

Maryland School Assessment-
Mathematics:
Grades 3 through 8

Technical Report:
2007 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, 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 and grades 4, 6, and 7 were added to the program in 2004. In addition, it should be noted that the *MSA-Math* was contracted to Harcourt Assessment, Inc starting with spring 2007.

The purpose of the 2007 *MSA-Math Technical Report* is to provide users and other interested parties with a general overview and statistical results of the *MSA-Math*.

The 2007 *Technical Report* is composed of four parts, and the first part contains the following information:

- General overview and purposes of the *MSA-Math*
- Development and review of the *MSA-Math*
- Test administration
- Operational test analyses
- Field test analyses
- Linking, equating, and scaling
- Score interpretation
- Test validity
- Unidimensionality analyses
- Item bank construction
- Quality assurance

The second part provides the 2007 MSA-Math results for students in grades 3 through 8. It contains information about the cutoff score and pass rate at each performance level for the 2007 math tests.

The third part contains statistical summaries for the 2007 MSA-Math. This part outlines the statistical and psychometric characteristics of the 2007 MSA-Math.

Five appendices provide additional statistical results for the 2007 MSA-Math: Appendix A contains stratified random sampling results; Appendix B contains 2007 MSA-Math scale score histograms and Tukey charts; Appendix C contains Year 2006 MSA-Math recalibration results from 3PL *IRT* to the Rasch model using equipercentile method; Appendix D contains both classical and *item response theory (IRT)* item parameters; Appendix E contains test blueprints for grades 3 through 8.

1. OVERVIEW OF THE 2007 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, and grades 4, 6, and 7 were added to the program in 2004. In addition, another vendor has administered the MSA-Math until 2006, and the MSA-Math was awarded to Harcourt Assessment, Inc. starting spring 2007. Because of different equating procedures between two vendors, a transformation of scale scores was conducted in 2006 using equipercentile method. Detailed information on scale score transformation can be found in Appendix C, Year 2006 MSA-Math Recalibration Results from 3PL IRT to the Rasch Model Using Equipercentile Method.

In 2007, SAT10 Core Form A or B was administered at grades 3 through 8. Several of the SAT10 items aligned to Maryland math curriculum were included into criterion-referenced scores. In addition, all of the SAT10 items were used to report norm-referenced scores. Some of the Maryland-specific items that appeared both in 2007 and in previous years were used to conduct year-to-year calibration and equating. It should be noted that the Rasch difficulty estimates of the Maryland-specific items which were generated by recalibration in 2006 were kept as fixed parameters in 2007 calibration and equating procedures. So all scale scores in 2006 were on the same scale in 2007 within each content and grade.

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 found 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).

From March 12 to March 21, 2007, students in grades 3 through 8 took the 2007 *MSA* in mathematics.

1.1 General Overview of the 2007 MSA-Math

The 2007 MSA-Math was designed to provide two types of information. First, *norm-referenced* information was provided by the items from the abbreviated form of the *Stanford Achievement Test Series, Tenth Edition (SAT10)*. For example, the *SAT10* consisted of *Problem Solving and Procedures*. Second, to produce *criterion-referenced* information, additional items, called augmented items, were written for the *Maryland Mathematics Standards* in grades 3 through 8 and were organized under the seven math content standards: *Algebra, Geometry, Measurement, Statistics, Probability, Numbers and Computation, and Process*. However, it should be noted that some standards were combined for reporting purposes, and the reporting strands can be found in Tables 1.6 through 1.23.

The 2007 MSA-Math produced both norm-referenced and criterion-referenced scores for each student. While norm-referenced scores included only the *SAT10* items, both items selected from the *SAT10* and augmented items created for Maryland comprised criterion-referenced scores. Figure 1.1 shows a schematic of the *SAT10* and augmented items that produced these test scores.

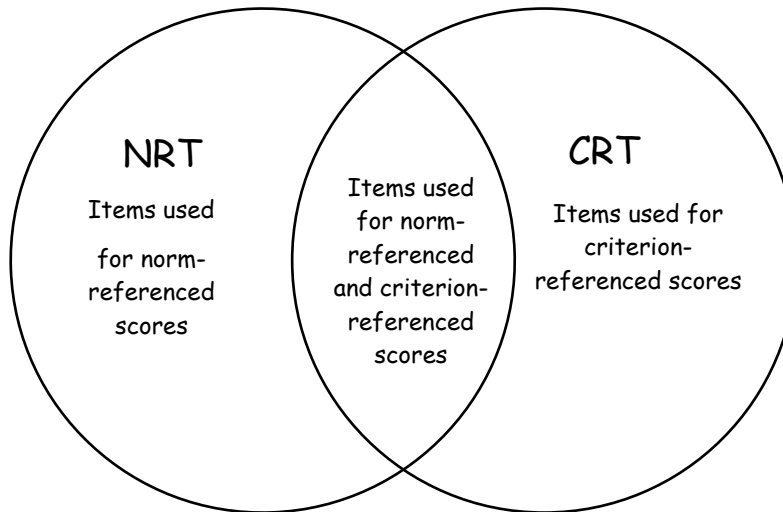


Figure 1.1 Schematic of the 2007 MSA-Math

1.2 Purposes/Uses of the 2007 MSA-Math

By measuring students' achievement against the new academic standards, the 2007 MSA-Math provides 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.

1.3 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.

While 100% of the standards should be tested, it was not the case that every indicator would necessarily be tested each year. Consequently, the *VSC* specified curricular indicators and objectives that contributed directly to measuring content standards, which were aligned to the *Maryland School Assessment (MSA)*.

1.4 Development and Review of the 2007 MSA-Math

Developing the 2007 MSA-Math was a complex process. It required a great deal of involvement from MSDE, Harcourt, and local school systems. In addition, teachers, administrators, and content specialists from all over Maryland were recruited for different test development committees. These individuals reviewed test forms and items to ensure that they measured students' knowledge and skills fairly and without bias. Table 1.1 identifies which groups were responsible for developing the 2007 MSA-Math.

Table 1.1 The 2007 MSA-Math Responsibility for Test Development

Development of the 2007 MSA-Math	Primary Responsibility
Development of Preliminary Blueprints and Item Specifications	Harcourt; MSDE; NPC
Development of Operational Form Requirement and Session Blueprint	MSDE
Item Writing	Harcourt
Item Review	Harcourt; MSDE; NPC; Content Review Committee
Bias Review	Harcourt; MSDE; Bias Review Committee
Vision Review	MSDE; Harcourt; Vision Review Committee
Modification of Special Forms	Harcourt; MSDE
Review of Special Forms	MSDE
Construction of Operational Test Forms	Harcourt; MSDE; NPC
Construction of Field Test Forms	Harcourt; MSDE
Review of Operational Test Forms	MSDE
Final Construction of Test Forms	Harcourt; MSDE

National Psychometric Council

The National Psychometric Council (NPC) took a major role in reviewing and recommending to MSDE on the development and implementation of the 2007 MSA-Math program. For example, they made recommendations to MSDE on issues, such as test blueprints, 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 view 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 separate Vision 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 suggested edits, based on ethnic, religious, disability, or geographical bias.

1.5 Test Structure of the 2007 MSA-Math

2007 MSA-Math Test Structure

The 2007 MSA-Math was composed of the *SAT10* items and augmented (Maryland-specific) operational items. In addition, the uniqueness of the MSA-Math was to spiral a relatively large number of Maryland field test items into multiple test forms (10 forms) for each grade in test administration.

As can be seen from Table 1.2, the 2007 MSA-Math produced 10 test forms for each grade, and there were 2 operational test forms within each grade. This means that Forms A, B, C, D and E (Form A) are identical, and Forms F, G, H, J, and K (Form F) are identical with respect to operational item sets.

Tables 1.3, 1.4, and 1.5 provide information concerning the test design of NRT and CRT and the number of operational and field test items included for each test form. Tables 1.6 through 1.23 provide information concerning the number of items that contribute to each strand (e.g., *Algebra, Geometry, Measurement, Statistics, Probability, Numbers and Computation, and Process*).

Table 1.2 The 2007 MSA-Math Test Structure: 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.

2007 MSA-Math Item Types

The 2007 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 2007 MSA-Math, students selected an answer from four or five alternatives. Each *SR* item was scored dichotomously (e.g., 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 2007 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 0-1 score point range from two independent scorers; all *BCR* Step B items received a 0-2 score point range and all *ECR* Step B items received a 0-3 score point range from two independent scorers. Score was the higher of the first and the second readers' 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 readers' scores. It should be noted that grade 3 and 4 tests did not include *ECR* items.

Table 1.3 The 2007 MSA-Math Test Design: Grades 3 and 4

Grade	Strand Title	SAT10 / Augmented	Item Type	No. of Items of Each Form	
				FA	FF
3	Total NRT	SAT10	SR	40	40
	Problem Solving	SAT10	SR	20	20
	Procedures	SAT10	SR	20	20
	Total CRT	Augmented	SR, BCR	61	61
	Algebra	Augmented	SR, BCR	13	13
	Geometry	Augmented	SR, BCR	7	7
	Measurement	Augmented	SR, BCR	7	7
	Statistics	Augmented	SR, BCR	12	12
	Probability	Augmented	SR	2	2
	Number Computation	Augmented	SR, BCR	13	13
	Process	Augmented	BCR	7	7
	4	Total NRT	SAT10	SR	40
Problem Solving		SAT10	SR	20	20
Procedures		SAT10	SR	20	20
Total CRT		Augmented	SR, BCR	64	64
Algebra		Augmented	SR, BCR	14	14
Geometry		Augmented	SR, BCR	7	7
Measurement		Augmented	SR, BCR	7	7
Statistics		Augmented	SR, BCR	8	8
Probability		Augmented	SR, BCR	7	7
Number Computation		Augmented	SR, BCR	14	14
Process		Augmented	BCR	7	7

Note. CRT contains SAT10 items. 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 The 2007 MSA-Math Test Design: Grades 5 and 6

Grade	Strand Title	SAT10 / Augmented	Item Type	No. of Items of Each Form	
				FA	FF
5	Total NRT	SAT10	SR	40	40
	Problem Solving	SAT10	SR	20	20
	Procedures	SAT10	SR	20	20
	Total CRT	Augmented	SR, BCR, ECR	61	59
	Algebra	Augmented	SR, BCR, ECR	14	14
	Geometry	Augmented	SR, BCR	5	5
	Measurement	Augmented	SR, BCR	7	7
	Statistics	Augmented	SR, BCR	9	8
	Probability	Augmented	SR, BCR	4	4
	Number Computation	Augmented	SR, BCR	14	14
	Process	Augmented	BCR, ECR	8	7
	6	Total NRT	SAT10	SR	40
Problem Solving		SAT10	SR	20	20
Procedures		SAT10	SR	20	20
Total CRT		Augmented	SR, BCR, ECR	59	59
Algebra		Augmented	SR, BCR, ECR	13	13
Geometry		Augmented	SR, BCR	8	8
Measurement		Augmented	SR, BCR	6	6
Statistics		Augmented	SR, BCR	9	9
Probability		Augmented	SR	4	4
Number Computation		Augmented	SR, BCR	12	12
Process		Augmented	BCR, ECR	7	7

Note. CRT contains SAT10 items. 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 The 2007 MSA-Math Test Design: Grades 7 and 8

Grade	Strand Title	SAT10 / Augmented	Item Type	No. of Items of Each Form	
				FA	FF
7	Total NRT	SAT10	SR	40	40
	Problem Solving	SAT10	SR	20	20
	Procedures	SAT10	SR	20	20
	Total CRT	Augmented	SR, SPR, BCR, ECR	61	61
	Algebra	Augmented	SR, SPR, BCR, ECR	14	14
	Geometry	Augmented	SR, SPR, ECR	7	7
	Measurement	Augmented	SR, SPR, BCR	6	6
	Statistics	Augmented	SR, SPR, BCR, ECR	9	9
	Probability	Augmented	SR, SPR, BCR	5	5
	Number Computation	Augmented	SR, SPR	13	13
	Process	Augmented	BCR, ECR	7	7
	8	Total NRT	SAT10	SR	40
Problem Solving		SAT10	SR	20	20
Procedures		SAT10	SR	20	20
Total CRT		Augmented	SR, SPR, BCR, ECR	59	59
Algebra		Augmented	SR, SPR, BCR, ECR	15	15
Geometry		Augmented	SR, SPR, ECR	7	7
Measurement		Augmented	SR, SPR, BCR	4	4
Statistics		Augmented	SR, SPR, BCR, ECR	9	9
Probability		Augmented	SR, SPR, BCR	5	5
Number Computation		Augmented	SR, SPR	11	11
Process		Augmented	BCR, ECR	8	8

Note. CRT contains SAT10 items. 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.

Table 1.6 Test Design and Item Distribution for the 2007 MSA-Math: Grades 3

Form	SAT10 / Maryland			Augmented Maryland Item								Total # of Item
	2*	6*	Total	1*	2*	3*	4*	5*	6*	7*	Total	
A	1	2	3	13	7	7	12	2	13	7	61	64
F	1	2	3	13	7	7	12	2	13	7	61	64

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

Table 1.7 Total and Reporting Cluster Scores for the 2007 MSA-Math: Grades 3

Form	Total and Reporting Cluster Scores					
	1	2&3	4&5	6	7	Total Score
A	13	15	14	15	14	71
F	13	15	14	15	14	71

Table 1.8 Item Type and Score Point Distribution for the 2007 MSA-Math: Grades 3

Form	# of SAT 10 SR Item	# of Aug. SR Item	# of Augmented BCR Item		Total # of Item	Scores of SAT10	Scores of Augmented SR	Scores of Aug. BCR		Total Score
			Step A	Step B				Step A	Step B	
F	3	47	7	7	64	3	47	7	14	71

Table 1.9 Test Design and Item Distribution for the 2007 MSA-Math: Grades 4

Form	SAT10 / Maryland	Augmented Maryland Item								Total # of Items
		1*	2*	3*	4*	5*	6*	7*	Total	
A	None of them	14	7	7	8	7	14	7	64	64
F	None of them	14	7	7	8	7	14	7	64	64

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

Table 1.10 Total and Reporting Cluster Scores for the 2007 MSA-Math: Grades 4

Form	Total and Reporting Cluster 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 2007 MSA-Math: Grades 4

Form	# of SAT 10 SR Item	# of Aug. SR Item	# of Augmented BCR Item		Total # of Item	Scores of SAT10	Scores of Augmented SR	Scores of Aug. BCR		Total Score
			Step A	Step B				Step A	Step B	
A	0	50	7	7	64	0	50	7	14	71
F	0	50	7	7	64	0	50	7	14	71

Table 1.12 Test Design and Item Distribution for the 2007 MSA-Math: Grades 5

Form	SAT10/ Maryland					Augmented Maryland Item								Total # of Items
	1*	2*	3*	6*	Total	1*	2*	3*	4*	5*	6*	7*	Total	
A	1	1	1	1	4	14	5	7	9	4	14	8	61	65
F	1	1	1	1	4	14	5	7	8*	4	14	7*	59	63

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

Note. One BCR item (both Step A and Step B) was dropped based on MSDE recommendation.

Table 1.13 Total and Reporting Cluster Scores for the 2007 MSA-Math: Grades 5

Form	Total and Reporting Cluster Scores					Total Score
	1	2&3	4&5	6	7	
A	15	14	13	15	17	74
F	15	14	12*	15	15*	71

Note. One BCR item was dropped based on MSDE recommendation.

Table 1.14 Item Type and Score Point Distribution for the 2007 MSA-Math: Grades 5

Form	# of SAT 10 SR Item	# of CRT SR Item	# of Augmented of BCR Item		# of Augmented of ECR Item		Total # of Item	Scores of SAT10	Scores of Aug. SR	Scores of Aug. BCR		Scores of Aug. ECR		Total Score
			Step A	Step B	Step A	Step B				Step A	Step B	Step A	Step B	
A	4	45	7	7	1	1	65	4	45	7	14	1	3	74
F	4	45	6*	6*	1	1	63*	4	45	6*	12*	1	3	71*

Note. One BCR item was dropped based on MSDE recommendation.

