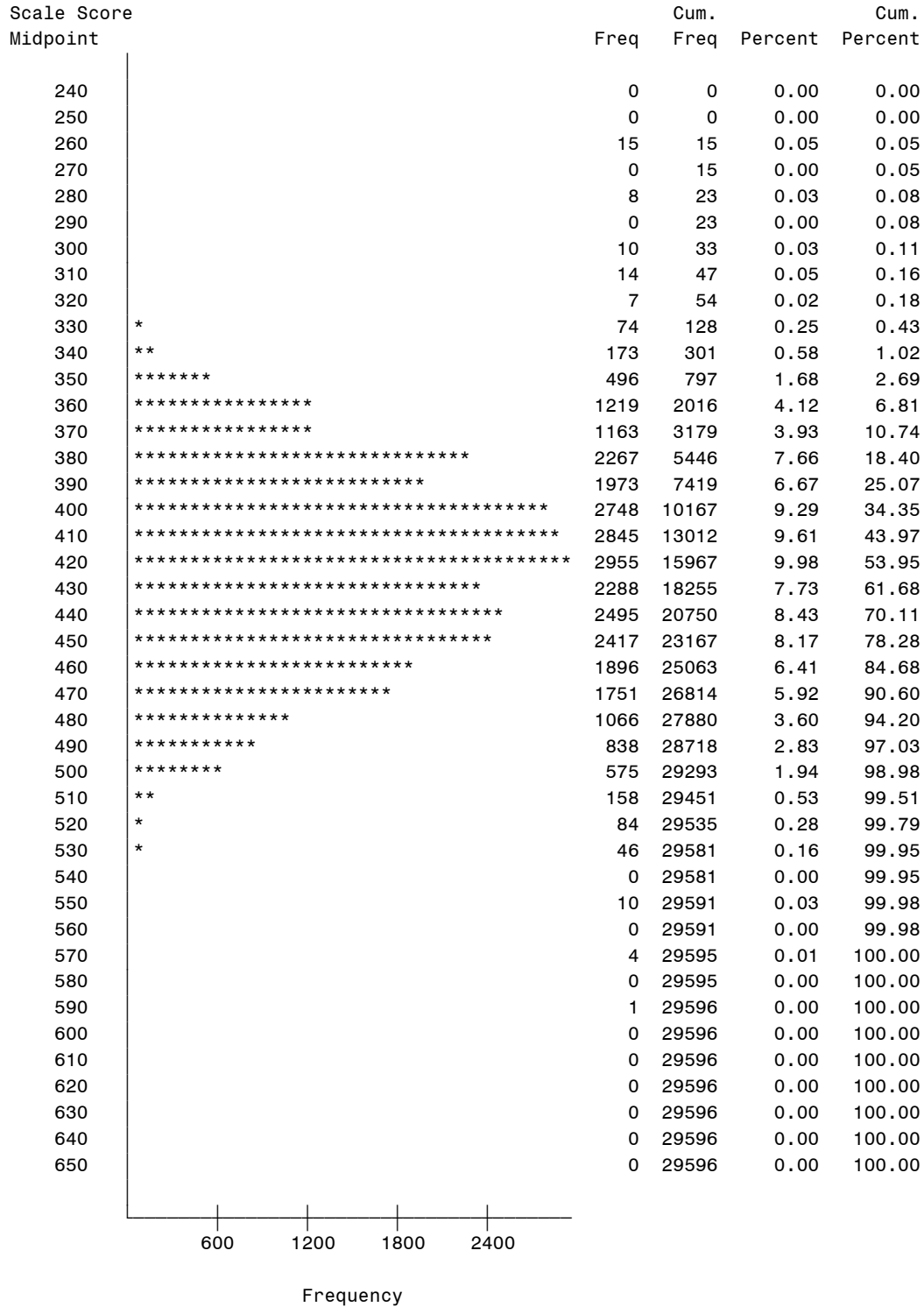


Figure B.33 Year 2009 Scale Score Distribution: Grade 7 Form F

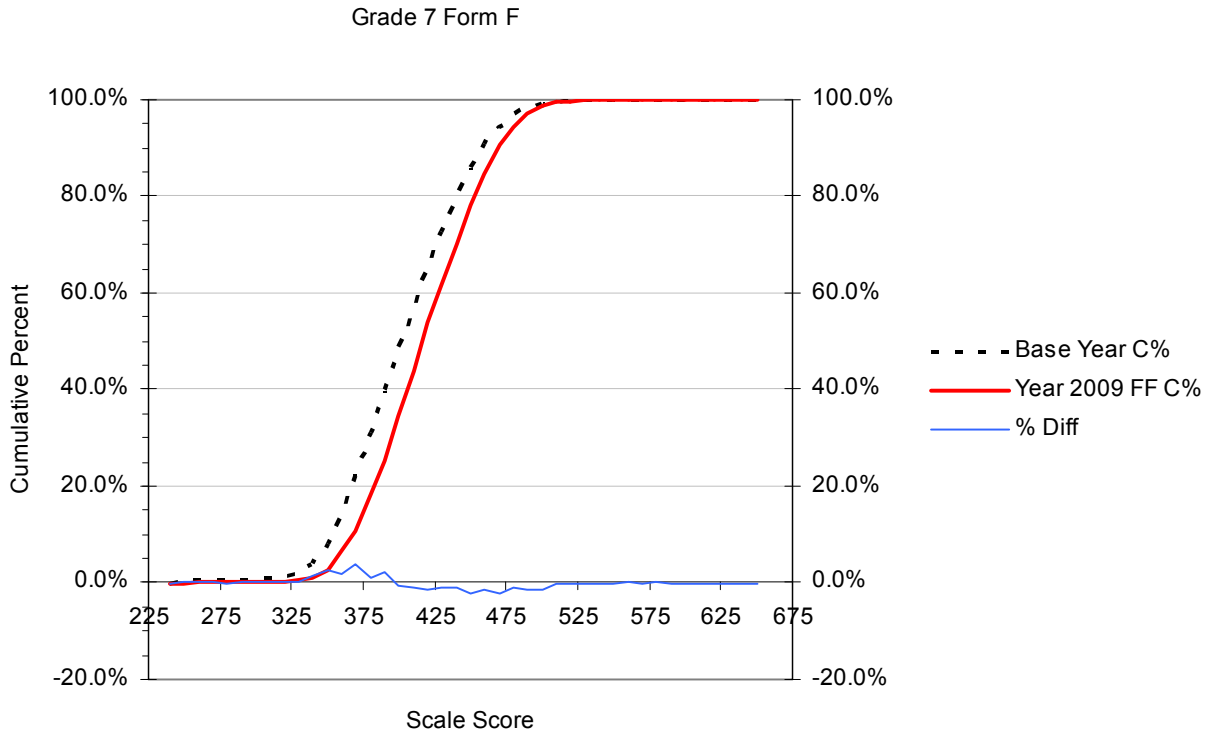


Figure B.34 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2009 Scale Scores with the Percent Differences between CDFs: Grade 7 Form F

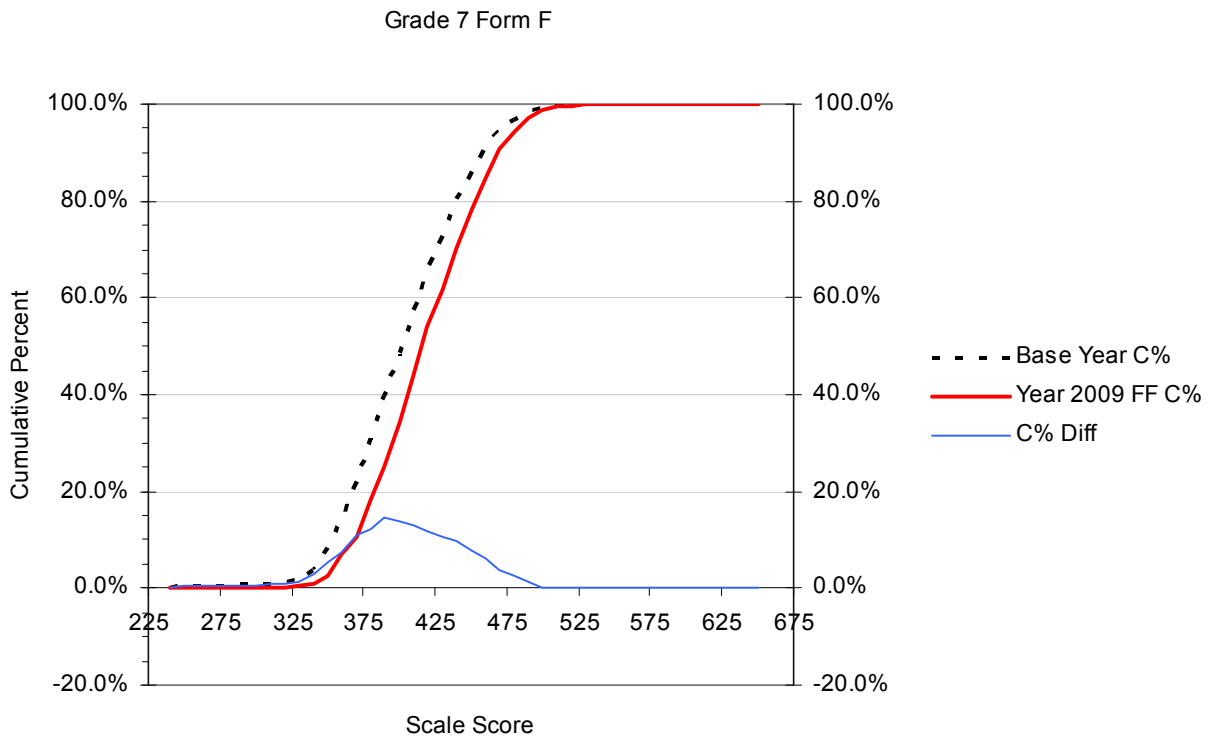


Figure B.35 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2009 Scale Scores with the Cumulative Percent Differences between CDFs: Grade 7 Form F

Year 2006 Grade=8

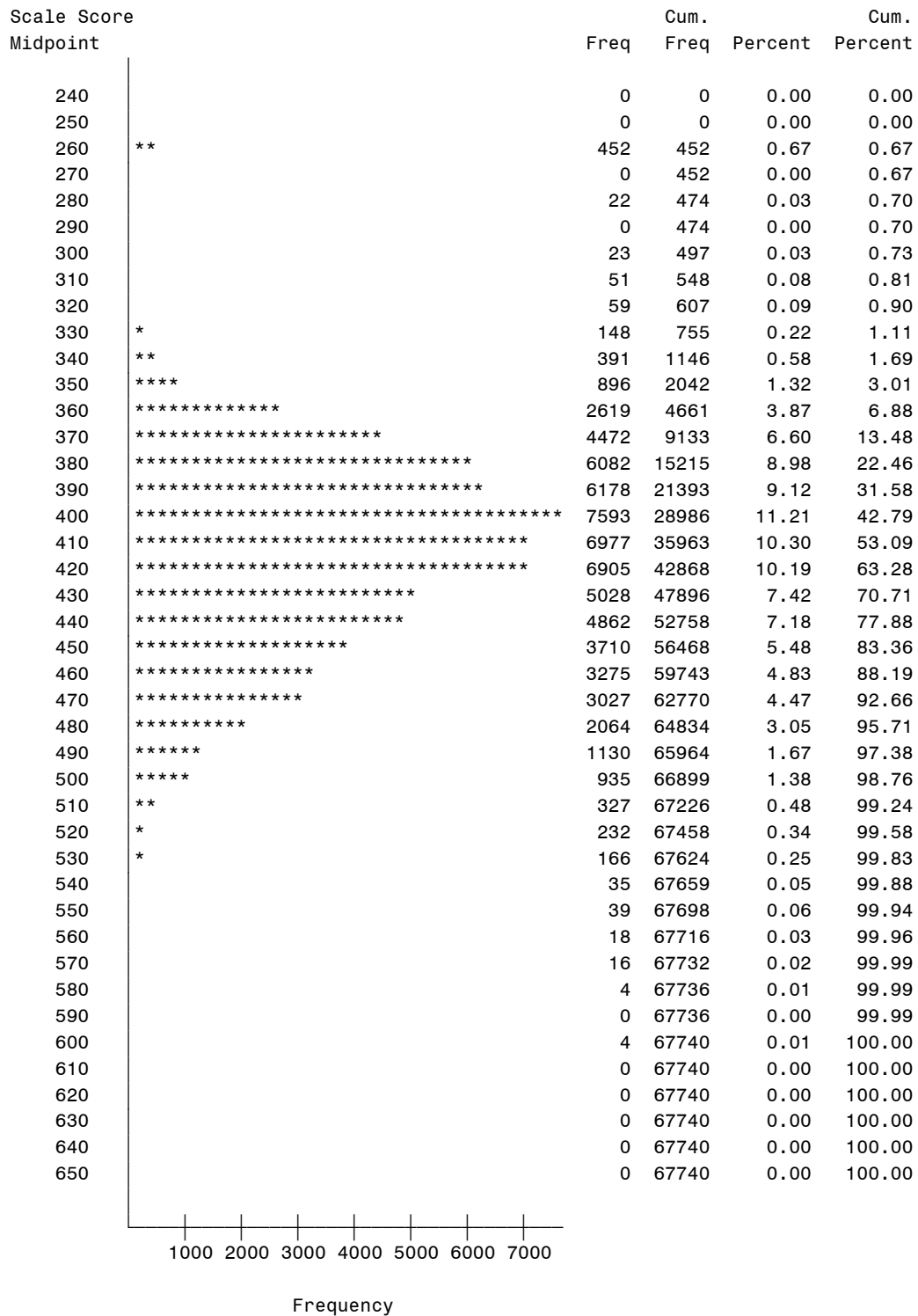


Figure B.36 Year 2006 Scale Score Distribution: Grade 8

Year 2009 Grade=8 Form=A

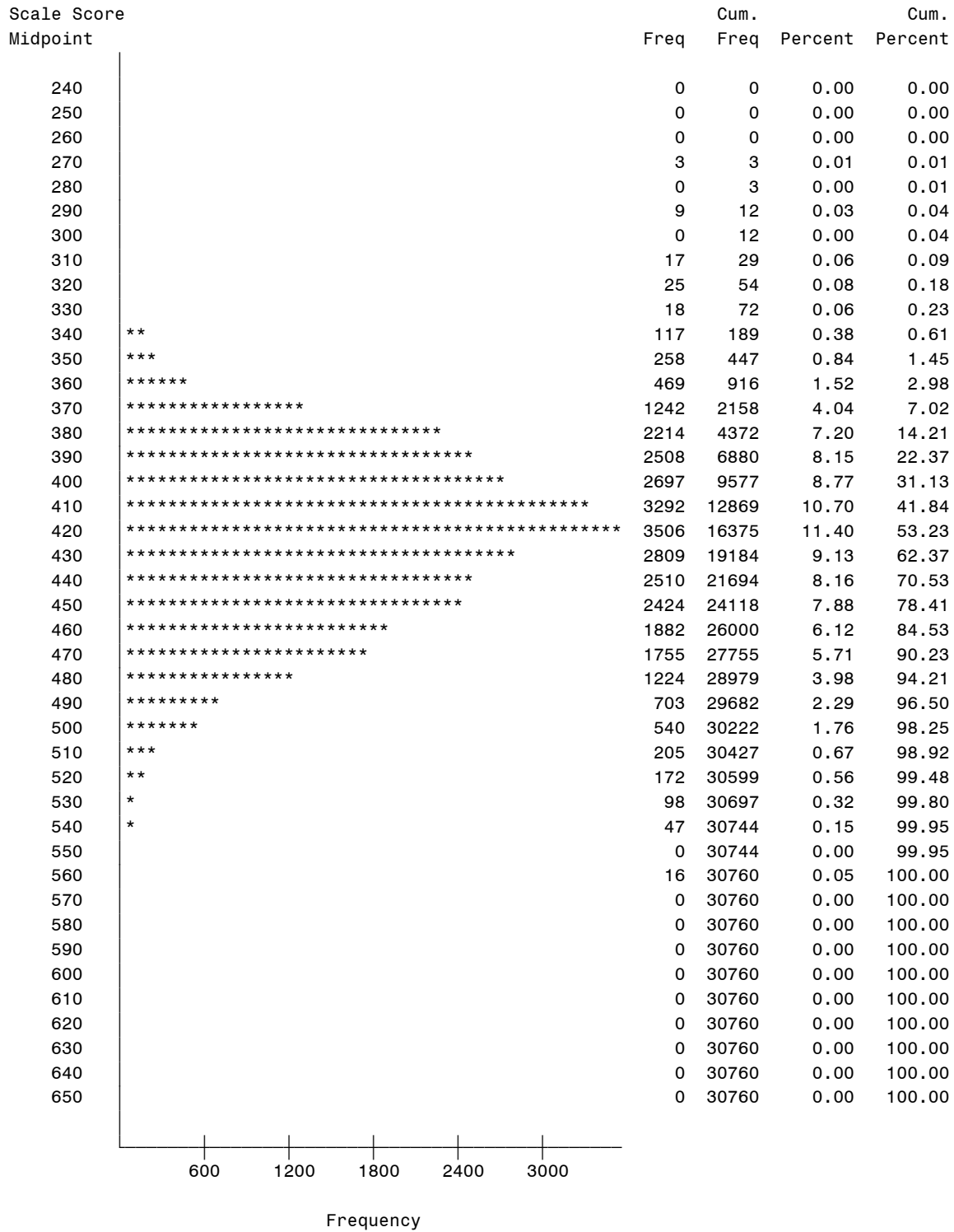


Figure B.37 Year 2009 Scale Score Distribution: Grade 8 Form A

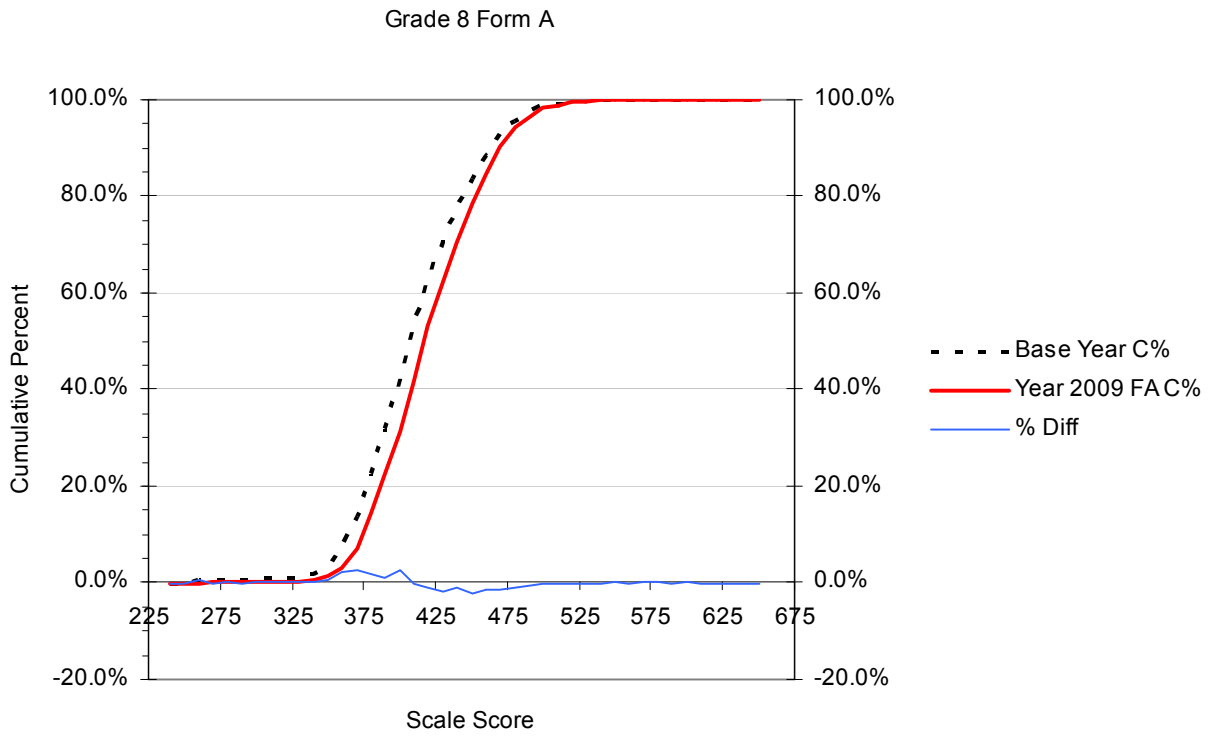


Figure B.38 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2009 Scale Scores with the Percent Differences between CDFs: Grade 8 Form A

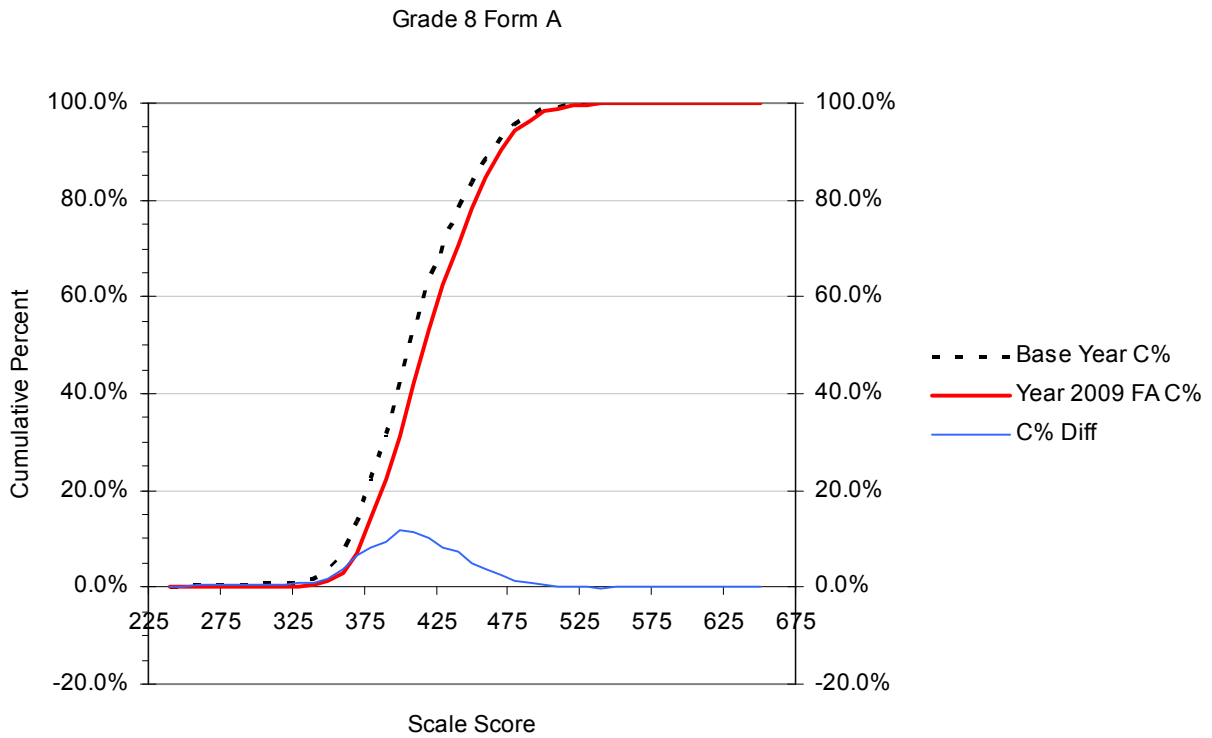


Figure B.39 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2009 Scale Scores with the Cumulative Percent Differences between CDFs: Grade 8 Form A

Year 2009 Grade=8 Form=F

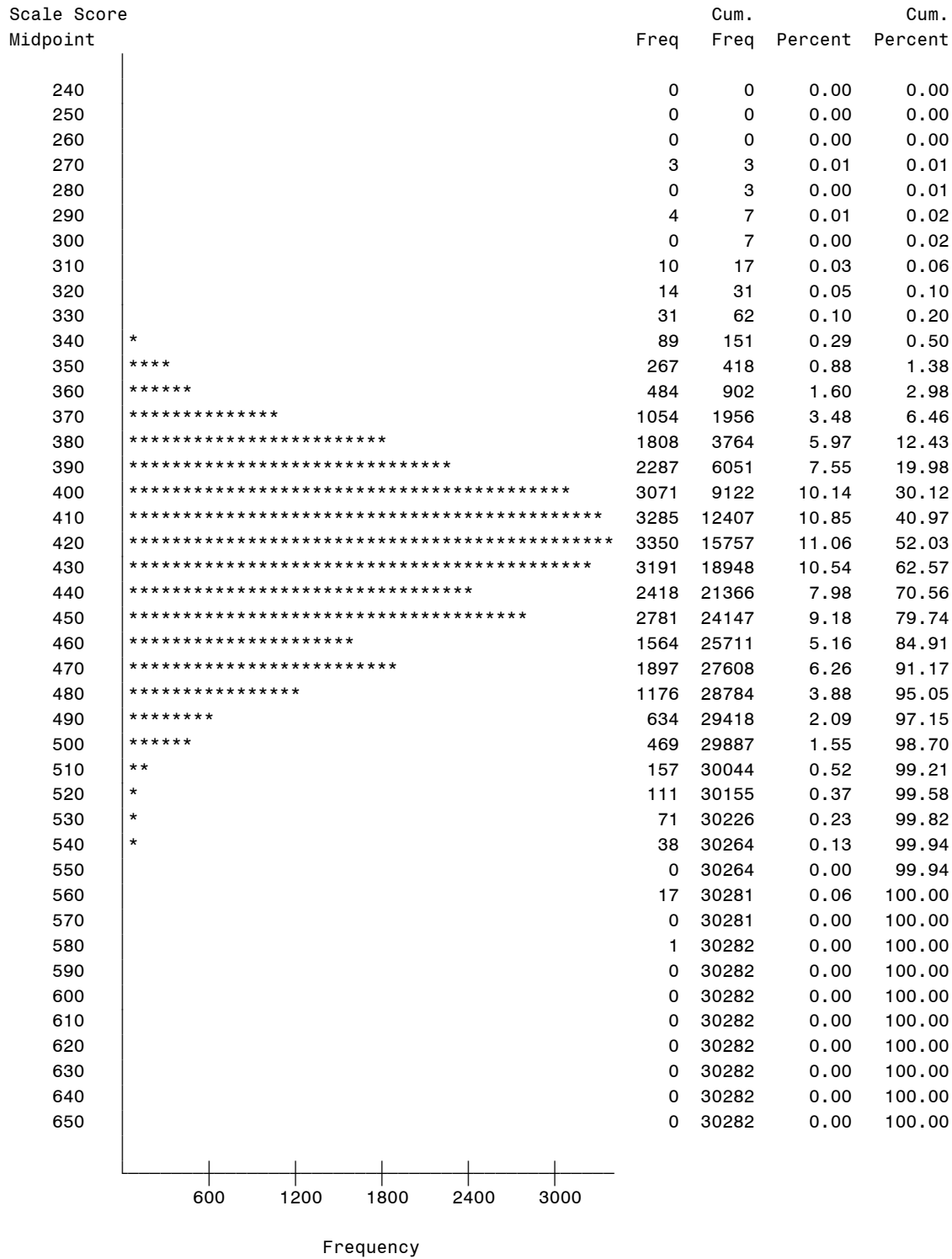


Figure B.40 Year 2009 Scale Score Distribution: Grade 8 Form F

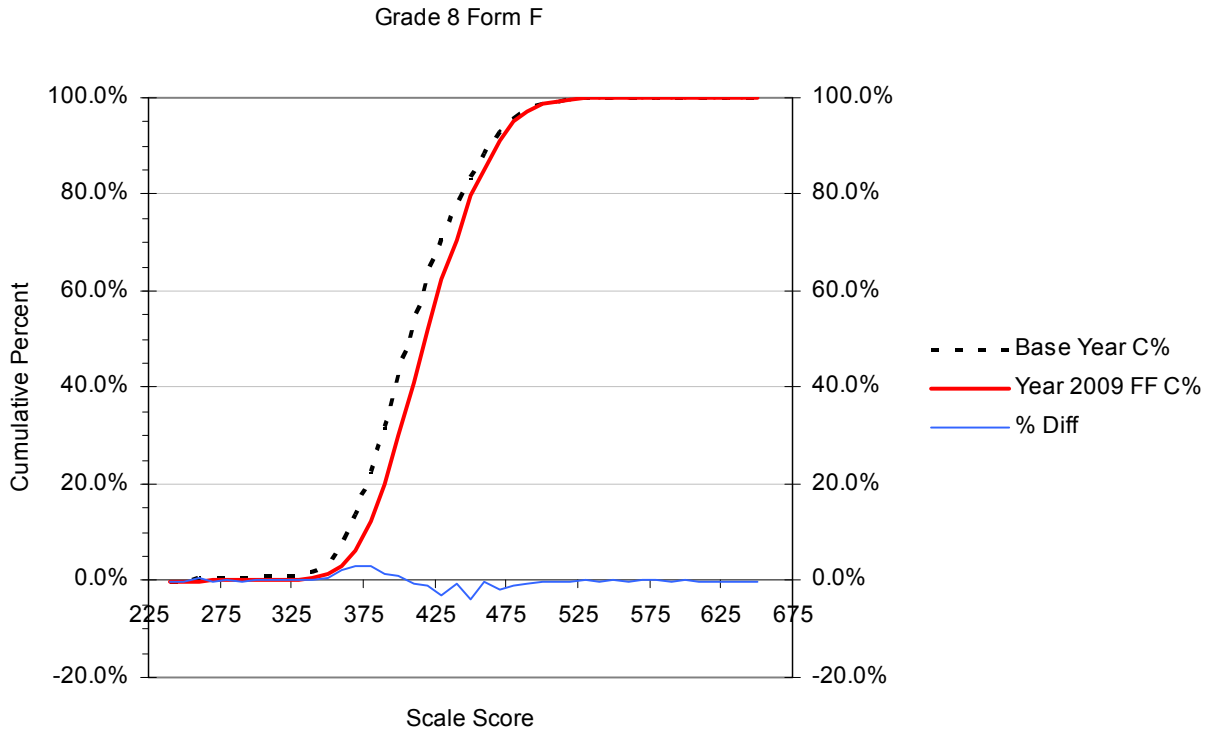


Figure B.41 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2009 Scale Scores with the Percent Differences between CDFs: Grade 8 Form F