Table 1.15 Test Design and Item Distribution for the 2007 MSA-Math: Grades 6

Form	SAT10/ Maryland			Augmented Maryland Item								Total # of Item
	1*	6*	Total	1*	2*	3*	4*	5*	6*	7*	Total	
A	1	2	3	13	8	6	9	4	12	7	59	62
F	1	2	3	13	8	6	9	4	12	7	59	62

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

Table 1.16 Total and Reporting Cluster Scores for the 2007 MSA-Math: Grades 6

Form	Total and Reporting Cluster 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 2007 MSA-Math: Grades 6

Form	# of SAT 10 SR Item	# of CRT SR Item	# of Augmented of BCR Item		# of Augmented of ECR Item		Total # of Item	Scores of SAT10	Scores of Aug. SR	Scores of Aug. BCR		Scores of Aug. ECR		Total Score
			Step A	Step B	Step A	Step B				Step A	Step B	Step A	Step B	
A	3	45	6	6	1	1	62	3	45	6	12	1	3	70
F	3	45	6	6	1	1	62	3	45	6	12	1	3	70

Table 1.18 Test Design and Item Distribution for the 2007 MSA-Math: Grades 7

Form	SAT10/ Maryland		Augmented Maryland Item								Total # of Item
	6	Total	1*	2*	3*	4*	5*	6*	7*	Total	
A	1	1	14	7	6	9	5	13	7	61	62
F	1	1	14	7	6	9	5	13	7	61	62

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

Table 1.19 Total and Reporting Cluster Scores for the 2007 MSA-Math: Grades 7

Form	Total and Reporting Cluster 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 2007 MSA-Math: Grades 7

Form	# of SAT 10	# of Aug. SR Item	# of Aug. SPR Item	# of Aug. BCR Item		# of Aug. ECR Item		Total # of Item	Scores of SAT 10	Scores of Aug. SR	Scores of Aug. SPR	Scores of Aug. BCR		Scores of Aug. ECR		Total Score
				Step A	Step B	Step A	Step B					Step A	Step B	Step A	Step B	
A	1	35	12	4	4	3	3	62	1	35	12	4	8	3	9	72
F	1	35	12	4	4	3	3	62	1	35	12	4	8	3	9	72

Table 1.21 Test Design and Item Distribution for the 2007 MSA-Math: Grades 8

Form	SAT10/ Maryland				Augmented Maryland Item								Total # of Item
	2*	3*	6*	Total	1*	2*	3*	4*	5*	6*	7*	Total	
A	1	1	1	3	15	7	4	9	5	11	8	59	62
F	1	1	1	3	15	7	4	9	5	11	8	59	62

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

Table 1.22 Total and Reporting Cluster Scores for the 2007 MSA-Math: Grades 8

Form	Total and Reporting Cluster Scores					Total Score
	1	2&3	4&5	6	7	
A	15	13	14	12	19	73
F	15	13	14	12	19	73

Table 1.23 Item Type and Score Point Distribution for the 2007 MSA-Math: Grades 8

Form	# of SAT 10	# of Aug. SR Item	# of Aug. SPR Item	# of Aug. BCR Item		# of Aug. ECR Item		Total # of Item	Scores of SAT 10	Scores of Aug. SR	Scores of Aug. SPR	Scores of Aug. BCR		Scores of Aug. ECR		Total Score
				Step A	Step B	Step A	Step B					Step A	Step B	Step A	Step B	
A	3	31	12	5	5	3	3	62	3	31	12	5	10	3	9	73
F	3	31	12	5	5	3	3	62	3	31	12	5	10	3	9	73

1.6 Test Administration

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. Pre-test workshops were held in Baltimore for all Local Accountability Coordinators in Maryland. These workshops provided the representatives of all the local school divisions with an overview of the test's content, security expectations, and procedures for completing the answer documents. They also considered the receipt, distribution, and return of test materials.

For the test examiner, Harcourt provided the following materials:

- Examiner's Manuals
- Preprinted and generic labels, which were applied to the Test/Answer Books by or under the direct supervision of the STC.
- Scoring Service Identification sheets
- Student Roster

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

- 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 for mathematical computations
- Classroom ruler(s) for both U.S. customary and metric measurements and a classroom calculator for all grade levels
- Classroom protractor(s) for grades 5 through 8
- Classroom compass(es) for grades 7 through 8

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

- A sign for the door, "Testing: Do not Disturb"
- A digital clock or a watch, or clock with a second hand
- Copies of the STOP and GO ON sample pages

Two test related examiners manuals (EM) were developed for the 2007 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 Harcourt for scoring. The TACM was distributed and reviewed during a workshop in January for STCs and LACs with duplicates sent to each school with its testing materials.

Test Administration Schedule

The overall test window for MSA was established by MSDE (March 12-21, 2007, with make-up testing held March 22-27, 2007). However, each Local Education Agency (LEA) set a specific schedule for administration of the MSA within that window for their district. Each LEA schedule was submitted to MSDE in advance and proved for each district by the State. For a given grade and content area, all testing had to take place on the same schedule. In addition, each content area at each grade was tested on two days during the window. For the 2007 MSA-Math, the primary testing days were as follows:

- Test materials delivered to schools (Examiner’s Manuals, Test/Answer Books, and Test Coordinator’s Kit) On or Before February 26, 2007
- Mathematics Primary Testing Window March 12 - March 21, 2007
- Make-up Testing Window March 22 - March 27, 2007

Students and parents should be reminded of the importance of students attending school during the administration of the MSA and the importance of student participation in MSA testing. Maryland was held to the 95% participation requirement under NCLB by the US Department of Education, and schools should do all they can to test all students on MSA or Alt-MSA (as applicable).

If a student was absent on the testing days, a make-up test was administered on any two consecutive days within 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 with LACs to determine the testing schedule to be followed.

During the administration of the 2007 MSA-Math, MSDE had testing monitors in selected schools observing administration procedures and testing conditions. All monitors had identification cards for security purposes. There were 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

All students in grades 3 through 8 had to participate in the 2007 MSA-Math. 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. The criteria that students should need to be tested in the Alt-MSA program instead of the MSA-Math could be viewed in section 2, Appendix C of the TACM.

The U.S. Department of Education was developing specific guidance related to Modified Assessment, but that guidance, as yet, had not been issued. Students might have been identified through the Individualized Education Program (IEP) process in the current school year as takers of the Mod-MSA. However, since the Mod-MSA was not available, those students had to be assessed using the regular MSA-Math.

Testing Accommodations

Testing accommodations for 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 might 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 2007 TACM for further information regarding testing accommodations.

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

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 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 pre-printed student ID label was affixed to the standard-size Test/Answer Book containing the transcribed responses, not to the large-print Test/Answer Book or Braille books.

An eligible Test Examiner (TE) transcribed the student responses into a standard-size Test/Answer Book exactly as given by the student. Any original student Test/Answer Books which were used as source documents for transcription was 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 TACM in section 3 and 4.

Security of Test Materials

The following code of ethnics 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 (Harcourt, 2007):

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 or MSDE disciplinary action. (p. 9)

The Test/Answer Books for the 2007 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 (Harcourt, 2007):

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. 9)

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.

Test Format

In 2007, 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 do not interfere with the bubbled answer choice area and/or the track marks along the outside margins of each page.

1.7 MSA-Math Scoring Procedures

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

Once received by Harcourt, Test/Answer Books were scanned into an electronic imaging system so that the information necessary to score responses was captured and converted into an electronic format. Students' identification and demographic information, school information, and answers to *SR* items were converted to alphanumeric format; hand-written responses were captured in digital image format.

Machine-Scored Items

After students' responses to *SR* and *SPR* items were converted to text format, the scoring key was applied to the captured item responses. Correct answers were assigned a score of one point. Incorrect answers, blank responses (omits), and responses with multiple marks were also assigned a score of zero.

Hand-Scored Items

Test/Answer Books were scanned into the electronic imaging system, allowing scorers to score these responses online at all scoring sites while maintaining the live documents at the contractor's facility. The imaging system randomly distributed responses, ensuring no one scorer scored a disproportionate number of responses from any one school. This online scoring system maintained a database of actual student responses and the scores associated with those responses. An off-site backup of all images and scores was maintained as well to guard against potential loss of data and images due to system failure. The system also provided continuous, up-to-date monitoring of all scoring activities. Detailed information on MSA scoring specification can be obtained in a document, Performance Assessment Scoring Center: Spring 2007 Scoring Specification for MSA-Reading and Math which is available from MSDE.

Scoring Staff

The MSDE had one Room Director (RD) dedicated for each grade level, domain (Math) and site. The RD worked closely with the PASC Training Supervisor and the PASC Math Specialists. The PASC Training Supervisor, Math Specialist, and RDs participated in the anchor-pulling sessions in Maryland. The Room Director/Training Team Leader 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 RD responsible for training the Team Leaders (TLs) and Readers for the respective Maryland prompts. For MSDE scoring projects, PASC had qualified alternate RDs available at the beginning of the project to ensure a timely start of training in the event that the primary RD was unavailable to start as scheduled. The alternate RD acted as a TL unless the RD couldn't fulfill his/her duties.

1) Reader/Scorer

A graduate of a four-year accredited college or university who had successfully passed the PASC new reader exam and new reader training. The readers were eligible to score custom programs for which they have been trained and successfully qualify.

2) Team Leader (TL)

An experienced reader who directly monitored the scoring of a team of readers and retrains as needed. The reader had successfully completed the PASC TL training program.

3) Room Director (RD)

A knowledgeable team leader who had been selected to work with team leaders and the training supervisor to oversee the scoring of several teams. An RD's main duty was to rule on validity of questionable papers and to maintain consistency in scoring decisions. RDs also served as trainers.

4) Reader's Aide (RA)

PASC storeroom personnel whose main responsibilities during scoring were to do copying and printing for the PASC materials center. During anchor pulling, RA responsibility might include duplicating student papers. They might also be assigned a variety of clerical duties.

5) Developers

An experienced PASC reader that was responsible for selecting a wide variety of student responses for such activities as benchmarking, anchor pulling range finding, and training materials. Selected papers were then submitted to MSDE for comment and approval. Developers remained on the project as anchor pulling participants and trainers whenever possible.

6) Trainers

Experienced personnel who were TLs or RDs and selected by the Training Supervisor to train and qualify readers for Maryland. Additionally these experienced personnel might also train new readers and do domain specific training.

Reader Recruitment and Qualifications

All Readers for MSDE had to provide Harcourt's staffing vendor their resume and documentation of a four-year, college degree. As part of the initial screening process for recruiting Readers into Harcourt's general pool, applicants had to respond to an open-ended prompt. This writing sample ensured that all applicants were able to perform the kinds of tasks they would assess. The writing sample was intended to screen out those who couldn't write standard, idiomatically correct English or who couldn't organize their thoughts clearly. The writing prompt was scored by a qualified PASC staff member. If successful on the preliminary screening, applicants then participated in a one-day general introductory training workshop presented by a PASC staff member. These workshops allowed Harcourt to eliminate potential Readers who might seem qualified according to their educational and professional experience but who couldn't learn to score to a scale consistently or who were otherwise unsuitable for assignment to large-scale scoring projects. The PASC staff member who presented the workshop evaluated each potential Reader and submitted these evaluations to the Training Supervisor/Site Supervisor with his/her recommendations. Those who successfully completed the workshop were to Harcourt's general pool of Readers who were potential scorers of Math assessments. This addition to the general pool did not necessarily qualify these Readers for scoring the MSDE program.

Team Leader Selection and Qualification

The training for new TLs consisted of a two day course focusing on the duties and responsibilities necessary to successfully manage a team of Readers. The workshop was led by two PASC Training Supervisors. The instruction included a review of PASC policies and procedures, sessions on use of the Reader monitoring reports to track a Reader's speed and accuracy, practice annotating anchors and simulated training of the annotated papers, role playing activities which explored various situations that could occur with Readers during the scoring of a project, and Reader counseling and retraining guidelines. Hands-on training on the various TL computer applications were also covered in the work shop. Upon completion of the workshop, the two PASC Training Supervisors reviewed each participant's performance making sure that each had a complete understanding of the TL role and its responsibilities. Any participant they found who had not performed to their satisfaction was not added to the qualified TL list.

Team Leader Project Training

Project-specific TL training for MSDE was conducted in the days immediately preceding scoring and Reader training. This training begun with the RD reading the rubrics aloud and answering any questions the TL or assistant RD might have regarding the rubric. The RD then read each anchor paper aloud to the TLs. Each response in the anchor set was thoroughly explained including the notes and comments of the anchor-pulling committee. Training set A was reviewed next. The TLs scored the training set individually, recorded the scores on the answer sheet and then waited for all TLs to complete the scoring. When everyone had completed scoring the training set, the RD discussed the answers one-by-one, focusing on why it was that score and not another. The RD reviewed with the group the reason for assigning each score point and discussed each paper in its entirety. The TLs were then ready to score Training set B. Training set B was scored and reviewed exactly as Training set A.

Having thoroughly discussed both training sets with the group, the RD explained that in order for a participant to qualify as a TL, it was required that the TL should score at least an 80% perfect match on both of the qualifying sets (Qualification Rules, Attachment M). The TLs scored the first qualifying set individually and recorded their scores on the appropriate answer sheet. As each TL finished scoring, he/she brought the answer sheet to the RD for grading. Each answer was reviewed and any questions the TL had were addressed before the TL attempted the next qualifying set; the TL followed the same procedure with Qualifying set 2. Upon completing the second qualifying set, the TL submitted the answer sheet to the RD for grading. The TL had to achieve both sets 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.

After the qualification process, the RD continued the training process with the decision set. This set was read aloud and each paper thoroughly explained and discussed. By following these procedures, the RD ensured that the anchor-pulling committees' notes and comments were completely understood.

Team Leader Duties

TLs were responsible for monitoring the training and qualifying of the Readers assigned to their team. The TLs assisted the RD, if requested, during the training of the Readers. The TL was responsible for grading the Readers' qualifying sets and discussing the results with the Readers so everyone received the same direction. The TL certified to the RD and Training Supervisor that the Reader was qualified and recorded the scores under Qualification scores on the Reader evaluation

form. The TL was also responsible for monitoring each Reader's assignment of scores to the responses. Additionally, the TL reviewed the daily Reader statistical reports with each individual on the team. The TL consulted the RD regarding variations by the team members from the acceptable standards (95% for Math Step A, and 85% for Math Step B). The TL had the initial responsibility to see that the Reader maintained the set standards through individual retraining. The RD monitored the TL by reviewing team statistics and working one on one with the TL.

Room Director Selection and Qualification

The candidates for RD had been recommended by the PASC Managers or Training Supervisors. The recommendations were based upon the evaluations the candidates received as Readers and TLs and were part of their personnel file. The Training Supervisors met as a group to discuss who might be considered for the position of RD. The Training Supervisor group reviewed the evaluations and the duties that the potential RDs had performed. The candidates generally had been TLs on large-scale projects for multiple teams, and/or they had served as TLs on small-scale projects where TLs trained their individual teams. They had been evaluated on their ability to train Readers as well as their ability to monitor the scoring accuracy and consistency of Readers. These evaluations were submitted in writing at the end of each scoring project by the Readers and RDs that had observed the work of the RD candidates.

Room Director Project Training

The RDs familiarized themselves with the rubric. Any questions regarding the rubric were addressed by the PASC Language Arts and Math Specialists, or MSDE. The next step was for the RD/TTL to prepare the anchors by annotating each response to all score points in the Anchor Set utilizing the notes from the anchor-pulling session. The MSDE approved the anchor-pulling notes and the Training Supervisor confirmed that the RD had accurately added the anchor-pulling notes to the training materials. The RD continued the process by annotating the training sets and decision sets with all notes and comments from the anchor-pulling session. Additionally, the RDs became familiar with the wording of all of the other prompts for the administration on which they are assigned.

Room Director Duties

The RD's job was to conduct the training of the TLs and Readers, oversee the actual scoring of the papers, monitor the work of the TL, and act as the decision maker for situations or questions that may arise during the scoring process. For example, all invalid (foreign language, off-topic, off-mode, etc.) responses were reviewed by the RD, who had to confirm any such decision and ensure consistency of decisions (Blanks were confirmed at the TL level and did not require RD confirmation). Additionally the RD and TL (after approval of Training Supervisor) conducted all resolution readings. Responses for which scores were non-matching or non-adjacent were automatically routed to the RD for an independent resolution scoring. The resolution score became the reported score.

The RD was familiar with all prompts and trained the TLs and Readers to recognize these alternate prompts. Thus, should the student place his/her answer in the wrong place, the answer was recognized by the RD, who could electronically move the response to the appropriate space for scoring by a Reader qualified on the appropriate prompt. The RD also reviewed any potential questionable content responses and forwarded those to the Training Supervisor to consult with the MSDE before processing.

The RD was also responsible for daily statistical review and analysis of all monitoring reports to ensure the quality of the scoring within the room. Review of the data allowed the RD not only to monitor the Reader but also to provide the TL with additional input. Available data included 1) individual Reader agreement rates between two independent scorings; 2) score point distributions by Reader and trend review; 3) prompt statistics for agreement rates and score point distributions; 4) Resolution data.

Project Scoring Parameters

MSDE had a long-standing history of implementing assessments that were composed of multiple item types: selected response (SR), brief constructed response (BCR), extended constructed response (ECR), and gridded or student-produced response (SPR). The MSA contained all such item types for operational scoring and each of the 10 forms per grade/subject also contained field-test items of each of these types. Open-ended items were scored using a generic rubric as follows:

- Mathematics BCR items: Step A 0-1 scale, Step B 0-2 scale
- ECR items Step A 0-1 scale, Step B 0-3 scale

All MSA response documents were image scanned at Harcourt's scoring center in San Antonio, Texas. The image scanner captured document identification (ID), demographic information, SR responses, and creates a bi-tonal image of the entire document, allowing images of the BCR and ECR responses to be distributed to readers for human scoring while images of the SR, SPR and all other data were made available to Scoring Editing for human review.

All constructed responses were scored by Harcourt's Performance Assessment Scoring Center (PASC). The PASC mission was to provide accurate, reliable, on-time scores for all student responses entrusted to our care. PASC maintained large pools of qualified, trained, professional readers who were well-experienced in scoring a wide range of writing assessments and open-ended assessments in reading, mathematics, science, social science, and other subjects, at each of our scoring sites.

Reader Project Training

Reader training was lead by the RD/TTL and was conducted utilizing our central scoring model. There was one RD responsible for each site, grade and Domain (Math). After all student responses were scored for the first item, the RD 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 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 Readers' understanding of how the responses differed from one another in incremental quality and 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 Readers had all their questions answered and the discussion of the anchor set was finished, the Readers began to score the first training set. Each Reader independently read and scored the responses in the training set. The trainer scored and recorded each reader's responses on a training record form. The correct scores were then read to the group when everyone had completed the scoring. In addition, each training paper was discussed as to reasons for applying each given score. At this point, Readers interacted with the RD in discussing the characteristics of each

response that earned the assigned score point. The same format was followed for each training set. During this process, the job of the Reader was to internalize the scoring scale and adjust his or her individual scoring to conform to that scale. Once all training papers had been scored and fully discussed, Readers began the qualifying process.

For MSDE, there were three qualifying sets. MSDE informed PASC in writing for each specific administration how many qualifying sets were approved and were available to the Readers. Readers must score an 80% on at least one of two for Math.

Inter-Rater Agreement

Harcourt's scoring system generated many kinds of internal monitoring reports that enabled the project leadership to monitor the accuracy and consistency of MSDE scoring. These reports were compiled by prompt, listed the entire prompt's Readers and provided the results of their scoring for each day. Information on these reports included the number of responses read by the Readers during the period, the number and percent of invalid 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 Reader was a point lower than the second Reader; the number and percent of responses on which the first Reader was a point higher than the second Reader (Adjacent) and the number and percent of responses differing by more than one score point (Non-Adjacent/Non-Perfect). The Training Supervisor 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*.

Reader Retraining

When a Reader's performance fell below acceptable parameters for a project, the Reader was retrained. Retraining was the process by which the RD or TL 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 Reader back on track with the guidelines provided by a specific program. Group retraining was conducted by the RD every Monday (or following any extended break) during the scoring project. In addition, daily retraining occurred as deemed necessary by the MSDE representative and Training Supervisor.

Read Behinds

Harcourt's system allowed TLs and/or RDs to conduct read behinds as an additional monitoring method. When conducting read behinds, the TL or RD received images of student responses and the scores assigned by the Reader. Responses selected for read behinds might be randomly selected or might be targeted read behinds (i.e., responses receiving specific scores, etc.). These read behinds were very useful in tracking specific areas of confusion for a given Reader or group of Readers and assisted the TL and RD in knowing just how to direct retraining activities for individual Readers or teams. The initial read behind percentage was set at 50%. This percentage might be adjusted either higher or lower by the TL based upon the performance of the Reader.

Retrain Readers with <80% Agreement rates

It was the responsibility of the Team Leader ("TL") to not only address questions and provide guidance to the Readers, but to also monitor and manage performance; this included Calibrations, Read Behinds, Agreement rates and Resolution rates. At times, TLs could become easily side-

tracked and spend more time acting as a resource for Readers more so than managing performance. PASC had identified this issue and planned to allocate additional TLs whose primary job responsibility was to manage/monitor performance. This level of staffing allowed us to monitor each Reader daily and provided retraining when the level of acceptable performance had not been met.

Pre-“Live” training on Field Test prompts

For 2007, PASC used scored student responses from the appropriate field test administration. This allowed the Readers to build familiarity with the program prior to live scoring.

Trainers Earlier and Longer

In addition to increasing the number of TLs dedicated to the program, PASC also felt it more effective to expedite and extend the time the Trainers were onsite. PASC trained a qualified individual at each site to act as the remote Trainer once the primary left. This individual was responsible for re-training Readers as needed.

Technology

PASC utilized the Student Response Window (“SRW”) application supplemented with the PASC Performance Monitoring (“PPM”) system that provided the Reader and/or client a “real-time” look into the scoring of each item. This system allowed the viewer to filter the information to provide detail down to the prompt, item, domain, site, Reader, etc. level. This helped in reporting results and creating a custom view of the program. The most important attribute of the application was its security features. Even though Readers in the same room could access the SRW application, each Reader could be setup to view different information within a program. This allowed segregation per domain or even grade within a partitioned room. This system greatly enhanced the quality and timeliness of reporting.

Scoring rules for MSA

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
- Score were the higher of the 1st and 2nd Readers' scores provided they were adjacent. If they are equal that was the score.
- The score result from adjacent reads was a decimal numeric; round this up to the nearest whole number.
- For example:

1 st Reader	2 nd Reader	Final Score
1	2	2
2	3	3

- A resolution reader was used if two non-adjacent initial scores were received.
- The resolution reader's score was used in place of both the 1st and 2nd Readers' scores.
- For example:

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

Development Procedures for Anchor Pulling

For a given math prompt, the PASC Developers had the following responsibilities (A developer was a PASC Reader who was selected by the PASC Training Supervisor to prepare sets of papers for client approval. These experienced Readers were judged by the Training Supervisor for their ability to recognize and assemble a wide variety of responses. A Material Development Evaluation was completed by the Language Arts Specialist for review by the Training Supervisor. This evaluation was part of the developer's personnel file. The developer also participated with the clients as a facilitator during the anchor-pulling session in order to make notes and be prepared to assemble the finished sets to the client's specifications. In the case of the MSDE, the developer was also the RD):

- 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, and Low.
 - Marked High, Medium, and Low papers—marked especially good ones that might be the potentially top scores.
 - Identified and flagged problem papers—off-topic, off-task, verbatim copying, strange, potential teacher interference, etc.
 - Marked the flag with score range or the nature of the problem and paper ID.
- 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 anchor pulling
 - Decided which particular papers from the sorted piles should go into which set for anchor pulling. Each paper selected went into only one set.
 - Used the following guidelines in deciding for which set a paper was most appropriate.
 - A. **Anchor set:** At least three examples of each score point, depending upon the score scale (no invalids). These had to be clean papers but should illustrate different types of the same score point, if there were such clear differences. Once completed, this set was submitted to the Training Supervisor and to MSDE for review and approval.

B. **Decision set:** This had to be a set of whatever size necessary to illustrate the various kinds of problems that might arise with this prompt or item. If the number of such responses was small, these might be incorporated into the first training set instead of being grouped into a separate additional set.

C. **Training sets:** These were at least two sets of up to 20 papers each (again, this varied according to the score point scale). They had to contain a range of responses including clean papers, line papers, and problem papers. The responses had to be in random order of quality and unmarked.

D. **Qualifying sets:** There were three sets of these. Generally there were 10 responses per set, but could be fewer, depending upon the score scale. These had to consist heavily of clean papers but not exclusively so. One of the sets might include an example of an invalid response, but it should be clearly so.

E. **Calibration sets (validity sets):** These were composed of five responses of mixed quality, arranged in random order. Harcourt created as many different sets as there were expected to be scoring days on a single prompt or group of items—minus one or two for the training day and the initial scoring day.

Comprehensive notes concerning the specific problems presented in these papers (and the solutions as decided by the committee during the anchor-pulling session) were to be recorded by the Harcourt representatives (developers and Training Specialists) and were to be discussed with the Readers during training. Any subsequent notes or communication from MSDE were incorporated into the training material as well.

Anchor Pulling Procedures

The objective of anchor pulling 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 from PASC the Language Arts and Math Specialists, Manager, Training Supervisor and the developers 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, Decision Sets Training 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 anchor pulling, the procedure for assigning scores to the papers in each set was as follows:

- Papers were read aloud and discussed by the anchor-pulling 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.

- Each subsequent set was read and scored by each panel member, 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.

The responses in which score points were not in perfect agreement were discussed starting with the lowest, but least controversial, score point. The papers that had the widest discrepancies of assigned scores around this lowest score point were discussed next before moving to the papers whose assigned scores were in the next higher range. There might be frequent reference to previous sets to make sure that decisions on score points were consistent.

This iterative process of reading, charting, and discussing successive sets had three goals:

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

During this process, the tentative scores assigned to papers in earlier sets became firm.

1.8 Operational Test Analyses

Classical Analyses with Form-to-Form Linking Common Items

The main purpose of this analysis was to check that the groups taking the two operational forms were essentially equivalent. Descriptive statistics, such as mean (M), standard deviation (SD) were calculated with the common items that appeared on both operational test forms. The statistical results of the two test forms were almost identical across all grades, as can be seen from Table 1.24.

Table 1.24 Descriptive Statistics for the 2007 MSA-Math Form-to-Form Linking Common Items

Grade	Form	No. of Items	N	M	SD
3	A	33	29,897	25.40	6.41
	F	33	29,858	25.47	6.34
4	A	26	30,402	18.93	5.61
	F	26	30,103	19.05	5.63
5	A	42	31,083	27.73	9.63
	F	42	30,875	28.10	9.58
6	A	38	31,558	24.89	9.12
	F	38	31,258	24.95	9.03
7	A	25	32,264	13.71	6.47
	F	25	32,000	13.85	6.40
8	A	24	32,836	12.24	5.53
	F	24	32,480	12.29	5.46

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. Analyses were conducted with a whole population.

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

Tables 1.25 through 1.36 provide information about how much the p-values of the items designated as a year-to-year linking item changed in Year 2007 from Year 2006. It should be noted that these analyses were conducted with a whole population. In general, we could conclude that most of the p-values in Year 2007 were almost the same or slightly increased compared to those in Year 2006 across all grades.

Table 1.25 Year 2006 vs. Y2007 Linking Common Item P-Value Comparison: Grade 3 Form A

Item Seq. No.	Item CID	Y06 FA	Y07 FA	Item Seq. No.	Item CID	Y06 FA	Y07 FA
it41	3509918	0.80	0.76	it82	3510060	0.83	0.84
it42	3564076	0.44	0.50	it83	3564078	0.50	0.53
it43	3509931	0.66	0.65	it84	3510346	0.77	0.85
it44	3510022	0.52	0.47	it85	3510033	0.78	0.79
it45	3510009	0.79	0.79	it86	3510012	0.73	0.78
it46	3509953	0.94	0.94	it87	3510062	0.84	0.85
it47	3548054	0.91	0.93	it88	3510063	0.73	0.78
it48	3509955	0.49	0.57	it89	3509983	0.92	0.91
it53	3509964	0.80	0.74	it90	3510065	0.96	0.96
it54	3509966	0.88	0.90	it91	3510066	0.80	0.80
it55	3509974	0.64	0.66	it92	3509936	0.74	0.74
it56	3509979	0.81	0.84	it93	3564079	0.43	0.48
it57	3509919	0.65	0.64	it97	3510071	0.66	0.64
it58	3564077	0.60	0.57	it98	3510072	0.85	0.85
it59	3509987	0.65	0.66	it99	3564080	0.54	0.58
it60	3510017	0.92	0.91	it100	3510126	0.75	0.78
it61	3510003	0.84	0.84	it101	3509945	0.91	0.91
it62	3510006	0.60	0.61	it103	3509957	0.77	0.77
it63	3548055	0.97	0.93	it104	3564081	0.37	0.43
it64	3510011	0.65	0.63	it105	3509958	0.84	0.87
it65	3510125	0.60	0.52	it106	3509961	0.92	0.92
it66	3510018	0.76	0.77	it107	3510068	0.84	0.81
it68	3510023	0.50	0.50	it108	3510069	0.32	0.35
it69	3510027	0.87	0.87	it109	3510070	0.97	0.97
it70	3510029	0.92	0.94	it111	3510034	0.32	0.30
it71	3510032	0.91	0.88	it112	3564082	0.25	0.32
it72	3510035	0.87	0.87	it113	3510041	0.95	0.92
it78	3510051	0.56	0.54	it114	3510043	0.80	0.76
it79	3510053	0.83	0.84	it117	3510044	0.85	0.86
it80	3510055	0.59	0.62	it119	3510329	0.52	0.55
it81	3510058	0.87	0.86				

Note. Analyses were conducted with a whole population.

Descriptive Statistics for Year-to-Year Linking Common Items: Grade 3 Form A

Form	Year	No. of Items	<i>M</i>	<i>SD</i>
A	Year 2006	61	0.73	0.18
	Year 2007	61	0.73	0.17

Table 1.26 Year 2006 vs. Y2007 Linking Common Item P-Value Comparison: Grade 3 Form F

Item Seq. No.	Item CID	Y06 FF	Y07 FF	Item Seq. No.	Item CID	Y06 FF	Y07 FF
it41	3509918	0.80	0.76	it82	3510060	0.83	0.83
it42	3564076	0.44	0.51	it83	3564078	0.50	0.53
it43	3509980	0.42	0.45	it84	3510052	0.85	0.75
it44	3510022	0.52	0.49	it85	3510347	0.68	0.68
it45	3548059	0.59	0.71	it86	3510036	0.83	0.85
it46	3510071	0.66	0.64	it87	3510062	0.84	0.85
it47	3548057	0.65	0.73	it88	3510063	0.73	0.79
it48	3509955	0.49	0.56	it89	3509945	0.91	0.92
it53	3509964	0.80	0.75	it90	3509935	0.62	0.67
it54	3509966	0.88	0.90	it91	3510067	0.82	0.82
it55	3509923	0.80	0.82	it92	3564083	0.65	0.73
it56	3509959	0.68	0.70	it93	3510006	0.60	0.64
it57	3509919	0.65	0.65	it97	3509956	0.68	0.64
it58	3564077	0.60	0.57	it98	3509963	0.76	0.74
it59	3509926	0.40	0.36	it99	3564084	0.47	0.47
it60	3509960	0.79	0.76	it100	3548063	0.89	0.93
it61	3509927	0.75	0.78	it101	3509965	0.96	0.94
it62	3509928	0.86	0.88	it103	3509922	0.68	0.65
it63	3510009	0.78	0.77	it104	3564085	0.32	0.34
it64	3510069	0.32	0.33	it105	3509958	0.84	0.88
it65	3509988	0.74	0.73	it106	3509961	0.92	0.92
it66	3509929	0.52	0.54	it107	3510066	0.82	0.82
it68	3509930	0.95	0.95	it108	3509938	0.94	0.93
it69	3510018	0.77	0.78	it109	3510070	0.97	0.98
it70	3510027	0.87	0.87	it111	3509932	0.98	0.98
it71	3510029	0.92	0.95	it112	3564086	0.37	0.39
it72	3510035	0.87	0.87	it113	3510041	0.95	0.93
it78	3510053	0.83	0.85	it114	3510043	0.80	0.77
it79	3509933	0.92	0.91	it117	3510044	0.85	0.84
it80	3510051	0.56	0.51	it119	3510013	0.49	0.50
it81	3509962	0.87	0.88				

Note. Analyses were conducted with a whole population.

Descriptive Statistics for Year-to-Year Linking Common Items: Grade 3 Form F

Form	Year	No. of Items	<i>N</i>	<i>M</i>	<i>SD</i>
F	Year 2006	61	29,897	0.73	0.18
	Year 2007	61	29,858	0.73	0.17

Table 1.27 Year 2006 vs. Y2007 Linking Common Item P-Value Comparison: Grade 4 Form A

Item Seq. No.	Item CID	Y06 FA	Y07 FA	Item Seq. No.	Item CID	Y06 FA	Y07 FA
it41	3515405	0.78	0.80	it81	3515886	0.41	0.45
it42	3564160	0.51	0.57	it82	3564162	0.46	0.52
it43	3515406	0.58	0.60	it83	3515909	0.47	0.49
it44	3515407	0.81	0.85	it84	3548085	0.45	0.55
it45	3515408	0.66	0.68	it85	3548086	0.66	0.76
it46	3515410	0.84	0.81	it86	3515787	0.55	0.51
it47	3515411	0.80	0.84	it87	3515557	0.70	0.69
it48	3515421	0.79	0.82	it88	3515558	0.29	0.36
it53	3515425	0.59	0.64	it89	3515648	0.45	0.50
it54	3515426	0.39	0.44	it90	3564163	0.49	0.56
it55	3515428	0.90	0.94	it91	3515559	0.66	0.72
it56	3515447	0.41	0.45	it92	3515570	0.53	0.52
it57	3515451	0.59	0.70	it93	3515571	0.82	0.85
it58	3564161	0.51	0.67	it94	3515573	0.44	0.50
it59	3515604	0.60	0.64	it95	3515574	0.83	0.85
it60	3515456	0.75	0.81	it98	3515577	0.69	0.73
it61	3515467	0.89	0.95	it99	3564164	0.44	0.50
it62	3515840	0.64	0.65	it100	3548081	0.41	0.58
it63	3515470	0.66	0.69	it101	3515807	0.79	0.79
it64	3515705	0.71	0.75	it102	3564165	0.39	0.37
it65	3515471	0.83	0.86	it103	3515423	0.73	0.90
it66	3515479	0.69	0.73	it104	3515424	0.55	0.57
it67	3515484	0.90	0.92	it109	3515575	0.71	0.77
it68	3515486	0.56	0.57	it110	3515576	0.59	0.61
it69	3515630	0.51	0.50	it114	3515585	0.22	0.19
it70	3515631	0.76	0.77	it115	3564166	0.48	0.43
it71	3515490	0.86	0.92	it116	3515500	0.86	0.71
it76	3515514	0.88	0.89	it117	3515506	0.88	0.89
it77	3515519	0.79	0.82	it118	3548083	0.87	0.88
it78	3515533	0.80	0.85	it119	3515832	0.64	0.66
it79	3515543	0.73	0.79	it120	3548088	0.66	0.74
it80	3515545	0.81	0.86	it121	3515853	0.75	0.71

Note. Analyses were conducted with a whole population.