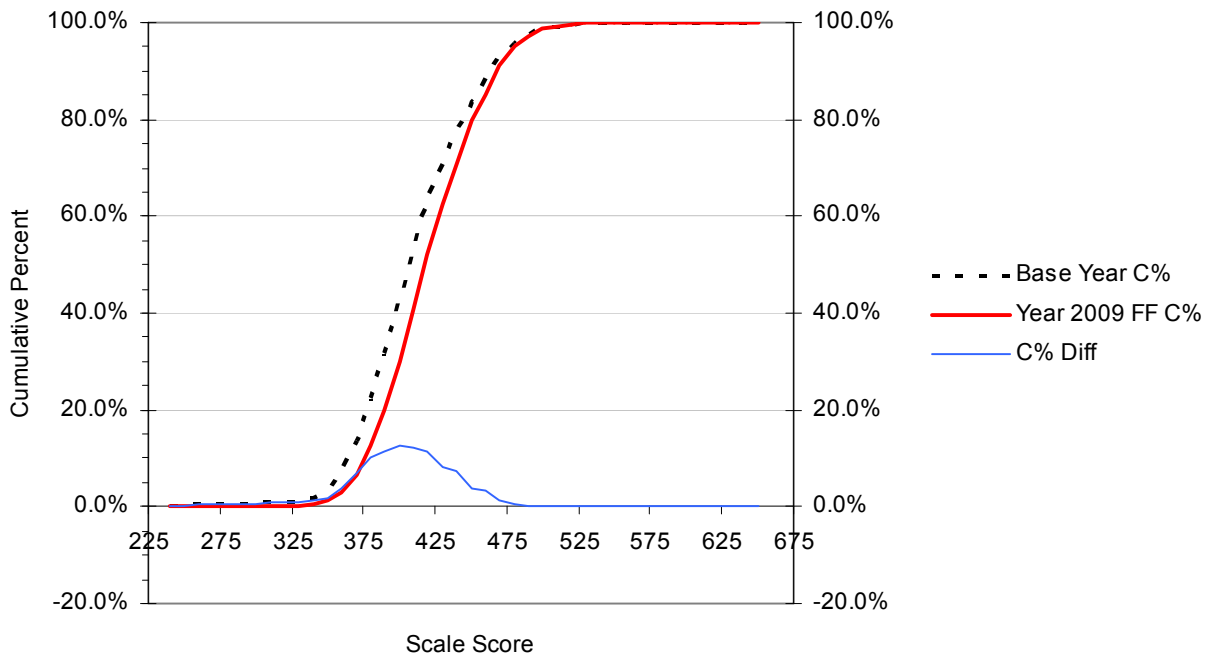


Figure B.42 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2009 Scale Scores with the Cumulative Percent Differences between CDFs: Grade 8 Form F

APPENDIX C: THE 2009 MSA-MATH CLASSICAL AND RASCH ITEM PARAMETERS

Table C.1 The 2009 MSA-Math Classical and Rasch Item Parameters: Grade 3 Form A

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2
3509931	SR	0.70	0.35	0.9627	0.0460	1.12	1.18		
3548055	SR	0.98	0.28	-2.4386	0.1279	0.92	0.61		
100000011184	BCR	0.57	0.43	1.5806	0.0431	1.00	0.96		
3595527	BCR	0.56	0.43	1.4153	0.0434	0.98	0.98	-2.5617	2.5617
3510009	SR	0.86	0.39	0.0690	0.0547	0.87	0.84		
100000205908	SR	0.81	0.45	0.1990	0.0530	0.96	0.91		
3548054	SR	0.96	0.27	-1.7100	0.0956	0.89	1.21		
100000210424	SR	0.58	0.41	1.6564	0.0429	1.05	1.08		
100000210493	SR	0.84	0.44	-0.0917	0.0571	0.95	0.97		
3510017	SR	0.93	0.36	-1.1315	0.0779	0.78	0.70		
3510006	SR	0.58	0.46	1.2257	0.0447	1.07	1.22		
3509960	SR	0.80	0.32	0.3981	0.0511	1.05	1.14		
3509964	SR	0.78	0.50	-0.0360	0.0565	1.11	0.97		
100000025225	SR	0.83	0.35	-0.2038	0.0591	1.05	1.06		
3509941	BCR	0.62	0.45	1.4160	0.0437	1.01	1.06		
3595501	BCR	0.56	0.50	1.5639	0.0376	0.95	0.95	-1.9549	1.9549
3509983	SR	0.94	0.42	-1.1470	0.0782	0.73	0.61		
3510022	SR	0.56	0.32	2.0077	0.0424	1.12	1.30		
3509927	SR	0.79	0.32	0.4123	0.0506	1.10	1.37		
100000025207	SR	0.95	0.38	-1.4723	0.0876	0.92	0.76		
3510005	SR	0.61	0.40	1.3897	0.0438	1.07	1.08		
100000025196	BCR	0.90	0.38	-0.7697	0.0689	1.02	0.84		
3595519	BCR	0.64	0.50	1.2125	0.0324	1.14	1.17	-0.9262	0.9262
100000025199	SR	0.94	0.35	-1.6379	0.0934	0.96	0.92		
3510062	SR	0.85	0.23	-0.3652	0.0613	1.30	1.74		
3488065	SR	0.88	0.58	-0.4834	0.0634	0.78	0.47		
100000004258	SR	0.89	0.43	-0.6636	0.0673	0.95	0.63		
3509988	SR	0.72	0.40	0.5005	0.0501	1.19	1.37		
3510070	SR	0.98	0.27	-2.6459	0.1405	0.68	0.85		
3488139	BCR	0.47	0.46	2.1303	0.0423	0.94	0.91		
3564095	BCR	0.45	0.47	2.4239	0.0390	0.98	0.98	-2.0904	2.0904
3510063	SR	0.80	0.45	0.4861	0.0500	0.88	0.82		
3510072	BCR	0.87	0.44	-0.3424	0.0608	0.91	0.94		
3564080	BCR	0.61	0.47	1.4331	0.0314	1.13	1.15	-0.8085	0.8085
100000210496	SR	0.85	0.19	-0.0611	0.0564	1.24	1.62		
3509926	SR	0.51	0.43	2.4187	0.0426	1.04	1.10		
3548507	SR	0.88	0.34	-0.2784	0.0599	0.91	0.83		
3509967	SR	0.91	0.34	-0.8856	0.0717	1.01	0.99		
3510065	SR	0.95	0.32	-2.1822	0.1159	1.44	1.80		

Table C.1 (continued)

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2
3509961	SR	0.93	0.37	-1.3667	0.0845	1.01	1.08		
100000044158	SR	0.87	0.46	-0.4990	0.0636	0.99	0.75		
3510018	SR	0.80	0.50	0.2953	0.0519	0.88	0.77		
3510035	SR	0.89	0.34	-0.6165	0.0657	1.09	1.33		
3509949	BCR	0.76	0.49	0.5146	0.0499	0.93	0.81		
3985609	BCR	0.68	0.56	0.9641	0.0334	0.98	1.01	-0.9820	0.9820
3510055	SR	0.62	0.46	1.2952	0.0442	0.99	0.97		
3510058	SR	0.90	0.43	-0.6059	0.0656	0.85	0.74		
3510347	SR	0.72	0.47	0.9229	0.0465	0.93	0.93		
3510053	SR	0.85	0.35	-0.2691	0.0598	1.02	1.03		
3510041	SR	0.94	0.31	-1.8190	0.0997	1.35	1.37		
3510051	SR	0.57	0.44	1.4814	0.0435	0.99	1.01		
3509929	SR	0.56	0.44	1.8021	0.0426	0.94	1.00		
3510329	SR	0.66	0.36	1.5719	0.0432	1.10	1.17		
3510033	SR	0.85	0.38	0.0473	0.0550	0.89	0.78		
3510043	SR	0.77	0.41	0.0444	0.0550	1.26	1.28		
100000210497	SR	0.97	0.39	-2.3219	0.1225	0.86	0.40		
3497888	SR	0.91	0.47	-0.9265	0.0726	0.89	0.74		
3509962	SR	0.91	0.42	-0.6247	0.0659	0.86	1.01		
3547998	BCR	0.88	0.45	-0.4669	0.063	0.93	0.83		
3564094	BCR	0.55	0.51	1.6096	0.0381	0.97	0.98	-2.0080	2.0080
100000011195	SR	0.90	0.33	-0.8620	0.0712	1.02	1.28		
100000018397	SR	0.85	0.33	-0.2798	0.0599	1.07	1.18		
100000011207	SR	0.83	0.48	0.0479	0.0551	0.91	0.72		
3490569	SR	0.91	0.29	-0.9778	0.0738	1.09	1.55		
3510036	SR	0.87	0.41	-0.5397	0.0645	1.06	1.05		

Table C.2 The 2009 MSA-Mathematics Classical and Rasch Item Parameters: Grade 3 Form F

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2
3509931	SR	0.70	0.36	0.9627	0.0454	1.11	1.16		
3548055	SR	0.98	0.25	-2.4386	0.1311	0.84	0.75		
100000011186	BCR	0.73	0.54	0.7532	0.0469	0.87	0.74		
3595529	BCR	0.60	0.37	1.0151	0.0409	1.11	1.15	-2.4072	2.4072
3510009	SR	0.86	0.38	0.0690	0.0541	0.89	0.89		
100000205908	SR	0.82	0.43	0.1990	0.0525	0.95	0.93		
3548054	SR	0.96	0.23	-1.7100	0.0969	0.69	0.61		
3509979	SR	0.89	0.38	-0.0209	0.0554	0.78	0.67		
100000011211	SR	0.68	0.45	1.0793	0.0450	0.96	0.96		
3510017	SR	0.92	0.34	-1.1315	0.0783	0.85	0.78		
3510006	SR	0.58	0.46	1.2257	0.0442	1.07	1.17		
3509960	SR	0.80	0.34	0.3981	0.0507	1.05	1.06		
3509964	SR	0.78	0.51	-0.036	0.0562	1.14	0.95		
100000025225	SR	0.83	0.34	-0.2038	0.0589	1.10	1.12		
3509941	BCR	0.63	0.44	1.4160	0.0431	0.96	0.97		
3595501	BCR	0.56	0.49	1.5639	0.0374	0.93	0.93	-1.9549	1.9549
3509983	SR	0.94	0.40	-1.1470	0.0785	0.81	0.71		
3510022	SR	0.57	0.32	2.0077	0.0417	1.09	1.16		
3509927	SR	0.73	0.23	0.4123	0.0500	1.46	2.29		
3509928	SR	0.95	0.43	-0.6271	0.0659	0.45	0.27		
100000004275	SR	0.44	0.24	2.3631	0.0419	1.18	1.41		
100000025196	BCR	0.90	0.39	-0.7697	0.0690	0.99	0.83		
3595519	BCR	0.64	0.50	1.2125	0.0319	1.14	1.17	-0.9262	0.9262
100000025210	SR	0.96	0.32	-2.1068	0.1141	0.95	0.65		
100000004270	SR	0.88	0.43	-0.5454	0.0643	0.96	0.88		
100000025202	SR	0.86	0.54	-0.2431	0.0589	0.84	0.60		
100000004258	SR	0.90	0.42	-0.6636	0.0673	0.82	0.61		
3509988	SR	0.74	0.39	0.5005	0.0495	1.10	1.15		
3510070	SR	0.98	0.23	-2.6459	0.1442	0.73	0.49		
3510067	BCR	0.85	0.38	-0.0129	0.0553	1.02	0.96		
3564083	BCR	0.82	0.38	0.2571	0.0366	1.28	1.45	-0.4253	0.4253
3510063	SR	0.8	0.44	0.4861	0.0494	0.90	0.82		
3488087	BCR	0.44	0.48	2.4484	0.0421	0.89	0.88		
3564099	BCR	0.40	0.47	2.8035	0.0346	0.98	0.99	-1.5459	1.5459
100000004263	SR	0.86	0.39	-0.2543	0.0591	0.96	0.98		
3509926	SR	0.48	0.42	2.4187	0.0420	1.01	1.11		
100000213058	SR	0.87	0.33	-0.4736	0.0631	1.04	1.02		

Table C.2 (continued)

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2
100000044163	SR	0.78	0.35	-0.4817	0.0632	1.93	2.64		
3510065	SR	0.95	0.31	-2.1822	0.1180	1.41	1.34		
3509961	SR	0.93	0.35	-1.3667	0.0852	0.85	0.74		
3511729	SR	0.68	0.47	1.0809	0.0448	0.95	0.98		
3510018	SR	0.81	0.51	0.2953	0.0513	0.81	0.69		
3510035	SR	0.89	0.31	-0.6165	0.0656	1.07	1.73		
3509978	BCR	0.66	0.46	1.1411	0.0443	0.99	0.99		
3985610	BCR	0.50	0.31	2.0758	0.0462	1.16	1.20	-2.6995	2.6995
3510055	SR	0.63	0.49	1.2952	0.0436	0.94	0.92		
3510058	SR	0.90	0.42	-0.6059	0.0654	0.83	0.71		
3510347	SR	0.73	0.47	0.9229	0.0458	0.90	0.87		
3510053	SR	0.87	0.33	-0.2691	0.0595	1.02	1.22		
3510041	SR	0.95	0.32	-1.8190	0.1012	1.24	1.40		
3510051	SR	0.56	0.45	1.4814	0.0428	1.02	1.04		
3509929	SR	0.56	0.45	1.8021	0.042	0.93	0.92		
3510329	SR	0.64	0.33	1.5719	0.0425	1.09	1.13		
3510033	SR	0.86	0.36	0.0473	0.0545	0.91	0.83		
3510043	SR	0.77	0.41	0.0444	0.0545	1.14	1.08		
3510012	SR	0.80	0.49	0.0993	0.0538	1.03	0.86		
100000025211	SR	0.77	0.53	0.4822	0.0495	0.88	0.70		
3509962	SR	0.92	0.42	-0.6247	0.0658	0.67	0.60		
3509932	BCR	0.98	0.24	-2.8170	0.1554	0.94	1.15		
3564086	BCR	0.46	0.54	2.3423	0.0343	0.95	0.94	-1.5697	1.5697
100000011196	SR	0.83	0.48	0.0623	0.0542	0.91	0.72		
100000018395	SR	0.91	0.30	-0.8495	0.0708	1.01	0.99		
3509950	SR	0.78	0.34	0.8475	0.0462	0.96	0.91		
3510176	SR	0.65	0.46	1.2021	0.0440	0.99	1.03		
3510036	SR	0.87	0.40	-0.5397	0.0642	1.05	1.16		

Table C.3 The 2009 MSA-Mathematics Classical and Rasch Item Parameters: Grade 4 Form A

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2
3488052	SR	0.65	0.44	0.7943	0.0432	0.98	0.95		
3515407	SR	0.87	0.43	-0.7990	0.0560	0.85	0.70		
100000044146	SR	0.92	0.20	-1.8595	0.0770	1.07	1.85		
3487819	BCR	0.50	0.45	1.3917	0.0422	1.00	1.00		
3564186	BCR	0.44	0.38	2.1573	0.0441	1.09	1.11	-2.6637	2.6637
3515408	SR	0.79	0.49	0.1763	0.0462	0.79	0.68		
3515641	SR	0.81	0.50	-0.8522	0.0569	1.10	0.97		
3515410	SR	0.89	0.37	-1.0550	0.0599	0.87	0.71		
3515827	SR	0.65	0.36	0.6152	0.0439	1.11	1.18		
3515605	SR	0.63	0.51	0.9009	0.0430	0.91	0.88		
100000025162	SR	0.91	0.24	-1.5223	0.0689	1.13	1.43		
3488159	SR	0.89	0.37	-1.1317	0.0613	0.90	1.22		
3515447	SR	0.53	0.45	1.4979	0.0422	1.00	1.12		
100000044142	BCR	0.83	0.41	-0.7600	0.0557	1.01	0.92		
3595499	BCR	0.47	0.50	1.7168	0.0395	0.97	0.96	-2.1933	2.1933
3515604	SR	0.69	0.52	0.3940	0.0449	0.94	0.90		
3515737	SR	0.83	0.31	-0.7461	0.0553	1.15	1.35		
3515576	SR	0.67	0.40	0.5508	0.0442	1.04	1.04		
3515470	SR	0.73	0.41	0.0797	0.0469	1.02	0.97		
3515643	SR	0.47	0.48	1.7570	0.0425	0.94	0.94		
100000007124	SR	0.65	0.38	0.5869	0.044	1.11	1.14		
100000025172	BCR	0.61	0.46	0.7480	0.0434	1.01	0.99		
3985613	BCR	0.46	0.53	1.5908	0.0355	0.98	0.98	-1.7399	1.7399
100000018336	SR	0.78	0.46	-0.2781	0.0500	0.95	0.97		
100000007112	SR	0.45	0.29	1.6779	0.0425	1.22	1.40		
3515571	SR	0.84	0.45	-0.9395	0.0583	0.99	1.00		
100000044144	SR	0.96	0.21	-2.7781	0.1095	1.23	2.08		
3515421	SR	0.85	0.40	-0.6701	0.0543	0.86	0.74		
100000025188	SR	0.68	0.45	0.3956	0.0449	1.03	1.04		
3487993	SR	0.92	0.29	-1.7595	0.0746	1.03	1.82		
100000007125	SR	0.71	0.34	0.2837	0.0458	1.12	1.17		
3515823	BCR	0.45	0.52	1.6944	0.0425	0.93	0.88		
3595532	BCR	0.38	0.55	2.3297	0.0369	0.93	0.92	-1.8612	1.8612
3488150	BCR	0.38	0.54	2.1316	0.0436	0.83	0.75		
3564176	BCR	0.47	0.60	1.6184	0.0320	0.87	0.87	-1.1561	1.1561
100000007115	SR	0.88	0.45	-1.3705	0.0658	0.88	0.58		
3515575	SR	0.90	0.41	-1.4972	0.0685	0.90	0.87		

Table C.3 (continued)

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2
100000025157	SR	0.92	0.30	-1.7237	0.0737	1.02	1.26		
3515471	SR	0.86	0.36	-0.9767	0.0586	1.00	0.85		
3515630	SR	0.56	0.48	0.9291	0.0428	0.98	0.96		
3488145	BCR	0.70	0.50	0.1552	0.0464	0.96	0.94		
3564189	BCR	0.48	0.43	1.5957	0.0409	1.03	1.04	-2.3378	2.3378
100000012183	SR	0.60	0.30	0.8211	0.0432	1.18	1.26		
3515533	SR	0.84	0.50	-0.7839	0.0558	0.86	0.74		
3515631	SR	0.79	0.39	-0.4674	0.0519	1.12	1.22		
100000011509	SR	0.76	0.54	-0.2239	0.0495	0.85	0.70		
100000011489	SR	0.97	0.26	-2.8436	0.1126	0.96	1.06		
100000201857	SR	0.48	0.39	1.0327	0.0428	1.12	1.20		
3515543	SR	0.80	0.54	-0.2743	0.0501	0.77	0.74		
3515853	SR	0.79	0.46	-0.1060	0.0484	0.89	0.79		
3497869	SR	0.82	0.26	-0.5937	0.0535	1.18	1.22		
3548078	SR	0.51	0.39	0.6282	0.0438	1.25	1.41		
3515933	SR	0.79	0.28	-0.3619	0.0507	1.23	1.46		
3515519	SR	0.86	0.43	-0.6898	0.0546	0.77	0.92		
3515795	SR	0.64	0.46	0.5626	0.0441	1.00	0.97		
100000201842	SR	0.87	0.42	-1.0863	0.0605	0.93	0.94		
3548086	SR	0.80	0.41	-0.2943	0.0502	0.97	0.92		
3515783	BCR	0.74	0.57	-0.0626	0.0481	0.87	0.73		
3595560	BCR	0.72	0.62	0.1566	0.0322	0.99	1.01	-0.3225	0.3225
3488164	SR	0.91	0.31	-1.6322	0.0714	0.97	1.28		
3515506	SR	0.90	0.39	-1.2169	0.0630	0.83	0.73		
100000201853	SR	0.87	0.38	-1.2081	0.0628	0.97	0.86		
3515632	SR	0.70	0.51	-0.0118	0.0478	1.01	0.95		
3548088	SR	0.77	0.45	-0.1831	0.0493	0.94	0.94		

Table C.4 The 2009 MSA-Mathematics Classical and Rasch Item Parameters: Grade 4 Form F

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2
3488053	SR	0.79	0.28	-0.3452	0.0507	1.13	1.32		
3515407	SR	0.87	0.40	-0.7990	0.0563	0.81	0.69		
100000044146	SR	0.92	0.19	-1.8595	0.0784	1.24	2.17		
3487819	BCR	0.51	0.44	1.3917	0.0421	1.00	1.01		
3564186	BCR	0.43	0.37	2.1573	0.0441	1.16	1.19	-2.6637	2.6637
3515408	SR	0.79	0.49	0.1763	0.0462	0.77	0.63		
3515641	SR	0.82	0.48	-0.8522	0.0573	1.07	0.94		
3515410	SR	0.89	0.36	-1.0550	0.0605	0.83	0.71		
100000025153	SR	0.98	0.21	-3.5593	0.1584	0.98	0.51		
3515605	SR	0.63	0.52	0.9009	0.0428	0.88	0.82		
3488056	SR	0.51	0.30	1.3222	0.0421	1.19	1.32		
3488159	SR	0.88	0.37	-1.1317	0.0618	0.92	1.09		
3515447	SR	0.54	0.48	1.4979	0.0421	0.95	0.98		
100000044142	BCR	0.83	0.40	-0.7600	0.0560	1.02	0.97		
3595499	BCR	0.47	0.49	1.7168	0.0395	1.00	0.99	-2.1933	2.1933
3515604	SR	0.69	0.51	0.3940	0.0449	0.91	0.85		
3515737	SR	0.84	0.31	-0.7461	0.0556	1.17	1.60		
100000007116	SR	0.62	0.47	0.7504	0.0433	0.95	0.91		
3515470	SR	0.73	0.39	0.0797	0.0469	1.08	1.07		
3515643	SR	0.47	0.48	1.7570	0.0424	0.97	0.97		
3497882	SR	0.79	0.36	-0.1920	0.0492	1.04	1.05		
3515642	BCR	0.28	0.48	2.6593	0.0463	0.86	0.80		
3985619	BCR	0.42	0.59	1.8365	0.0320	0.91	0.89	-1.1225	1.1225
100000201943	SR	0.44	0.38	1.7574	0.0424	1.06	1.15		
100000201937	SR	0.91	0.39	-1.6415	0.0728	1.00	0.69		
3515571	SR	0.85	0.41	-0.9395	0.0587	1.00	1.01		
100000044144	SR	0.96	0.20	-2.7781	0.1122	1.14	1.31		
3515421	SR	0.86	0.38	-0.6701	0.0546	0.88	0.81		
3498610	SR	0.93	0.38	-1.7896	0.0765	0.93	0.78		
3548767	SR	0.70	0.34	0.0868	0.0469	1.23	1.30		
100000025158	SR	0.51	0.31	1.2922	0.0425	1.18	1.27		
100000201938	BCR	0.66	0.60	0.4797	0.0445	0.84	0.73		
3985620	BCR	0.42	0.51	2.4328	0.0456	0.91	0.89	-2.8528	2.8528
3515807	BCR	0.75	0.39	-0.2644	0.0512	1.08	1.02		
3564165	BCR	0.39	0.47	2.1333	0.0350	1.08	1.08	-1.6175	1.6175
3497865	SR	0.66	0.50	0.4883	0.0445	0.92	0.90		
3515575	SR	0.91	0.41	-1.4972	0.0694	0.86	0.77		

Table C.4 (continued)

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step	Step
								0-1	1-2
100000025156	SR	0.84	0.39	-0.8555	0.0573	0.99	0.88		
3515471	SR	0.86	0.36	-0.9767	0.0591	1.03	0.81		
3515630	SR	0.57	0.49	0.9291	0.0427	0.97	0.94		
3488145	BCR	0.72	0.49	0.1552	0.0464	0.95	0.91		
3564189	BCR	0.48	0.43	1.5957	0.0411	1.09	1.10	-2.3378	2.3378
3551477	SR	0.53	0.55	1.2590	0.0422	0.85	0.80		
3515533	SR	0.85	0.50	-0.7839	0.0561	0.86	0.64		
3515631	SR	0.78	0.38	-0.4674	0.0520	1.20	1.36		
100000201942	SR	0.69	0.45	0.3220	0.0453	0.99	1.03		
100000201852	SR	0.85	0.47	-0.9014	0.0579	0.86	0.68		
100000201857	SR	0.45	0.39	1.0327	0.0429	1.20	1.33		
3515543	SR	0.81	0.51	-0.2743	0.0504	0.76	0.63		
3515853	SR	0.82	0.46	-0.1060	0.0484	0.78	0.67		
3515785	SR	0.78	0.32	0.1771	0.0463	0.99	0.97		
3548078	SR	0.54	0.40	0.6282	0.0437	1.19	1.26		
3515933	SR	0.80	0.26	-0.3619	0.0509	1.10	1.33		
3515519	SR	0.87	0.42	-0.6898	0.0548	0.78	0.77		
3515795	SR	0.64	0.46	0.5626	0.0440	0.99	0.94		
100000201939	SR	0.93	0.34	-1.9724	0.0817	0.96	0.89		
3548086	SR	0.81	0.41	-0.2943	0.0503	0.93	0.91		
100000201940	BCR	0.68	0.53	0.4107	0.0449	0.88	0.81		
3985623	BCR	0.64	0.61	0.6834	0.0292	0.96	0.96	0.0238	-0.0238
100000212986	SR	0.59	0.23	0.8914	0.0428	1.26	1.38		
3515506	SR	0.91	0.38	-1.2169	0.0635	0.79	0.64		
3502602	SR	0.61	0.41	0.8642	0.0430	1.04	1.06		
3515632	SR	0.69	0.51	-0.0118	0.0478	1.02	0.98		
3548088	SR	0.79	0.44	-0.1831	0.0493	0.96	0.90		

Table C.5 The 2009 MSA-Mathematics Classical and Rasch Item Parameters: Grade 5 Form A

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2	Step 2-3
3488443	SR	0.42	0.29	1.6277	0.0434	1.21	1.37			
3511269	SR	0.88	0.30	-1.0845	0.0591	0.89	0.85			
3492139	SR	0.54	0.07	0.9589	0.0431	1.49	1.69			
3488471	BCR	0.31	0.44	2.2862	0.0461	0.94	0.86			
3564052	BCR	0.42	0.48	1.8914	0.0389	1.00	1.00	-2.0216	2.0216	
3488391	SR	0.88	0.28	-1.2591	0.0621	0.99	1.03			
100000022548	SR	0.52	0.49	1.0761	0.0430	0.91	0.92			
3511203	SR	0.92	0.39	-1.8897	0.0763	0.89	0.53			
3488331	SR	0.80	0.33	-0.6848	0.0536	1.07	1.26			
3488507	SR	0.78	0.46	-0.4448	0.0509	0.93	0.90			
3511196	SR	0.57	0.51	0.6094	0.0445	0.97	0.96			
3492130	SR	0.54	0.45	0.9322	0.0438	0.99	0.97			
3488373	SR	0.68	0.42	0.1790	0.0469	1.00	0.99			
3511467	SR	0.82	0.40	-0.9093	0.0575	0.88	0.77			
3512529	SR	0.58	0.24	0.4459	0.0457	1.30	1.45			
3511339	SR	0.65	0.52	0.4633	0.0445	0.87	0.83			
3512698	SR	0.92	0.24	-1.7862	0.0734	1.04	1.29			
100000043853	SR	0.70	0.43	0.3350	0.0451	0.97	0.93			
3488461	BCR	0.50	0.57	1.1765	0.0431	0.85	0.78			
3564055	BCR	0.73	0.63	-0.1442	0.0339	0.88	0.83	-0.4881	0.4881	
3511216	SR	0.69	0.27	0.2030	0.0458	1.19	1.21			
3512638	SR	0.70	0.42	0.2606	0.0455	0.95	0.91			
3511499	SR	0.63	0.53	0.1746	0.0461	0.99	0.95			
3488506	SR	0.40	0.45	1.7536	0.0437	1.03	1.08			
3488522	BCR	0.65	0.48	0.3599	0.0451	0.97	0.95			
3564059	BCR	0.80	0.52	-0.6893	0.0382	0.95	1.01	-0.8147	0.8147	
3488324	SR	0.78	0.52	-0.2851	0.0495	0.82	0.69			
3511246	SR	0.79	0.48	-0.3310	0.0499	0.86	0.75			
3511458	SR	0.90	0.38	-1.7535	0.0730	0.92	0.68			
3488419	SR	0.72	0.44	-0.0825	0.0477	0.99	0.98			
100000028276	SR	0.84	0.48	-0.9996	0.0580	0.87	0.62			
3511566	SR	0.68	0.41	0.1548	0.0461	1.06	1.08			
3511513	SR	0.86	0.38	-1.1293	0.0600	0.96	1.02			
3488272	SR	0.53	0.38	0.8010	0.0435	1.09	1.13			
3548429	ECR	0.68	0.60	0.1442	0.0465	0.82	0.71			
3564047	ECR	0.63	0.67	0.4382	0.0253	0.94	0.92	-0.9888	0.1966	0.7922
3511266	SR	0.70	0.44	0.0148	0.0471	1.05	0.97			