Descriptive Statistics for Year-to-Year Linking Common Items: Grade 4 Form A

Form	Year	<i>N</i>	<i>M</i>	<i>SD</i>
A	Year 2006	64	0.65	0.17
	Year 2007	64	0.68	0.17

Table 1.28 Year 2006 vs. Y2007 Linking Common Item P-Value Comparison: Grade 4 Form F

Item Seq. No.	Item CID	Y06 FF	Y07 FF	Item Seq. No.	Item CID	Y06 FF	Y07 FF
it41	3515595	0.73	0.77	it81	3515638	0.63	0.62
it42	3564167	0.38	0.47	it82	3564169	0.42	0.46
it43	3515407	0.81	0.85	it83	3515791	0.71	0.75
it44	3515596	0.77	0.78	it84	3515795	0.54	0.60
it45	3515447	0.41	0.46	it85	3515869	0.54	0.56
it46	3515408	0.66	0.69	it86	3515836	0.57	0.58
it47	3515599	0.64	0.71	it87	3515557	0.70	0.71
it48	3515410	0.84	0.82	it88	3515640	0.35	0.42
it53	3515600	0.74	0.75	it89	3515648	0.45	0.50
it54	3515601	0.69	0.68	it90	3564163	0.49	0.55
it55	3515602	0.49	0.53	it91	3515641	0.81	0.83
it56	3515428	0.90	0.94	it92	3515570	0.53	0.50
it57	3515603	0.54	0.55	it93	3515571	0.82	0.85
it58	3564168	0.36	0.38	it94	3515643	0.36	0.38
it59	3515604	0.60	0.64	it95	3515645	0.70	0.71
it60	3515605	0.50	0.53	it98	3515862	0.47	0.49
it61	3515456	0.75	0.80	it99	3564170	0.51	0.59
it62	3515467	0.89	0.94	it100	3548081	0.41	0.57
it63	3515606	0.87	0.91	it101	3515807	0.79	0.78
it64	3515652	0.63	0.68	it102	3564165	0.39	0.37
it65	3515471	0.83	0.86	it103	3515424	0.55	0.59
it66	3515936	0.80	0.86	it104	3515425	0.59	0.71
it67	3515486	0.56	0.57	it109	3515575	0.71	0.79
it68	3548078	0.52	0.50	it110	3515576	0.59	0.60
it69	3515630	0.51	0.50	it114	3515830	0.94	0.95
it70	3515631	0.76	0.77	it115	3564171	0.74	0.71
it71	3515632	0.69	0.71	it116	3515933	0.74	0.76
it76	3515634	0.72	0.75	it117	3515506	0.88	0.89
it77	3515635	0.56	0.60	it118	3515592	0.77	0.82
it78	3548079	0.80	0.94	it119	3515931	0.68	0.67
it79	3515636	0.53	0.54	it120	3515880	0.67	0.69
it80	3515545	0.81	0.86	it121	3515887	0.88	0.89

Note. Analyses were conducted with a whole population.

Descriptive Statistics for Year-to-Year Linking Common Items: Grade 4 Form F

Form	Year	N	M	SD
F	Year 2006	64	0.64	0.16
	Year 2007	64	0.68	0.16

Table 1.29 Year 2006 vs. Y2007 Linking Common Item P-Value Comparison: Grade 5 Form A

Item Seq. No.	Item CID	Y06 FA	Y07 FA	Item Seq. No.	Item CID	Y06 FA	Y07 FA
it41	3511531	0.61	0.68	it81	3563989	0.35	0.34
it42	3563986	0.45	0.55	it82	3511458	0.89	0.92
it43	3511196	0.56	0.55	it83	3511467	0.81	0.85
it44	3511203	0.86	0.87	it84	3512627	0.86	0.88
it45	3511216	0.62	0.67	it85	3511470	0.78	0.81
it46	3512606	0.59	0.63	it86	3511479	0.56	0.51
it47	3511246	0.73	0.78	it91	3511504	0.83	0.90
it48	3512632	0.37	0.39	it92	3511513	0.83	0.85
it52	3512702	0.60	0.54	it93	3511521	0.62	0.67
it53	3511307	0.38	0.41	it94	3556476	0.54	0.49
it54	3511312	0.38	0.39	it95	3563990	0.49	0.46
it57	3511336	0.33	0.33	it96	3511563	0.70	0.62
it58	3563987	0.30	0.34	it97	3511258	0.79	0.81
it59	3511339	0.57	0.62	it98	3563991	0.41	0.49
it60	3511345	0.84	0.92	it99	3511266	0.67	0.71
it61	3511348	0.49	0.57	it100	3511320	0.86	0.91
it62	3511626	0.85	0.81	it101	3512595	0.78	0.79
it63	3511371	0.48	0.53	it102	3511483	0.35	0.38
it64	3511376	0.82	0.81	it103	3563992	0.29	0.34
it65	3512638	0.66	0.64	it104	3511499	0.64	0.63
it66	3511396	0.82	0.84	it105	3511330	0.55	0.63
it67	3511410	0.68	0.67	it107	3511269	0.82	0.81
it68	3512618	0.35	0.45	it108	3511566	0.64	0.66
it69	3563988	0.40	0.52	it109	3511455	0.75	0.79
it70	3511429	0.75	0.75	it110	3563993	0.61	0.67
it71	3511433	0.94	0.97	it111	3511442	0.55	0.61
it72	3511439	0.76	0.79	it112	3512710	0.57	0.59
it77	3512616	0.33	0.44	it113	3512687	0.54	0.52
it78	3512625	0.85	0.88	it114	3512628	0.71	0.77
it79	3512714	0.92	0.91	it115	3511448	0.78	0.76
it80	3512649	0.27	0.27				

Note. Analyses were conducted with a whole population.

Descriptive Statistics for Year-to-Year Linking Common Items: Grade 5 Form A

Form	Year	<i>N</i>	<i>M</i>	<i>SD</i>
A	Year 2006	61	0.63	0.19
	Year 2007	61	0.65	0.18

Table 1.30 Year 2006 vs. Y2007 Linking Common Item P-Value Comparison: Grade 5 Form F

Item Seq. No.	Item CID	Y06 FF	Y07 FF	Item Seq. No.	Item CID	Y06 FF	Y07 FF
it43	3512527	0.68	0.63	it82	3512578	0.86	0.88
it44	3512528	0.84	0.87	it83	3511467	0.81	0.86
it45	3512606	0.59	0.65	it84	3512605	0.89	0.94
it46	3511216	0.62	0.68	it85	3511470	0.78	0.82
it47	3511246	0.73	0.79	it86	3511479	0.56	0.58
it48	3512529	0.59	0.56	it91	3511504	0.83	0.89
it52	3512702	0.60	0.53	it92	3511513	0.83	0.86
it53	3511307	0.38	0.41	it93	3511521	0.62	0.69
it54	3511312	0.38	0.40	it94	3556476	0.54	0.51
it57	3511336	0.33	0.33	it95	3563990	0.49	0.47
it58	3563987	0.30	0.34	it96	3511563	0.70	0.64
it59	3512534	0.64	0.69	it97	3512530	0.61	0.64
it60	3511345	0.84	0.92	it98	3563999	0.46	0.45
it61	3511348	0.49	0.56	it99	3511266	0.67	0.70
it62	3512540	0.55	0.57	it100	3511320	0.86	0.93
it63	3511371	0.48	0.54	it101	3512595	0.78	0.77
it64	3512543	0.73	0.72	it102	3511483	0.35	0.38
it65	3512546	0.83	0.84	it103	3563992	0.29	0.35
it66	3512638	0.66	0.63	it104	3511499	0.64	0.64
it67	3512553	0.58	0.59	it105	3511330	0.55	0.63
it68	3512618	0.35	0.45	it107	3511269	0.82	0.81
it69	3563988	0.40	0.53	it108	3512637	0.79	0.80
it70	3511439	0.76	0.78	it109	3512559	0.83	0.84
it71	3511410	0.68	0.70	it110	3564001	0.55	0.59
it72	3511396	0.82	0.85	it111	3511442	0.55	0.61
it77	3512612	0.38	0.38	it112	3512648	0.45	0.48
it78	3512696	0.83	0.87	it113	3512688	0.41	0.42
it79	3512691	0.51	0.52	it114	3511631	0.74	0.76
it80	3512649	0.27	0.29	it115	3511448	0.78	0.80
it81	3563989	0.35	0.36				

Note. Analyses were conducted with a whole population.

Descriptive Statistics for Year-to-Year Linking Common Items: Grade 5 Form F

Form	Year	N	M	SD
F	Year 2006	59	0.61	0.18
	Year 2007	59	0.64	0.18

Table 1.31 Year 2006 vs. Y2007 Linking Common Item P-Value Comparison: Grade 6 Form A

Item Seq. No.	Item CID	Y06 FA	Y07 FA	Item Seq. No.	Item CID	Y06 FA	Y07 FA
it41	3516240	0.55	0.56	it75	3564004	0.43	0.57
it42	3516241	0.82	0.84	it76	3516313	0.80	0.83
it43	3516243	0.64	0.69	it77	3516318	0.86	0.88
it44	3516242	0.35	0.38	it78	3516327	0.41	0.44
it45	3516912	0.52	0.54	it79	3564005	0.53	0.59
it46	3516248	0.72	0.75	it84	3517000	0.45	0.51
it47	3516247	0.52	0.55	it85	3517010	0.44	0.48
it48	3516249	0.66	0.67	it86	3516328	0.71	0.75
it49	3516452	0.64	0.64	it87	3516293	0.39	0.45
it50	3564002	0.44	0.47	it88	3516330	0.65	0.79
it51	3516255	0.67	0.70	it89	3516331	0.38	0.41
it52	3516256	0.56	0.60	it94	3516352	0.73	0.77
it53	3516257	0.79	0.83	it95	3516353	0.57	0.58
it54	3516258	0.53	0.54	it96	3516354	0.72	0.72
it55	3516279	0.71	0.73	it97	3516355	0.62	0.66
it56	3516280	0.46	0.50	it98	3516627	0.56	0.52
it57	3516281	0.43	0.44	it99	3564006	0.38	0.42
it58	3516283	0.42	0.43	it100	3516284	0.47	0.52
it61	3516285	0.52	0.54	it101	3564007	0.35	0.42
it62	3516290	0.60	0.64	it102	3516351	0.50	0.51
it63	3516291	0.43	0.47	it103	3516332	0.48	0.51
it66	3516298	0.26	0.29	it104	3516329	0.50	0.62
it67	3516573	0.62	0.67	it105	3516295	0.55	0.65
it68	3516301	0.60	0.67	it106	3516333	0.54	0.60
it69	3516302	0.66	0.69	it107	3564008	0.46	0.61
it70	3516303	0.47	0.53	it112	3516326	0.74	0.77
it71	3516305	0.64	0.68	it113	3564009	0.56	0.58
it72	3516307	0.54	0.61	it114	3516320	0.83	0.90
it73	3516310	0.65	0.69	it115	3516323	0.60	0.67
it74	3517013	0.30	0.35				

Note. Analyses were conducted with a whole population.

Descriptive Statistics for Year-to-Year Linking Common Items: Grade 6 Form A

Form	Year	<i>N</i>	<i>M</i>	<i>SD</i>
A	Year 2006	59	0.56	0.14
	Year 2007	59	0.60	0.14

Table 1.32 Year 2006 vs. Y2007 Linking Common Item P-Value Comparison: Grade 6 Form F

Item Seq. No.	Item CID	Y06 FF	Y07 FF	Item Seq. No.	Item CID	Y06 FF	Y07 FF
it41	3516240	0.55	0.55	it75	3564004	0.43	0.56
it42	3516429	0.89	0.92	it76	3516305	0.64	0.68
it43	3516242	0.35	0.39	it77	3516320	0.83	0.92
it44	3516912	0.52	0.54	it78	3516327	0.41	0.42
it45	3516243	0.64	0.69	it79	3564005	0.53	0.59
it46	3516247	0.52	0.56	it84	3517000	0.45	0.49
it47	3516248	0.72	0.75	it85	3516907	0.55	0.61
it48	3516451	0.72	0.74	it86	3516328	0.71	0.74
it49	3517004	0.80	0.87	it87	3516293	0.39	0.46
it50	3564010	0.50	0.58	it88	3516618	0.34	0.34
it51	3516255	0.67	0.72	it89	3516621	0.79	0.71
it52	3516256	0.56	0.61	it94	3516623	0.72	0.74
it53	3516280	0.46	0.51	it95	3516624	0.25	0.23
it54	3516453	0.73	0.76	it96	3516625	0.79	0.84
it55	3516454	0.78	0.80	it97	3516354	0.72	0.72
it56	3516455	0.49	0.49	it98	3516627	0.56	0.52
it57	3517002	0.72	0.74	it99	3564006	0.38	0.41
it58	3516517	0.32	0.32	it100	3516284	0.47	0.53
it61	3516559	0.81	0.84	it101	3564007	0.35	0.43
it62	3516565	0.42	0.44	it102	3516332	0.48	0.55
it63	3516571	0.34	0.35	it103	3516351	0.50	0.51
it66	3516291	0.43	0.46	it104	3516329	0.50	0.65
it67	3516573	0.62	0.69	it105	3516295	0.55	0.65
it68	3516301	0.60	0.69	it106	3516622	0.38	0.42
it69	3516302	0.66	0.69	it107	3564011	0.43	0.49
it70	3516303	0.47	0.53	it112	3516616	0.39	0.40
it71	3516594	0.76	0.80	it113	3564012	0.44	0.49
it72	3516313	0.80	0.83	it114	3516318	0.86	0.84
it73	3516613	0.51	0.55	it115	3516323	0.60	0.64
it74	3517013	0.30	0.36				

Note. Analyses were conducted with a whole population.

Descriptive Statistics for Year-to-Year Linking Common Items: Grade 6 Form F

Form	Year	<i>N</i>	<i>M</i>	<i>SD</i>
F	Year 2006	59	0.56	0.14
	Year 2007	59	0.60	0.14

Table 1.33 Year 2006 vs. Y2007 Linking Common Item P-Value Comparison: Grade 7 Form A

Item Seq. No.	Item CID	Y06 FA	Y07 FA	Item Seq. No.	Item CID	Y06 FA	Y07 FA
it41	3517744	0.42	0.35	it79	3564020	0.38	0.40
it42	3564018	0.21	0.24	it80	3517757	0.28	0.35
it43	3517604	0.33	0.32	it81	3517704	0.38	0.43
it44	3517601	0.44	0.45	it82	3517759	0.45	0.43
it45	3517609	0.50	0.50	it83	3517719	0.21	0.26
it46	3517613	0.63	0.62	it84	3564021	0.36	0.41
it47	3517616	0.55	0.55	it85	3517709	0.64	0.64
it48	3517634	0.61	0.63	it86	3517712	0.41	0.45
it49	3517642	0.45	0.42	it87	3517714	0.50	0.54
it50	3517638	0.72	0.69	it88	3517716	0.57	0.61
it51	3517647	0.64	0.65	it89	3517718	0.55	0.61
it52	3517643	0.63	0.66	it90	3517721	0.41	0.42
it53	3517650	0.60	0.60	it91	3517723	0.39	0.39
it54	3517652	0.63	0.66	it92	3555858	0.33	0.39
it59	3547473	0.68	0.77	it93	3547477	0.39	0.49
it60	3517663	0.26	0.27	it94	3517725	0.25	0.26
it61	3517665	0.35	0.35	it95	3564022	0.35	0.40
it62	3517667	0.61	0.57	it98	3517730	0.57	0.58
it63	3517670	0.27	0.30	it99	3517732	0.29	0.31
it64	3564019	0.12	0.15	it102	3517656	0.59	0.63
it65	3517675	0.64	0.68	it103	3517736	0.49	0.51
it66	3555857	0.34	0.36	it104	3517818	0.31	0.33
it67	3517681	0.53	0.56	it105	3564023	0.30	0.38
it68	3517683	0.43	0.46	it107	3517876	0.10	0.14
it69	3517678	0.89	0.88	it108	3547482	0.15	0.17
it70	3517710	0.68	0.61	it109	3564024	0.30	0.35
it71	3517742	0.47	0.50	it110	3517779	0.45	0.64
it72	3517687	0.54	0.56	it111	3517697	0.31	0.37
it73	3517692	0.77	0.79	it112	3517733	0.50	0.53
it74	3517694	0.73	0.73	it113	3555859	0.72	0.74
it78	3517673	0.62	0.65				

Note. Analyses were conducted with a whole population.

Descriptive Statistics for Year-to-Year Linking Common Items: Grade 7 Form A

Form	Year	N	M	SD
A	Year 2006	61	0.46	0.17
	Year 2007	61	0.49	0.17

Table 1.34 Year 2006 vs. Y2007 Linking Common Item P-Value Comparison: Grade 7 Form F

Item Seq. No.	Item CID	Y06 FF	Y07 FF	Item Seq. No.	Item CID	Y06 FF	Y07 FF
it41	3517706	0.54	0.47	it79	3564027	0.57	0.58
it42	3564025	0.29	0.28	it80	3517695	0.36	0.35
it43	3517613	0.63	0.62	it81	3517729	0.64	0.68
it44	3555861	0.64	0.72	it82	3517757	0.28	0.33
it45	3517604	0.33	0.32	it83	3517693	0.13	0.16
it46	3517602	0.39	0.45	it84	3564028	0.40	0.45
it47	3517638	0.72	0.69	it85	3517709	0.64	0.66
it48	3517679	0.41	0.49	it86	3517712	0.41	0.45
it49	3517609	0.50	0.49	it87	3517714	0.50	0.56
it50	3517643	0.66	0.66	it88	3517716	0.57	0.63
it51	3517740	0.49	0.53	it89	3517662	0.45	0.47
it52	3517631	0.72	0.71	it90	3517721	0.41	0.44
it53	3517634	0.61	0.62	it91	3517664	0.73	0.80
it54	3517665	0.35	0.34	it92	3517752	0.60	0.62
it59	3517635	0.68	0.67	it93	3517885	0.34	0.35
it60	3517615	0.66	0.68	it94	3517666	0.25	0.27
it61	3517637	0.71	0.74	it95	3564029	0.36	0.40
it62	3517639	0.28	0.28	it98	3517668	0.32	0.34
it63	3517670	0.27	0.29	it99	3517671	0.32	0.34
it64	3564019	0.12	0.16	it102	3517650	0.60	0.60
it65	3517675	0.64	0.69	it103	3517652	0.62	0.67
it66	3555864	0.20	0.22	it104	3517715	0.74	0.81
it67	3517683	0.44	0.45	it105	3564030	0.44	0.50
it68	3517645	0.64	0.69	it107	3517758	0.23	0.24
it69	3517741	0.90	0.91	it108	3547487	0.66	0.77
it70	3517812	0.49	0.54	it109	3564031	0.23	0.31
it71	3547535	0.59	0.76	it110	3555865	0.27	0.34
it72	3517687	0.54	0.57	it111	3517718	0.55	0.64
it73	3517692	0.77	0.79	it112	3517756	0.40	0.44
it74	3517694	0.73	0.75	it113	3555859	0.72	0.76
it78	3517648	0.62	0.63				

Note. Analyses were conducted with a whole population.

Descriptive Statistics for Year-to-Year Linking Common Items: Grade 7 Form F

Form	Year	<i>N</i>	<i>M</i>	<i>SD</i>
F	Year 2006	61	0.50	0.18
	Year 2007	61	0.53	0.19

Table 1.35 Year 2006 vs. Y2007 Linking Common Item P-Value Comparison: Grade 8 Form A

Item Seq. No.	Item CID	Y06 FA	Y07 FA	Item Seq. No.	Item CID	Y06 FA	Y07 FA
it41	3514015	0.23	0.23	it80	3514093	0.32	0.33
it42	3514014	0.52	0.56	it81	3514107	0.13	0.12
it43	3514016	0.72	0.75	it82	3514103	0.54	0.60
it44	3514046	0.51	0.52	it83	3514608	0.43	0.41
it45	3514013	0.43	0.44	it84	3514287	0.58	0.62
it46	3564107	0.58	0.64	it85	3514267	0.29	0.35
it47	3547550	0.67	0.57	it86	3564110	0.43	0.62
it53	3514056	0.74	0.79	it87	3514113	0.65	0.65
it54	3514053	0.70	0.71	it88	3514275	0.74	0.72
it55	3514058	0.30	0.30	it92	3514117	0.28	0.32
it56	3514059	0.59	0.63	it93	3564111	0.32	0.39
it57	3514062	0.39	0.41	it94	3514279	0.20	0.21
it58	3514702	0.28	0.28	it96	3514131	0.32	0.39
it59	3564108	0.29	0.34	it97	3514057	0.65	0.65
it60	3514064	0.16	0.14	it98	3514607	0.23	0.26
it61	3514276	0.43	0.45	it99	3564112	0.21	0.24
it62	3514127	0.24	0.22	it100	3514055	0.53	0.57
it63	3514125	0.62	0.60	it101	3514052	0.50	0.50
it64	3514121	0.68	0.69	it102	3514118	0.08	0.09
it65	3514139	0.64	0.73	it103	3564113	0.22	0.40
it66	3514073	0.56	0.55	it104	3514291	0.67	0.73
it67	3514074	0.42	0.42	it105	3514606	0.69	0.69
it68	3514075	0.60	0.63	it106	3514076	0.45	0.46
it69	3514078	0.21	0.22	it107	3514100	0.63	0.75
it70	3564109	0.24	0.31	it111	3514080	0.53	0.52
it73	3514611	0.61	0.65	it112	3514079	0.27	0.31
it74	3514083	0.18	0.24	it113	3514669	0.53	0.51
it76	3514092	0.42	0.42	it114	3564114	0.64	0.63
it77	3514102	0.54	0.62	it116	3514710	0.54	0.53
it78	3514095	0.29	0.31				

Note. Analyses were conducted with a whole population.

Descriptive Statistics for Year-to-Year Linking Common Items: Grade 8 Form A

Form	Year	<i>N</i>	<i>M</i>	<i>SD</i>
A	Year 2006	59	0.45	0.18
	Year 2007	59	0.47	0.18

Table 1.36 Year 2006 vs. Y2007 Linking Common Item P-Value Comparison: Grade 8 Form F

Item Seq. No.	Item CID	Y06 FF	Y07 FF	Item Seq. No.	Item CID	Y06 FF	Y07 FF
it41	3514015	0.23	0.22	it80	3514100	0.63	0.69
it42	3514014	0.52	0.56	it81	3514138	0.60	0.58
it43	3514016	0.72	0.77	it82	3514213	0.56	0.63
it44	3514055	0.53	0.58	it83	3514103	0.54	0.58
it45	3514147	0.36	0.38	it84	3547555	0.51	0.51
it46	3564115	0.25	0.33	it85	3514108	0.12	0.13
it47	3514052	0.50	0.51	it86	3564118	0.19	0.23
it53	3514058	0.30	0.30	it87	3514263	0.54	0.51
it54	3514062	0.39	0.42	it88	3514111	0.40	0.42
it55	3514059	0.59	0.63	it92	3514117	0.28	0.32
it56	3514156	0.74	0.73	it93	3564111	0.32	0.40
it57	3514056	0.74	0.75	it94	3514708	0.59	0.57
it58	3514283	0.33	0.34	it96	3514114	0.43	0.41
it59	3564116	0.43	0.49	it97	3514046	0.51	0.52
it60	3514159	0.63	0.62	it98	3514152	0.33	0.33
it61	3514161	0.19	0.19	it99	3564119	0.32	0.34
it62	3514162	0.37	0.37	it100	3547550	0.67	0.64
it63	3514163	0.54	0.52	it101	3547551	0.83	0.85
it64	3514122	0.58	0.60	it102	3514266	0.29	0.29
it65	3514092	0.42	0.42	it103	3564120	0.43	0.49
it66	3514075	0.60	0.64	it104	3547547	0.46	0.54
it67	3514073	0.56	0.54	it105	3514288	0.59	0.58
it68	3514076	0.45	0.48	it106	3514074	0.42	0.41
it69	3514164	0.52	0.55	it107	3514102	0.54	0.64
it70	3564117	0.37	0.45	it111	3514083	0.18	0.26
it73	3514090	0.54	0.63	it112	3514611	0.61	0.62
it74	3514281	0.36	0.21	it113	3514133	0.30	0.37
it76	3514173	0.47	0.49	it114	3564121	0.41	0.49
it77	3514095	0.29	0.29	it116	3547536	0.48	0.49
it78	3514174	0.44	0.58				

Note. Analyses were conducted with a whole population.

Descriptive Statistics for Year-to-Year Linking Common Items: Grade 8 Form F

Form	Year	<i>N</i>	<i>M</i>	<i>SD</i>
F	Year 2006	59	0.46	0.15
	Year 2007	59	0.48	0.16

Validation Check with Year 2007 Operational Items

To collect information about how much the same items that appeared on the test forms in consecutive years changed in terms of item difficulty, difficulty indices such as p-value and Rasch difficulty were calculated.

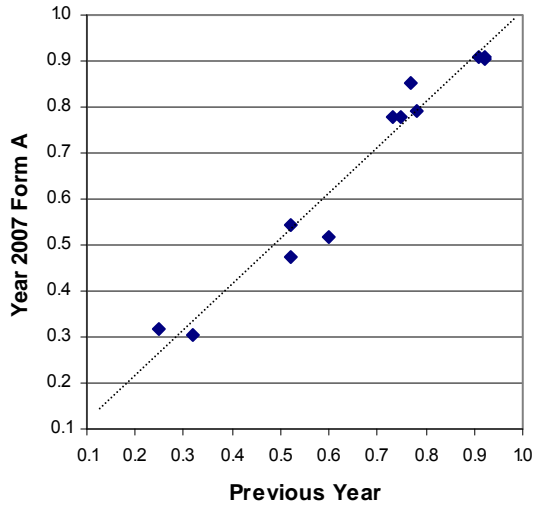
First, it should be noted these items were at first augmented as field test items in previous years and then appeared as operational test items in Year 2007. Second, Year 2007 Forms A, B, C, E, and E are the same, and Year 2007 Forms F, G, H, J, and K are the same except for the field test portion. More detailed information about the specific test design and construction of Year 2007 can be obtained from section 1.5, Test Structure of the 2007 MSA-Math.

First of all, it should be noted that p-value in previous years was calculated with a field-tested sample and Year 2007 p-value was calculated with a whole population. P-value of BCR item was the item mean score divided by the item score range. In addition, the numbers in “Omits” in each table were very substantial and included students who did not responded at all. Item p-value (easiness) results indicated that in general, most of the p-values in Year 2007 were almost the same or somewhat increased compared to those in previous years across all grades.

With respect to Rasch difficulty analysis, most of the items in Year 2007 were almost the same or somewhat easier compared to those in previous years across all grades. It should be noted that Rasch difficulties were based on the same scale (e.g., linked to Year 2006).

In conclusion, both p-value and Rasch difficulty results reflected the same phenomenon, indicating that most of the items became easier.

Table 1.37 Augmented Item P-Value Comparison for Previous Year vs. Year 2007: Grade 3 Form A



Item CID	Previous Year	Year 07 Form A
3510022	0.52	0.47
3510017	0.92	0.91
3510125	0.60	0.52
3510346	0.77	0.85
3510033	0.78	0.79
3510012	0.73	0.78
3509983	0.92	0.91
3510126	0.75	0.78
3509945	0.91	0.91
3510034	0.32	0.30
3564082	0.25	0.32
3510329	0.52	0.55

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

Table 1.38 Score-Point Distribution Comparison for Previous Year vs. Year 2007: Grade 3 Form A

Year	Item CID	Item Type	N	Mean	SD	Score-Point Distribution (%)				
						0	1	2	3	Omit
2006	3510034	BCR	2,733	0.32	0.47	66.92	32.38	N/A	N/A	0.70
2006	3564082	BCR	2,733	0.50	0.47	58.76	30.85	9.37	N/A	1.02
2007	3510034	BCR	29,897	0.30	0.46	68.51	30.47	N/A	N/A	1.02
2007	3564082	BCR	29,897	0.63	0.62	42.80	47.44	7.89	N/A	1.87

Table 1.39 Augmented IRT Item Difficulty Comparison for Previous Year vs. Year 2007: Grade 3 Form A

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2
2006	44	3510022	SR	1.7764		
2006	60	3510017	SR	-1.2060		
2006	65	3510125	SR	1.3096		
2006	84	3510346	SR	0.4046		
2006	85	3510033	SR	0.2523		
2006	86	3510012	SR	0.6353		
2006	89	3509983	SR	-1.1855		
2006	100	3510126	SR	0.3985		
2006	101	3509945	SR	-1.0471		
2006	111	3510034	BCR	2.8051		
2006	112	3564082	BCR	3.2825	-0.7346	0.7346
2006	119	3510329	SR	1.8416		
<hr/>						
2007	44	3510022	SR	2.0077		
2007	60	3510017	SR	-1.1315		
2007	65	3510125	SR	1.6971		
2007	84	3510346	SR	-0.5185		
2007	85	3510033	SR	0.0473		
2007	86	3510012	SR	0.0993		
2007	89	3509983	SR	-1.1470		
2007	100	3510126	SR	0.1797		
2007	101	3509945	SR	-1.1209		
2007	111	3510034	BCR	2.8934		
2007	112	3564082	BCR	3.0491	-1.5541	1.5541
2007	119	3510329	SR	1.5719		

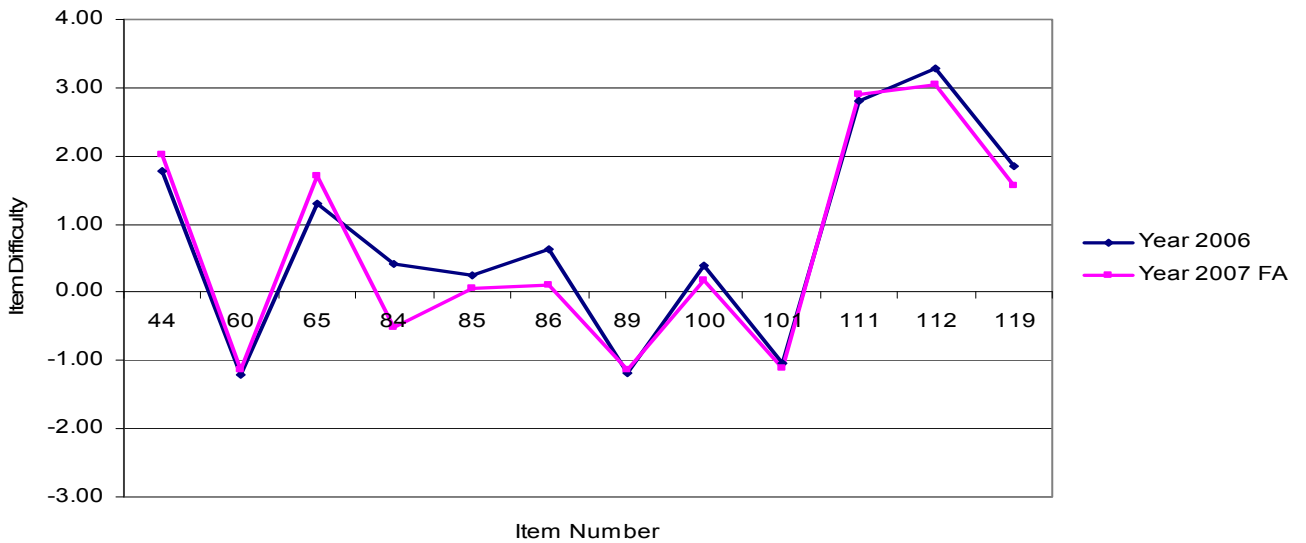
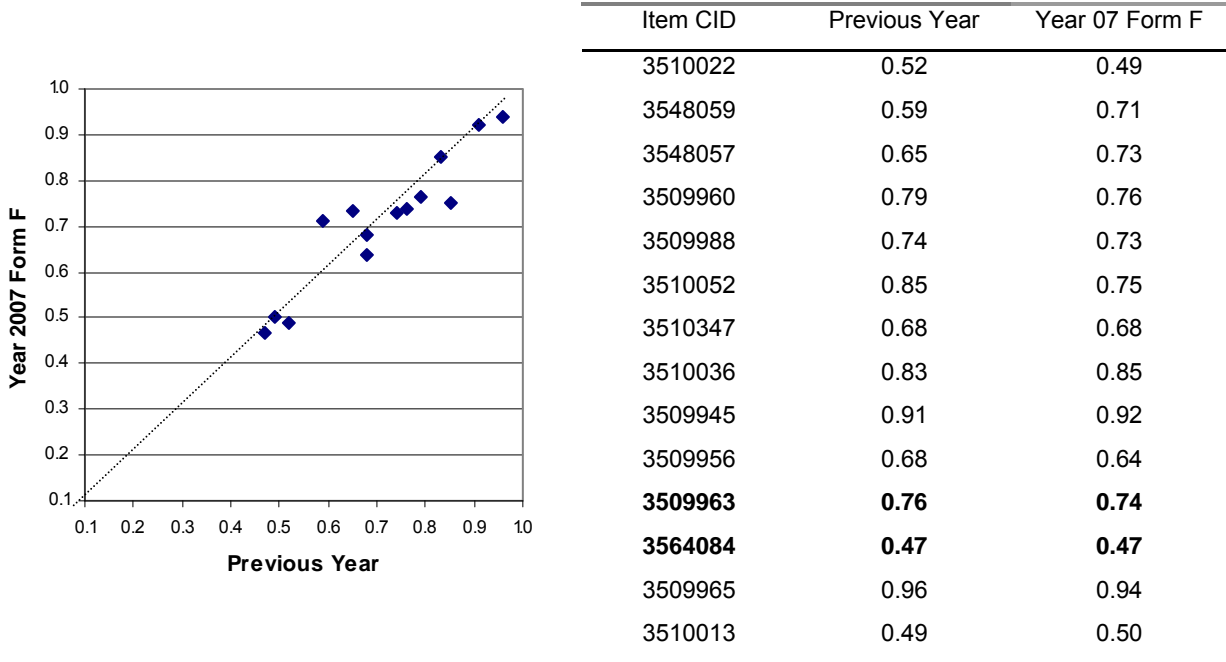