Table C.5 (continued)

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2	Step 2-3
3488431	SR	0.74	0.30	-0.2130	0.0488	1.11	1.28			
3511470	SR	0.85	0.40	-0.6898	0.0538	0.82	0.72			
3488375	SR	0.90	0.32	-1.6090	0.0695	1.02	0.93			
100000028274	SR	0.86	0.36	-1.3725	0.0645	0.98	1.05			
3488347	BCR	0.45	0.61	1.4298	0.0433	0.79	0.73			
3564046	BCR	0.42	0.63	1.5002	0.0276	0.90	0.84	0.8247	-0.8247	
3488393	SR	0.91	0.35	-1.8559	0.0755	0.97	0.86			
3512595	SR	0.78	0.36	-0.6828	0.0537	1.16	1.38			
3488241	SR	0.92	0.28	-1.7928	0.0740	0.91	1.08			
3511572	SR	0.48	0.34	1.2621	0.0431	1.14	1.22			
100000043857	SR	0.81	0.41	-0.9439	0.0574	0.95	0.95			
3512712	SR	0.90	0.35	-1.6307	0.0698	0.95	0.97			
3511396	SR	0.85	0.41	-1.1516	0.0603	0.93	0.83			
3511429	SR	0.78	0.42	-0.5025	0.0516	1.03	1.00			
3488277	BCR	0.47	0.59	1.2616	0.0436	0.83	0.76			
3564193	BCR	0.45	0.58	1.3546	0.0324	1.01	1.01	-1.0498	1.0498	
3511626	SR	0.86	0.32	-0.9260	0.0569	0.94	1.04			
100000022555	SR	0.48	0.39	1.1820	0.0430	1.08	1.15			
3511631	SR	0.79	0.39	-0.3862	0.0507	0.92	0.93			
3488251	SR	0.64	0.36	0.5581	0.0443	1.08	1.05			
3511439	SR	0.78	0.47	-0.5779	0.0525	0.95	0.79			
3488406	BCR	0.56	0.51	0.7860	0.0437	0.91	0.86			
3563998	BCR	0.52	0.49	0.9340	0.0342	1.07	1.07	-1.4162	1.4162	
3488326	SR	0.65	0.40	0.2463	0.0458	1.08	1.15			
3488348	BCR	0.68	0.49	0.0277	0.0478	0.95	0.85			
3464056	BCR	0.47	0.59	1.1386	0.0317	0.97	0.96	-0.8486	0.8486	
3488328	SR	0.71	0.39	-0.0717	0.0483	1.01	0.96			
3511448	SR	0.76	0.35	-0.6839	0.0543	1.14	1.31			

Table C.6 The 2009 MSA-Mathematics Classical and Rasch Item Parameters: Grade 5 Form F

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2	Step 2-3
3492123	SR	0.54	0.34	1.1181	0.0422	1.10	1.13			
3511269	SR	0.89	0.29	-1.0845	0.0598	0.94	0.90			
3492117	SR	0.95	0.28	-2.4397	0.0961	0.91	0.58			
3511531	BCR	0.70	0.50	0.1282	0.0459	0.93	0.87			
3563986	BCR	0.59	0.48	0.5377	0.0352	1.06	1.07	-1.5615	1.5615	
3492128	SR	0.54	0.49	1.0153	0.0424	0.94	0.90			
100000022548	SR	0.53	0.50	1.0761	0.0423	0.94	0.97			
3511203	SR	0.94	0.33	-1.8897	0.0779	0.73	0.53			
100000022547	SR	0.83	0.47	-0.7480	0.0546	0.91	0.79			
100000028251	SR	0.63	0.35	0.5516	0.0437	1.10	1.13			
3511196	SR	0.57	0.51	0.6094	0.0439	0.96	0.95			
100000028253	SR	0.46	0.35	1.4773	0.0428	1.10	1.16			
3488373	SR	0.69	0.43	0.1790	0.0465	0.95	0.90			
3511467	SR	0.82	0.41	-0.9093	0.0579	0.94	0.82			
3512529	SR	0.60	0.25	0.4459	0.0451	1.32	1.47			
3511339	SR	0.66	0.51	0.4633	0.0440	0.89	0.86			
3488515	SR	0.83	0.22	-0.7556	0.0547	1.15	1.49			
100000043853	SR	0.70	0.40	0.3350	0.0446	0.95	1.03			
3488461	BCR	0.50	0.58	1.1765	0.0424	0.83	0.79			
3564055	BCR	0.74	0.62	-0.1442	0.0338	0.85	0.79	-0.4881	0.4881	
3511216	SR	0.64	0.30	0.2030	0.0454	1.22	1.27			
3512638	SR	0.76	0.44	0.2606	0.0450	0.86	0.79			
3488495	SR	0.88	0.33	-1.2540	0.0631	0.99	0.87			
3492140	SR	0.89	0.40	-1.4589	0.0673	0.92	0.69			
3512615	BCR	0.78	0.51	-0.4877	0.0517	0.86	0.81			
3595439	BCR	0.58	0.52	0.5673	0.0362	0.95	0.96	-1.6948	1.6948	
3488324	SR	0.78	0.51	-0.2851	0.0495	0.76	0.65			
3511246	SR	0.77	0.45	-0.3310	0.0500	0.91	0.84			
3511458	SR	0.93	0.31	-1.7535	0.0748	0.61	0.54			
3512616	SR	0.48	0.31	1.2809	0.0422	1.14	1.25			
3488240	SR	0.69	0.51	0.2496	0.0451	0.94	0.91			
3511566	SR	0.67	0.40	0.1548	0.0457	1.12	1.26			
3511513	SR	0.87	0.37	-1.1293	0.0608	0.94	0.99			
100000209182	SR	0.20	0.13	3.1000	0.0522	1.21	1.97			
3488525	ECR	0.82	0.39	-0.7202	0.0544	0.97	0.97			
3564053	ECR	0.50	0.58	1.1388	0.0285	1.02	1.01	-2.2589	0.246	2.0128
3511266	SR	0.70	0.44	0.0148	0.0467	1.03	0.95			

Table C.6 (continued)

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2	Step 2-3
3488431	SR	0.75	0.29	-0.2130	0.0486	1.11	1.36			
3511470	SR	0.86	0.38	-0.6898	0.0539	0.77	0.66			
3492126	SR	0.86	0.49	-1.1318	0.0609	0.83	0.54			
100000028274	SR	0.88	0.38	-1.3725	0.0653	0.92	0.90			
3488347	BCR	0.46	0.60	1.4298	0.0424	0.80	0.75			
3564046	BCR	0.43	0.62	1.5002	0.0268	0.88	0.87	0.8247	-0.8247	
3488393	SR	0.92	0.34	-1.8559	0.0770	0.90	0.63			
3512595	SR	0.79	0.34	-0.6828	0.0538	1.20	1.38			
3488241	SR	0.92	0.26	-1.7928	0.0754	0.97	0.98			
3488509	SR	0.80	0.51	-0.5908	0.0527	0.86	0.79			
100000043857	SR	0.83	0.41	-0.9439	0.0577	1.00	1.05			
3512712	SR	0.91	0.34	-1.6307	0.0711	0.91	0.85			
3511396	SR	0.86	0.39	-1.1516	0.0609	1.04	0.98			
3511429	SR	0.77	0.41	-0.5025	0.0516	1.09	1.15			
3548459	BCR	0.75	0.55	-0.2124	0.0491	0.85	0.72			
3564051	BCR	0.68	0.42	0.0385	0.0350	1.20	1.39	-1.2689	1.2689	
3511626	SR	0.88	0.30	-0.9260	0.0573	0.87	0.84			
3488275	SR	0.49	0.53	1.2554	0.0423	0.90	0.87			
3511631	SR	0.80	0.40	-0.3862	0.0509	0.87	0.77			
3488251	SR	0.64	0.35	0.5581	0.0436	1.08	1.04			
3511439	SR	0.79	0.48	-0.5779	0.0525	1.00	0.83			
3512649	BCR	0.28	0.46	2.5751	0.0475	0.89	0.85			
3563989	BCR	0.38	0.48	1.7474	0.0282	1.19	1.36	0.2559	-0.2559	
3492134	SR	0.64	0.20	0.5423	0.0437	1.29	1.36			
3488259	BCR	0.19	0.44	3.0327	0.0518	0.82	0.69			
3564048	BCR	0.33	0.56	1.9710	0.0287	0.98	0.91	0.495	-0.495	
3488328	SR	0.72	0.41	-0.0717	0.0478	0.99	1.01			
3511448	SR	0.77	0.33	-0.6839	0.0544	1.13	1.35			

Table C.7 The 2009 MSA-Mathematics Classical and Rasch Item Parameters: Grade 6 Form A

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2	Step 2-3
3516257	SR	0.90	0.23	-1.8193	0.0669	1.03	1.26			
100000078832	SR	0.82	0.34	-1.0614	0.0538	1.04	1.05			
3516291	SR	0.54	0.31	0.6406	0.0425	1.25	1.35			
3492091	SR	0.75	0.35	-0.4928	0.0478	1.12	1.27			
100000028397	SR	0.80	0.41	-0.9101	0.0521	0.97	0.86			
3516243	SR	0.73	0.41	-0.2844	0.0462	0.98	0.88			
3517004	ECR	0.93	0.34	-2.4767	0.0852	0.95	0.67			
3564010	ECR	0.66	0.57	-0.2026	0.0279	1.12	1.15	-1.9106	0.2374	1.6732
3516248	SR	0.85	0.37	-1.3223	0.0577	1.01	0.94			
3516559	SR	0.92	0.26	-2.1208	0.0742	0.99	1.17			
3516255	SR	0.77	0.30	-0.4703	0.0476	1.10	1.30			
3516258	SR	0.64	0.39	0.3254	0.0433	1.07	1.11			
3488422	SR	0.48	0.45	1.0056	0.0422	0.99	0.98			
3516240	SR	0.67	0.52	0.2409	0.0436	0.89	0.83			
3516909	SR	0.58	0.46	0.4042	0.0433	0.99	0.97			
100000012866	SR	0.21	0.30	2.8196	0.0514	1.00	1.35			
3548404	BCR	0.53	0.52	0.7098	0.0427	0.94	0.91			
3564013	BCR	0.47	0.41	1.2037	0.0513	0.98	0.99	-3.0576	3.0576	
3488296	SR	0.81	0.40	-1.0460	0.0543	0.99	1.01			
3516351	SR	0.50	0.53	0.4777	0.0434	0.99	0.98			
3516290	SR	0.69	0.41	-0.1396	0.0461	1.02	1.06			
100000043862	SR	0.62	0.44	0.2101	0.0443	1.02	0.99			
100000208908	SR	0.32	0.44	1.8806	0.0449	0.92	1.05			
3517010	SR	0.54	0.39	0.8496	0.0422	1.12	1.16			
100000043865	SR	0.55	0.42	0.7262	0.0424	1.04	1.03			
3488462	BCR	0.62	0.58	0.2562	0.0437	0.83	0.77			
3564075	BCR	0.52	0.61	0.7929	0.0306	0.94	0.94	-0.803	0.803	
3503966	SR	0.51	0.59	0.8279	0.0423	0.82	0.77			
3516331	SR	0.52	0.39	1.1378	0.0423	1.08	1.08			
3516241	SR	0.86	0.39	-1.4702	0.0602	0.97	0.87			
3516247	SR	0.63	0.60	0.3674	0.0431	0.80	0.74			
3516329	SR	0.71	0.37	-0.2969	0.0464	1.06	1.22			
3516355	SR	0.71	0.48	-0.1849	0.0456	0.90	0.85			
3516359	SR	0.67	0.43	0.0835	0.0442	1.04	1.01			
3492095	SR	0.79	0.49	-0.9261	0.0525	0.90	0.73			
100000028408	SR	0.85	0.42	-1.4442	0.0599	0.94	0.72			

Table C.7 (continued)

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2	Step 2-3
3516333	BCR	0.67	0.62	-0.0954	0.0452	0.78	0.67			
3564008	BCR	0.66	0.66	0.0294	0.0303	0.83	0.82	-0.1519	0.1519	
3488398	SR	0.97	0.27	-3.1672	0.1133	0.93	0.52			
3516929	SR	0.72	0.50	0.0810	0.0442	0.87	0.76			
3488358	SR	0.67	0.46	-0.0834	0.0452	0.94	1.04			
3488302	SR	0.55	0.47	0.6636	0.0427	1.00	0.98			
100000012859	SR	0.71	0.40	-0.2466	0.0462	1.04	1.16			
3516906	SR	0.60	0.41	0.2864	0.0436	1.08	1.10			
3516332	SR	0.53	0.31	0.5885	0.0428	1.24	1.38			
3516256	SR	0.63	0.36	0.1350	0.0442	1.12	1.24			
3516302	SR	0.71	0.40	-0.4092	0.0473	1.10	1.26			
100000208906	SR	0.88	0.38	-1.5247	0.0612	0.93	0.84			
100000208909	BCR	0.46	0.55	1.1385	0.0427	0.88	0.83			
3985730	BCR	0.48	0.62	0.9849	0.0281	1.01	0.98	0.1811	-0.1811	
3516375	SR	0.63	0.52	0.2607	0.0434	0.91	0.87			
3503954	SR	0.83	0.21	-1.1222	0.0547	1.18	1.56			
3516616	BCR	0.44	0.57	1.1920	0.0429	0.89	0.84			
3564012	BCR	0.52	0.45	0.5835	0.0373	1.14	1.15	-1.8963	1.8963	
3516613	SR	0.57	0.28	0.4071	0.0435	1.25	1.32			
100000022470	SR	0.51	0.56	0.8821	0.0423	0.87	0.83			
100000208907	SR	0.83	0.45	-1.1677	0.0554	0.91	0.83			
3488306	SR	0.89	0.28	-1.7554	0.0656	1.03	1.19			
3488411	BCR	0.48	0.39	1.1054	0.0424	1.09	1.12			
3564014	BCR	0.55	0.54	0.6090	0.0340	1.01	1.00	-1.4986	1.4986	
3488258	SR	0.79	0.41	-0.8592	0.0518	0.98	0.91			
3516303	SR	0.55	0.48	0.6580	0.0427	0.94	0.90			

Table C.8 The 2009 MSA-Mathematics Classical and Rasch Item Parameters: Grade 6 Form F

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2	Step 2-3
3516257	SR	0.89	0.23	-1.8193	0.0690	1.15	1.52			
3488263	SR	0.87	0.33	-1.5008	0.0622	0.99	0.84			
3516291	SR	0.55	0.30	0.6406	0.0422	1.19	1.27			
3492143	SR	0.79	0.42	-0.6658	0.0499	0.89	0.77			
3488262	SR	0.91	0.31	-2.1168	0.0768	0.98	0.79			
3516243	SR	0.74	0.39	-0.2844	0.0465	0.93	0.84			
3548350	ECR	0.59	0.61	0.3475	0.0443	0.84	0.76			
3564015	ECR	0.50	0.64	0.8817	0.0242	1.04	1.04	-0.7206	-0.1891	0.9097
3516248	SR	0.84	0.36	-1.3223	0.0589	1.14	1.05			
3516559	SR	0.92	0.25	-2.1208	0.0769	1.01	1.20			
3516255	SR	0.78	0.31	-0.4703	0.0480	1.06	1.18			
3516258	SR	0.65	0.38	0.3254	0.0433	1.02	1.06			
3488440	SR	0.68	0.59	-0.1323	0.0455	0.82	0.68			
3516240	SR	0.66	0.50	0.2409	0.0435	0.86	0.83			
3516909	SR	0.58	0.46	0.4042	0.0431	0.98	0.95			
3488307	SR	0.68	0.39	-0.1634	0.046	1.04	1.01			
3516627	BCR	0.51	0.51	0.6268	0.0434	0.98	1.00			
3564006	BCR	0.42	0.55	1.3578	0.0378	0.98	0.98	-1.9164	1.9164	
100000022483	SR	0.54	0.27	0.6958	0.0427	1.23	1.32			
3516351	SR	0.50	0.52	0.4777	0.0434	0.99	0.96			
3516290	SR	0.69	0.42	-0.1396	0.0464	0.96	0.94			
100000043862	SR	0.61	0.46	0.2101	0.0445	0.97	0.92			
3488424	SR	0.81	0.42	-1.1816	0.058	0.92	0.80			
100000028430	SR	0.67	0.37	0.0122	0.0446	1.08	1.18			
100000043865	SR	0.55	0.40	0.7262	0.0422	1.03	1.01			
3488469	BCR	0.69	0.52	-0.1844	0.0462	0.89	0.80			
3564071	BCR	0.74	0.56	-0.2008	0.0305	1.01	0.86	0.9385	-0.9385	
3492099	SR	0.92	0.28	-2.1347	0.0773	1.02	1.10			
3516331	SR	0.52	0.36	1.1378	0.0418	1.16	1.21			
3516241	SR	0.86	0.36	-1.4702	0.0616	0.92	0.79			
3516247	SR	0.63	0.59	0.3674	0.0429	0.80	0.74			
3516329	SR	0.65	0.40	-0.2969	0.0465	1.20	1.33			
3516355	SR	0.71	0.48	-0.1849	0.0457	0.92	0.86			
3488260	SR	0.63	0.45	0.1206	0.0439	0.98	0.91			
3492095	SR	0.78	0.45	-0.9261	0.0531	1.00	1.06			
100000004462	SR	0.79	0.18	-0.6746	0.0501	1.19	1.55			

Table C.8 (continued)

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2	Step 2-3
3516358	BCR	0.43	0.52	1.2893	0.0424	0.95	0.90			
3985729	BCR	0.40	0.56	1.5499	0.0327	0.98	0.97	-1.2584	1.2584	
3492093	SR	0.80	0.33	-0.7772	0.0512	1.05	1.21			
3516929	SR	0.70	0.48	0.0810	0.0442	0.86	0.75			
10000028419	SR	0.76	0.48	-0.6904	0.0503	0.93	1.00			
100000004450	SR	0.63	0.41	0.1537	0.0440	1.07	1.09			
100000028416	SR	0.49	0.39	1.0327	0.0420	1.06	1.08			
3516906	SR	0.66	0.46	0.2864	0.0434	0.93	0.85			
3516332	SR	0.53	0.29	0.5885	0.0425	1.23	1.35			
3516256	SR	0.63	0.35	0.1350	0.0440	1.18	1.30			
3516302	SR	0.71	0.39	-0.4092	0.0475	1.09	1.15			
3488489	SR	0.71	0.43	-0.2639	0.0464	0.99	0.87			
100000208909	BCR	0.48	0.55	1.1385	0.0425	0.88	0.84			
3985730	BCR	0.50	0.61	0.9849	0.0278	1.01	0.99	0.1811	-0.1811	
3516375	SR	0.62	0.53	0.2607	0.0433	0.88	0.80			
3492087	SR	0.80	0.35	-0.8918	0.0525	1.02	1.17			
3516616	BCR	0.40	0.55	1.1920	0.0432	0.84	0.77			
3564012	BCR	0.50	0.42	0.5835	0.0380	1.07	1.09	-1.8963	1.8963	
3516613	SR	0.56	0.28	0.4071	0.0437	1.19	1.27			
100000028409	SR	0.63	0.43	0.2401	0.0434	1.02	0.98			
3503961	SR	0.93	0.26	-2.2456	0.0804	1.02	1.03			
3492120	SR	0.63	0.38	0.2830	0.0433	1.04	1.02			
3516913	BCR	0.42	0.53	1.2807	0.0422	0.89	0.85			
3985725	BCR	0.56	0.63	0.3129	0.0353	0.85	0.84	-1.6336	1.6336	
3488385	SR	0.77	0.43	-0.6632	0.0501	0.97	0.88			
3516303	SR	0.56	0.47	0.6580	0.0424	0.94	0.91			

Table C.9 The 2009 MSA-Mathematics Classical and Rasch Item Parameters: Grade 7 Form A

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2	Step 2-3
3517604	SR	0.36	0.44	1.0539	0.0442	0.98	0.97			
3517601	SR	0.55	0.54	0.4455	0.0436	0.90	0.88			
3517609	SR	0.60	0.51	0.1508	0.0439	0.93	0.89			
3487664	SR	0.24	0.33	2.2060	0.0508	1.04	1.30			
3517744	BCR	0.45	0.45	0.6921	0.0444	1.06	1.04			
3564018	BCR	0.34	0.50	1.4348	0.0344	1.16	1.14	-1.1447	1.1447	
3517616	SR	0.67	0.50	-0.1398	0.0447	0.94	0.91			
3517634	SR	0.71	0.54	-0.4706	0.0462	0.84	0.76			
3517677	SR	0.67	0.54	-0.3998	0.0458	0.91	0.86			
3517638	SR	0.78	0.49	-1.1551	0.0514	0.91	0.83			
100000026796	SR	0.83	0.37	-1.4762	0.0551	1.02	1.06			
3517650	SR	0.69	0.51	-0.4683	0.0462	0.93	0.86			
3487922	SR	0.68	0.36	-0.4981	0.0463	1.11	1.19			
3517652	SR	0.74	0.46	-0.6359	0.0472	0.93	0.83			
3547473	SR	0.83	0.41	-1.1243	0.0511	0.81	0.72			
3517663	SR	0.35	0.42	1.5825	0.0464	1.13	1.28			
100000018130	SPR	0.53	0.48	0.3886	0.0441	1.03	1.09			
3491692	ECR	0.45	0.65	0.7615	0.0444	0.76	0.68			
3564159	ECR	0.47	0.71	0.5864	0.0256	0.95	0.93	-1.186	0.4071	0.7788
3517668	SPR	0.37	0.51	1.0492	0.0453	0.96	0.91			
100000043354	SPR	0.36	0.54	1.2412	0.0460	0.92	0.89			
100000043350	SPR	0.60	0.58	-0.1607	0.0465	0.87	0.84			
3487925	BCR	0.66	0.50	-0.6335	0.0493	1.00	1.08			
3564151	BCR	0.69	0.44	-1.0291	0.0377	1.19	1.54	-0.8589	0.8589	
100000208466	SR	0.55	0.49	0.0546	0.0460	1.00	0.96			
3517667	SR	0.60	0.45	-0.5147	0.0464	1.18	1.35			
3517678	SR	0.94	0.31	-2.682	0.0791	0.73	0.67			
3517742	SR	0.60	0.45	0.0227	0.0444	1.01	1.02			
3547642	SPR	0.72	0.36	-0.8342	0.0489	1.09	1.28			
3487560	SPR	0.30	0.59	1.6314	0.0475	0.80	0.68			
3517725	BCR	0.33	0.57	1.4747	0.0462	0.89	0.79			
3564022	BCR	0.52	0.65	0.1132	0.0334	0.91	0.90	-1.1539	1.1539	
100000043349	SR	0.34	0.38	1.3415	0.0452	1.08	1.26			
3517656	SR	0.67	0.41	-0.4094	0.0459	1.13	1.09			
100000012796	SR	0.56	0.35	0.2502	0.0438	1.20	1.26			
100000043347	ECR	0.71	0.60	-0.6646	0.0477	0.81	0.73			

Table C.9 (continued)

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step	Step	Step
								0-1	1-2	2-3
3595366	ECR	0.41	0.57	1.6353	0.0331	1.06	1.09	-3.0103	-0.694	3.7043
3547777	SPR	0.33	0.48	1.5096	0.0463	0.99	0.95			
100000207793	SPR	0.62	0.48	-0.2274	0.0455	1.02	1.08			
3547535	SR	0.83	0.44	-1.5891	0.0568	0.94	0.71			
100000043338	SR	0.35	0.28	1.4392	0.0458	1.17	1.51			
3517687	SR	0.61	0.47	-0.0583	0.0444	1.00	0.95			
3517692	SR	0.84	0.32	-1.4991	0.0553	0.95	1.11			
3517648	ECR	0.67	0.38	-0.4422	0.0462	1.13	1.29			
3564027	ECR	0.73	0.60	-0.8657	0.0297	0.98	1.03	-0.9282	-0.5852	1.5135
3500155	SPR	0.22	0.45	2.2489	0.0527	0.95	0.83			
3517704	SPR	0.39	0.49	1.0690	0.0459	0.97	0.97			
100000004171	SPR	0.44	0.59	0.8686	0.0444	0.87	0.82			
3517712	SR	0.47	0.40	0.5663	0.0446	1.09	1.13			
3517714	SR	0.58	0.57	0.0092	0.0454	0.87	0.80			
3517716	SR	0.69	0.36	-0.4333	0.0460	1.12	1.05			
3517718	SR	0.72	0.36	-0.2963	0.0453	1.03	1.06			
3487678	BCR	0.50	0.53	0.5631	0.0439	0.95	0.92			
3564153	BCR	0.44	0.51	0.9376	0.0397	1.02	1.01	-2.0991	2.0991	
3517721	SR	0.53	0.49	0.5231	0.0435	0.97	0.94			
3517691	SR	0.66	0.59	-0.2784	0.0454	0.83	0.78			
100000018106	SR	0.60	0.35	0.0819	0.0441	1.18	1.20			
3555858	SR	0.46	0.46	0.6673	0.0437	0.99	1.02			
3492167	SPR	0.35	0.57	1.3391	0.0454	0.87	0.78			
3555859	SR	0.77	0.42	-1.4603	0.0550	1.14	1.19			
3517752	SR	0.66	0.51	-0.5723	0.0470	0.99	0.93			
3488830	SR	0.60	0.56	-0.0385	0.0445	0.91	0.85			

Table C.10 The 2009 MSA-Mathematics Classical and Rasch Item Parameters: Grade 7 Form F

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2	Step 2-3
3517604	SR	0.36	0.45	1.0539	0.0445	0.96	0.95			
3517601	SR	0.56	0.55	0.4455	0.0437	0.90	0.87			
3517609	SR	0.61	0.53	0.1508	0.0439	0.93	0.87			
3487664	SR	0.25	0.34	2.2060	0.0512	1.03	1.36			
3517744	BCR	0.46	0.44	0.6921	0.0444	1.08	1.07			
3564018	BCR	0.35	0.50	1.4348	0.0345	1.15	1.14	-1.1447	1.1447	
3517616	SR	0.67	0.51	-0.1398	0.0448	0.92	0.89			
3517634	SR	0.72	0.56	-0.4706	0.0461	0.84	0.74			
3517677	SR	0.68	0.54	-0.3998	0.0457	0.88	0.82			
3517638	SR	0.78	0.48	-1.1551	0.0512	0.90	0.83			
100000026796	SR	0.83	0.38	-1.4762	0.0548	0.96	0.90			
3517650	SR	0.70	0.51	-0.4683	0.0460	0.90	0.82			
3487605	SR	0.61	0.34	0.0261	0.0442	1.21	1.45			
3517652	SR	0.77	0.46	-0.6359	0.047	0.90	0.78			
3547473	SR	0.84	0.41	-1.1243	0.0508	0.79	0.70			
3517663	SR	0.35	0.39	1.5825	0.0467	1.10	1.19			
100000043344	SPR	0.37	0.54	1.3744	0.0461	0.94	0.93			
3487765	ECR	0.50	0.60	0.5452	0.0439	0.85	0.81			
3564141	ECR	0.53	0.58	0.5905	0.0327	1.00	1.03	-2.1342	-1.1123	3.2465
3517668	SPR	0.38	0.51	1.0492	0.0452	0.95	0.89			
3547893	SPR	0.25	0.56	2.1319	0.0517	0.81	0.63			
100000043350	SPR	0.60	0.56	-0.1607	0.0464	0.89	0.85			
3487925	BCR	0.67	0.49	-0.6335	0.049	0.94	1.04			
3564151	BCR	0.70	0.43	-1.0291	0.0375	1.22	1.61	-0.8589	0.8589	
100000208467	SR	0.59	0.38	-0.0362	0.0458	1.14	1.24			
3517667	SR	0.56	0.39	-0.5147	0.0464	1.35	1.80			
3517678	SR	0.95	0.30	-2.6820	0.0785	0.72	0.52			
3517742	SR	0.60	0.46	0.0227	0.0445	1.00	1.01			
3555865	SPR	0.35	0.54	1.4240	0.0466	0.88	0.89			
100000043360	SPR	0.58	0.56	0.0968	0.0442	0.90	0.86			
100000048821	BCR	0.54	0.44	0.2601	0.0441	1.07	1.08			
3595371	BCR	0.32	0.48	2.1656	0.0409	1.03	1.02	-2.2964	2.2964	
100000043349	SR	0.33	0.38	1.3415	0.0456	1.09	1.23			
3517656	SR	0.67	0.40	-0.4094	0.0459	1.12	1.05			
3491634	SR	0.32	0.21	1.7720	0.0479	1.38	1.87			
100000012779	ECR	0.53	0.56	0.3215	0.0442	0.92	0.90			