Figure 1.2 Augmented IRT Item Difficulty Comparison Plot for Previous Year vs. Year 2007: Grade 3 Form A

Table 1.40 Augmented Item P-Value Comparison for Previous Year vs. Year 2007: Grade 3 Form F



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

Table 1.41 Score-Point Distribution Comparison for Previous Year vs. Year 2007: Grade 3 Form F

Year	Item CID	Item Type	N	Mean	SD	Score-Point Distribution (%)				
						0	1	2	3	Omit
2006	3509963	BCR	2,754	0.76	0.43	16.99	76.11	N/A	N/A	6.90
2006	3564084	BCR	2,754	0.94	0.29	10.57	82.57	5.63	N/A	1.23
2007	3509963	BCR	29,858	0.74	0.44	17.49	73.73	N/A	N/A	8.78
2007	3564084	BCR	29,858	0.93	0.36	8.54	86.94	3.27	N/A	1.25

Table 1.42 Augment IRT Item Difficulty Comparison for Previous Year vs. Year 2007: Grade 3 Form F

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2
2006	44	3510022	SR	1.7764		
2004	45	3548059	SR	0.9222		
2005	47	3548057	SR	0.8586		
2006	60	3509960	SR	0.2320		
2006	65	3509988	SR	0.5483		
2006	84	3510052	SR	-0.4111		
2006	85	3510347	SR	0.9718		
2006	86	3510036	SR	-0.1787		
2006	89	3509945	SR	-1.0471		
2006	97	3509956	SR	0.9445		
2006	98	3509963	BCR	0.1860		
2006	99	3564084	BCR	2.3419	-3.0004	3.0004
2006	101	3509965	SR	-1.8621		
2006	119	3510013	SR	1.9699		
2007	44	3510022	SR	2.0077		
2007	45	3548059	SR	0.6288		
2007	47	3548057	SR	0.5502		
2007	60	3509960	SR	0.3981		
2007	65	3509988	SR	0.5005		
2007	84	3510052	SR	0.5884		
2007	85	3510347	SR	0.9229		
2007	86	3510036	SR	-0.5397		
2007	89	3509945	SR	-1.1209		
2007	97	3509956	SR	1.1953		
2007	98	3509963	BCR	0.1298		
2007	99	3564084	BCR	1.9318	-3.8671	3.8671
2007	101	3509965	SR	-1.6657		
2007	119	3510013	SR	1.8364		

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

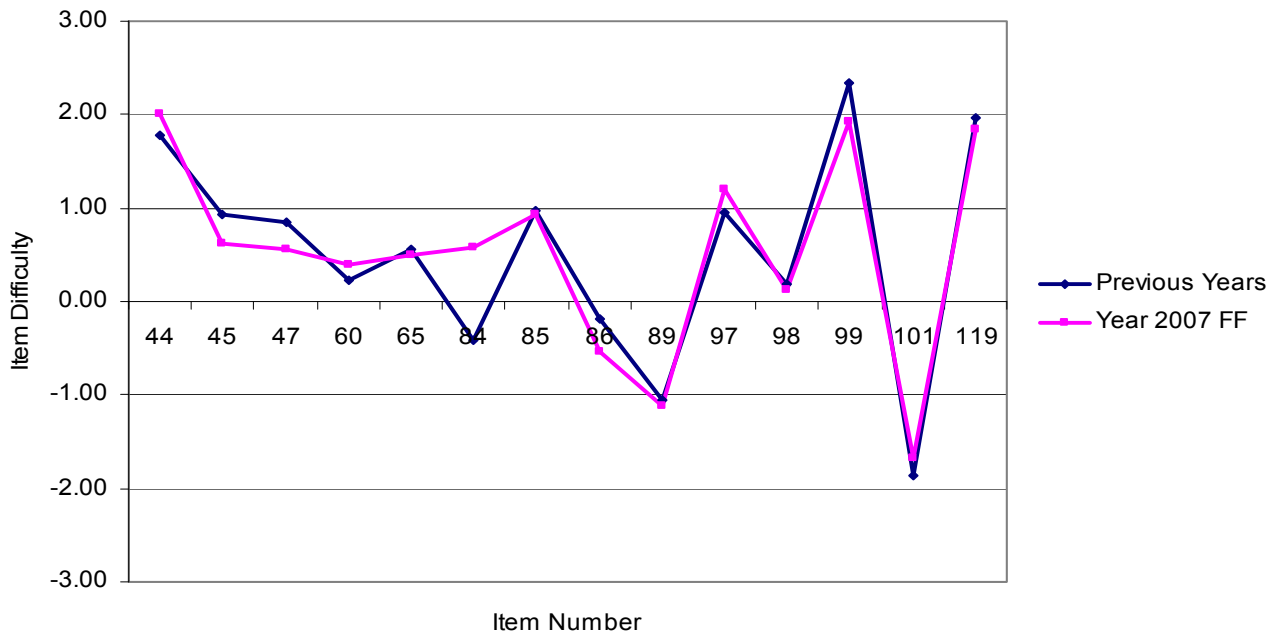
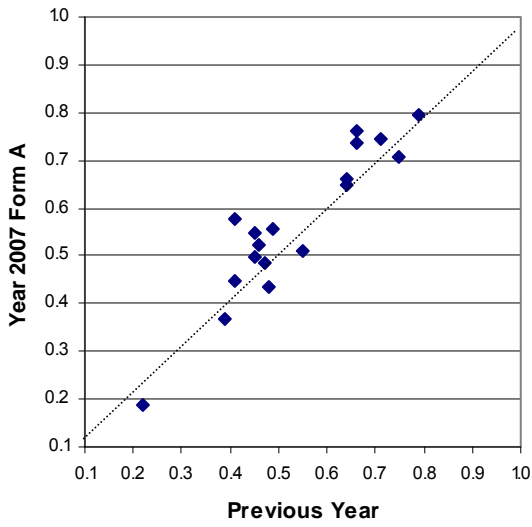


Figure 1.3 Augmented IRT Item Difficulty Comparison Plot for Previous Year vs. Year 2007: Grade 3 Form F

Table 1.43 Augmented Item P-Value Comparison for Previous Year vs. Year 2007: Grade 4 Form A



Item CID	Previous Year	Year 07 Form A
3515840	0.64	0.65
3515705	0.71	0.75
3515886	0.41	0.45
3564162	0.46	0.52
3515909	0.47	0.49
3548085	0.45	0.55
3548086	0.66	0.76
3515787	0.55	0.51
3515648	0.45	0.50
3564163	0.49	0.56
3548081	0.41	0.58
3515807	0.79	0.79
3564165	0.39	0.37
3515585	0.22	0.19
3564166	0.48	0.43
3515832	0.64	0.66
3548088	0.66	0.74
3515853	0.75	0.71

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

Table 1.44 Item Score-Point Distribution Comparison for Previous Year vs. Year 2007: Grade 4 Form A

Year	Item CID	Item Type	N	Mean	SD	Score-Point Distribution (%)				
						0	1	2	3	Omit
2006	3515886	BCR	2,799	0.41	0.49	55.88	41.01	N/A	N/A	3.11
2006	3564162	BCR	2,799	0.92	0.45	21.22	58.81	16.36	N/A	3.61
2006	3515648	BCR	2,875	0.45	0.50	53.95	44.94	N/A	N/A	1.11
2006	3564163	BCR	2,875	0.97	0.56	31.34	36.80	30.16	N/A	1.70
2006	3515807	BCR	2,858	0.79	0.40	17.56	79.39	N/A	N/A	3.04
2006	3564165	BCR	2,858	0.78	0.48	34.81	48.64	14.77	N/A	1.78
2006	3515585	BCR	2,940	0.22	0.42	75.31	22.11	N/A	N/A	2.59
2006	3564166	BCR	2,940	0.96	0.58	33.23	32.14	32.11	N/A	2.52
2007	3515886	BCR	30,402	0.45	0.50	51.99	44.94	N/A	N/A	3.07
2007	3564162	BCR	30,402	1.05	0.61	11.50	62.43	21.10	N/A	4.97
2007	3515648	BCR	30,402	0.50	0.50	49.35	49.60	N/A	N/A	1.05
2007	3564163	BCR	30,402	1.11	0.75	21.50	42.22	34.60	N/A	1.68
2007	3515807	BCR	30,402	0.79	0.41	16.33	79.31	N/A	N/A	4.36
2007	3564165	BCR	30,402	0.73	0.62	34.05	54.85	9.32	N/A	1.77
2007	3515585	BCR	30,402	0.19	0.39	78.65	18.63	N/A	N/A	2.72
2007	3564166	BCR	30,402	0.87	0.73	31.17	44.49	21.05	N/A	3.29

Table 1.45 Augment IRT Item Difficulty Comparison for Previous Year vs. Year 2007: Grade 4 Form A

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2
2006	62	3515840	SR	0.2870		
2006	64	3515705	SR	-0.1011		
2006	81	3515886	BCR	1.5380		
2006	82	3564162	BCR	1.3256	-1.6892	1.6892
2006	83	3515909	SR	1.2766		
2006	84	3548085	SR	0.7940		
2006	85	3548086	SR	-0.4484		
2006	86	3515787	SR	0.8057		
2006	89	3515648	BCR	1.3302		
2006	90	3564163	BCR	1.1295	-0.6464	0.6464
2006	100	3548081	SR	0.9106		
2006	101	3515807	BCR	-0.6634		
2006	102	3564165	BCR	1.8360	-1.2560	1.2560
2006	114	3515585	BCR	2.6800		
2006	115	3564166	BCR	1.1258	-0.4681	0.4681
2006	119	3515832	SR	0.4035		
2006	120	3548088	SR	-0.3474		
2006	121	3515853	SR	-0.2637		
2007	62	3515840	SR	0.4436		
2007	64	3515705	SR	-0.2051		
2007	81	3515886	BCR	1.4586		
2007	82	3564162	BCR	0.8111	-1.9929	1.9929
2007	83	3515909	SR	1.2871		
2007	84	3548085	SR	0.9256		
2007	85	3548086	SR	-0.2943		
2007	86	3515787	SR	1.1443		
2007	89	3515648	BCR	1.2409		
2007	90	3564163	BCR	0.8470	-0.9809	0.9809
2007	100	3548081	SR	0.8669		
2007	101	3515807	BCR	-0.7079		
2007	102	3564165	BCR	2.1566	-1.7285	1.7285
2007	114	3515585	BCR	3.2248		
2007	115	3564166	BCR	1.6067	-1.1609	1.1609
2007	119	3515832	SR	0.3339		
2007	120	3548088	SR	-0.1831		
2007	121	3515853	SR	-0.1060		

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

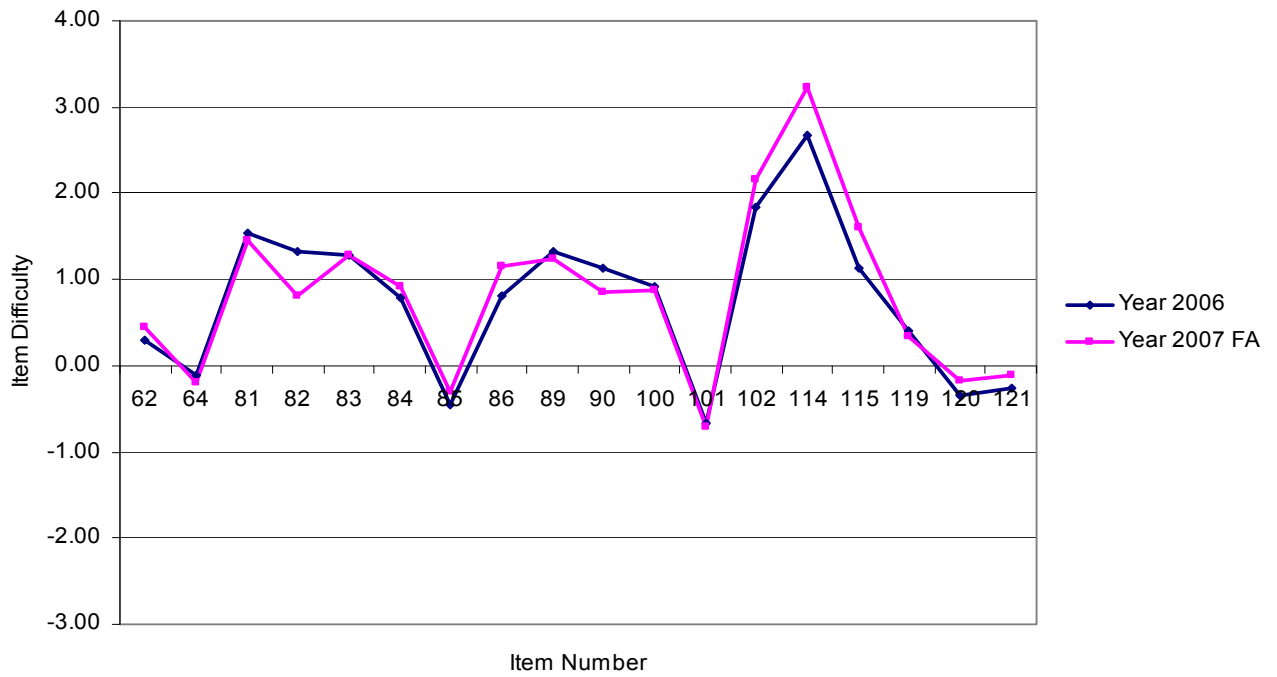
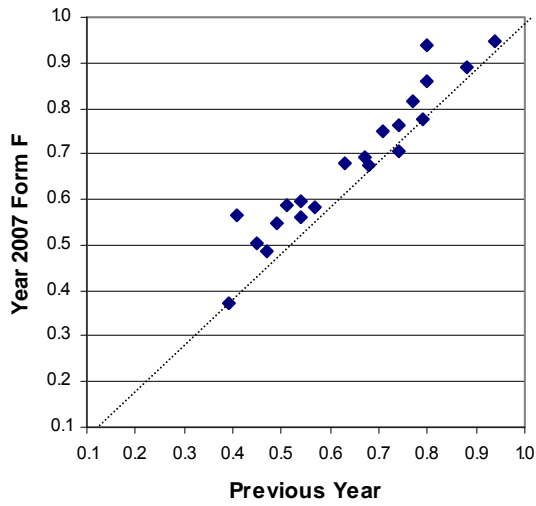


Figure 1.4 Augmented IRT Item Difficulty Comparison Plot for Previous Year vs. Year 2007: Grade 4 Form A

Table 1.46 Augmented Item P-Value Comparison for Previous Year vs. Year 2007: Grade 4 Form F



Item CID	Previous Year	Year 07 Form F
3515652	0.63	0.68
3515936	0.80	0.86
3548079	0.80	0.94
3515791	0.71	0.75
3515795	0.54	0.60
3515869	0.54	0.56
3515836	0.57	0.58
3515648	0.45	0.50
3564163	0.49	0.55
3515862	0.47	0.49
3564170	0.51	0.59
3548081	0.41	0.57
3515807	0.79	0.78
3564165	0.39	0.37
3515830	0.94	0.95
3564171	0.74	0.71
3515933	0.74	0.76
3515592	0.77	0.82
3515931	0.68	0.67
3515880	0.67	0.69
3515887	0.88	0.89

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

Table 1.47 Score-Point Distribution Comparison for Previous Year vs. Year 2007: Grade 4 Form F

Year	Item CID	Item Type	N	Mean	SD	Score-Point Distribution (%)				
						0	1	2	3	Omit
2006	3515648	BCR	2,875	0.45	0.50	53.95	44.94	N/A	N/A	1.11
2006	3564163	BCR	2,875	0.97	0.56	31.34	36.80	30.16	N/A	1.70
2006	3515862	BCR	2,799	0.47	0.50	50.63	46.77	N/A	N/A	2.61
2006	3564170	BCR	2,799	1.02	0.58	29.87	33.33	34.16	N/A	2.64
2006	3515807	BCR	2,858	0.79	0.40	17.56	79.39	N/A	N/A	3.04
2006	3564165	BCR	2,858	0.78	0.48	34.81	48.64	14.77	N/A	1.78
2006	3515830	BCR	2,858	0.95	0.23	4.72	94.44	N/A	N/A	0.84
2006	3564171	BCR	2,858	1.49	0.46	7.17	34.81	56.93	N/A	1.08
2007	3515648	BCR	30,103	0.50	0.50	48.42	50.46	N/A	N/A	1.12
2007	3564163	BCR	30,103	1.10	0.76	22.73	40.88	34.54	N/A	1.85
2007	3515862	BCR	30,103	0.49	0.50	49.21	48.76	N/A	N/A	2.02
2007	3564170	BCR	30,103	1.17	0.79	21.52	34.56	41.26	N/A	2.66
2007	3515807	BCR	30,103	0.78	0.42	19.28	77.54	N/A	N/A	3.18
2007	3564165	BCR	30,103	0.75	0.62	33.08	55.81	9.51	N/A	1.60
2007	3515830	BCR	30,103	0.95	0.22	4.40	94.72	N/A	N/A	0.87
2007	3564171	BCR	30,103	1.41	0.59	4.28	47.72	46.68	N/A	1.32

Table 1.48 Augment IRT Item Difficulty Comparison for Previous Year vs. Year 2007: Grade 4 Form F

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2
2006	64	3515652	SR	0.3611		
2006	66	3515936	SR	-0.7328		
2004	78	3548079	SR	-1.2412		
2006	83	3515791	SR	-0.0774		
2006	84	3515795	SR	0.8572		
2006	85	3515869	SR	0.9029		
2006	86	3515836	SR	0.7894		
2006	89	3515648	BCR	1.3302		
2006	90	3564163	BCR	1.1295	-0.6464	0.6464
2006	98	3515862	BCR	1.2450		
2006	99	3564170	BCR	1.0292	-0.5080	0.5080
2004	100	3548081	SR	0.9106		
2006	101	3515807	BCR	-0.6634		
2006	102	3564165	BCR	1.8360	-1.2560	1.2560
2006	114	3515830	BCR	-2.3704		
2006	115	3564171	BCR	-0.3428	-1.0181	1.0181
2006	116	3515933	SR	-0.2666		
2006	118	3515592	SR	-0.5349		
2006	119	3515931	SR	0.1335		
2006	120	3515880	SR	0.1498		
2006	121	3515887	SR	-1.3678		
2007	64	3515652	SR	0.1694		
2007	66	3515936	SR	-1.1494		
2007	78	3548079	SR	-2.3000		
2007	83	3515791	SR	-0.2628		
2007	84	3515795	SR	0.5626		
2007	85	3515869	SR	0.8080		
2007	86	3515836	SR	0.6346		
2007	89	3515648	BCR	1.2409		
2007	90	3564163	BCR	0.8470	-0.9809	0.9809
2007	98	3515862	BCR	1.1734		
2007	99	3564170	BCR	0.6541	-0.6701	0.6701
2007	100	3548081	SR	0.8669		
2007	101	3515807	BCR	-0.7079		
2007	102	3564165	BCR	2.1566	-1.7285	1.7285
2007	114	3515830	BCR	-2.4304		
2007	115	3564171	BCR	-0.5629	-1.5858	1.5858
2007	116	3515933	SR	-0.3619		
2007	118	3515592	SR	-0.8156		
2007	119	3515931	SR	0.1924		
2007	120	3515880	SR	0.0211		
2007	121	3515887	SR	-1.4589		

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

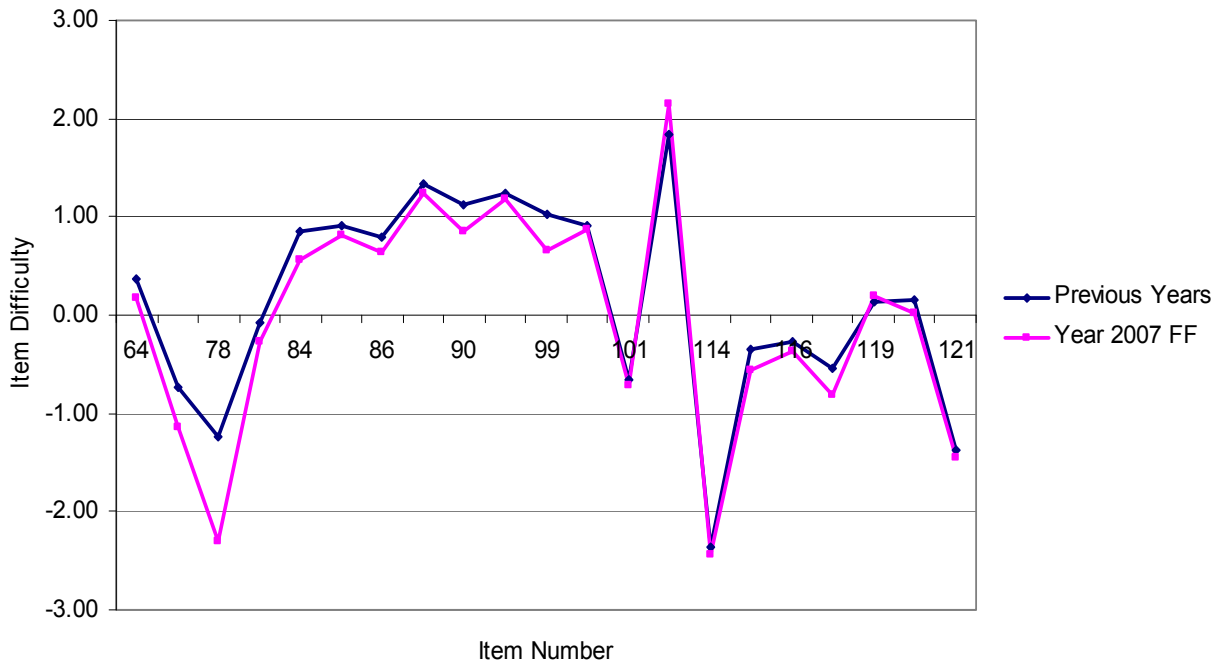
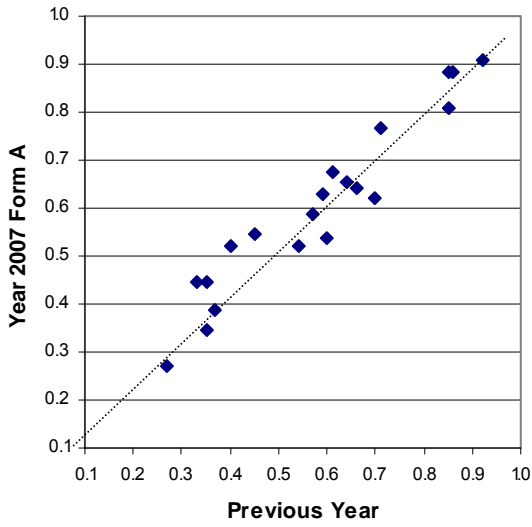


Figure 1.5 Augmented IRT Item Difficulty Comparison Plot for Previous Year vs. Year 2007: Grade 4 Form F

Table 1.49 Augmented Item P-Value Comparison for Previous Year vs. Year 2007: Grade 5 Form A



Item CID	Previous Year	Year 07 Form A
3511531	0.61	0.68
3563986	0.45	0.55
3512606	0.59	0.63
3512632	0.37	0.39
3512702	0.60	0.54
3511626	0.85	0.81
3512638	0.66	0.64
3512618	0.35	0.45
3563988	0.40	0.52
3512616	0.33	0.44
3512625	0.85	0.88
3512714	0.92	0.91
3512649	0.27	0.27
3563989	0.35	0.34
3512627	0.86	0.88
3511563	0.70	0.62
3511566	0.64	0.66
3512710	0.57	0.59
3512687	0.54	0.52
3512628	0.71	0.77

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

Table 1.50 Item Score-Point Distribution Comparison for Previous Year vs. Year 2007: Grade 5 Form A

Year	Item CID	Item Type	N	Mean	SD	Score-Point Distribution (%)				
						0	1	2	3	Omit
2006	3511531	BCR	2,975	0.61	0.49	37.08	61.21	N/A	N/A	1.71
2006	3563986	BCR	2,975	0.89	0.51	29.68	46.76	21.28	N/A	2.29
2006	3512618	BCR	2,949	0.35	0.48	61.65	35.44	N/A	N/A	2.92
2006	3563988	BCR	2,949	0.80	0.47	30.25	52.42	13.77	N/A	3.56
2006	3512649	BCR	2,873	0.27	0.44	70.66	26.84	N/A	N/A	2.51
2006	3563989	BCR	2,873	0.70	0.63	56.46	11.63	28.96	N/A	2.96
2007	3511531	BCR	31,083	0.68	0.47	31.32	67.50	N/A	N/A	1.18
2007	3563986	BCR	31,083	1.09	0.65	15.05	56.26	26.61	N/A	2.08
2007	3512618	BCR	31,083	0.45	0.50	52.54	44.54	N/A	N/A	2.92
2007	3563988	BCR	31,083	1.05	0.52	7.46	72.60	15.99	N/A	3.95
2007	3512649	BCR	31,083	0.27	0.44	66.35	27.13	N/A	N/A	6.52
2007	3563989	BCR	31,083	0.69	0.89	52.00	10.88	29.04	N/A	8.08

Table 1.51 Augment IRT Item Difficulty Comparison for Previous Year vs. Year 2007: Grade 5 Form A

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2
2006	41	3511531	BCR	0.3047		
2006	42	3563986	BCR	1.2297	-1.1443	1.1443
2006	46	3512606	SR	0.5058		
2006	48	3512632	SR	1.5474		
2006	52	3512702	SR	0.5524		
2006	62	3511626	SR	-1.2487		
2006	65	3512638	SR	0.1748		
2006	68	3512618	BCR	1.7011		
2006	69	3563988	BCR	1.5613	-1.4527	1.4527
2006	77	3512616	SR	1.8493		
2006	78	3512625	SR	-1.2385		
2006	79	3512714	SR	-2.0481		
2006	80	3512649	BCR	2.2683		
2006	81	3563989	BCR	1.6142	0.8261	-0.8261
2006	84	3512627	SR	-1.1851		
2006	96	3511563	SR	-0.1377		
2006	108	3511566	SR	0.1830		
2006	112	3512710	SR	0.7118		
2006	113	3512687	SR	0.8104		
2006	114	3512628	SR	-0.2779		
2007	41	3511531	BCR	0.0868		
2007	42	3563986	BCR	0.6862	-1.6106	1.6106
2007	46	3512606	SR	0.3045		
2007	48	3512632	SR	1.6552		
2007	52	3512702	SR	0.8431		
2007	62	3511626	SR	-0.9260		
2007	65	3512638	SR	0.2606		
2007	68	3512618	BCR	1.2891		
2007	69	3563988	BCR	0.6654	-2.4487	2.4487
2007	77	3512616	SR	1.2809		
2007	78	3512625	SR	-1.6381		
2007	79	3512714	SR	-1.9727		
2007	80	3512649	BCR	2.3175		
2007	81	3563989	BCR	1.6549	0.7655	-0.7655
2007	84	3512627	SR	-1.3981		
2007	96	3511563	SR	0.3760		
2007	108	3511566	SR	0.1548		
2007	112	3512710	SR	0.5954		
2007	113	3512687	SR	0.9241		
2007	114	3512628	SR	-0.5862		

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

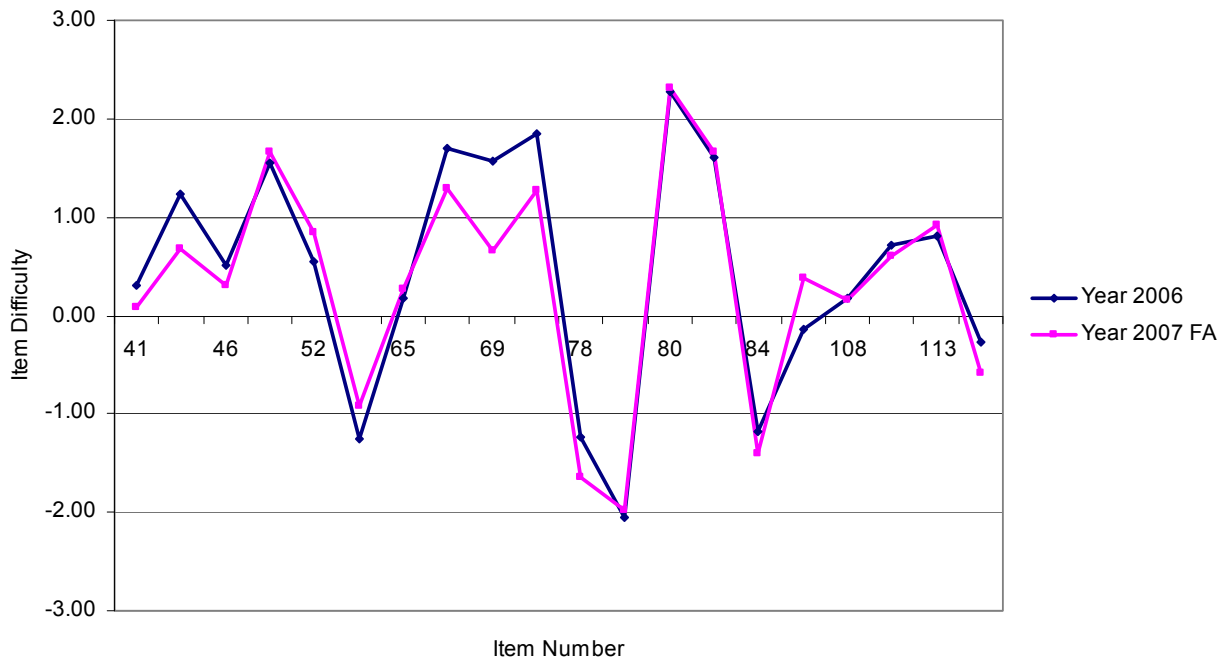
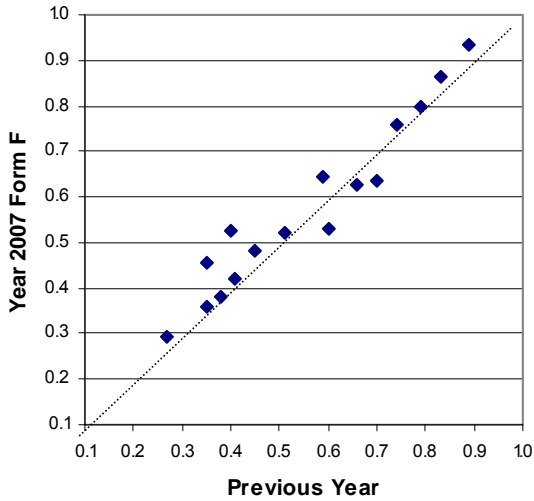


Figure 1.6 Augmented IRT Item Difficulty Comparison Plot for Previous Year vs. Year 2007: Grade 5 Form A

Table 1.52 Augmented Item P-Value Comparison for Previous Year vs. Year 2007: Grade 5 Form F



Item CID	Previous Year	Year 07 Form F
3512606	0.59	0.65
3512702	0.60	0.53
3512638	0.66	0.63
3512618	0.35	0.45
3563988	0.40	0.53
3512612	0.38	0.38
3512696	0.83	0.87
3512691	0.51	0.52
3512649	0.27	0.29
3563989	0.35	0.36
3512605	0.89	0.94
3511563	0.70	0.64
3512637	0.79	0.80
3512648	0.45	0.48
3512688	0.41	0.42
3511631	0.74	0.76

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

Table 1.53 Score-Point Distribution Comparison for Previous Year vs. Year 2007: Grade 5 Form F

Year	Item CID	Item Type	N	Mean	SD	Score-Point Distribution (%)				
						0	1	2	3	Omit
2006	3512618	BCR	2,949	0.35	0.48	61.65	35.44	N/A	N/A	2.92
2006	3563988	BCR	2,949	0.80	0.47	30.25	52.42	13.77	N/A	3.56
2006	3512649	BCR	2,873	0.27	0.44	70.66	26.84	N/A	N/A	2.51
2006	3563989	BCR	2,873	0.70	0.63	56.46	11.63	28.96	N/A	2.96
2007	3512618	BCR	30,875	0.45	0.50	51.61	45.37	N/A	N/A	3.01
2007	3563988	BCR	30,875	1.05	0.54	7.81	71.05	17.18	N/A	3.96
2007	3512649	BCR	30,875	0.29	0.46	62.10	29.43	N/A	N/A	8.47
2007	3563989	BCR	30,875	0.72	0.91	48.65	9.55	31.26	N/A	10.54

Table 1.54 Augment IRT Item Difficulty Comparison for Previous Year vs. Year 2007: Grade 5 Form F

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2
2006	45	3512606	SR	0.5058		
2006	52	3512702	SR	0.5524		
2006	66	3512638	SR	0.1748		
2006	68	3512618	BCR	1.7011		
2006	69	3563988	BCR	1.5613	-1.4527	1.4527
2006	77	3512612	SR	1.6049		
2006	78	3512696	SR	-1.2411		
2006	79	3512691	SR	0.9245		
2006	80	3512649	BCR	2.2683		
2006	81	3563989	BCR	1.6142	0.8261	-0.8261
2006	84	3512605	SR	-1.6432		
2006	96	3511563	SR	-0.1377		
2006	108	3512637	SR	-0.6144		
2006	112	3512648	SR	1.3551		
2006	113	3512688	SR	1.4904		
2006	114	3511631	SR	-0.3956		
2007	45	3512606	SR	0.3045		
2007	52	3512702	SR	0.8431		
2007	66	3512638	SR	0.2606		
2007	68	3512618	BCR	1.2891		
2007	69	3563988	BCR	0.6654	-2.4487	2.4487
2007	77	3512612	SR	1.6747		
2007	78	3512696	SR	-1.4768		
2007	79	3512691	SR	1.0014		
2007	80	3512649	BCR	2.3175		
2007	81	3563989	BCR	1.6549	0.7655	-0.7655
2007	84	3512605	SR	-2.0760		
2007	96	3511563	SR	0.3760		
2007	108	3512637	SR	-0.6947		
2007	112	3512648	SR	1.2138		
2007	113	3512688	SR	1.4200		
2007	114	3511631	SR	-0.3862		