Table C.10 (continued)

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step	Step	Step
								0-1	1-2	2-3
3595378	ECR	0.36	0.66	1.5606	0.0317	0.87	0.87	-2.5425	0.2773	2.2652
100000207795	SPR	0.65	0.62	-0.2841	0.0456	0.79	0.74			
3517683	SPR	0.58	0.63	0.2289	0.0443	0.80	0.73			
3547535	SR	0.82	0.44	-1.5891	0.0566	1.01	0.87			
100000043338	SR	0.34	0.27	1.4392	0.0462	1.26	1.70			
3517687	SR	0.61	0.48	-0.0583	0.0444	1.01	0.99			
3517692	SR	0.84	0.32	-1.4991	0.0551	0.97	1.05			
3517648	ECR	0.68	0.37	-0.4422	0.0461	1.15	1.35			
3564027	ECR	0.74	0.61	-0.8657	0.0296	0.96	1.02	-0.9282	-0.5852	1.5135
3492169	SPR	0.39	0.54	1.1920	0.0455	0.94	0.91			
100000043342	SPR	0.63	0.45	-0.1596	0.0450	1.01	1.07			
3492156	SPR	0.41	0.61	1.0662	0.0449	0.82	0.75			
3517712	SR	0.50	0.42	0.5663	0.0440	1.12	1.22			
3517714	SR	0.62	0.60	0.0092	0.0446	0.85	0.79			
3517716	SR	0.69	0.38	-0.4333	0.0460	1.11	1.05			
3517718	SR	0.73	0.36	-0.2963	0.0452	1.04	1.10			
100000012810	BCR	0.28	0.52	1.8858	0.0498	0.91	0.84			
3595375	BCR	0.39	0.55	1.5793	0.0447	0.93	0.90	-2.5264	2.5264	
3517721	SR	0.55	0.50	0.5231	0.0437	1.00	0.99			
3517691	SR	0.69	0.58	-0.2784	0.0453	0.79	0.71			
3487748	SR	0.60	0.39	0.1268	0.044	1.16	1.14			
3555858	SR	0.47	0.47	0.6673	0.0439	1.03	1.07			
100000018133	SPR	0.32	0.57	1.6464	0.0478	0.81	0.70			
3555859	SR	0.77	0.43	-1.4603	0.0547	1.16	1.31			
3517752	SR	0.67	0.52	-0.5723	0.0468	0.94	0.87			
3488830	SR	0.57	0.54	-0.0385	0.0445	0.96	0.91			

Table C.11 The 2009 MSA-Mathematics Classical and Rasch Item Parameters: Grade 8 Form A

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2	Step 2-3
3514015	SR	0.27	0.33	1.4965	0.0471	1.09	1.14			
3514014	SR	0.57	0.42	-0.2177	0.0429	1.07	1.01			
3514013	BCR	0.5	0.66	0.1810	0.0428	0.74	0.67			
3564107	BCR	0.68	0.63	-0.9848	0.0348	0.83	0.80	-1.1835	1.1835	
3514016	SR	0.81	0.33	-1.3613	0.0493	0.94	0.92			
100000018156	SR	0.68	0.36	-0.7550	0.0448	1.11	1.11			
3514053	SR	0.77	0.36	-1.2003	0.0479	0.93	0.96			
100000043330	SR	0.47	0.51	0.3621	0.0426	0.96	0.96			
3500150	SR	0.48	0.40	0.3158	0.0426	1.08	1.12			
100000018174	SPR	0.52	0.60	0.0671	0.0429	0.80	0.74			
3487680	ECR	0.31	0.66	1.2610	0.0463	0.72	0.59			
3564133	ECR	0.35	0.69	0.8697	0.0240	1.03	0.96	-0.111	0.3415	-0.2305
3514065	SPR	0.91	0.33	-2.9220	0.0786	0.90	0.85			
100000026780	SPR	0.38	0.58	0.7842	0.0442	0.85	0.79			
100000043325	SPR	0.56	0.45	-0.2713	0.0440	1.05	1.19			
100000004108	SPR	0.53	0.47	0.0206	0.0428	1.03	1.09			
3514595	SR	0.71	0.36	-0.8540	0.0454	1.03	1.07			
100000012754	SR	0.65	0.46	-0.6096	0.0442	0.98	0.96			
3487759	BCR	0.30	0.64	1.2982	0.0465	0.76	0.62			
3564128	BCR	0.51	0.73	0.0944	0.0321	0.72	0.71	-1.0009	1.0009	
100000004078	SPR	0.52	0.65	0.0720	0.0428	0.75	0.70			
100000043320	SR	0.46	0.36	0.2581	0.0427	1.12	1.17			
3514058	SR	0.35	0.48	1.0306	0.0444	0.98	1.01			
3514062	SR	0.45	0.57	0.5139	0.0429	0.86	0.83			
3514117	BCR	0.41	0.66	0.7346	0.0445	0.78	0.70			
3564111	BCR	0.46	0.62	0.2987	0.0332	0.93	0.94	-1.0752	1.0752	
3513646	SPR	0.46	0.58	0.4579	0.0433	0.88	0.84			
3514597	SPR	0.88	0.36	-2.3874	0.0651	0.90	0.82			
3514156	SR	0.77	0.42	-1.4579	0.0504	1.03	1.05			
3487934	ECR	0.51	0.44	0.0273	0.0434	1.04	1.04			
3564122	ECR	0.38	0.57	0.9667	0.0266	1.19	1.20	-0.9274	-1.0424	1.9698
100000043323	SR	0.51	0.52	0.5661	0.0430	0.99	1.00			
3514291	SR	0.81	0.36	-1.4001	0.0498	0.87	0.98			
100000049037	SR	0.65	0.43	-0.5927	0.0443	1.00	0.95			
3487633	BCR	0.67	0.50	-0.8046	0.0461	0.94	0.90			
3564123	BCR	0.49	0.38	0.2204	0.0289	1.60	1.95	0.0018	-0.0018	

Table C.11 (continued)

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2	Step 2-3
3514055	SR	0.59	0.40	-0.2581	0.0431	1.07	1.11			
3514052	SR	0.53	0.35	-0.1085	0.0429	1.21	1.22			
3487539	SR	0.64	0.36	-0.6178	0.0444	1.12	1.14			
100000043311	SR	0.37	0.17	0.8435	0.0439	1.41	1.64			
3487525	SR	0.53	0.58	0.0551	0.0428	0.86	0.80			
3487540	SR	0.67	0.42	-0.7102	0.0446	1.02	0.98			
3514074	SR	0.46	0.35	0.3257	0.0428	1.17	1.23			
3514075	SR	0.67	0.39	-0.6275	0.0442	1.07	0.98			
3514164	ECR	0.57	0.54	-0.2697	0.0436	0.91	0.94			
3564117	ECR	0.51	0.58	0.0215	0.0277	1.16	1.16	-2.0897	0.3751	1.7146
100000043326	SPR	0.45	0.53	0.3680	0.0430	0.92	0.90			
3514083	SPR	0.28	0.52	1.2566	0.0480	0.90	0.84			
3514095	SR	0.33	0.45	1.2102	0.0453	1.01	1.16			
3487568	SR	0.20	0.10	2.0087	0.0514	1.37	1.85			
3514103	SR	0.70	0.35	-0.5330	0.0439	1.03	1.07			
100000043304	SR	0.32	0.50	1.3321	0.0464	0.93	1.03			
3519734	SR	0.24	0.33	1.7460	0.0491	1.06	1.55			
100000004118	SR	0.54	0.53	0.0905	0.0427	0.90	0.85			
3487906	SPR	0.22	0.47	1.7189	0.0522	0.89	0.81			
3500160	SPR	0.26	0.54	1.5068	0.0487	0.86	0.74			
3487939	BCR	0.44	0.60	0.3153	0.0452	0.85	0.79			
3564124	BCR	0.29	0.57	1.5079	0.0379	0.99	0.96	-1.5771	1.5771	
3487912	SR	0.53	0.48	-0.0934	0.0436	1.02	0.98			
3514710	SR	0.56	0.35	-0.1424	0.0436	1.15	1.24			
100000004091	SR	0.52	0.35	0.0638	0.0437	1.15	1.22			

Table C.12 The 2009 MSA-Mathematics Classical and Rasch Item Parameters: Grade 8 Form F

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2	Step 2-3
3514015	SR	0.28	0.32	1.4965	0.0468	1.12	1.19			
3514014	SR	0.58	0.41	-0.2177	0.0427	1.07	1.05			
3514016	SR	0.82	0.33	-1.3613	0.0492	0.89	0.83			
100000018154	SR	0.69	0.43	-0.6627	0.0442	0.99	0.97			
3514053	SR	0.78	0.36	-1.2003	0.0479	0.95	1.03			
100000043330	SR	0.49	0.53	0.3621	0.0423	0.90	0.88			
3500150	SR	0.49	0.38	0.3158	0.0423	1.13	1.21			
3500167	SPR	0.21	0.27	1.8723	0.0516	1.17	1.46			
3514283	ECR	0.44	0.61	0.5874	0.043	0.83	0.75			
3564116	ECR	0.58	0.64	-0.5358	0.0267	1.04	1.02	-2.4564	1.4718	0.9846
3492049	SPR	0.61	0.41	-0.4824	0.0443	1.03	1.15			
100000004107	SPR	0.52	0.44	0.1624	0.0428	1.02	1.04			
100000199104	SPR	0.42	0.59	0.6409	0.0437	0.84	0.81			
3514161	SPR	0.23	0.51	1.7775	0.0497	0.84	0.71			
100000018159	SR	0.88	0.42	-2.1690	0.0603	0.86	0.64			
3488841	SR	0.68	0.26	-0.7247	0.0446	1.20	1.59			
3491681	BCR	0.28	0.41	1.4238	0.0467	1.02	0.99			
3564126	BCR	0.36	0.48	1.1318	0.0360	1.05	1.05	-1.6837	1.6837	
3513650	SPR	0.36	0.54	1.0321	0.0445	0.88	0.81			
100000026754	SR	0.67	0.37	-0.5765	0.0438	1.08	1.13			
3514058	SR	0.35	0.45	1.0306	0.0441	0.93	0.97			
3514062	SR	0.46	0.55	0.5139	0.0426	0.87	0.84			
3514117	BCR	0.43	0.65	0.7346	0.0440	0.79	0.70			
3564111	BCR	0.47	0.63	0.2987	0.0327	0.90	0.91	-1.0752	1.0752	
3492059	SPR	0.42	0.50	0.5743	0.0431	0.96	0.92			
3514279	SPR	0.27	0.58	1.5561	0.048	0.78	0.66			
3514156	SR	0.74	0.43	-1.4579	0.0504	1.08	1.10			
3487934	ECR	0.51	0.44	0.0273	0.0432	1.00	0.95			
3564122	ECR	0.37	0.55	0.9667	0.0263	1.14	1.14	-0.9274	-1.0424	1.9698
100000043323	SR	0.52	0.51	0.5661	0.0427	0.94	0.94			
3514291	SR	0.80	0.32	-1.4001	0.0497	0.92	1.07			
3487545	SR	0.70	0.27	-0.8828	0.0456	1.17	1.29			
3519815	BCR	0.57	0.51	-0.2045	0.0432	0.93	0.97			
3564138	BCR	0.41	0.56	0.7170	0.0336	1.00	0.99	-1.3017	1.3017	
3514055	SR	0.58	0.40	-0.2581	0.0430	1.04	1.10			
3514052	SR	0.54	0.34	-0.1085	0.0427	1.19	1.21			

Table C.12 (continued)

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2	Step 2-3
3487539	SR	0.65	0.35	-0.6178	0.0444	1.13	1.14			
3514705	SR	0.26	0.26	1.5905	0.0478	1.13	1.61			
3487525	SR	0.54	0.55	0.0551	0.0427	0.88	0.84			
3487540	SR	0.68	0.42	-0.7102	0.0444	1.05	1.05			
3514074	SR	0.48	0.36	0.3257	0.0424	1.10	1.13			
3514075	SR	0.67	0.40	-0.6275	0.0441	1.06	0.97			
100000043313	ECR	0.64	0.51	-0.5323	0.0441	0.90	0.93			
3595407	ECR	0.77	0.58	-1.2176	0.0272	0.95	1.10	-0.7351	0.1474	0.5877
100000012732	SPR	0.27	0.50	1.5351	0.0474	0.90	0.84			
3514167	SPR	0.60	0.46	-0.3043	0.0433	1.00	0.96			
3514095	SR	0.34	0.45	1.2102	0.0449	0.99	1.04			
100000018153	SR	0.65	0.31	-0.5150	0.0436	1.18	1.30			
100000004114	SR	0.33	0.31	1.2076	0.0450	1.17	1.33			
3514103	SR	0.72	0.35	-0.5330	0.0437	0.98	0.97			
100000018151	SR	0.55	0.47	0.0346	0.0424	1.00	1.01			
3487712	SR	0.61	0.48	-0.3805	0.0432	0.91	0.88			
3492047	SR	0.30	0.38	1.0119	0.0441	1.02	1.05			
100000018179	SPR	0.34	0.55	1.0936	0.0451	0.89	0.80			
3500164	SPR	0.45	0.48	0.5224	0.0434	1.01	0.99			
3487939	BCR	0.44	0.63	0.3153	0.0441	0.77	0.70			
3564124	BCR	0.29	0.61	1.5079	0.0374	1.01	0.97	-1.5771	1.5771	
3487912	SR	0.56	0.50	-0.0934	0.0431	0.94	0.89			
3514710	SR	0.56	0.37	-0.1424	0.0432	1.09	1.10			
3487902	SR	0.81	0.33	-1.8764	0.0564	0.99	1.05			

APPENDIX D: THE 2009 MSA-MATH BLUEPRINTS

Table D.1 The 2008 MSA-Math Blueprint: Grade 3

Code	Standard / Objective statement	No. of Augmented Items (Form A)		No. of Augmented Items (Form B)		No. of Augmented Items (Form C)		No. of Augmented Items (Form D)		No. of Augmented Items (Form E)	
		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
1	Knowledge of Algebra, Patterns, or Functions - Students will algebraically represent, model, analyze, or solve mathematical or real-world problems involving patterns or functional relationships	12	1	12	1	12	1	12	1	12	1
		(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(2)	(1)
1.A	Patterns or Functions										
1.A.1	Identify, describe, extend, or create numeric patterns to:										
1.A.1.a	Represent or analyze numeric patterns using skip counting by 2, 5, 10, or 100 starting with any whole number (0-1,000)										
1.A.1.b	Represent or analyze numeric patterns using skip counting by 3 or 4 starting with 0, 1, 2, 3, or 4 (0-30)										
1.A.1.c	Represent or analyze numeric patterns using skip counting backward by 10 or 100 starting with any whole number (0-1,000)										
1.A.2	Identify, describe, extend or create non-numeric patterns to:										
1.A.2.a	Represent or analyze growing patterns using symbols, shapes, designs, or pictures starting at the beginning and showing at least 3 levels but no more than 5 and asking for the next level										
1.A.2.b	Represent or analyze repeating patterns using symbols, shapes, designs, or pictures with no more than 4 objects in the core of the pattern										
1.B	Expressions, Equations, or Inequalities										
1.B.1	Write or identify expressions to:										
1.B.1.a	Represent numeric quantities with one operational symbol (+, -) using whole numbers (0-50)										
1.B.2	Identify, write, or solve equations or inequalities to:										
1.B.2.a	Represent relationships by using the appropriate relational symbols (>, <, =) and operational symbols (+, -) on either side using whole numbers (0-1,000)										

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective statement	No. of Augmented Items (Form F)		No. of Augmented Items (Form G)		No. of Augmented Items (Form H)		No. of Augmented Items (Form J)		No. of Augmented Items (Form K)	
		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
1	Knowledge of Algebra, Patterns, or Functions - Students will algebraically represent, model, analyze, or solve mathematical or real-world problems involving patterns or functional relationships	12	1	12	1	12	1	12	1	12	1
			(1)	(1)	(1)		(1)		(1)	(1)	(1)
1.A	Patterns or Functions										
1.A.1	Identify, describe, extend, or create numeric patterns to:										
1.A.1.a	Represent or analyze numeric patterns using skip counting by 2, 5, 10, or 100 starting with any whole number (0-1,000)										
1.A.1.b	Represent or analyze numeric patterns using skip counting by 3 or 4 starting with 0, 1, 2, 3, or 4 (0-30)										
1.A.1.c	Represent or analyze numeric patterns using skip counting backward by 10 or 100 starting with any whole number (0-1,000)										
1.A.2	Identify, describe, extend or create non-numeric patterns to:										
1.A.2.a	Represent or analyze growing patterns using symbols, shapes, designs, or pictures starting at the beginning and showing at least 3 levels but no more than 5 and asking for the next level										
1.A.2.b	Represent or analyze repeating patterns using symbols, shapes, designs, or pictures with no more than 4 objects in the core of the pattern										
1.B	Expressions, Equations, or Inequalities										
1.B.1	Write or identify expressions to:										
1.B.1.a	Represent numeric quantities with one operational symbol (+, -) using whole numbers (0-50)										
1.B.2	Identify, write, or solve equations or inequalities to:										
1.B.2.a	Represent relationships by using the appropriate relational symbols (>, <, =) and operational symbols (+, -) on either side using whole numbers (0-1,000)										

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)		No. of Augmented Items (Form B)		No. of Augmented Items (Form C)		No. of Augmented Items (Form D)		No. of Augmented Items (Form E)	
		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
1.B.2.b	Find the missing number (unknown) in a number sentence (equation) with one operation (+, -) using whole numbers (0-100)										
1.C	Numeric or Graphic Representations of Relationships										
1.C.1	Locate points on a number line to:										
1.C.1.a	Represent whole numbers on a number line (0-500)										
1.C.1.b	Represent proper fractions with denominators of 2, 3, or 4 on a number line										
2	Knowledge of Geometry - Students will apply the properties of one, two, or three-dimensional geometric figures to describe, reason, or solve problems about shape, size, position, or motion of objects	7	1	7	1	7	1	7	1	7	1
		(2)		(2)		(2)		(1)		(1)	(1)
2.A	Plane Geometric Figures										
2.A.1	Analyze the properties of plane geometric figures to:										
2.A.1.a	Identify or describe polygons including triangles, quadrilaterals, pentagons, hexagons, or octagons by the number of sides or vertices										
2.A.1.b	Identify or describe quadrilaterals (squares, rectangles, rhombi, parallelograms, trapezoids) by the length of sides										
2.A.1.c	Identify triangles, rectangles, or squares as part of a composite figure comprised of 2 of the stated polygons										
2.B	Solid Geometric Figures										
2.B.1	Analyze the properties of solid geometric figures to:										
2.B.1.a	Identify or describe a cube by the number of edges, faces, vertices, or shape of each face										
2.D	Congruence or Similarity										
2.D.1	Analyze congruent figures to:										
2.D.1.a	Identify or describe geometric figures with the same shape and same size										

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)		No. of Augmented Items (Form G)		No. of Augmented Items (Form H)		No. of Augmented Items (Form J)		No. of Augmented Items (Form K)	
		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
1.B.2.b	Find the missing number (unknown) in a number sentence (equation) with one operation (+, -) using whole numbers (0-100)										
1.C	Numeric or Graphic Representations of Relationships										
1.C.1	Locate points on a number line to:										
1.C.1.a	Represent whole numbers on a number line (0-500)										
1.C.1.b	Represent proper fractions with denominators of 2, 3, or 4 on a number line										
2	Knowledge of Geometry - Students will apply the properties of one, two, or three-dimensional geometric figures to describe, reason, or solve problems about shape, size, position, or motion of objects	7	1	7	1	7	1	7	1	7	1
		(2)	(1)	(2)		(1)		(2)		(1)	
2.A	Plane Geometric Figures										
2.A.1	Analyze the properties of plane geometric figures to:										
2.A.1.a	Identify or describe polygons including triangles, quadrilaterals, pentagons, hexagons, or octagons by the number of sides or vertices										
2.A.1.b	Identify or describe quadrilaterals (squares, rectangles, rhombi, parallelograms, trapezoids) by the length of sides										
2.A.1.c	Identify triangles, rectangles, or squares as part of a composite figure comprised of 2 of the stated polygons										
2.B	Solid Geometric Figures										
2.B.1	Analyze the properties of solid geometric figures to:										
2.B.1.a	Identify or describe a cube by the number of edges, faces, vertices, or shape of each face										
2.D	Congruence or Similarity										
2.D.1	Analyze congruent figures to:										
2.D.1.a	Identify or describe geometric figures with the same shape and same size										

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)		No. of Augmented Items (Form B)		No. of Augmented Items (Form C)		No. of Augmented Items (Form D)		No. of Augmented Items (Form E)	
		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
2.E	Transformations										
2.E.1	Analyze a transformation to:										
2.E.1.a	Identify or describe the results of a slide (horizontal), flip (over a vertical line), or turn around a given point (90o clockwise) of a geometric figure or picture										
2.E.2	Analyze geometric figures or pictures to:										
2.E.2.a	Identify or describe not more than 4 lines of symmetry										
3	Knowledge of Measurement - Students will identify attributes, units, or systems of measurement or apply a variety of techniques, formulas, tools or technology for determining measurements.	6	1	6	1	6	1	6	1	6	1
		(2)		(1)		(1)		(3)		(2)	
3.A	Measurement Scales										
3.A.1	Read scales to:										
3.A.1.a	Estimate or determine length to the nearest centimeter or 1/2 inch										
3.A.1.b	Identify time to the nearest minute using an analog clock										
3.A.1.c	Estimate or determine temperature to the nearest degree (°F or °C)										
3.A.1.d	Estimate or determine weight to the nearest pound or ounce										
3.B	Measurement Tools										
3.B.1	Use standard or metric units to:										
3.B.1.a	Measure length to the nearest centimeter or ½ inch using a ruler										
3.C	Applications in Measurement										
3.C.1	Apply measurement concepts to:										

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)		No. of Augmented Items (Form G)		No. of Augmented Items (Form H)		No. of Augmented Items (Form J)		No. of Augmented Items (Form K)	
		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
2.E	Transformations										
2.E.1	Analyze a transformation to:										
2.E.1.a	Identify or describe the results of a slide (horizontal), flip (over a vertical line), or turn around a given point (90o clockwise) of a geometric figure or picture										
2.E.2	Analyze geometric figures or pictures to:										
2.E.2.a	Identify or describe not more than 4 lines of symmetry										
3	Knowledge of Measurement - Students will identify attributes, units, or systems of measurement or apply a variety of techniques, formulas, tools or technology for determining measurements.	6	1	6	1	6	1	6	1	6	1
		(1)								(1)	
3.A	Measurement Scales										
3.A.1	Read scales to:										
3.A.1.a	Estimate or determine length to the nearest centimeter or 1/2 inch										
3.A.1.b	Identify time to the nearest minute using an analog clock										
3.A.1.c	Estimate or determine temperature to the nearest degree (°F or °C)										
3.A.1.d	Estimate or determine weight to the nearest pound or ounce										
3.B	Measurement Tools										
3.B.1	Use standard or metric units to:										
3.B.1.a	Measure length to the nearest centimeter or ½ inch using a ruler										
3.C	Applications in Measurement										
3.C.1	Apply measurement concepts to:										

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)		No. of Augmented Items (Form B)		No. of Augmented Items (Form C)		No. of Augmented Items (Form D)		No. of Augmented Items (Form E)	
		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
3.C.1.a	Find the perimeter of geometric figure or pictures on a grid (0-50)										
3.C.1.b	Find the area of geometric figures or pictures on a grid using whole units (0-50)										
3.C.2	Calculate to:										
3.C.2.a	Determine equivalent units of 12 inches = 1 foot or 3 feet = 1 yard (0-30)										
4	Knowledge of Statistics - Students will collect, organize, display, analyze, or interpret data to make decisions or predictions	11	1	11	1	11	1	11	1	11	1
		(2)	(1)	(3)	(1)	(2)	(1)	(3)	(1)	(3)	
4.A	Data Displays										
4.A.1	Organize or display data to:										
4.A.1.a	Make tables with no more than 4 categories and 1 set of data using whole numbers (0-1,000)										
4.A.1.b	Make pictographs with scales of 2:1, 4:1, or 10:1 using whole numbers (0-100)										
4.A.1.c	Make single bar graphs with no more than 4 categories using intervals of 1, 2, 5, or 10 using whole numbers (0-100)										
4.B	Data Analysis										
4.B.1	Analyze data to:										
4.B.1.a	Interpret tables with no more than 4 categories and 1 set of data using whole numbers (0-1,000)										
4.B.1.b	Interpret pictographs with scales of 2:1, 4:1, or 10:1 using whole numbers (0-100)										
4.B.1.c	Interpret single bar graphs with maximum of 4 bars with intervals of 1, 2, 5, or 10 using whole numbers (0-100)										

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)		No. of Augmented Items (Form G)		No. of Augmented Items (Form H)		No. of Augmented Items (Form J)		No. of Augmented Items (Form K)	
		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
3.C.1.a	Find the perimeter of geometric figure or pictures on a grid (0-50)										
3.C.1.b	Find the area of geometric figures or pictures on a grid using whole units (0-50)										
3.C.2	Calculate to:										
3.C.2.a	Determine equivalent units of 12 inches = 1 foot or 3 feet = 1 yard (0-30)										
4	Knowledge of Statistics - Students will collect, organize, display, analyze, or interpret data to make decisions or predictions	11	1	11	1	11	1	11	1	11	1
		(2)		(1)	(1)	(2)	(1)	(1)	(1)	(1)	(1)
4.A	Data Displays										
4.A.1	Organize or display data to:										
4.A.1.a	Make tables with no more than 4 categories and 1 set of data using whole numbers (0-1,000)										
4.A.1.b	Make pictographs with scales of 2:1, 4:1, or 10:1 using whole numbers (0-100)										
4.A.1.c	Make single bar graphs with no more than 4 categories using intervals of 1, 2, 5, or 10 using whole numbers (0-100)										
4.B	Data Analysis										
4.B.1	Analyze data to:										
4.B.1.a	Interpret tables with no more than 4 categories and 1 set of data using whole numbers (0-1,000)										
4.B.1.b	Interpret pictographs with scales of 2:1, 4:1, or 10:1 using whole numbers (0-100)										
4.B.1.c	Interpret single bar graphs with maximum of 4 bars with intervals of 1, 2, 5, or 10 using whole numbers (0-100)										

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)		No. of Augmented Items (Form B)		No. of Augmented Items (Form C)		No. of Augmented Items (Form D)		No. of Augmented Items (Form E)	
		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
5	Knowledge of Probability - Students will use experimental methods or theoretical reasoning to determine probabilities to make predictions or solve problems about events whose outcomes involve random variation.	2		2		2	(1)	2	(1)	2	
5.B	Theoretical Probability										
5.B.1	Determine the relative probability of one simple event to:										
5.B.1.a	Describe the probability using the terms more (or most) likely, less (or least) likely, or equally likely										
6	Knowledge of Number Relationships or Computation - Students will describe, represent, or apply numbers or their relationships or will estimate or compute using mental strategies, paper/pencil or technology.	13	3	13	3	13	3	13	3	13	3
		(6)		(7)		(6)		(5)		(5)	
6.A	Knowledge of Number or Place Value										
6.A.1.	Apply knowledge of rational numbers or place value to:										
6.A.1.a	Read, write, or represent whole numbers using symbols, words, or models (0-10,000)										
6.A.1.b	Express whole numbers in expanded form (0-10,000)										
6.A.1.c	Identify the place value of a digit in a number (0-9,999)										
6.A.1.d	Compare, order, or describe no more than 4 whole numbers with or without using the symbols (<, >, =) (0-10,000)										
6.A.2	Apply knowledge of fractions to:										
6.A.2.a	Read, write, or represent halves, thirds, or fourths of a single region using symbols, words, or models										
6.A.2.b	Read, write, or represent halves, thirds, or fourths of a set which has the same number of items as the denominator using symbols, words, or models										

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)		No. of Augmented Items (Form G)		No. of Augmented Items (Form H)		No. of Augmented Items (Form J)		No. of Augmented Items (Form K)	
		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
5	Knowledge of Probability - Students will use experimental methods or theoretical reasoning to determine probabilities to make predictions or solve problems about events whose outcomes involve random variation.	2		2		2	(1)	2	(1)	2	
5.B	Theoretical Probability										
5.B.1	Determine the relative probability of one simple event to:										
5.B.1.a	Describe the probability using the terms more (or most) likely, less (or least) likely, or equally likely										
6	Knowledge of Number Relationships or Computation - Students will describe, represent, or apply numbers or their relationships or will estimate or compute using mental strategies, paper/pencil or technology.	13	3	13	3	13	3	13	3	13	3
		(8)		(8)		(9)		(9)		(9)	
6.A	Knowledge of Number or Place Value										
6.A.1.	Apply knowledge of rational numbers or place value to:										
6.A.1.a	Read, write, or represent whole numbers using symbols, words, or models (0-10,000)										
6.A.1.b	Express whole numbers in expanded form (0-10,000)										
6.A.1.c	Identify the place value of a digit in a number (0-9,999)										
6.A.1.d	Compare, order, or describe no more than 4 whole numbers with or without using the symbols (<, >, =) (0-10,000)										
6.A.2	Apply knowledge of fractions to:										
6.A.2.a	Read, write, or represent halves, thirds, or fourths of a single region using symbols, words, or models										
6.A.2.b	Read, write, or represent halves, thirds, or fourths of a set which has the same number of items as the denominator using symbols, words, or models										

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)		No. of Augmented Items (Form B)		No. of Augmented Items (Form C)		No. of Augmented Items (Form D)		No. of Augmented Items (Form E)	
		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
6.A.3	Apply knowledge of money to:										
6.A.3.a	Represent money amounts (\$0-\$100)										
6.A.3.b	Determine the value of a given set of mixed currency up (\$0-\$100)										
6.B	Number Theory										
6.B.1	Apply number relationships to:										
6.B.1.a	Identify or describe whole numbers as even or odd (0-100)										
6.C	Number Computation										
6.C.1	Analyze number relationships or compute to:										
6.C.1.a	Add up to 3 addends with no more than 3 digits in each addend using whole numbers (0-1,000)										
6.C.1.b	Subtract a minuend and subtrahend with no more than 3 digits in each using whole numbers (0-999)										
6.C.1.c	Represent multiplication or division basic facts (up to $9 \times 9 = 81$) using number sentences, pictures or drawings										
6.C.1.d	Identify or use the commutative, identity or zero properties for multiplication using whole numbers (0-20)										

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)		No. of Augmented Items (Form G)		No. of Augmented Items (Form H)		No. of Augmented Items (Form J)		No. of Augmented Items (Form K)	
		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
6.A.3	Apply knowledge of money to:										
6.A.3.a	Represent money amounts (\$0-\$100)										
6.A.3.b	Determine the value of a given set of mixed currency up (\$0-\$100)										
6.B	Number Theory										
6.B.1	Apply number relationships to:										
6.B.1.a	Identify or describe whole numbers as even or odd (0-100)										
6.C	Number Computation										
6.C.1	Analyze number relationships or compute to:										
6.C.1.a	Add up to 3 addends with no more than 3 digits in each addend using whole numbers (0-1,000)										
6.C.1.b	Subtract a minuend and subtrahend with no more than 3 digits in each using whole numbers (0-999)										
6.C.1.c	Represent multiplication or division basic facts (up to $9 \times 9 = 81$) using number sentences, pictures or drawings										
6.C.1.d	Identify or use the commutative, identity or zero properties for multiplication using whole numbers (0-20)										

Note. Number in parentheses indicates the total number of field test items.

Table D.2 The 2008 MSA-Math Blueprint: Grade 4

Code	Standard / Objective Statement	No. of Augmented Items (Form A)		No. of Augmented Items (Form B)		No. of Augmented Items (Form C)		No. of Augmented Items (Form D)		No. of Augmented Items (Form E)	
		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
1	Knowledge of Algebra, Patterns, or Functions - Students will algebraically represent, model, analyze, or solve mathematical or real-world problems involving patterns or functional relationships.	13	1	13	1	13	1	13	1	13	1
		(3)	(1)	(3)	(1)	(4)	(1)	(5)		(3)	(1)
1.A	Patterns or Functions										
1.A.1	Identify, describe, extend, or create numeric patterns or functions to:										
1.A.1.a	Represent or analyze numeric patterns using skip counting by 3, 4, 6, 7, 8, or 9 starting with any whole number (0-100)										
1.A.1.b	Complete a function table using a rule with one operation (+, -, x, ÷ with no remainders) using whole numbers (0-50)										
1.A.2	Identify, describe, extend, analyze, or create a non-numeric growing or repeating pattern to:										
1.A.2.a	Generalize a rule for the next level of a non-numeric growing pattern given at least 3 levels but no more than 5 levels										
1.A.2.b	Generalize a rule for a repeating pattern with no more than 4 objects in the core pattern										
1.B	Expressions, Equations, or Inequalities										
1.B.1	Write or identify expressions to:										
1.B.1.a	Represent numeric quantities with one operational symbol (+, -, x, ÷ with no remainders) using whole numbers (0-100)										
1.B.1.b	1.B.1.b. Determine equivalent numeric expressions using whole number (0-100)										
1.B.2	Identify, write, or solve equations or inequalities to:										
1.B.2.a	Represent relationships by using the appropriate relational symbols (>, <, =) and operational symbols (+, -, x) on either side using whole numbers (0-200)										

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)		No. of Augmented Items (Form G)		No. of Augmented Items (Form H)		No. of Augmented Items (Form J)		No. of Augmented Items (Form K)	
		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
1	Knowledge of Algebra, Patterns, or Functions - Students will algebraically represent, model, analyze, or solve mathematical or real-world problems involving patterns or functional relationships.	13	1	13	1	13	1	13	1	13	1
		(4)		(4)		(4)		(3)	(1)	(3)	(1)
1.A	Patterns or Functions										
1.A.1	Identify, describe, extend, or create numeric patterns or functions to:										
1.A.1.a	Represent or analyze numeric patterns using skip counting by 3, 4, 6, 7, 8, or 9 starting with any whole number (0-100)										
1.A.1.b	Complete a function table using a rule with one operation (+, -, x, ÷ with no remainders) using whole numbers (0-50)										
1.A.2	Identify, describe, extend, analyze, or create a non-numeric growing or repeating pattern to:										
1.A.2.a	Generalize a rule for the next level of a non-numeric growing pattern given at least 3 levels but no more than 5 levels										
1.A.2.b	Generalize a rule for a repeating pattern with no more than 4 objects in the core pattern										
1.B	Expressions, Equations, or Inequalities										
1.B.1	Write or identify expressions to:										
1.B.1.a	Represent numeric quantities with one operational symbol (+, -, x, ÷ with no remainders) using whole numbers (0-100)										
1.B.1.b	1.B.1.b. Determine equivalent numeric expressions using whole number (0-100)										
1.B.2	Identify, write, or solve equations or inequalities to:										
1.B.2.a	Represent relationships by using the appropriate relational symbols (>, <, =) and operational symbols (+, -, x) on either side using whole numbers (0-200)										

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)		No. of Augmented Items (Form B)		No. of Augmented Items (Form C)		No. of Augmented Items (Form D)		No. of Augmented Items (Form E)	
		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
1.B.2.b	Find the unknown in an equation with one operation (x) using whole numbers (0-100)										
1.C	Numeric or Graphic Representations of Relationships										
1.C.1	Locate points on a number line or in a coordinate grid to:										
1.C.1.a	Represent proper fractions with denominators of 6, 8, or 10 on a number line										
1.C.1.b	Identify positions on a coordinate plane in the first quadrant using ordered pairs of whole numbers (0-20)										
2	Knowledge of Geometry - Students will apply the properties of one, two, or three-dimensional geometric figures to describe, reason, or solve problems about shape, size, position, or motion of objects	6	1	6	1	6	1	6	1	6	1
		(1)		(2)		(2)		(2)		(2)	
2.A	Plane Geometric Figures										
2.A.1	Analyze the properties of plane geometric figures to:										
2.A.1.a	Identify or describe an angle as acute, right, or obtuse angle in relationship to another angle										
2.A.2	Analyze geometric relationships to:										
2.A.2.a	Compare or classify an angle as acute, right, or obtuse in relationship to another angle										
2.B	Solid Geometric Figures										
2.B.1	Analyze the properties of solid geometric figures to:										
2.B.1.a	Identify cones or cylinders										
2.B.1.b	Describe triangular pyramids, rectangular pyramids, triangular prisms, or rectangular prisms by the number of edges, faces, or vertices										
2.B.2	Analyze the relationship between plane geometric figures and faces of solid geometric figures to:										

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)		No. of Augmented Items (Form G)		No. of Augmented Items (Form H)		No. of Augmented Items (Form J)		No. of Augmented Items (Form K)	
		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
1.B.2.b	Find the unknown in an equation with one operation (x) using whole numbers (0-100)										
1.C	Numeric or Graphic Representations of Relationships										
1.C.1	Locate points on a number line or in a coordinate grid to:										
1.C.1.a	Represent proper fractions with denominators of 6, 8, or 10 on a number line										
1.C.1.b	Identify positions on a coordinate plane in the first quadrant using ordered pairs of whole numbers (0-20)										
2	Knowledge of Geometry - Students will apply the properties of one, two, or three-dimensional geometric figures to describe, reason, or solve problems about shape, size, position, or motion of objects	6	1	6	1	6	1	6	1	6	1
		(1)		(3)		(3)		(2)		(3)	
2.A	Plane Geometric Figures										
2.A.1	Analyze the properties of plane geometric figures to:										
2.A.1.a	Identify or describe an angle as acute, right, or obtuse angle in relationship to another angle										
2.A.2	Analyze geometric relationships to:										
2.A.2.a	Compare or classify an angle as acute, right, or obtuse in relationship to another angle										
2.B	Solid Geometric Figures										
2.B.1	Analyze the properties of solid geometric figures to:										
2.B.1.a	Identify cones or cylinders										
2.B.1.b	Describe triangular pyramids, rectangular pyramids, triangular prisms, or rectangular prisms by the number of edges, faces, or vertices										
2.B.2	Analyze the relationship between plane geometric figures and faces of solid geometric figures to:										

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)		No. of Augmented Items (Form B)		No. of Augmented Items (Form C)		No. of Augmented Items (Form D)		No. of Augmented Items (Form E)	
		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
2.B.2.a	Analyze or identify the number or arrangement of squares needed to make a cube										
2.B.2.b	Analyze or identify the number or arrangement of triangles/rectangles needed to make a triangular pyramid or rectangular pyramid										
2.D	Congruence or Similarity										
2.D.1	Apply congruence in transformation to:										
2.D.1.a	Identify the result in a transformation as being congruent to the original figure										
2.E	Transformations										
2.E.1	Analyze a transformation to:										
2.E.1.a	Identify or describe the results of a translation (horizontal), reflection (over a vertical line), or rotation around a given point (90o clockwise) of a geometric figure or picture										
3	Knowledge of Measurement - Students will identify attributes, units, or systems of measurement or apply a variety of techniques, formulas, tools or technology for determining measurements	6	1	6	1	6	1	6	1	6	1
		(4)	(1)	(3)		(3)		(3)		(6)	
3.A	Measurement Scales										
3.A.1	Read scales to:										
3.A.1.a	Estimate or determine length to the nearest millimeter or ¼ inch										
3.B	Measurement Tools										
3.B.1	Use standard or metric units to:										
3.B.1.a	Measure length to the nearest millimeter or 1/4 inch using a ruler										
3.C	Applications in Measurement										

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)		No. of Augmented Items (Form G)		No. of Augmented Items (Form H)		No. of Augmented Items (Form J)		No. of Augmented Items (Form K)	
		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
2.B.2.a	Analyze or identify the number or arrangement of squares needed to make a cube										
2.B.2.b	Analyze or identify the number or arrangement of triangles/rectangles needed to make a triangular pyramid or rectangular pyramid										
2.D	Congruence or Similarity										
2.D.1	Apply congruence in transformation to:										
2.D.1.a	Identify the result in a transformation as being congruent to the original figure										
2.E	Transformations										
2.E.1	Analyze a transformation to:										
2.E.1.a	Identify or describe the results of a translation (horizontal), reflection (over a vertical line), or rotation around a given point (90o clockwise) of a geometric figure or picture										
3	Knowledge of Measurement - Students will identify attributes, units, or systems of measurement or apply a variety of techniques, formulas, tools or technology for determining measurements	6 (5)	1	6 (5)	1	6 (5)	1	6 (5)	1	6 (6)	1
3.A	Measurement Scales										
3.A.1	Read scales to:										
3.A.1.a	Estimate or determine length to the nearest millimeter or ¼ inch										
3.B	Measurement Tools										
3.B.1	Use standard or metric units to:										
3.B.1.a	Measure length to the nearest millimeter or 1/4 inch using a ruler										
3.C	Applications in Measurement										

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)		No. of Augmented Items (Form B)		No. of Augmented Items (Form C)		No. of Augmented Items (Form D)		No. of Augmented Items (Form E)	
		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
3.C.1	Count or calculate to:										
3.C.1.a	Find the perimeter of polygons with no more than 6 sides given the length of the sides in whole numbers (0-100)										
3.C.1.b	Find the area of rectangles given the length of the sides in whole numbers (0-100)										
3.C.1.c	Find elapsed or end time using hour and half hour intervals										
3.C.2	Calculate to:										
3.C.2.a	Determine equivalent units of 36 inches = 1 yard (0-100)										
4	Knowledge of Statistics - Students will collect, organize, display, analyze, or interpret data to make decisions or predictions	7	1	7	1	7	1	7	1	7	1
		(3)		(3)		(3)				(2)	
4.A	Data Displays										
4.A.1	Organize or display data to:										
4.A.1.a	Make line plots with no more than 20 pieces of unorganized data with a range of no more than 10 using whole numbers (0-100)										
4.B	Data Analysis										
4.B.1	Analyze data to:										
4.B.1.a	Interpret line plots with no more than 20 pieces of data with a range no more than 10 using whole numbers (0-100)										
4.B.1.b	Interpret line graphs with the x-axis representing no more than 6 time intervals, the y-axis consisting of no more than 10 intervals with scales as factors of 100 using whole numbers (0-100)										
4.B.2	Analyze a data set to:										
4.B.2.a	Find the range, median, or mode of a given data set with no more than 8 pieces of data using whole numbers (0-100)										

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)		No. of Augmented Items (Form G)		No. of Augmented Items (Form H)		No. of Augmented Items (Form J)		No. of Augmented Items (Form K)	
		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
3.C.1	Count or calculate to:										
3.C.1.a	Find the perimeter of polygons with no more than 6 sides given the length of the sides in whole numbers (0-100)										
3.C.1.b	Find the area of rectangles given the length of the sides in whole numbers (0-100)										
3.C.1.c	Find elapsed or end time using hour and half hour intervals										
3.C.2	Calculate to:										
3.C.2.a	Determine equivalent units of 36 inches = 1 yard (0-100)										
4	Knowledge of Statistics - Students will collect, organize, display, analyze, or interpret data to make decisions or predictions	7	1	7	1	7	1	7	1	7	1
4.A	Data Displays										
4.A.1	Organize or display data to:										
4.A.1.a	Make line plots with no more than 20 pieces of unorganized data with a range of no more than 10 using whole numbers (0-100)										
4.B	Data Analysis										
4.B.1	Analyze data to:										
4.B.1.a	Interpret line plots with no more than 20 pieces of data with a range no more than 10 using whole numbers (0-100)										
4.B.1.b	Interpret line graphs with the x-axis representing no more than 6 time intervals, the y-axis consisting of no more than 10 intervals with scales as factors of 100 using whole numbers (0-100)										
4.B.2	Analyze a data set to:										
4.B.2.a	Find the range, median, or mode of a given data set with no more than 8 pieces of data using whole numbers (0-100)										

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)		No. of Augmented Items (Form B)		No. of Augmented Items (Form C)		No. of Augmented Items (Form D)		No. of Augmented Items (Form E)	
		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
5	Knowledge of Probability - Students will use experimental methods or theoretical reasoning to determine probabilities to make predictions or solve problems about events whose outcomes involve random variation.	6	1	6	1	6	1	6	1	6	1
5.B	Theoretical Probability										
5.B.1	Determine the relative probability of one simple event comprised of equally likely outcomes to:										
5.B.1.a	Describe the probability as a fraction with a sample space of no more than 6 outcomes										
6	Knowledge of Number Relationships or Computation - Students will describe, represent, or apply numbers or their relationships or will estimate or compute using mental strategies, paper/pencil or technology.	12	2	12	2	12	2	12	2	12	2
		(1)		(2)	(1)	(1)	(1)	(2)	(2)	(1)	
6.A	Knowledge of Number or Place Value										
6.A.1.	Apply knowledge of whole numbers or place value to:										
6.A.1.a	Read, write, or represent whole numbers using symbols, words, or models (0-1,000,000)										
6.A.1.b	Express whole numbers in expanded form (0-1,000,000)										
6.A.1.c	Identify the place value of a digit in a number (0-1,000,000)										
6.A.1.d	Compare or order no more than 4 whole numbers with or without using the symbols (<, >, =), (0-1,000,000)										
6.A.2	Apply knowledge of fractions or decimals to:										
6.A.2.a.	Read, write, or represent proper fractions in sixths, eighths, tenths, of a single region using symbols, words, or models										
6.A.2.b	Read, write, or represent proper fractions in sixths, eighths, tenths of a set which has the same number of items as the denominator using symbols, words, or models										

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)		No. of Augmented Items (Form G)		No. of Augmented Items (Form H)		No. of Augmented Items (Form J)		No. of Augmented Items (Form K)	
		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
5	Knowledge of Probability - Students will use experimental methods or theoretical reasoning to determine probabilities to make predictions or solve problems about events whose outcomes involve random variation.	6	1	6	1	6	1	6	1	6	1
5.B	Theoretical Probability										
5.B.1	Determine the relative probability of one simple event comprised of equally likely outcomes to:										
5.B.1.a	Describe the probability as a fraction with a sample space of no more than 6 outcomes										
6	Knowledge of Number Relationships or Computation - Students will describe, represent, or apply numbers or their relationships or will estimate or compute using mental strategies, paper/pencil or technology.	12	2	12	2	12	2	12	2	12	2
		(1)	(2)	(1)	(2)	(1)	(2)	(2)	(1)	(1)	
6.A	Knowledge of Number or Place Value										
6.A.1.	Apply knowledge of whole numbers or place value to:										
6.A.1.a	Read, write, or represent whole numbers using symbols, words, or models (0-1,000,000)										
6.A.1.b	Express whole numbers in expanded form (0-1,000,000)										
6.A.1.c	Identify the place value of a digit in a number (0-1,000,000)										
6.A.1.d	Compare or order no more than 4 whole numbers with or without using the symbols (<, >, =), (0-1,000,000)										
6.A.2	Apply knowledge of fractions or decimals to:										
6.A.2.a.	Read, write, or represent proper fractions in sixths, eighths, tenths, of a single region using symbols, words, or models										
6.A.2.b	Read, write, or represent proper fractions in sixths, eighths, tenths of a set which has the same number of items as the denominator using symbols, words, or models										

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)		No. of Augmented Items (Form B)		No. of Augmented Items (Form C)		No. of Augmented Items (Form D)		No. of Augmented Items (Form E)	
		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
6.A.2.c	Read, write, or represent decimals with no more than 2 decimal places using symbols, words, or models (0-100)										
6.A.2.d	Express decimals with no more than 2 decimal places in expanded form (0-100)										
6.A.2.e	Compare or order no more than 3 fractions or mixed numbers with like denominators with or without using the symbols (<, >, =) (0-20)										
6.A.2.f	Compare, order, or describe no more than 3 decimals with no more than 2 decimal places with or without using symbols (<, >, =) (0-100)										
6.A.3	Apply knowledge of money to:										
6.A.3.a	Compare the value of 2 sets of mixed currency (\$0-\$100)										
6.B	Number Theory										
6.B.1	Apply number relationships to:										
6.B.1.a	Identify or use divisibility rules of 2, 5, or 10 with whole numbers (0-1,000)										
6.B.1.b	Identify the factors of whole numbers (0-24)										
6.B.1.c	Identify no more than the first 5 multiples of any single digit whole number										
6.C	Number Computation										
6.C.1	Analyze number relationships or compute to:										
6.C.1.a	Add up to 3 addends with no more than 4 digits in each addend using whole numbers (0-10,000)										
6.C.1.b	Subtract a minuend and subtrahend with no more than 4 digits in each using whole numbers (0-10,000)										
6.C.1.c	Multiply a one 1-digit factor by up to a 3-digit factor using whole numbers (0-1,000)										

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)		No. of Augmented Items (Form G)		No. of Augmented Items (Form H)		No. of Augmented Items (Form J)		No. of Augmented Items (Form K)	
		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
6.A.2.c	Read, write, or represent decimals with no more than 2 decimal places using symbols, words, or models (0-100)										
6.A.2.d	Express decimals with no more than 2 decimal places in expanded form (0-100)										
6.A.2.e	Compare or order no more than 3 fractions or mixed numbers with like denominators with or without using the symbols (<, >, =) (0-20)										
6.A.2.f	Compare, order, or describe no more than 3 decimals with no more than 2 decimal places with or without using symbols (<, >, =) (0-100)										
6.A.3	Apply knowledge of money to:										
6.A.3.a	Compare the value of 2 sets of mixed currency (\$0-\$100)										
6.B	Number Theory										
6.B.1	Apply number relationships to:										
6.B.1.a	Identify or use divisibility rules of 2, 5, or 10 with whole numbers (0-1,000)										
6.B.1.b	Identify the factors of whole numbers (0-24)										
6.B.1.c	Identify no more than the first 5 multiples of any single digit whole number										
6.C	Number Computation										
6.C.1	Analyze number relationships or compute to:										
6.C.1.a	Add up to 3 addends with no more than 4 digits in each addend using whole numbers (0-10,000)										
6.C.1.b	Subtract a minuend and subtrahend with no more than 4 digits in each using whole numbers (0-10,000)										
6.C.1.c	Multiply a one 1-digit factor by up to a 3-digit factor using whole numbers (0-1,000)										

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)		No. of Augmented Items (Form B)		No. of Augmented Items (Form C)		No. of Augmented Items (Form D)		No. of Augmented Items (Form E)	
		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
6.C.1.d	Divide up to a 3-digit dividend by a 1-digit divisor using whole numbers and no remainders (0-1,000)										
6.C.1.e	Add or subtract 2 proper fractions with single digit like denominators, 2 mixed numbers with single digit like denominators or a whole number and a proper fraction with a single digit denominator (0-20)										
6.C.1.f	Add 2 decimals with the same number of decimal places but no more than 2 decimal places and no more than 4 digits including monetary notation (0-100)										
6.C.1.g	Subtract 2 decimals with the same number of decimal places but no more than 2 decimal places and no more than 4 digits including monetary notation (0-100)										
6.C.2	Estimate to:										
6.C.2.a	Determine the sum or difference of 2 numbers with no more than 2 decimal places in each (0-100)										
6.C.2.b	Determine the product of one 1-digit factor with the other factor having no more than 2 digits or the quotient of a 1-digit divisor with the dividend having no more than 2 digits using whole numbers (0-1,000)										

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)		No. of Augmented Items (Form G)		No. of Augmented Items (Form H)		No. of Augmented Items (Form J)		No. of Augmented Items (Form K)	
		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
6.C.1.d	Divide up to a 3-digit dividend by a 1-digit divisor using whole numbers and no remainders (0-1,000)										
6.C.1.e	Add or subtract 2 proper fractions with single digit like denominators, 2 mixed numbers with single digit like denominators or a whole number and a proper fraction with a single digit denominator (0-20)										
6.C.1.f	Add 2 decimals with the same number of decimal places but no more than 2 decimal places and no more than 4 digits including monetary notation (0-100)										
6.C.1.g	Subtract 2 decimals with the same number of decimal places but no more than 2 decimal places and no more than 4 digits including monetary notation (0-100)										
6.C.2	Estimate to:										
6.C.2.a	Determine the sum or difference of 2 numbers with no more than 2 decimal places in each (0-100)										
6.C.2.b	Determine the product of one 1-digit factor with the other factor having no more than 2 digits or the quotient of a 1-digit divisor with the dividend having no more than 2 digits using whole numbers (0-1,000)										

Note. Number in parentheses indicates the total number of field test items.

Table D.3 The 2008 MSA-Math Blueprint: Grade 5

Code	Standard / Objective Statement	No. of Augmented Items (Form A)			No. of Augmented Items (Form B)			No. of Augmented Items (Form C)			No. of Augmented Items (Form D)			No. of Augmented Items (Form E)		
		SR	BCR	ECR	SR	BCR	ECR	SR	BCR	ECR	SR	BCR	ECR	SR	BCR	ECR
1	Knowledge of Algebra, Patterns, or Functions - Students will algebraically represent, model, analyze, or solve mathematical or real-world problems involving patterns or functional relationships.	13	1	1	13	1	1	13	1	1	13	1	1	13	1	1
		(4)	(1)	(1)	(3)	(1)	(1)	(1)	(1)	(1)	(2)	(1)	(1)	(1)	(1)	(1)
1.A	Patterns or Functions															
1.A.1	Identify, describe, extend, or create numeric patterns or functions to:															
1.A.1.a	Interpret or write the rule for a one operation (+, -, x, ÷ with no remainders) function table using whole numbers or decimals with no more than 2 decimal places (0-1,000)															
1.A.1.b	Complete a function table with a one operation (+, -, x, ÷ with no remainders) rule using whole numbers or decimals with no more than 2 decimal places (0-200)															
1.A.1.c	Apply a given two-operation rule (+, -, x) for a pattern using whole numbers (0-100)															
1.B	Expressions, Equations, or Inequalities															
1.B.1	Write or evaluate expressions to:															
1.B.1.a	Represent unknown quantities with one unknown and one operation (+, -, x, ÷ with no remainders) using whole numbers (0-100) or money (\$0-\$100)															
1.B.1.b	Determine the value of algebraic expressions with one unknown and one operation (+, -) using whole numbers (0-1,000)															
1.B.1.c	Determine the value of algebraic expressions with one unknown and one operation (x, ÷ with no remainders) that uses whole numbers and the number for the unknown is no more than 9 (0-100)															

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)			No. of Augmented Items (Form G)			No. of Augmented Items (Form H)			No. of Augmented Items (Form J)			No. of Augmented Items (Form K)		
		SR	BC	RECR	SR	BC	RECR	SR	BC	ECR	SR	BC	ECR	SR	BC	RECR
1	Knowledge of Algebra, Patterns, or Functions - Students will algebraically represent, model, analyze, or solve mathematical or real-world problems involving patterns or functional relationships.	13	1	1	13	1	1	13	1	1	13	1	1	13	1	1
		(1)	(1)		(1)		(1)		(1)		(1)		(1)	(1)	(1)	(1)
1.A	Patterns or Functions															
1.A.1	Identify, describe, extend, or create numeric patterns or functions to:															
1.A.1.a	Interpret or write the rule for a one operation (+, -, x, ÷ with no remainders) function table using whole numbers or decimals with no more than 2 decimal places (0-1,000)															
1.A.1.b	Complete a function table with a one operation (+, -, x, ÷ with no remainders) rule using whole numbers or decimals with no more than 2 decimal places (0-200)															
1.A.1.c	Apply a given two-operation rule (+, -, x) for a pattern using whole numbers (0-100)															
1.B	Expressions, Equations, or Inequalities															
1.B.1	Write or evaluate expressions to:															
1.B.1.a	Represent unknown quantities with one unknown and one operation (+, -, x, ÷ with no remainders) using whole numbers (0-100) or money (\$0-\$100)															
1.B.1.b	Determine the value of algebraic expressions with one unknown and one operation (+, -) using whole numbers (0-1,000)															
1.B.1.c	Determine the value of algebraic expressions with one unknown and one operation (x, ÷ with no remainders) that uses whole numbers and the number for the unknown is no more than 9 (0-100)															

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)	No. of Augmented Items (Form B)	No. of Augmented Items (Form C)	No. of Augmented Items (Form D)	No. of Augmented Items (Form E)
		SR BCRECR	SR BCR ECR	SR BCR ECR	SR BCRECR	SR BCRECR
1.B.2	Identify, write, or solve equations or inequalities to:					
1.B.2.a	Represent relationships by using the appropriate relational symbols (>, <, =) and one operational symbol (+, -, x, ÷ with no remainders) on either side using whole numbers (0-400)					
1.B.2.b	Find the unknown in an equation with one operation (+, -, x, ÷ with no remainders) using whole numbers (0-2,000)					
1.C	Numeric or Graphic Representations of Relationships					
1.C.1	Locate points on a number line or in a coordinate grid to:					
1.C.1.a	Represent decimals with no more than two decimal places (0-100) or mixed numbers (0-10) with denominators of 2, 3, 4, 5, 6, 8, or 10 on a number line					
1.C.1.b	Create a graph in the first quadrant of a coordinate plane using ordered pairs of whole numbers (0-50)					
2.0	Knowledge of Geometry - Students will apply the properties of one, two, or three-dimensional geometric figures to describe, reason, or solve problems about shape, size, position, or motion of objects	5 1 (4)	5 1 (2)	5 1 (2) (1)	5 1	5 1 (2)
2.A	Plane Geometric Figures					
2.A.1	Analyze the properties of plane geometric figures to:					
2.A.1.a	Identify or describe parallel or perpendicular lines or line segments in geometric figures or pictures					
2.A.1.b	Identify a polygon with no more than 8 sides as part of composite figure comprised of triangles or quadrilaterals					
2.A.2	Analyze geometric relationships to:					

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)	No. of Augmented Items (Form G)	No. of Augmented Items (Form H)	No. of Augmented Items (Form J)	No. of Augmented Items (Form K)
		SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
1.B.2	Identify, write, or solve equations or inequalities to:					
1.B.2.a	Represent relationships by using the appropriate relational symbols (>, <, =) and one operational symbol (+, -, x, ÷ with no remainders) on either side using whole numbers (0-400)					
1.B.2.b	Find the unknown in an equation with one operation (+, -, x, ÷ with no remainders) using whole numbers (0-2,000)					
1.C	Numeric or Graphic Representations of Relationships					
1.C.1	Locate points on a number line or in a coordinate grid to:					
1.C.1.a	Represent decimals with no more than two decimal places (0-100) or mixed numbers (0-10) with denominators of 2, 3, 4, 5, 6, 8, or 10 on a number line					
1.C.1.b	Create a graph in the first quadrant of a coordinate plane using ordered pairs of whole numbers (0-50)					
2.0	Knowledge of Geometry - Students will apply the properties of one, two, or three-dimensional geometric figures to describe, reason, or solve problems about shape, size, position, or motion of objects	5 1	5 1 (1)	5 1 (1)	5 1 (1)	5 1
2.A	Plane Geometric Figures					
2.A.1	Analyze the properties of plane geometric figures to:					
2.A.1.a	Identify or describe parallel or perpendicular lines or line segments in geometric figures or pictures					
2.A.1.b	Identify a polygon with no more than 8 sides as part of composite figure comprised of triangles or quadrilaterals					
2.A.2	Analyze geometric relationships to:					

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)	No. of Augmented Items (Form B)	No. of Augmented Items (Form C)	No. of Augmented Items (Form D)	No. of Augmented Items (Form E)
		SR BCRECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCRECR
2.A.2.a	Compare or classify quadrilaterals including squares, rectangles, rhombi, parallelograms, or trapezoids by length of the sides or the types of the angles (Use the angle symbol \angle ABC)					
2.B	Solid Geometric Figures					
2.B.1	Analyze the properties of solid geometric figures to:					
2.B.1.a	Identify or classify pyramids or prisms as triangular pyramids, rectangular pyramids, triangular prisms or rectangular prisms by the number of edges, faces, or vertices					
2.B.1.b	Classify prisms or pyramids as triangular or rectangular by the base					
2.B.2	Analyze the relationship between plane geometric figures and surfaces of solid geometric figures to:					
2.B.2.a	Analyze or identify the number or arrangement of rectangles needed to make a rectangle prism					
2.B.2.b	Analyze or identify the number or arrangement of triangles/rectangles needed to make a triangular prism					
2.B.2.c	Analyze or identify the number or arrangement of circles/rectangles needed to make a cylinder					
2.C	Representation of Geometric Figures					
2.C.1	Represent plane geometric figures to:					
2.C.1.a	Identify, describe or draw angles, parallel line segments or perpendicular line segments given their dimensions using whole numbers (0-20) or angle measurements (0° - 179°)					
2.D	Congruence of Similarity					
2.D.1	Analyze similar figures to:					
2.D.1.a	Identify or describe geometric figures with the same shape and different size					

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)	No. of Augmented Items (Form G)	No. of Augmented Items (Form H)	No. of Augmented Items (Form J)	No. of Augmented Items (Form K)
		SR BCRECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCRECR
2.A.2.a	Compare or classify quadrilaterals including squares, rectangles, rhombi, parallelograms, or trapezoids by length of the sides or the types of the angles (Use the angle symbol \angle ABC)					
2.B	Solid Geometric Figures					
2.B.1	Analyze the properties of solid geometric figures to:					
2.B.1.a	Identify or classify pyramids or prisms as triangular pyramids, rectangular pyramids, triangular prisms or rectangular prisms by the number of edges, faces, or vertices					
2.B.1.b	Classify prisms or pyramids as triangular or rectangular by the base					
2.B.2	Analyze the relationship between plane geometric figures and surfaces of solid geometric figures to:					
2.B.2.a	Analyze or identify the number or arrangement of rectangles needed to make a rectangle prism					
2.B.2.b	Analyze or identify the number or arrangement of triangles/rectangles needed to make a triangular prism					
2.B.2.c	Analyze or identify the number or arrangement of circles/rectangles needed to make a cylinder					
2.C	Representation of Geometric Figures					
2.C.1	Represent plane geometric figures to:					
2.C.1.a	Identify, describe or draw angles, parallel line segments or perpendicular line segments given their dimensions using whole numbers (0-20) or angle measurements (0° - 179°)					
2.D	Congruence of Similarity					
2.D.1	Analyze similar figures to:					
2.D.1.a	Identify or describe geometric figures with the same shape and different size					

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)	No. of Augmented Items (Form B)	No. of Augmented Items (Form C)	No. of Augmented Items (Form D)	No. of Augmented Items (Form E)
		SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
2.E	Transformations					
2.E.1	Analyze a transformation to:					
2.E.1.a	Identify or describe the given result of a translation (vertical), a reflection (over a horizontal line), or a rotation around a given point (90° or 180° around a given point) of a geometric figure or picture					
3.0	Knowledge of Measurement - Students will identify attributes, units, or systems of measurement or apply a variety of techniques, formulas, tools or technology for determining measurements.	7 1 (1)	7 1 (1)	7 1 (2)	7 1 (1) (1)	7 1
3.A	Measurement Scales					
3.A.1	Read scales to:					
3.A.1.a	Estimate or determine weight to the nearest ounce or gram					
3.A.1.b	Estimate or determine capacity to the nearest ounce					
3.B	Measurement Tools					
3.B.1	Use standard units to:					
3.B.1.a	Measure length to the nearest 1/8 inch using a ruler					
3.B.2	Use standard units to:					
3.B.2.a	Measure angles (acute, right, obtuse) to the nearest degree using protractors					
3.C	Applications in Measurement					
3.C.1	Estimate or apply formulas to:					
3.C.1.a	Determine the perimeter of polygons with no more than 8 sides using whole numbers (0-500)					

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)	No. of Augmented Items (Form G)	No. of Augmented Items (Form H)	No. of Augmented Items (Form J)	No. of Augmented Items (Form K)
		SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
2.E	Transformations					
2.E.1	Analyze a transformation to:					
2.E.1.a	Identify or describe the given result of a translation (vertical), a reflection (over a horizontal line), or a rotation around a given point (90° or 180° around a given point) of a geometric figure or picture					
3.0	Knowledge of Measurement - Students will identify attributes, units, or systems of measurement or apply a variety of techniques, formulas, tools or technology for determining measurements.	7 1	7 1	7 1 (1)	7 1	7 1 (1)
3.A	Measurement Scales					
3.A.1	Read scales to:					
3.A.1.a	Estimate or determine weight to the nearest ounce or gram					
3.A.1.b	Estimate or determine capacity to the nearest ounce					
3.B	Measurement Tools					
3.B.1	Use standard units to:					
3.B.1.a	Measure length to the nearest 1/8 inch using a ruler					
3.B.2	Use standard units to:					
3.B.2.a	Measure angles (acute, right, obtuse) to the nearest degree using protractors					
3.C	Applications in Measurement					
3.C.1	Estimate or apply formulas to:					
3.C.1.a	Determine the perimeter of polygons with no more than 8 sides using whole numbers (0-500)					

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)	No. of Augmented Items (Form B)	No. of Augmented Items (Form C)	No. of Augmented Items (Form D)	No. of Augmented Items (Form E)
		SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
3.C.1.b	Determine the area of rectangles with whole numbers (0-200)					
3.C.1.c	Find the area or perimeter of any closed figure drawn on a grid using partial units (0-50)					
3.C.2	Calculate to:					
3.C.2.a	Find start, elapsed or end time to the nearest minute					
3.C.2.b	Determine equivalent units of seconds, minutes, or hours					
3.C.2.c	Determine equivalent units of pints, quarts, or gallons					
4.0	Knowledge of Statistics - Students will collect, organize, display, analyze, or interpret data to make decisions or predictions	8 1 (3)	8 1 (3) (1)	8 1 (2) (1)	8 1 (2)	8 1 (1)
4.A	Data Displays					
4.A.1	Organize or display data to:					
4.A.1.a	Make stem & leaf plots with no more than 20 data points using whole numbers (0-100)					
4.A.1.b	Make line plots with no more than 20 pieces of data with a range of no more than 20 using whole numbers (0-200)					
4.A.1.c	Make double bar graphs with no more than 4 categories and intervals of 1, 2, 5, or 10 using whole numbers (0-100)					
4.A.1.d	Make line graphs with y-axis having intervals of 1, 2, 4, 5, or 10 and x-axis with no more than 10 time intervals using whole numbers (0-100)					
4.B	Data Analysis					
4.B.1	Analyze data to:					
4.B.1.a	Interpret stem & leaf plots with no more than 20 pieces of data points using whole numbers (0-100)					

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)	No. of Augmented Items (Form G)	No. of Augmented Items (Form H)	No. of Augmented Items (Form J)	No. of Augmented Items (Form K)
		SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
3.C.1.b	Determine the area of rectangles with whole numbers (0-200)					
3.C.1.c	Find the area or perimeter of any closed figure drawn on a grid using partial units (0-50)					
3.C.2	Calculate to:					
3.C.2.a	Find start, elapsed or end time to the nearest minute					
3.C.2.b	Determine equivalent units of seconds, minutes, or hours					
3.C.2.c	Determine equivalent units of pints, quarts, or gallons					
4.0	Knowledge of Statistics - Students will collect, organize, display, analyze, or interpret data to make decisions or predictions	8 1 (5) (1)	8 1 (5)	8 1 (1)	8 1 (2)	8 1 (6)
4.A	Data Displays					
4.A.1	Organize or display data to:					
4.A.1.a	Make stem & leaf plots with no more than 20 data points using whole numbers (0-100)					
4.A.1.b	Make line plots with no more than 20 pieces of data with a range of no more than 20 using whole numbers (0-200)					
4.A.1.c	Make double bar graphs with no more than 4 categories and intervals of 1, 2, 5, or 10 using whole numbers (0-100)					
4.A.1.d	Make line graphs with y-axis having intervals of 1, 2, 4, 5, or 10 and x-axis with no more than 10 time intervals using whole numbers (0-100)					
4.B	Data Analysis					
4.B.1	Analyze data to:					
4.B.1.a	Interpret stem & leaf plots with no more than 20 pieces of data points using whole numbers (0-100)					

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)		No. of Augmented Items (Form B)		No. of Augmented Items (Form C)		No. of Augmented Items (Form D)		No. of Augmented Items (Form E)			
		SR	BCRECR	SR	BCRECR	SR	BCR	ECR	SR	BCR	ECR	SR	BCRECR
4.B.1.b	Interpret line plots with no more than 20 pieces of data with a range of no more than 20 using whole numbers (0-100)												
4.B.1.c	Interpret double bar graphs with no more than 4 categories and intervals of 1, 2, 5, or 10 using whole numbers (0-1,000)												
4.B.1.d	Interpret double line graphs with y-axis having intervals of 1, 2, 5, or 10 and x-axis having no more than 10 time intervals using whole numbers (0-100)												
4.B.1.e	Read circle graphs with no more than 4 categories and data in whole numbers or percents which are multiples of 5 (0-100)												
4.B.2	Determine measures of central tendency of a data set to:												
4.B.2.a	Find the mean (no remainders) of a given data set with no more than 8 pieces of data using whole numbers (0-1,000)												
5.0	Knowledge of Probability - Students will use experimental methods or theoretical reasoning to determine probabilities to make predictions or solve problems about events whose outcomes involve random variation.	3	1	3	1	3	1	3	1	3	1	3	1
5.A	Sample Space												
5.A.1	Identify members of a sample space to:												
5.A.1.a	Determine all possible outcomes of two independent events with no more than 4 outcomes each, using an organized list or tree diagram												
5.B	Theoretical Probability												
5.B.1	Determine the probability of one simple event comprised of equally likely outcomes to:												
5.B.1.a	Express the probability as a fraction with a sample space of no more than 20 outcomes												
6.0	Knowledge of Number Relationships or Computation - Students will describe, represent, or apply numbers or their relationships or will estimate or compute using mental strategies, paper/pencil or technology.	13	2	13	2	13	2	13	2	13	2	13	2
		(3)		(3)		(5)		(7)	(1)	(8)	(1)		

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)		No. of Augmented Items (Form G)		No. of Augmented Items (Form H)		No. of Augmented Items (Form J)		No. of Augmented Items (Form K)			
		SR	BCRECR	SR	BCRECR	SR	BCR	ECR	SR	BCR	ECR	SR	BCRECR
4.B.1.b	Interpret line plots with no more than 20 pieces of data with a range of no more than 20 using whole numbers (0-100)												
4.B.1.c	Interpret double bar graphs with no more than 4 categories and intervals of 1, 2, 5, or 10 using whole numbers (0-1,000)												
4.B.1.d	Interpret double line graphs with y-axis having intervals of 1, 2, 5, or 10 and x-axis having no more than 10 time intervals using whole numbers (0-100)												
4.B.1.e	Read circle graphs with no more than 4 categories and data in whole numbers or percents which are multiples of 5 (0-100)												
4.B.2	Determine measures of central tendency of a data set to:												
4.B.2.a	Find the mean (no remainders) of a given data set with no more than 8 pieces of data using whole numbers (0-1,000)												
5.0	Knowledge of Probability - Students will use experimental methods or theoretical reasoning to determine probabilities to make predictions or solve problems about events whose outcomes involve random variation.	3	1	3	1	3	1	3	1	3	1	3	1
5.A	Sample Space												
5.A.1	Identify members of a sample space to:												
5.A.1.a	Determine all possible outcomes of two independent events with no more than 4 outcomes each, using an organized list or tree diagram												
5.B	Theoretical Probability												
5.B.1	Determine the probability of one simple event comprised of equally likely outcomes to:												
5.B.1.a	Express the probability as a fraction with a sample space of no more than 20 outcomes												
6.0	Knowledge of Number Relationships or Computation - Students will describe, represent, or apply numbers or their relationships or will estimate or compute using mental strategies, paper/pencil or technology.	13	2	13	2	13	2	13	2	13	2	13	2
		(6)		(7)		(10)		(9)	(1)	(5)			

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)	No. of Augmented Items (Form B)	No. of Augmented Items (Form C)	No. of Augmented Items (Form D)	No. of Augmented Items (Form E)
		SR BCRECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCRECR
6.A	Knowledge of Number or Place Value					
6.A.1	Apply Knowledge of fractions, decimals, or place value to:					
6.A.1.a	Read, write, or represent fractions or mixed numbers with denominators as factors of 24 using symbols, words, or models (0-200)					
6.A.1.b	Read, write, or represent decimals with no more than 3 decimal places or percents using symbols, words, or models (0-100)					
6.A.1.c	Identify or determine equivalent forms of proper fractions with denominators that are factors of 100, decimals, or percents (0-200)					
6.A.1.d	Compare or order no more than 4 fractions or mixed numbers with denominators that are factors of 100 with or without using the symbols (>, <, =) (0-100)					
6.A.1.e	Compare, order, or describe no more than 4 decimals with no more than 3 decimal places with or without using the symbols (>, <, =) (0-100)					
6.B	Number Theory					
6.B.1	Apply number relationships to:					
6.B.1.a	Identify or describe whole numbers as prime or composite (0-100)					
6.B.1.b	Identify or use rules of divisibility for 2, 3, 5, 9, or 10 with whole numbers (0-10,000)					
6.B.1.c	Identify the greatest common factor which is no more than 10 of two whole numbers (0-100)					
6.B.1.d	Identify a common multiple or the least common multiple of no more than 4 single digit whole numbers					
6.C	Number Computation					

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)	No. of Augmented Items (Form G)	No. of Augmented Items (Form H)	No. of Augmented Items (Form J)	No. of Augmented Items (Form K)
		SR BCRECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCRECR
6.A	Knowledge of Number or Place Value					
6.A.1	Apply Knowledge of fractions, decimals, or place value to:					
6.A.1.a	Read, write, or represent fractions or mixed numbers with denominators as factors of 24 using symbols, words, or models (0-200)					
6.A.1.b	Read, write, or represent decimals with no more than 3 decimal places or percents using symbols, words, or models (0-100)					
6.A.1.c	Identify or determine equivalent forms of proper fractions with denominators that are factors of 100, decimals, or percents (0-200)					
6.A.1.d	Compare or order no more than 4 fractions or mixed numbers with denominators that are factors of 100 with or without using the symbols (>, <, =) (0-100)					
6.A.1.e	Compare, order, or describe no more than 4 decimals with no more than 3 decimal places with or without using the symbols (>, <, =) (0-100)					
6.B	Number Theory					
6.B.1	Apply number relationships to:					
6.B.1.a	Identify or describe whole numbers as prime or composite (0-100)					
6.B.1.b	Identify or use rules of divisibility for 2, 3, 5, 9, or 10 with whole numbers (0-10,000)					
6.B.1.c	Identify the greatest common factor which is no more than 10 of two whole numbers (0-100)					
6.B.1.d	Identify a common multiple or the least common multiple of no more than 4 single digit whole numbers					
6.C	Number Computation					

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)	No. of Augmented Items (Form B)	No. of Augmented Items (Form C)	No. of Augmented Items (Form D)	No. of Augmented Items (Form E)
		SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
6.C.1	Analyze number relationships or compute to:					
6.C.1.a	Multiply a 3-digit factor by another factor with no more than 2-digits using whole numbers (0-10,000)					
6.C.1.b	Divide a dividend with no more than a 4-digit dividend by a 2-digit divisor using whole numbers (0-10,000)					
6.C.1.c	Interpret quotients (including remainders) with no more than a 3-digit dividend by a 1- or 2-digit divisor using whole numbers (0-1,000)					
6.C.1.d	Add or subtract proper fractions or mixed numbers with denominators as factors of 24 and answers in simplest form (0-20)					
6.C.1.e	Add decimals, including monetary notation, with no more than 4 addends and no more than 3 decimal places in each addend (0-1,000)					
6.C.1.f	Subtract decimals including monetary notation with a minuend and subtrahend with no more than 3 decimal places (0-1,000)					
6.C.1.g	Multiply a decimal in monetary notation by a single digit whole number (0-100)					
6.C.2	Estimate to:					
6.C.2.a	Determine sum of no more than 3 addends with no more than 3 decimal places in each addend or the difference of a minuend and subtrahend with no more than 3 decimal places (0-1,000)					
6.C.2.b	Determine the product of one 1-digit factor with the other factor having no more than 3 digits or the quotient of a dividend having no more than 3 digits and a 1-digit divisor using whole numbers (0-5,000)					
6.C.2.c	Determine the product of a decimal in monetary notation by a single digit whole number (0-100)					

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)	No. of Augmented Items (Form G)	No. of Augmented Items (Form H)	No. of Augmented Items (Form J)	No. of Augmented Items (Form K)
		SR BCRECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCRECR
6.C.1	Analyze number relationships or compute to:					
6.C.1.a	Multiply a 3-digit factor by another factor with no more than 2-digits using whole numbers (0-10,000)					
6.C.1.b	Divide a dividend with no more than a 4-digit dividend by a 2-digit divisor using whole numbers (0-10,000)					
6.C.1.c	Interpret quotients (including remainders) with no more than a 3-digit dividend by a 1- or 2-digit divisor using whole numbers (0-1,000)					
6.C.1.d	Add or subtract proper fractions or mixed numbers with denominators as factors of 24 and answers in simplest form (0-20)					
6.C.1.e	Add decimals, including monetary notation, with no more than 4 addends and no more than 3 decimal places in each addend (0-1,000)					
6.C.1.f	Subtract decimals including monetary notation with a minuend and subtrahend with no more than 3 decimal places (0-1,000)					
6.C.1.g	Multiply a decimal in monetary notation by a single digit whole number (0-100)					
6.C.2	Estimate to:					
6.C.2.a	Determine sum of no more than 3 addends with no more than 3 decimal places in each addend or the difference of a minuend and subtrahend with no more than 3 decimal places (0-1,000)					
6.C.2.b	Determine the product of one 1-digit factor with the other factor having no more than 3 digits or the quotient of a dividend having no more than 3 digits and a 1-digit divisor using whole numbers (0-5,000)					
6.C.2.c	Determine the product of a decimal in monetary notation by a single digit whole number (0-100)					

Note. Number in parentheses indicates the total number of field test items.

Table D.4 The 2008 MSA-Math Blueprint: Grade 6

Code	Standard / Objective Statement	No. of Augmented Items (Form A)			No. of Augmented Items (Form B)			No. of Augmented Items (Form C)			No. of Augmented Items (Form D)			No. of Augmented Items (Form E)		
		SR	BC	RECR	SR	BC	RECR	SR	BC	RECR	SR	BC	RECR	SR	BC	RECR
1	Knowledge of Algebra, Patterns, or Functions- Students will algebraically represent, model, analyze, or solve mathematical or real-world problems involving patterns or functional relationships.	12	1	1	12	1	1	12	1	1	12	1	1	12	1	1
		(5)		(1)	(4)	(1)	(1)	(3)	(1)	(1)	(6)		(1)	(6)		(1)
1.A	Patterns or Functions															
1.A.1	Identify, describe, extend, or create numeric patterns or functions to:															
1.A.1.a	Interpret or write the rule for a one operation (+, -, x, ÷) function table using whole numbers or decimals with no more than two decimal places (0-10,000)															
1.A.1.b	Complete a function table using a given two-operations (+, -, x) rule using whole numbers no more than 10 in the rule (0-50)															
1.B	Expressions, Equations, or Inequalities															
1.B.1	Write or evaluate expressions to:															
1.B.1.a	Represent unknown quantities with one unknown and one operation (+, -) using whole numbers (0-200), fractions with denominators as factors of 24 (0-50), or decimals with no more than two decimal places (0-50)															
1.B.1.b	Determine the value of algebraic expressions with one unknown and one operation (+, -) using whole numbers (0-200), fractions with denominators as factors of 24 (0-50), or decimals with no more than two decimal places (0-50)															
1.B.1.c	Determine the value of numeric expressions using order of operations (+, -, x, ÷, with no remainders) with no more than 4 operations and 1 set of grouping symbols using parentheses or a division bar with whole numbers (0-100)															

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)			No. of Augmented Items (Form G)			No. of Augmented Items (Form H)			No. of Augmented Items (Form J)			No. of Augmented Items (Form K)		
		SR	BC	RECR	SR	BC	RECR	SR	BC	ECR	SR	BC	ECR	SR	BC	RECR
1	Knowledge of Algebra, Patterns, or Functions- Students will algebraically represent, model, analyze, or solve mathematical or real-world problems involving patterns or functional relationships.	12	1	1	12	1	1	12	1	1	12	1	1	12	1	1
		(5)		(1)	(2)	(1)	(1)	(4)		(1)	(3)	(1)	(1)	(2)		(1)
1.A	Patterns or Functions															
1.A.1	Identify, describe, extend, or create numeric patterns or functions to:															
1.A.1.a	Interpret or write the rule for a one operation (+, -, x, ÷) function table using whole numbers or decimals with no more than two decimal places (0-10,000)															
1.A.1.b	Complete a function table using a given two-operations (+, -, x) rule using whole numbers no more than 10 in the rule (0-50)															
1.B	Expressions, Equations, or Inequalities															
1.B.1	Write or evaluate expressions to:															
1.B.1.a	Represent unknown quantities with one unknown and one operation (+, -) using whole numbers (0-200), fractions with denominators as factors of 24 (0-50), or decimals with no more than two decimal places (0-50)															
1.B.1.b	Determine the value of algebraic expressions with one unknown and one operation (+, -) using whole numbers (0-200), fractions with denominators as factors of 24 (0-50), or decimals with no more than two decimal places (0-50)															
1.B.1.c	Determine the value of numeric expressions using order of operations (+, -, x, ÷, with no remainders) with no more than 4 operations and 1 set of grouping symbols using parentheses or a division bar with whole numbers (0-100)															

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)	No. of Augmented Items (Form B)	No. of Augmented Items (Form C)	No. of Augmented Items (Form D)	No. of Augmented Items (Form E)
		SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
1.B.2	Identify, write, or solve equations or inequalities to:					
1.B.2.a	Represent relationships using a variable with the appropriate relational symbols (>, <, =) and one operational symbol (+, -, x, ÷) on either side using fractions with denominators as factors of 24 (0-50), or decimals with no more than two decimal places (0-50)					
1.B.2.b	Find the unknown in an equation with one operation (+, -, x, ÷, with no remainder) and positive coefficients using decimals with no more than two decimal places (0-100)					
1.C	Numeric or Graphic Representations of Relationships					
1.C.1	Locate points on a number line or in a coordinate plane to:					
1.C.1.a	Represent integers (-20 to 20) on a number line					
1.C.1.b	Create a graph in the coordinate plane using no more than 3 ordered pairs of integers (-20 to 20) or no more than 3 ordered pairs with fractions/mixed numbers with denominators of 2 (-10 to 10)					
1.C.2	Analyze linear relationships to:					
1.C.2.a	Identify given graph of a line that shows increase, decrease, or no change					
2.0	Knowledge of Geometry - Students will apply the properties of one, two, or three-dimensional geometric figures to describe, reason, or solve problems about shape, size, position, or motion of objects	7 1 (1) (1)	7 1 (4)	7 1 (1)	7 1 (1)	7 1 (1) (1)
2.A	Plane Geometric Figures					
2.A.1	Analyze the properties of plane geometric figures to:					
2.A.1.a	Identify or describe diagonal line segments					

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)	No. of Augmented Items (Form G)	No. of Augmented Items (Form H)	No. of Augmented Items (Form J)	No. of Augmented Items (Form K)
		SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
1.B.2	Identify, write, or solve equations or inequalities to:					
1.B.2.a	Represent relationships using a variable with the appropriate relational symbols (>, <, =) and one operational symbol (+, -, x, ÷) on either side using fractions with denominators as factors of 24 (0-50), or decimals with no more than two decimal places (0-50)					
1.B.2.b	Find the unknown in an equation with one operation (+, -, x, ÷, with no remainder) and positive coefficients using decimals with no more than two decimal places (0-100)					
1.C	Numeric or Graphic Representations of Relationships					
1.C.1	Locate points on a number line or in a coordinate plane to:					
1.C.1.a	Represent integers (-20 to 20) on a number line					
1.C.1.b	Create a graph in the coordinate plane using no more than 3 ordered pairs of integers (-20 to 20) or no more than 3 ordered pairs with fractions/mixed numbers with denominators of 2 (-10 to 10)					
1.C.2	Analyze linear relationships to:					
1.C.2.a	Identify given graph of a line that shows increase, decrease, or no change					
2.0	Knowledge of Geometry - Students will apply the properties of one, two, or three-dimensional geometric figures to describe, reason, or solve problems about shape, size, position, or motion of objects	7 1 (1) (1)	7 1	7 1 (1) (1)	7 1 (1)	7 1 (2) (1)
2.A	Plane Geometric Figures					
2.A.1	Analyze the properties of plane geometric figures to:					
2.A.1.a	Identify or describe diagonal line segments					

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)	No. of Augmented Items (Form B)	No. of Augmented Items (Form C)	No. of Augmented Items (Form D)	No. of Augmented Items (Form E)
		SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
2.A.1.b	Identify or describe the radius, diameter, or circumference of a circle					
2.A.2	Analyze geometric relationships to:					
2.A.2.a	Compare or classify triangles as scalene, equilateral, or isosceles					
2.A.2.b	Compare or classify triangles as equiangular, obtuse, acute, or right					
2.A.2.c	Apply the concept of the sum of angles in any triangle is 180° without using a diagram					
2.A.2.d	Identify or compare circumference, radii, or diameter of a circle (pi = 3.14)					
2.C	Representation of Geometric Figures					
2.C.1	Represent plane geometric figures to:					
2.C.1.a	Draw triangles given the measure of 2 sides and one angle or 2 angles and 1 side using whole numbers (0-20) and angle measures (0° - 179°)					
2.C.1.b	Identify, describe or draw a polygon in the first quadrant given no more than six coordinates					
2.C.1.c	Identify or describe perpendicular bisectors or angle bisectors					
3.0	Knowledge of Measurement - Students will identify attributes, units, or systems of measurement or apply a variety of techniques, formulas, tools or technology for determining measurements.	5 1 (2)	5 1 (1)	5 1	5 1 (1)	5 1 (1)
3.B	Measurement Tools					
3.B.1	Use standard units to:					
3.B.1.a	Measure length to the nearest 1/16 inch using a ruler					
3.C	Applications in Measurement					
3.C.1	Estimate or apply formulas to:					
3.C.1.a	Determine the area of a triangle with whole number dimensions (0-200)					
3.C.1.b	Determine the volume of rectangular prisms with whole number dimensions (0-1,000)					

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)	No. of Augmented Items (Form G)	No. of Augmented Items (Form H)	No. of Augmented Items (Form J)	No. of Augmented Items (Form K)
		SR BC RE CR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BC RE CR
2.A.1.b	Identify or describe the radius, diameter, or circumference of a circle					
2.A.2	Analyze geometric relationships to:					
2.A.2.a	Compare or classify triangles as scalene, equilateral, or isosceles					
2.A.2.b	Compare or classify triangles as equiangular, obtuse, acute, or right					
2.A.2.c	Apply the concept of the sum of angles in any triangle is 180° without using a diagram					
2.A.2.d	Identify or compare circumference, radii, or diameter of a circle (pi = 3.14)					
2.C	Representation of Geometric Figures					
2.C.1	Represent plane geometric figures to:					
2.C.1.a	Draw triangles given the measure of 2 sides and one angle or 2 angles and 1 side using whole numbers (0-20) and angle measures (0° - 179°)					
2.C.1.b	Identify, describe or draw a polygon in the first quadrant given no more than six coordinates					
2.C.1.c	Identify or describe perpendicular bisectors or angle bisectors					
3.0	Knowledge of Measurement - Students will identify attributes, units, or systems of measurement or apply a variety of techniques, formulas, tools or technology for determining measurements.	5 1 (1)	5 1 (2) (1)	5 1	5 1 (2)	5 1
3.B	Measurement Tools					
3.B.1	Use standard units to:					
3.B.1.a	Measure length to the nearest 1/16 inch using a ruler					
3.C	Applications in Measurement					
3.C.1	Estimate or apply formulas to:					
3.C.1.a	Determine the area of a triangle with whole number dimensions (0-200)					
3.C.1.b	Determine the volume of rectangular prisms with whole number dimensions (0-1,000)					

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)	No. of Augmented Items (Form B)	No. of Augmented Items (Form C)	No. of Augmented Items (Form D)	No. of Augmented Items (Form E)
		SR BCRECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCRECR
3.C.1.c	Determine the area of composite figures using no more than 4 polygons (triangles or rectangles) with whole number dimensions (0-200)					
3.C.1.d	Determine the missing dimension of a quadrilateral given the perimeter using whole number dimensions (0-200)					
3.C.1.e	Determine the missing dimension of a square or rectangle given the area using whole number dimensions (0-200)					
4.0	Knowledge of Statistics - Students will collect, organize, display, analyze, or interpret data to make decisions or predictions	8 1	8 1	8 1	8 1	8 1
4.A	Data Displays					
4.A.1	Organize or display data to:					
4.A.1.a	Make frequency tables with no more than 5 categories or ranges of numbers and frequencies of no more than 25					
4.A.1.b	Make stem-and-leaf plots with no more than 20 data points using whole numbers (0-1,000)					
4.B	Data Analysis					
4.B.1	Analyze data to:					
4.B.1.a	Interpret frequency tables with no more than 5 categories or ranges of numbers and frequencies of no more than 25					
4.B.1.b	Read or analyze circle graphs with no more than 5 categories using data in whole numbers or percents (0-1,000)					
5.0	Knowledge of Probability – Students will use experimental methods or theoretical reasoning to determine probabilities to make predictions or solve problems about events whose outcomes involve random variation.	4	4	4	4	4
		(2)	(2)	(2)		
5.B	Theoretical Probability					
5.B.1	Determine the probability of one simple event comprised of equality likely outcomes to:					

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)	No. of Augmented Items (Form G)	No. of Augmented Items (Form H)	No. of Augmented Items (Form J)	No. of Augmented Items (Form K)
		SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
3.C.1.c	Determine the area of composite figures using no more than 4 polygons (triangles or rectangles) with whole number dimensions (0-200)					
3.C.1.d	Determine the missing dimension of a quadrilateral given the perimeter using whole number dimensions (0-200)					
3.C.1.e	Determine the missing dimension of a square or rectangle given the area using whole number dimensions (0-200)					
4.0	Knowledge of Statistics - Students will collect, organize, display, analyze, or interpret data to make decisions or predictions	8 1 (1) (1)	8 1 (4)	8 1 (1) (1)	8 1 (1)	8 1 (1) 91)
4.A	Data Displays					
4.A.1	Organize or display data to:					
4.A.1.a	Make frequency tables with no more than 5 categories or ranges of numbers and frequencies of no more than 25					
4.A.1.b	Make stem-and-leaf plots with no more than 20 data points using whole numbers (0-1,000)					
4.B	Data Analysis					
4.B.1	Analyze data to:					
4.B.1.a	Interpret frequency tables with no more than 5 categories or ranges of numbers and frequencies of no more than 25					
4.B.1.b	Read or analyze circle graphs with no more than 5 categories using data in whole numbers or percents (0-1,000)					
5.0	Knowledge of Probability – Students will use experimental methods or theoretical reasoning to determine probabilities to make predictions or solve problems about events whose outcomes involve random variation.	4 (1)	4	4 (1)	4	4 (2)
5.B	Theoretical Probability					
5.B.1	Determine the probability of one simple event comprised of equality likely outcomes to:					

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)		No. of Augmented Items (Form B)		No. of Augmented Items (Form C)		No. of Augmented Items (Form D)		No. of Augmented Items (Form E)			
		SR	BCRECR	SR	BCRECR	SR	BCR	ECR	SR	BCR	ECR	SR	BCRECR
5.B.1.a	Express the probability as a decimal with a sample space of 10, 20, 25, or 50 outcomes												
5.C	Experimental Probability												
5.C.1	Analyze the results of a probability experiment to:												
5.C.1.a	Make predictions and express the experimental probability as a fraction, decimal or percent with no more than 30 results												
6.0	Knowledge of Number Relationships or Computation - Students will describe, represent, or apply numbers or their relationships or will estimate or compute using mental strategies, paper/pencil or technology.	12	2	12	2	12	2	12	2	12	2	12	2
		(2)		(1)		(5)		(4)	(1)	(4)	(1)		
6.A	Knowledge of Number or Place Value												
6.A.1.	Apply Knowledge of rational numbers or place value to:												
6.A.1.a	Read, write, or represent whole numbers using exponential form using powers of 10 (0-10,000)												
6.A.1.b	Read, write, or represent integers (-100 to 100)												
6.A.1.c	Identify or determine equivalent forms of proper fractions with denominators as factors of 100, decimals, percents, or ratios (0-1,000)												
6.A.1.d	Compare or order no more than 4 fractions with denominators as factors of 100 to decimals with up to 2 decimal places with or without using the symbols (<, >, =) (0-100)												
6.C	Number Computation												
6.C.1	Analyze number relationships or compute to:												
6.C.1.a	Add or subtract proper fractions or mixed numbers with denominator as factors of 60 and answers in simplest form (0-20)												

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)		No. of Augmented Items (Form G)		No. of Augmented Items (Form H)		No. of Augmented Items (Form J)		No. of Augmented Items (Form K)			
		SR	BCRECR	SR	BCRECR	SR	BCR	ECR	SR	BCR	ECR	SR	BCRECR
5.B.1.a	Express the probability as a decimal with a sample space of 10, 20, 25, or 50 outcomes												
5.C	Experimental Probability												
5.C.1	Analyze the results of a probability experiment to:												
5.C.1.a	Make predictions and express the experimental probability as a fraction, decimal, or percent with no more than 30 results												
6.0	Knowledge of Number Relationships or Computation - Students will describe, represent, or apply numbers or their relationships or will estimate or compute using mental strategies, paper/pencil or technology.	12	2	12	2	12	2	12	2	12	2	12	2
		(3)		(4)		(4)		(5)	(1)	(5)			
6.A	Knowledge of Number or Place Value												
6.A.1	Apply Knowledge of rational numbers or place value to:												
6.A.1.a	Read, write, or represent whole numbers using exponential form using powers of 10 (0-10,000)												
6.A.1.b	Read, write, or represent integers (-100 to 100)												
6.A.1.c	Identify or determine equivalent forms of proper fractions with denominators as factors of 100, decimals, percents, or ratios (0-1,000)												
6.A.1.d	Compare or order no more than 4 fractions with denominators as factors of 100 to decimals with up to 2 decimal places with or without using the symbols (<, >, =) (0-100)												
6.C	Number Computation												
6.C.1	Analyze number relationships or compute to:												
6.C.1.a	Add or subtract proper fractions or mixed numbers with denominator as factors of 60 and answers in simplest form (0-20)												

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)	No. of Augmented Items (Form B)	No. of Augmented Items (Form C)	No. of Augmented Items (Form D)	No. of Augmented Items (Form E)
		SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
6.C.1.b	Multiply proper fractions or mixed numbers with denominators as factors of 24 not including 24 and express answers in simplest form (0-20)					
6.C.1.c	Multiply a decimal with no more than 3-digits by a 2 digit decimal (0-1,000)					
6.C.1.d	Divide a decimal with no more than a 5-digits by whole number with no more than 2 digits without annexing zeros (0-1,000)					
6.C.1.e	Determine 10%, 20%, 25%, or 50% of a whole number (0-1,000)					
6.C.1.f	Use the distributive property to simplify numeric expressions using whole numbers (0-1,000)					
6.C.2	Estimate to:					
6.C.2.a	Determine the product of a decimal with no more than 3-digits by a 2-digit whole number or the quotient of a decimal with no more than 5-digits in the dividend by a 2-digit whole number (0-1,000)					

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)	No. of Augmented Items (Form G)	No. of Augmented Items (Form H)	No. of Augmented Items (Form J)	No. of Augmented Items (Form K)
		SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
6.C.1.b	Multiply proper fractions or mixed numbers with denominators as factors of 24 not including 24 and express answers in simplest form (0-20)					
6.C.1.c	Multiply a decimal with no more than 3-digits by a 2 digit decimal (0-1,000)					
6.C.1.d	Divide a decimal with no more than a 5-digits by whole number with no more than 2 digits without annexing zeros (0-1,000)					
6.C.1.e	Determine 10%, 20%, 25%, or 50% of a whole number (0-1,000)					
6.C.1.f	Use the distributive property to simplify numeric expressions using whole numbers (0-1,000)					
6.C.2	Estimate to:					
6.C.2.a	Determine the product of a decimal with no more than 3-digits by a 2-digit whole number or the quotient of a decimal with no more than 5-digits in the dividend by a 2-digit whole number (0-1,000)					

Note. Number in parentheses indicates the total number of field test items.

Table D.5 The 2008 MSA- Mathematics Blueprint: Grade 7

Code	Standard / Objective Statement	No. of Augmented Items (Form A)				No. of Augmented Items (Form B)				No. of Augmented Items (Form C)				No. of Augmented Items (Form D)				No. of Augmented Items (Form E)			
		S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E
		R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C
1.0	Knowledge of Algebra, Patterns, or Functions - Students will algebraically represent, model, analyze, or solve mathematical or real-world problems involving patterns or functional relationships.	9	3	1	1	9	3	1	1	9	3	1	1	9	3	1	1	9	3	1	1
		(6)	(2)	(1)		(5)	(3)	(1)	(1)	(1)	(1)							(2)	(1)	(1)	
1.A	Patterns or Functions																				
1.A.1	Identify, describe, extend, or create linear patterns or functions to:																				
1.A.1.a	Complete a function table using a given two-operations (+, -, x) rule whose numbers are whole numbers no more than 20 in the rule and whole numbers (0-500)																				
1.B	Expressions, Equations, or Inequalities																				
1.B.1	Write or evaluate expressions to:																				
1.B.1.a	Represent unknown quantities with one unknown and one or two operations (+, -, x, ÷ with no remainders) using whole numbers (0-20), fractions with denominators as factors of 100 (0-20), or decimals with no more than three decimal places (0-20)																				
1.B.1.b	Determine the value of algebraic expressions with one unknown and no more than two operations (+, -, x, ÷ with no remainders) using whole numbers (0-200), fractions with denominators as factors of 100 (0-100), or decimals with no more than three decimal places (0-100)																				
1.B.1.c	Determine the value of numeric expressions using order of operations with no more than 4 operation (+, -, x, ÷ with no remainders) and 1 set of grouping symbols using parentheses, brackets, or a division bar using whole numbers (0-200), fractions with denominators as factors of 100 (0-100) or decimals with no more than three decimal places (0-100)																				

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)				No. of Augmented Items (Form G)				No. of Augmented Items (Form H)				No. of Augmented Items (Form J)				No. of Augmented Items (Form K)			
		S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E
		R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C
1.0	Knowledge of Algebra, Patterns, or Functions - Students will algebraically represent, model, analyze, or solve mathematical or real-world problems involving patterns or functional relationships.	9	3	1	1	9	3	1	1	9	3	1	1	9	3	1	1	9	3	1	1
		(2)	(2)	(1)		(3)		(1)													
1.A	Patterns or Functions																				
1.A.1	Identify, describe, extend, or create linear patterns or functions to:																				
1.A.1.a	Complete a function table using a given two-operations (+, -, x) rule whose numbers are whole numbers no more than 20 in the rule and whole numbers (0-500)																				
1.B	Expressions, Equations, or Inequalities																				
1.B.1	Write or evaluate expressions to:																				
1.B.1.a	Represent unknown quantities with one unknown and one or two operations (+, -, x, ÷ with no remainders) using whole numbers (0-20), fractions with denominators as factors of 100 (0-20), or decimals with no more than three decimal places (0-20)																				
1.B.1.b	Determine the value of algebraic expressions with one unknown and no more than two operations (+, -, x, ÷ with no remainders) using whole numbers (0-200), fractions with denominators as factors of 100 (0-100), or decimals with no more than three decimal places (0-100)																				
1.B.1.c	Determine the value of numeric expressions using order of operations with no more than 4 operation (+, -, x, ÷ with no remainders) and 1 set of grouping symbols using parentheses, brackets, or a division bar using whole numbers (0-200), fractions with denominators as factors of 100 (0-100) or decimals with no more than three decimal places (0-100)																				

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)				No. of Augmented Items (Form B)				No. of Augmented Items (Form C)				No. of Augmented Items (Form D)				No. of Augmented Items (Form E)			
		S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E
		R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C
1.B.2	Identify, write, or solve equations or inequalities to:																				
1.B.2.a	Represent relationships using a variable with the appropriate relational symbols ($>$, \geq , $<$, \leq , $=$) and one or two operational symbols ($+$, $-$, \times , \div) on either side using whole numbers (0-20), fractions with denominators as factors of 100 (0-20) or decimals with no more than three decimal places (0-20)																				
1.B.2.b	Find the unknown (used only once) in an equation with one or two operations ($+$, $-$, \times) using whole numbers (0-500), fractions with denominators as factors of 100 (0-50), or decimals with no more than three decimal places (0-100)																				
1.B.2.c	Find the unknown in an inequality with one variable with a positive whole number whole coefficient with one operation ($+$, $-$, \times , \div with no remainders) using whole numbers or decimals with no more than 2 decimal places (0-100)																				
1.B.2.d	Identify or graph solutions or inequalities on a number line using whole numbers (0-50)																				
1.B.2.e	Apply given formulas having no more than three variables and up to two operations using whole numbers (0-100), fractions with denominators as factors of 100 (0-100), or decimals with no more than three decimal places (0-100)																				
1.C	Numeric or Graphic Representations of Relationships																				
1.C.1	Locate points on a number line or in a coordinate plane to:																				
1.C.1.a	Represent rational numbers on a number line (-100 to 100)																				

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)				No. of Augmented Items (Form G)				No. of Augmented Items (Form H)				No. of Augmented Items (Form J)				No. of Augmented Items (Form K)			
		S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E
		R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C
1.B.2	Identify, write, or solve equations or inequalities to:																				
1.B.2.a	Represent relationships using a variable with the appropriate relational symbols ($>$, \geq , $<$, \leq , $=$) and one or two operational symbols ($+$, $-$, \times , \div) on either side using whole numbers (0-20), fractions with denominators as factors of 100 (0-20) or decimals with no more than three decimal places (0-20)																				
1.B.2.b	Find the unknown (used only once) in an equation with one or two operations ($+$, $-$, \times) using whole numbers (0-500), fractions with denominators as factors of 100 (0-50), or decimals with no more than three decimal places (0-100)																				
1.B.2.c	Find the unknown in an inequality with one variable with a positive whole number whole coefficient with one operation ($+$, $-$, \times , \div with no remainders) using whole numbers or decimals with no more than 2 decimal places (0-100)																				
1.B.2.d	Identify or graph solutions or inequalities on a number line using whole numbers (0-50)																				
1.B.2.e	Apply given formulas having no more than three variables and up to two operations using whole numbers (0-100), fractions with denominators as factors of 100 (0-100), or decimals with no more than three decimal places (0-100)																				
1.C	Numeric or Graphic Representations of Relationships																				
1.C.1	Locate points on a number line or in a coordinate plane to:																				
1.C.1.a	Represent rational numbers on a number line (-100 to 100)																				

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)	No. of Augmented Items (Form B)	No. of Augmented Items (Form C)	No. of Augmented Items (Form D)	No. of Augmented Items (Form E)					
		S P R	B C R	E C R	S P R	B C R	E C R	S P R	B C R	E C R	S P R
1.C.1.b	Create a graph in the coordinate plane using no more than 4 ordered pairs of rational numbers (-20 to 20)										
1.C.2	Analyze linear relationships to:										
1.C.2.a	Identify a table of values that shows increase, decrease, or no change										
2.0	Knowledge of Geometry - Students will apply the properties of one -, two -, or three-dimensional geometric figures to describe, reason, or solve problems about shape, size, position, or motion of objects	4 2 1 (1) (1)	4 2 1 (1) (1)	4 2 1 (3) (1) (1) (1)	4 2 1 (1) (1)	4 2 1 (1)					
2.A	Plane Geometric Figures										
2.A.1	Analyze the properties of plane geometric figures to:										
2.A.1.a	Identify or describe vertical, adjacent, complementary, or supplementary angles (Use the angle notation m)										
2.A.2	Analyze geometric relationships to:										
2.A.2.a	Determine missing measurements of an angle in a quadrilateral										
2.A.2.b	Determine missing measurements of vertical, adjacent, complementary, or supplementary angles.										
2.C	Representation of Geometric Figures										
2.C.1	Represent plane geometric figures to:										
2.C.1.a	Construct a circle using a given line segment for the radius in whole number inches or centimeters										
2.C.1.b	Construct a line segment congruent to a given line segment										
2.C.1.c	Construct a perpendicular bisector to given line segment or a bisector to a given angle										

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items				No. of Augmented Items															
		(Form F)				(Form G)				(Form H)				(Form J)				(Form K)			
		S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E
		R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C
1.C.1.b	Create a graph in the coordinate plane using no more than 4 ordered pairs of rational numbers (-20 to 20)																				
1.C.2	Analyze linear relationships to:																				
1.C.2.a	Identify a table of values that shows increase, decrease, or no change																				
2.0	Knowledge of Geometry - Students will apply the properties of one-, two-, or three-dimensional geometric figures to describe, reason, or solve problems about shape, size, position, or motion of objects	4	2	1		4	2	1		4	2	1		4	2	1		4	2	1	
								(1)	(1)			(1)						(1)	(1)		
2.A	Plane Geometric Figures																				
2.A.1	Analyze the properties of plane geometric figures to:																				
2.A.1.a	Identify or describe vertical, adjacent, complementary, or supplementary angles (Use the angle notation m)																				
2.A.2	Analyze geometric relationships to:																				
2.A.2.a	Determine missing measurements of an angle in a quadrilateral																				
2.A.2.b	Determine missing measurements of vertical, adjacent, complementary, or supplementary angles.																				
2.C	Representation of Geometric Figures																				
2.C.1	Represent plane geometric figures to:																				
2.C.1.a	Construct a circle using a given line segment for the radius in whole number inches or centimeters																				
2.C.1.b	Construct a line segment congruent to a given line segment																				
2.C.1.c	Construct a perpendicular bisector to given line segment or a bisector to a given angle																				

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items				No. of Augmented Items				No. of Augmented Items				No. of Augmented Items				No. of Augmented Items							
		(Form A)				(Form B)				(Form C)				(Form D)				(Form E)							
		S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E
		R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C
2.D	Congruence or Similarity																								
2.D.1	Apply the properties of congruent polygons to:																								
2.D.1.a	Find the length of corresponding sides or the measure of corresponding angles using whole numbers (0-1,000)																								
2.E	Transformations																								
2.E.1	Analyze a transformation on a coordinate plane to:																								
2.E.1.a	Identify or plot the result of one translation (horizontal or vertical), reflection (horizontal or vertical), or rotation around a given point (90° or 180°)																								
3.0	Knowledge of Measurement - Students will identify attributes, units, or systems of measurement or apply a variety of techniques, formulas, tools or technology for determining measurements.	4	1	1		4	1	1		4	1	1		4	1	1		4	1	1		4	1	1	
					(1)												(1) (1)								(1) (1) (1)
3.C	Applications in Measurement																								
3.C.1	Estimate or apply formulas to:																								
3.C.1.a	Determine area of parallelograms or trapezoids using whole number dimensions (0-1,000)																								
3.C.1.b	Determine surface area of rectangular prisms using whole number dimensions (0-1,000)																								
3.C.2	Analyze scale drawings to:																								
3.C.2.a	Determine a missing length for a polygon with no more than 8 sides using whole numbers (0-1000)																								
3.C.2.b	Determine the distance between 2 points using a drawing and a scale of 1 cm = ?, ¼ inch = ?, or ½ inch = ? (0-1,000)																								

Note. Number in parentheses indicates the total number of field test items.

Cod	Standard / Objective Statement	No. of Augmented Items (Form F)				No. of Augmented Items (Form G)				No. of Augmented Items (Form H)				No. of Augmented Items (Form J)				No. of Augmented Items (Form K)				
		S R	S P R	B C R	E C R	S R	S P R	B C R	E C R	S R	S P R	B C R	E C R	S R	S P R	B C R	E C R	S R	S P R	B C R	E C R	
2.D	Congruence or Similarity																					
2.D.1	Apply the properties of congruent polygons to:																					
2.D.1.a	Find the length of corresponding sides or the measure of corresponding angles using whole numbers (0-1,000)																					
2.E	Transformations																					
2.E.1	Analyze a transformation on a coordinate plane to:																					
2.E.1.a	Identify or plot the result of one translation (horizontal or vertical), reflection (horizontal or vertical), or rotation around a given point (90° or 180°)																					
3.0	Knowledge of Measurement - Students will identify attributes, units, or systems of measurement or apply a variety of techniques, formulas, tools or technology for determining measurements.	4	1	1	4	1	1	4	1	1	4	1	1	4	1	1	4	1	1	4	1	1
				(1)		(2)				(1)			(1)	(1)					(1)			
3.C	Applications in Measurement																					
3.C.1	Estimate or apply formulas to:																					
3.C.1.a	Determine area of parallelograms or trapezoids using whole number dimensions (0-1,000)																					
3.C.1.b	Determine surface area of rectangular prisms using whole number dimensions (0-1,000)																					
3.C.2	Analyze scale drawings to:																					
3.C.2.a	Determine a missing length for a polygon with no more than 8 sides using whole numbers (0-1000)																					
3.C.2.b	Determine the distance between 2 points using a drawing and a scale of 1 cm = ?, ¼ inch = ?, or ½ inch = ? (0-1,000)																					

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)				No. of Augmented Items (Form B)				No. of Augmented Items (Form C)				No. of Augmented Items (Form D)				No. of Augmented Items (Form E)			
		S R	S P R	B C R	E C R	S R	S P R	B C R	E C R	S R	S P R	B C R	E C R	S R	S P R	B C R	E C R	S R	S P R	B C R	E C R
4.0	Knowledge of Statistics - Students will collect, organize, display, analyze, or interpret data to make decisions or predictions	5	2	1	1	5	2	1	1	5	2	1	1	5	2	1	1	5	2	1	1
				(1)	(2)			(1)	(1)	(1)			(1)			(1)	(1)			(1)	(1)
4.A	Data Displays																				
4.A.1	Organize or display data to:																				
4.A.1.a	Make back-to-back stem-and-leaf plots with no more than 20 data points using whole numbers (0-99)																				
4.B	Data Analysis																				
4.B.1	Analyze data to:																				
4.B.1.a	Recognize or analyze faulty interpretation or representation of data caused by an inappropriate scale or choice of display for a given data set.																				
4.B.1.b	Determine the best choice of a data display for a given data set																				
4.B.2	Analyze measures of central tendency to:																				
4.B.2.a	Determine or apply the mean or median of a given data set with no more than 15 pieces of data or the mode of a given data set with 15-30 pieces of data, using whole numbers or decimals with no more than 2 decimal places (0-100)																				
5.0	Knowledge of Probability - Students will use experimental methods or theoretical reasoning to determine probabilities to make predictions or solve problems about events whose outcomes involve random variation.	3	1	1		3	1	1		3	1	1		3	1	1		3	1	1	
		(1)								(1)	(2)							(1)	(1)		
5.A	Sample Space																				

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)				No. of Augmented Items (Form G)				No. of Augmented Items (Form H)				No. of Augmented Items (Form J)				No. of Augmented Items (Form K)			
		S R	S P R	B C R	E C R	S R	S P R	B C R	E C R	S R	S P R	B C R	E C R	S R	S P R	B C R	E C R	S R	S P R	B C R	E C R
4.0	Knowledge of Statistics - Students will collect, organize, display, analyze, or interpret data to make decisions or predictions	5	2	1	1	5	2	1	1	5	2	1	1	5	2	1	1	5	2	1	1
		(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
4.A	Data Displays																				
4.A.1	Organize or display data to:																				
4.A.1.a	Make back-to-back stem-and-leaf plots with no more than 20 data points using whole numbers (0-99)																				
4.B	Data Analysis																				
4.B.1	Analyze data to:																				
4.B.1.a	Recognize or analyze faulty interpretation or representation of data caused by an inappropriate scale or choice of display for a given data set.																				
4.B.1.b	Determine the best choice of a data display for a given data set																				
4.B.2	Analyze measures of central tendency to:																				
4.B.2.a	Determine or apply the mean or median of a given data set with no more than 15 pieces of data or the mode of a given data set with 15-30 pieces of data, using whole numbers or decimals with no more than 2 decimal places (0-100)																				
5.0	Knowledge of Probability - Students will use experimental methods or theoretical reasoning to determine probabilities to make predictions or solve problems about events whose outcomes involve random variation.	3	1	1		3	1	1		3	1	1		3	1	1		3	1	1	
		(1)				(1)	(1)	(1)		(3)				(1)	(1)			(1)			
5.A	Sample Space																				

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items				No. of Augmented Items															
		(Form A)				(Form B)				(Form C)				(Form D)				(Form E)			
		S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E
		R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C
5.A.1	Identify numbers of members of a sample space to:																				
5.A.1.a	Determine the number of outcomes for no more than 3 independent events with a sample space of no more than 6 outcomes in each event																				
5.B	Theoretical Probability																				
5.B.1	Determine the probability of an event comprised of no more than 2 independent events to:																				
5.B.1.a	Express the probability as a fraction, decimal with no more than 2 decimal places, or percent with a sample space of no more than 35 outcomes.																				
5.C	Experimental Probability																				
5.C.1	Analyze the results of a survey or simulation to:																				
5.C.1.a	Make predictions and express the probability as a fraction, decimal with no more than 2 decimal places, or percent with 25 or 50 results																				
6.0	Knowledge of Number Relationships or Computation - Students will describe, represent, or apply numbers or their relationships or will estimate or compute using mental strategies, paper/pencil or technology.	11	3			11	3			11	3			11	3			11	3		
		(1)								(1)				(5)	(3)			(2)	(1)		
6.A	Knowledge of Number or Place Value																				
6.A.1.	Apply knowledge of rational numbers or place value to:																				
6.A.1.a	Read, write, or represent whole numbers in exponential notation with bases no more than 12 and exponents no more than 3 in standard form (0-1,000)																				
6.A.1.b	Express decimals with no more than 4 decimal places using expanded form (0-100)																				
6.A.1.c	Determine equivalent forms of fraction, decimals, percents, or ratios using positive rational numbers (0-100)																				

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)				No. of Augmented Items (Form G)				No. of Augmented Items (Form H)				No. of Augmented Items (Form J)				No. of Augmented Items (Form K)				
		S R	S P R	B C R	E C R	S R	S P R	B C R	E C R	S R	S P R	B C R	E C R	S R	S P R	B C R	E C R	S R	S P R	B C R	E C R	
5.A.1	Identify numbers of members of a sample space to:																					
5.A.1.a	Determine the number of outcomes for no more than 3 independent events with a sample space of no more than 6 outcomes in each event																					
5.B	Theoretical Probability																					
5.B.1	Determine the probability of an event comprised of no more than 2 independent events to:																					
5.B.1.a	Express the probability as a fraction, decimal with no more than 2 decimal places, or percent with a sample space of no more than 35 outcomes.																					
5.C	Experimental Probability																					
5.C.1	Analyze the results of a survey or simulation to:																					
5.C.1.a	Make predictions and express the probability as a fraction, decimal with no more than 2 decimal places, or percent with 25 or 50 results																					
6.0	Knowledge of Number Relationships or Computation - Students will describe, represent, or apply numbers or their relationships or will estimate or compute using mental strategies, paper/pencil or technology.	11	3			11	3			11	3			11	3			11	3			
		(3)	(2)			(2)	(1)			(2)	(3)			(4)	(3)			(4)	(1)			
6.A	Knowledge of Number or Place Value																					
6.A.1.	Apply knowledge of rational numbers or place value to:																					
6.A.1.a	Read, write, or represent whole numbers in exponential notation with bases no more than 12 and exponents no more than 3 in standard form (0-1,000)																					
6.A.1.b	Express decimals with no more than 4 decimal places using expanded form (0-100)																					
6.A.1.c	Determine equivalent forms of fraction, decimals, percents, or ratios using positive rational numbers (0-100)																					

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)				No. of Augmented Items (Form B)				No. of Augmented Items (Form C)				No. of Augmented Items (Form D)				No. of Augmented Items (Form E)			
		S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E
		R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C
6.A.1.d	Compare, order, or describe no more than 4 fractions with denominators as factors of 300 that are less than 101 (1-100), decimals with no more than 4 decimal places (0-100), percents (0-100), or integers (-100 to 100) with or without using the symbols (<, >, =)																				
6.C	Number Computation																				
6.C.1	Analyze number relationships or compute to:																				
6.C.1.a	Add, subtract, multiply, or divide integers (Use one operation and -100 to 100)																				
6.C.1.b	Add, subtract, or multiply positive fractions or mixed numbers with denominators as factors of 300 less than 101 (use no more than 2 operation and 0-2,000)																				
6.C.1.c	Calculate powers using exponents of no more than 3 and bases of whole numbers (0-20) or integers (-10 to 20); square roots of perfect square whole numbers (0-100)																				
6.C.1.d	Simplify using the rules of exponents (power x power or power divided by power) with the same whole numbers base (0-100) and exponents (0-10)																				
6.C.1.e	Identify or use the commutative property of addition and multiplication, associative property of addition or multiplication, additive inverse property, the distinctive property, or the identity property for one or zero with whole numbers (0-100)																				
6.C.2	Estimate to:																				
6.C.2.a	Determine the sum, difference, product or quotient of no more than 3 positive rational numbers (0-1,000)																				
6.C.3	Analyze ratios or percents to:																				

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)				No. of Augmented Items (Form G)				No. of Augmented Items (Form H)				No. of Augmented Items (Form J)				No. of Augmented Items (Form K)			
		S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E
		R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C
6.A.1.d	Compare, order, or describe no more than 4 fractions with denominators as factors of 300 that are less than 101 (1-100), decimals with no more than 4 decimal places (0-100), percents (0-100), or integers (-100 to 100) with or without using the symbols (<, >, =)																				
6.C	Number Computation																				
6.C.1	Analyze number relationships or compute to:																				
6.C.1.a	Add, subtract, multiply, or divide integers (Use one operation and -100 to 100)																				
6.C.1.b	Add, subtract, or multiply positive fractions or mixed numbers with denominators as factors of 300 less than 101 (use no more than 2 operation and 0-2,000)																				
6.C.1.c	Calculate powers using exponents of no more than 3 and bases of whole numbers (0-20) or integers (-10 to 20); square roots of perfect square whole numbers (0-100)																				
6.C.1.d	Simplify using the rules of exponents (power x power or power divided by power) with the same whole numbers base (0-100) and exponents (0-10)																				
6.C.1.e	Identify or use the commutative property of addition and multiplication, associative property of addition or multiplication, additive inverse property, the distinctive property, or the identity property for one or zero with whole numbers (0-100)																				
6.C.2	Estimate to:																				
6.C.2.a	Determine the sum, difference, product or quotient of no more than 3 positive rational numbers (0-1,000)																				
6.C.3	Analyze ratios or percents to:																				

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items				No. of Augmented Items				
		(Form A)	(Form B)	(Form C)	(Form D)	(Form E)				
		S P R	B C R	E C R	S P R	B C R	E C R	S P R	B C R	E C R
6.C.3.a	Determine equivalent ratios with denominators as factors of 300 less than 101 using whole numbers (0-100)									
6.C.3.b	Determine or use rates, unit rates, or percents as ratios in the context of a problem using whole numbers (0-1,000)									

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items				No. of Augmented Items				
		(Form F)	(Form G)	(Form H)	(Form J)	(Form K)				
		S P R	B C R	E C R	S P R	B C R	E C R	S P R	B C R	E C R
6.C.3.a	Determine equivalent ratios with denominators as factors of 300 less than 101 using whole numbers (0-100)									
6.C.3.b	Determine or use rates, unit rates, or percents as ratios in the context of a problem using whole numbers (0-1,000)									

Note. Number in parentheses indicates the total number of field test items.

Table D.6 The 2008 MSA-Math Blueprint: Grade 8

Code	Standard / Objective Statement	No. of Augmented Items (Form A)				No. of Augmented Items (Form B)				No. of Augmented Items (Form C)				No. of Augmented Items (Form D)				No. of Augmented Items (Form E)			
		S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E
		R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C
1.0	Knowledge of Algebra, Patterns, or Functions - Students will algebraically represent, model, analyze, or solve mathematical or real-world problems involving patterns or functional relationships.	8	4	2	1	8	4	2	1	8	4	2	1	8	4	2	1	8	4	2	1
		(3)	(1)	(2)	(1)	(2)	(2)	(1)	(1)	(2)	(1)	(1)		(2)	(1)	(1)		(2)	(2)	(1)	
1.A	Patterns or Functions																				
1.A.1	Identify, describe, extend, or create patterns, functions, or sequences to:																				
1.A.1.a	Determine the nth term no more than 10 terms beyond the last given term using the recursive relationship of arithmetic sequences with common differences no more than 10 (-100 to 5,000)																				
1.A.1.b	Determine the nth term no more than 5 terms beyond the last given term using the recursive relationship of geometric sequences with a common whole number ratio of no more than 5:1 (0-10,000)																				
1.A.1.c	Determine whether a relationship is linear or non-linear given the graph of the function																				
1.B	Expressions, Equations, or Inequalities																				
1.B.1	Write, simplify or evaluate expressions to:																				
1.B.1.a	Represent unknown quantities with one unknown and no more than three operations using rational numbers (-1,000 to 1,000)																				
1.B.1.b	Determine the value of algebraic expressions with one or two unknowns and up to three operations using rational numbers (-100 to 100)																				

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)				No. of Augmented Items (Form G)				No. of Augmented Items (Form H)				No. of Augmented Items (Form J)				No. of Augmented Items (Form K)			
		S R	S P R	B C R	E C R	S R	S P R	B C R	E C R	S R	S P R	B C R	E C R	S R	S P R	B C R	E C R	S R	S P R	B C R	E C R
1.0	Knowledge of Algebra, Patterns, or Functions - Students will algebraically represent, model, analyze, or solve mathematical or real-world problems involving patterns or functional relationships.	8	4	2	1	8	4	2	1	8	4	2	1	8	4	2	1	8	4	2	1
		(2)	(1)	(2)		(1)	(1)			(1)	(3)	(1)		(3)	(1)	(1)				(1)	
1.A	Patterns or Functions																				
1.A.1	Identify, describe, extend, or create patterns, functions, or sequences to:																				
1.A.1.a	Determine the nth term no more than 10 terms beyond the last given term using the recursive relationship of arithmetic sequences with common differences no more than 10 (-100 to 5,000)																				
1.A.1.b	Determine the nth term no more than 5 terms beyond the last given term using the recursive relationship of geometric sequences with a common whole number ratio of no more than 5:1 (0-10,000)																				
1.A.1.c	Determine whether a relationship is linear or non-linear given the graph of the function																				
1.B	Expressions, Equations, or Inequalities																				
1.B.1	Write, simplify or evaluate expressions to:																				
1.B.1.a	Represent unknown quantities with one unknown and no more than three operations using rational numbers (-1,000 to 1,000)																				
1.B.1.b	Determine the value of algebraic expressions with one or two unknowns and up to three operations using rational numbers (-100 to 100)																				

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)	No. of Augmented Items (Form B)	No. of Augmented Items (Form C)	No. of Augmented Items (Form D)	No. of Augmented Items (Form E)					
		S P R	B C R	E C R	S P R	B C R	E C R	S P R	B C R	E C R	S P R
1.B.1.c	Determine the value of numeric expressions using order of operations with no more than 5 operations including exponents of no more than 3 and 2 sets of grouping symbols using parentheses, brackets, a division bar, or absolute value with rational numbers (-100 to 100)										
1.B.1.d	Represent equivalent algebraic expressions by combining like terms with no more than 3 variables using whole numbers (-50 to 50) or proper fractions with denominators as factors of 20 (-20 to 20)										
1.B.2	Identify, write, or solve equations or inequalities to:										
1.B.2.a	Represent relationships using a variable by using the appropriate relational symbols ($>$, \geq , $<$, \leq , $=$) and no more than three operational symbols (+, -, \times , \div) on either side using rational numbers (-1,000 to 1,000)										
1.B.2.b	Find the unknown in an equation with one unknown on one side used no more than 3 times and up to three operations (same or different but only one division) using rational numbers (-2,000 to 2,000)										
1.B.2.c	Find the unknown in an inequality with one variable on one side used no more than 3 times whose result after combining coefficients is a positive whole number coefficient and one or two operations (-100 to 100)										
1.B.2.d	Identify or graph solutions of inequalities with one variable used once and a positive whole number coefficient on a number line using integers (-100 to 100)										
1.B.2.e	Identify equivalent equations using one unknown no more than 3 times on one side and up to three operations (same or different but only one division) and integers (-2,000 to 2,000)										
1.B.2.f	Apply given formulas having no more than four variables and up to three operations using rational numbers (-500 to 500)										

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)	No. of Augmented Items (Form G)	No. of Augmented Items (Form H)	No. of Augmented Items (Form J)	No. of Augmented Items (Form K)					
		S P R	B C R	E C R	S P R	B C R	E C R	S P R	B C R	E C R	S P R
1.B.1.c	Determine the value of numeric expressions using order of operations with no more than 5 operations including exponents of no more than 3 and 2 sets of grouping symbols using parentheses, brackets, a division bar, or absolute value with rational numbers (-100 to 100)										
1.B.1.d	Represent equivalent algebraic expressions by combining like terms with no more than 3 variables using whole numbers (-50 to 50) or proper fractions with denominators as factors of 20 (-20 to 20)										
1.B.2	Identify, write, or solve equations or inequalities to:										
1.B.2.a	Represent relationships using a variable by using the appropriate relational symbols ($>$, \geq , $<$, \leq , $=$) and no more than three operational symbols (+, -, \times , \div) on either side using rational numbers (-1,000 to 1,000)										
1.B.2.b	Find the unknown in an equation with one unknown on one side used no more than 3 times and up to three operations (same or different but only one division) using rational numbers (-2,000 to 2,000)										
1.B.2.c	Find the unknown in an inequality with one variable on one side used no more than 3 times whose result after combining coefficients is a positive whole number coefficient and one or two operations (-100 to 100)										
1.B.2.d	Identify or graph solutions of inequalities with one variable used once and a positive whole number coefficient on a number line using integers (-100 to 100)										
1.B.2.e	Identify equivalent equations using one unknown no more than 3 times on one side and up to three operations (same or different but only one division) and integers (-2,000 to 2,000)										
1.B.2.f	Apply given formulas having no more than four variables and up to three operations using rational numbers (-500 to 500)										

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)	No. of Augmented Items (Form B)	No. of Augmented Items (Form C)	No. of Augmented Items (Form D)	No. of Augmented Items (Form E)					
		S P R	B C R	E C R	S P R	B C R	E C R	S P R	B C R	E C R	S P R
1.C	Numeric or Graphic Representations of Relationships										
1.C.1	Locate points on a coordinate plane to:										
1.C.1.a	Create a graph in the coordinate plane of a linear equation with two unknowns having integers coefficients (-9 to 9) and integer constants (-20 to 20)										
1.C.2	Analyze linear relationships to:										
1.C.2.a	Determine the slope of a linear relationship having integer coefficients (-9 to 9) and integer constants (-20 to 20), given the graph of the relationship										
2.0	Knowledge of Geometry - Students will apply the properties of one-, two-, or three-dimensional geometric figures to describe, reason, or solve problems about shape, size, position, or motion of objects	5 2 (1) (2)	5 2 (1) (1)	5 2 (1) (1)	5 2 (1) (1)	5 2 (1) (1) (1)					
2.A	Plane Geometric Figures										
2.A.1	Analyze the properties of plane geometric figures to:										
2.A.1.a	Identify or describe the geometric relationships of alternate interior, alternate exterior, or corresponding angles formed by parallel lines cut by a transversal										
2.A.1.b	Identify or describe the hypotenuse or legs of right triangles										
2.A.2	Analyze geometric relationships to:										
2.A.2.a	Determine the missing measurements of alternate interior, alternate exterior or corresponding angles formed by parallel lines but by a transversal										
2.A.2.b	Apply the Pythagorean Theorem										

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items				No. of Augmented Items							
		(Form F)	(Form G)	(Form H)	(Form J)	(Form K)	(Form L)	(Form M)	(Form N)				
		S R	S P R	B C R	E C R	S R	S P R	B C R	E C R	S R	S P R	B C R	E C R
1.C	Numeric or Graphic Representations of Relationships												
1.C.1	Locate points on a coordinate plane to:												
1.C.1.a	Create a graph in the coordinate plane of a linear equation with two unknowns having integers coefficients (-9 to 9) and integer constants (-20 to 20)												
1.C.2	Analyze linear relationships to:												
1.C.2.a	Determine the slope of a linear relationship having integer coefficients (-9 to 9) and integer constants (-20 to 20), given the graph of the relationship												
2.0	Knowledge of Geometry - Students will apply the properties of one-, two-, or three-dimensional geometric figures to describe, reason, or solve problems about shape, size, position, or motion of objects	5 2	5 2	5 2	5 2	5 2	5 2	5 2	5 2	5 2	5 2	1	1
		(1) (1)	(1) (1) (1)	(1) (1) (1)	(1) (1) (1)	(1) (1) (1)	(1) (1) (1)	(1) (1) (1)	(1) (1) (1)	(1) (1) (1)	(1) (1) (1)	(1) (1) (1)	(1) (1) (1)
2.A	Plane Geometric Figures												
2.A.1	Analyze the properties of plane geometric figures to:												
2.A.1.a	Identify or describe the geometric relationships of alternate interior, alternate exterior, or corresponding angles formed by parallel lines cut by a transversal												
2.A.1.b	Identify or describe the hypotenuse or legs of right triangles												
2.A.2	Analyze geometric relationships to:												
2.A.2.a	Determine the missing measurements of alternate interior, alternate exterior or corresponding angles formed by parallel lines but by a transversal												
2.A.2.b	Apply the Pythagorean Theorem												

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items				No. of Augmented Items															
		(Form A)				(Form B)				(Form C)				(Form D)				(Form E)			
		S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E
		R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C
2.C	Representation of Geometric Figures																				
2.C.1	Represent plane geometric figures to:																				
2.C.1.a	Draw quadrilaterals given their whole number dimensions in inches or centimeters or angle measurements																				
2.C.1.b	Construct a perpendicular through a given point on a given line segment																				
2.C.1.c	Construct a triangle congruent to a given triangle																				
2.D	Congruence or Similarity																				
2.D.1	Analyze the properties of congruent polygons to:																				
2.D.1.a	Find the length of corresponding sides or the measure of corresponding angles using rational numbers with no more than 2 decimal places (0-1,000)																				
2.E	Transformations																				
2.E.1	Analyze a transformation on a coordinate plane to:																				
2.E.1.a	Identify or plot the result of two transformation on one figure using translations (horizontal or vertical), reflections (horizontal or vertical), or rotations around a given point (90° or 180°)																				
3.0	Knowledge of Measurement - Students will identify attributes, units, or systems of measurement or apply a variety of techniques, formulas, tools or technology for determining measurements.	3	1	1		3	1	1		3	1	1		3	1	1		3	1	1	
		(1)	(1)			(1)				(3)	(1)	(1)									
3.C	Applications in Measurement																				

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items				No. of Augmented Items															
		(Form F)		(Form G)		(Form H)		(Form J)		(Form K)											
		S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E
		R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C
2.C	Representation of Geometric Figures																				
2.C.1	Represent plane geometric figures to:																				
2.C.1.a	Draw quadrilaterals given their whole number dimensions in inches or centimeters or angle measurements																				
2.C.1.b	Construct a perpendicular through a given point on a given line segment																				
2.C.1.c	Construct a triangle congruent to a given triangle																				
2.D	Congruence or Similarity																				
2.D.1	Analyze the properties of congruent polygons to:																				
2.D.1.a	Find the length of corresponding sides or the measure of corresponding angles using rational numbers with no more than 2 decimal places (0-1,000)																				
2.E	Transformations																				
2.E.1	Analyze a transformation on a coordinate plane to:																				
2.E.1.a	Identify or plot the result of two transformation on one figure using translations (horizontal or vertical), reflections (horizontal or vertical), or rotations around a given point (90° or 180°)																				
3.0	Knowledge of Measurement - Students will identify attributes, units, or systems of measurement or apply a variety of techniques, formulas, tools or technology for determining measurements.	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1
3.C	Applications in Measurement																				

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)				No. of Augmented Items (Form B)				No. of Augmented Items (Form C)				No. of Augmented Items (Form D)				No. of Augmented Items (Form E)			
		S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E
		R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C
3.C.1	Estimate or apply formulas to:																				
3.C.1.a	Find the circumference or area of a circle using rational numbers with no more than 2 decimal places (0-10,000)																				
3.C.1.b	Find the area of a composite figure with no more than six polygons (triangles, rectangles, or circles) by measuring, partitioning, or using formulas with whole number dimensions (0-10,000)																				
3.C.1.c	Find the volume of a cylinder with whole number dimensions, given the formula (0-10,000)																				
3.C.2	Analyze measurement relationships to:																				
3.C.2.a	Solve problems using proportions, scale drawings with scales as whole numbers, or rates using whole numbers or decimals (0-1,000)																				
4.0	Knowledge of Statistics - Students will collect, organize, display, analyze, or interpret data to make decisions or predictions	6	1	1	1	6	1	1	1	6	1	1	1	6	1	1	1	6	1	1	1
		(1)					(1)				(1)			(1)	(1)	(1)	(1)				(1)
4.A	Data Displays																				
4.A.1	Organize and display data to:																				
4.A.1.a	Make circle graphs with no more than 5 categories using data in whole number percents																				
4.A.1.b	Make box-and-whisker plots with no more than 12 pieces of data using whole numbers (0-1,000)																				
4.A.1.c	Make scatter plots with no more than 10 points using whole numbers (0-1,000)																				
4.B	Data Analysis																				

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)				No. of Augmented Items (Form G)				No. of Augmented Items (Form H)				No. of Augmented Items (Form J)				No. of Augmented Items (Form K)			
		S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E
		R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C
3.C.1	Estimate or apply formulas to:																				
3.C.1.a	Find the circumference or area of a circle using rational numbers with no more than 2 decimal places (0-10,000)																				
3.C.1.b	Find the area of a composite figure with no more than six polygons (triangles, rectangles, or circles) by measuring, partitioning, or using formulas with whole number dimensions (0-10,000)																				
3.C.1.c	Find the volume of a cylinder with whole number dimensions, given the formula (0-10,000)																				
3.C.2	Analyze measurement relationships to:																				
3.C.2.a	Solve problems using proportions, scale drawings with scales as whole numbers, or rates using whole numbers or decimals (0-1,000)																				
4.0	Knowledge of Statistics - Students will collect, organize, display, analyze, or interpret data to make decisions or predictions	6	1	1	1	6	1	1	1	6	1	1	1	6	1	1	1	6	1	1	1
					(1)	(3)			(1)	(2)			(1)	(1)			(1)	(1)			(1)
4.A	Data Displays																				
4.A.1	Organize and display data to:																				
4.A.1.a	Make circle graphs with no more than 5 categories using data in whole number percents																				
4.A.1.b	Make box-and-whisker plots with no more than 12 pieces of data using whole numbers (0-1,000)																				
4.A.1.c	Make scatter plots with no more than 10 points using whole numbers (0-1,000)																				
4.B	Data Analysis																				

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items				No. of Augmented Items															
		(Form A)				(Form B)				(Form C)				(Form D)				(Form E)			
		S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E
		R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C
4.B.1	Analyze data to:																				
4.B.1.a	Interpret tables with no more than 5 categories having no more than 2 quantities per category using whole numbers or decimals with no more than 2 decimal places (0-100)																				
4.B.1.b	Interpret box-and-whisker plots using minimum, first (lower) quartile, median (middle) quartile, third (upper) quartile, or maximum using whole numbers (0-100)																				
4.B.1.c	Interpret scatter plots with no more than 10 points using whole numbers or decimals with no more than 2 decimal places (0-100)																				
4.B.1.d	Interpret circle graph with no more than 8 categories (0-1,000)																				
5.0	Knowledge of Probability - Students will use experimental methods or theoretical reasoning to determine probabilities to make predictions or solve problems about events whose outcomes involve random variation.	2	2	1		2	2	1		2	2	1		2	2	1		2	2	1	
		(1)				(1)				(1)				(1)				(1)			
5.A	Sample Space																				
5.A.1	Identify number of members of a sample space to:																				
5.A.1.a	Determine the number of outcomes for no more than 5 dependent events with no more than 10 outcomes in the first event.																				
5.B	Theoretical Probability																				
5.B.1	Determine the probability of an event comprised of no more than 2 independent events to:																				
5.B.1.a	Express the probability as a fraction, decimal or percent with a sample space of no more than 36-60 outcomes																				

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)				No. of Augmented Items (Form G)				No. of Augmented Items (Form H)				No. of Augmented Items (Form J)				No. of Augmented Items (Form K)			
		S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E
		R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C
4.B.1	Analyze data to:																				
4.B.1.a	Interpret tables with no more than 5 categories having no more than 2 quantities per category using whole numbers or decimals with no more than 2 decimal places (0-100)																				
4.B.1.b	Interpret box-and-whisker plots using minimum, first (lower) quartile, median (middle) quartile, third (upper) quartile, or maximum using whole numbers (0-100)																				
4.B.1.c	Interpret scatter plots with no more than 10 points using whole numbers or decimals with no more than 2 decimal places (0-100)																				
4.B.1.d	Interpret circle graph with no more than 8 categories (0-1,000)																				
5.0	Knowledge of Probability - Students will use experimental methods or theoretical reasoning to determine probabilities to make predictions or solve problems about events whose outcomes involve random variation.	2	2	1		2	2	1		2	2	1		2	2	1		2	2	1	
										(1)				(1)	(1)			(1)			
5.A	Sample Space																				
5.A.1	Identify number of members of a sample space to:																				
5.A.1.a	Determine the number of outcomes for no more than 5 dependent events with no more than 10 outcomes in the first event.																				
5.B	Theoretical Probability																				
5.B.1	Determine the probability of an event comprised of no more than 2 independent events to:																				
5.B.1.a	Express the probability as a fraction, decimal or percent with a sample space of no more than 36-60 outcomes																				

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items				No. of Augmented Items															
		(Form A)				(Form B)				(Form C)				(Form D)				(Form E)			
		S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E
		R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C	R	P	C	C
5.B.2	Determine the probability of second event that is dependent on a first event of equally likely outcomes to:																				
5.B.2.a	Express the probability as a fraction, decimal, or percent with a sample space of no more than 60 outcomes																				
5.C	Experimental Probability																				
5.C.1	Analyze the results of a survey or simulation to:																				
5.C.1.a	Make predictions and express the probability as a fraction, decimal with no more than 2 decimal places, or percent with 20-500 results																				
6.0	Knowledge of Number Relationships or Computation - Students will describe, represent, or apply numbers or their relationships or will estimate or compute using mental strategies, paper/pencil or technology.	10	2			10	2			10	2			10	2			10	2		
						(1)	(2)			(1)				(1)	(2)			(3)	(2)		
6.A	Knowledge of Number or Place Value																				
6.A.1.	Apply knowledge of rational numbers or place value to:																				
6.A.1.a	Read, write, or represent rational numbers in exponential notation or scientific notation (-10,000 to 1,000,000,000)																				
6.A.1.b	Compare, order, or describe no more than 4 integers (-100 to 100) or positive rational numbers (0-100) using equivalent forms or absolute value with or without using the symbols (<, >, =)																				

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)				No. of Augmented Items (Form G)				No. of Augmented Items (Form H)				No. of Augmented Items (Form J)				No. of Augmented Items (Form K)			
		S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E
		R	P	C	R	R	P	C	R	R	P	C	R	R	P	C	R	R	P	C	R
5.B.2	Determine the probability of second event that is dependent on a first event of equally likely outcomes to:																				
5.B.2.a	Express the probability as a fraction, decimal, or percent with a sample space of no more than 60 outcomes																				
5.C	Experimental Probability																				
5.C.1	Analyze the results of a survey or simulation to:																				
5.C.1.a	Make predictions and express the probability as a fraction, decimal with no more than 2 decimal places, or percent with 20-500 results																				
6.0	Knowledge of Number Relationships or Computation - Students will describe, represent, or apply numbers or their relationships or will estimate or compute using mental strategies, paper/pencil or technology.	10	2			10	2			10	2			10	2			10	2		
		(2)	(1)			(1)	(2)							(1)	(2)			(5)	(3)		
6.A	Knowledge of Number or Place Value																				
6.A.1.	Apply knowledge of rational numbers or place value to:																				
6.A.1.a	Read, write, or represent rational numbers in exponential notation or scientific notation (-10,000 to 1,000,000,000)																				
6.A.1.b	Compare, order, or describe no more than 4 integers (-100 to 100) or positive rational numbers (0-100) using equivalent forms or absolute value with or without using the symbols (<, >, =)																				

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form A)	No. of Augmented Items (Form B)	No. of Augmented Items (Form C)	No. of Augmented Items (Form D)	No. of Augmented Items (Form E)
		S P R	S P R	S P R	S P R	S P R
6.C	Number Computation					
6.C.1	Analyze number relationships or compute to:					
6.C.1.a	Add, subtract, multiply, or divide integers using one operation (-1,000 to 1,000)					
6.C.1.b	Calculate powers using bases no more than 12 and exponents no more than 3 or square roots of perfect squares no more than 144					
6.C.1.c	Simplify using the rules of exponents (power x power or power divided by power) with the same integer as a base (-20 to 20) and exponents (0-10)					
6.C.1.d	6.C.1.d Identify or use the commutative property of addition and multiplication, associative property of addition or multiplication, additive inverse property, the distributive property, or the identity property for one or zero with integers (-100 to 100)					
6.C.2	Estimate to:					
6.C.2.a	Determine square roots of whole numbers (0-100)					
6.C.3	Analyze ratios, proportions, or percents to:					
6.C.3.a	Determine unit rates using positive rational numbers (0-100)					
6.C.3.b	Determine or use percents, rate of increase/decrease, discount, commission, sales tax, or simple interest in the context of a problem using positive rational numbers (0-10,000)					
6.C.3.c	Use proportional reasoning to solve problems using positive rational numbers (0-1,000)					

Note. Number in parentheses indicates the total number of field test items.

Code	Standard / Objective Statement	No. of Augmented Items (Form F)	No. of Augmented Items (Form G)	No. of Augmented Items (Form H)	No. of Augmented Items (Form J)	No. of Augmented Items (Form K)					
		S R	S P R	B C R	E C R	S R	S P R	B C R	E C R	S R	S P R
6.C	Number Computation										
6.C.1	Analyze number relationships or compute to:										
6.C.1.a	Add, subtract, multiply, or divide integers using one operation (-1,000 to 1,000)										
6.C.1.b	Calculate powers using bases no more than 12 and exponents no more than 3 or square roots of perfect squares no more than 144										
6.C.1.c	Simplify using the rules of exponents (power x power or power divided by power) with the same integer as a base (-20 to 20) and exponents (0-10)										
6.C.1.d	6.C.1.d Identify or use the commutative property of addition and multiplication, associative property of addition or multiplication, additive inverse property, the distributive property, or the identity property for one or zero with integers (-100 to 100)										
6.C.2	Estimate to:										
6.C.2.a	Determine square roots of whole numbers (0-100)										
6.C.3	Analyze ratios, proportions, or percents to:										
6.C.3.a	Determine unit rates using positive rational numbers (0-100)										
6.C.3.b	Determine or use percents, rate of increase/decrease, discount, commission, sales tax, or simple interest in the context of a problem using positive rational numbers (0-10,000)										
6.C.3.c	Use proportional reasoning to solve problems using positive rational numbers (0-1,000)										

Note. Number in parentheses indicates the total number of field test items.