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

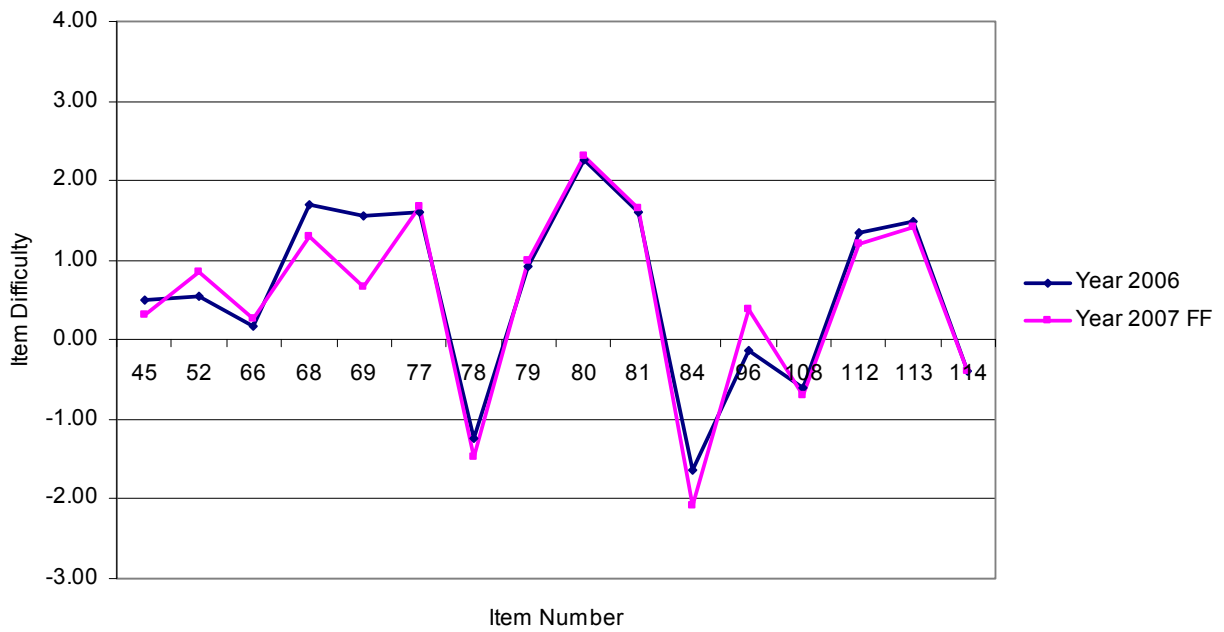
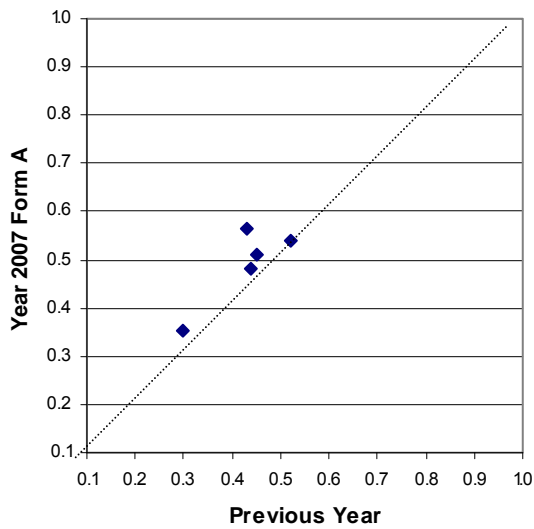


Figure 1.7 Augmented IRT Item Difficulty Comparison Plot for Previous Year vs. Year 2007: Grade 5 Form F

Table 1.55 Augmented Item P-Value Comparison for Previous Year vs. Year 2007: Grade 6 Form A



Item CID	Previous Year	Year 07 Form A
3516912	0.52	0.54
3517013	0.30	0.35
3564004	0.43	0.57
3517000	0.45	0.51
3517010	0.44	0.48

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

Table 1.56 Score-Point Distribution Comparison for Previous Year vs. Year 2007: Grade 6 Form A

Year	Item CID	Item Type	N	Mean	SD	Score-Point Distribution (%)				
						0	1	2	3	Omit
2006	3517013	BCR	3,219	0.30	0.50	65.49	30.20	N/A	N/A	4.32
2006	3564004	BCR	3,219	0.87	0.50	27.71	48.68	18.95	N/A	4.66
2007	3517013	BCR	31,558	0.35	0.48	61.55	35.38	N/A	N/A	3.07
2007	3564004	BCR	31,558	1.13	0.63	10.29	59.17	27.04	N/A	3.50

Table 1.57 Augment IRT Item Difficulty Comparison for Previous Year vs. Year 2007: Grade 6 Form A

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2
2006	45	3516912	SR	0.3519		
2006	74	3517013	BCR	1.5654		
2006	75	3564004	BCR	0.8553	-1.2512	1.2512
2006	84	3517000	SR	0.7559		
2006	85	3517010	SR	0.8241		
2007	45	3516912	SR	0.5174		
2007	74	3517013	BCR	1.4674		
2007	75	3564004	BCR	0.0865	-1.7954	1.7954
2007	84	3517000	SR	0.6588		
2007	85	3517010	SR	0.8496		

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

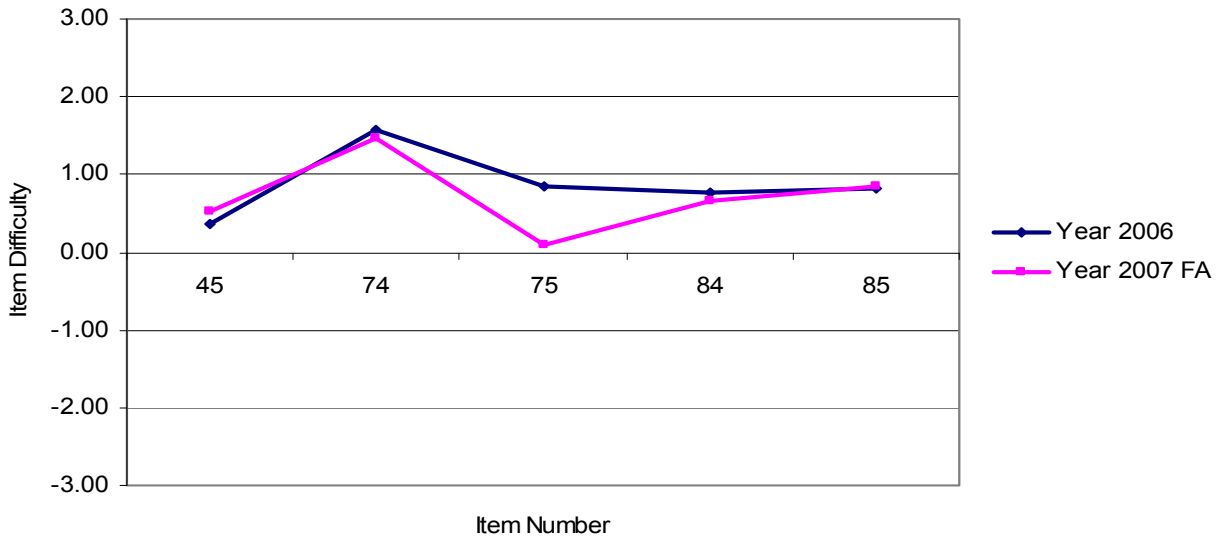
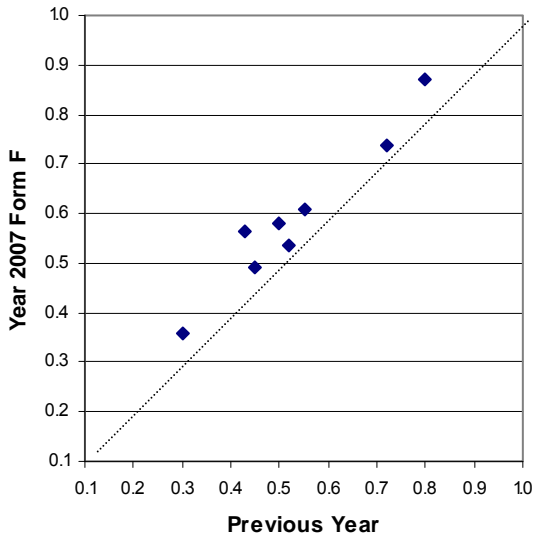


Figure 1.8 Augmented IRT Item Difficulty Comparison Plot for Previous Year vs. Year 2007: Grade 6 Form A

Table 1.58 Augmented Item P-Value Comparison for Previous Year vs. Year 2007: Grade 6 Form F



Item CID	Previous Year	Year 07 Form F
3516912	0.52	0.54
3517004	0.80	0.87
3564010	0.50	0.58
3517002	0.72	0.74
3517013	0.30	0.36
3564004	0.43	0.56
3517000	0.45	0.49
3516907	0.55	0.61

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

Table 1.59 Score-Point Distribution Comparison for Previous Year vs. Year 2007: Grade 6 Form F

Year	Item CID	Item Type	N	Mean	SD	Score-Point Distribution (%)				
						0	1	2	3	Omit
2006	3517004	ECR	3,219	0.80	0.40	16.78	79.96	N/A	N/A	3.26
2006	3564010	ECR	3,219	1.51	0.59	15.04	32.34	28.02	20.78	3.82
2006	3517013	BCR	3,219	0.30	0.46	65.49	30.20	N/A	N/A	4.32
2006	3564004	BCR	3,219	0.87	0.50	27.71	48.68	18.95	N/A	4.66
2007	3517004	ECR	31,258	0.87	0.34	11.36	87.09	N/A	N/A	1.55
2007	3564010	ECR	31,258	1.74	0.96	8.71	29.21	34.34	25.26	2.49
2007	3517013	BCR	31,258	0.36	0.48	61.55	35.68	N/A	N/A	2.78
2007	3564004	BCR	31,258	1.13	0.63	11.05	58.70	27.09	N/A	3.16

Table 1.60 Augment IRT Item Difficulty Comparison for Previous Year vs. Year 2007: Grade 6 Form F

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2	Step 2-3
2006	44	3516912	SR	0.3519			
2006	49	3517004	ECR	-1.3826			
2006	50	3564010	ECR	0.4105	-1.4436	0.2291	1.2145
2006	57	3517002	SR	-0.7658			
2006	74	3517013	BCR	1.5654			
2006	75	3564004	BCR	0.8553	-1.2512	1.2512	
2006	84	3517000	SR	0.7559			
2006	85	3516907	SR	0.2435			
2007	44	3516912	SR	0.5174			
2007	49	3517004	ECR	-1.7238			
2007	50	3564010	ECR	0.2493	-1.6097	0.1701	1.4396
2007	57	3517002	SR	-0.7729			
2007	74	3517013	BCR	1.4674			
2007	75	3564004	BCR	0.0865	-1.7954	1.7954	
2007	84	3517000	SR	0.6588			
2007	85	3516907	SR	0.1598			

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

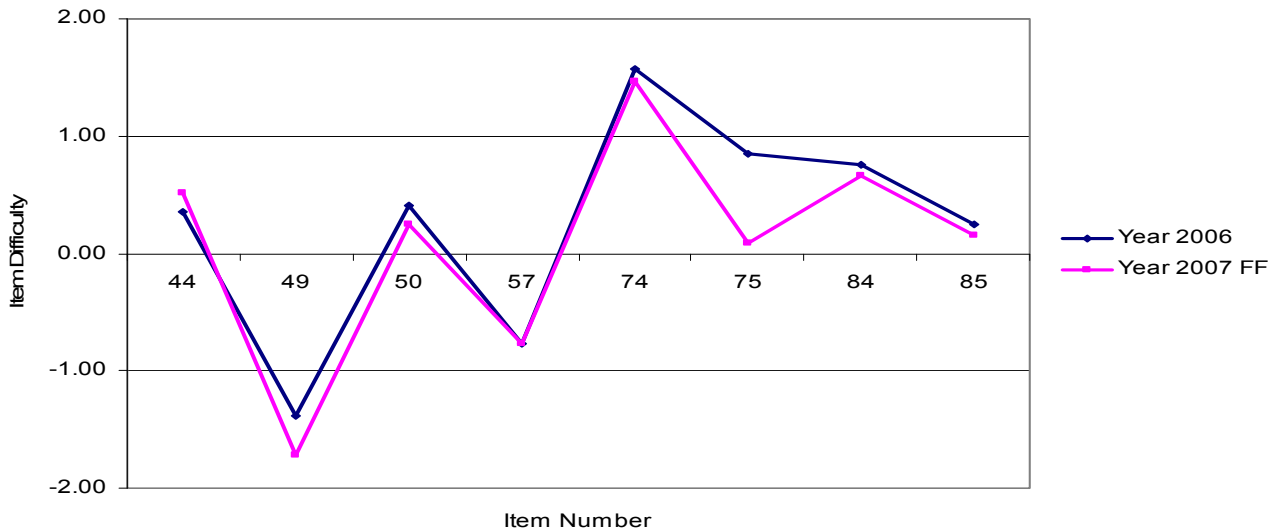
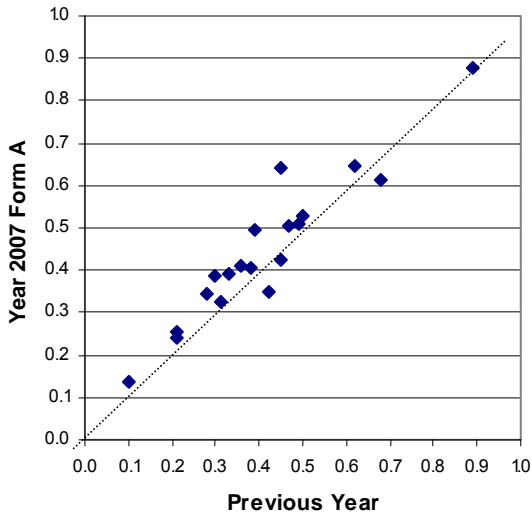


Figure 1.9 Augmented IRT Item Difficulty Comparison Plot for Previous Year vs. Year 2007: Grade 6 Form F

Table 1.61 Augmented Item P-Value Comparison for Previous Year vs. Year 2007: Grade 7 Form A



Item CID	Previous Year	Year 07 Form A
3517744	0.42	0.35
3564018	0.21	0.24
3517678	0.89	0.88
3517710	0.68	0.61
3517742	0.47	0.50
3517673	0.62	0.65
3564020	0.38	0.40
3517757	0.28	0.35
3517759	0.45	0.43
3517719	0.21	0.26
3564021	0.36	0.41
3555858	0.33	0.39
3547477	0.39	0.49
3517736	0.49	0.51
3517818	0.31	0.33
3564023	0.30	0.38
3517876	0.10	0.14
3517779	0.45	0.64
3517733	0.50	0.53

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

Table 1.62 Score-Point Distribution Comparison for Previous Year vs. Year 2007: Grade 7 Form A

Year	Item CID	Item Type	N	Mean	SD	Score-Point Distribution (%)				
						0	1	2	3	Omit
2006	3517744	BCR	3,398	0.42	0.49	50.21	41.85	N/A	N/A	7.95
2006	3564018	BCR	3,398	0.43	0.43	55.18	29.49	6.59	N/A	8.74
2006	3517673	ECR	3,438	0.62	0.49	34.58	61.93	N/A	N/A	3.49
2006	3564020	ECR	3,438	1.14	0.31	3.66	73.04	18.96	1.05	3.29
2006	3517719	BCR	3,422	0.21	0.41	65.23	21.04	N/A	N/A	13.73
2006	3564021	BCR	3,422	0.71	0.39	19.73	61.08	5.08	N/A	14.11
2006	3517818	BCR	3,382	0.31	0.46	56.15	30.90	N/A	N/A	12.95
2006	3564023	BCR	3,382	0.61	0.37	26.91	57.27	1.71	N/A	14.10
2007	3517744	BCR	32,264	0.35	0.48	57.42	35.11	N/A	N/A	7.48
2007	3564018	BCR	32,264	0.48	0.66	52.89	29.28	9.33	N/A	8.51
2007	3517673	ECR	32,264	0.65	0.48	31.06	64.74	N/A	N/A	4.20
2007	3564020	ECR	32,264	1.21	0.60	3.39	66.72	23.79	2.30	3.80
2007	3517719	BCR	32,264	0.26	0.44	62.91	25.69	N/A	N/A	11.40
2007	3564021	BCR	32,264	0.82	0.55	13.67	67.11	7.58	N/A	11.64
2007	3517818	BCR	32,264	0.33	0.47	61.95	32.55	N/A	N/A	5.50
2007	3564023	BCR	32,264	0.77	0.58	23.33	61.20	7.86	N/A	7.61

Table 1.63 Augment IRT Item Difficulty Comparison for Previous Year vs. Year 2007: Grade 7 Form A

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2	Step 2-3
2006	41	3517744	BCR	0.5220			
2006	42	3564018	BCR	1.9858	-1.0098	1.0098	
2006	69	3517678	SR	-2.5560			
2006	70	3517710	SR	-0.7950			
2006	71	3517742	SR	0.3521			
2006	78	3517673	ECR	-0.5260			
2006	79	3564020	ECR	1.0845	-4.6256	0.9338	3.6918
2006	80	3517757	SPR	1.3453			
2006	82	3517759	SPR	0.3521			
2006	83	3517719	BCR	1.7788			
2006	84	3564021	BCR	1.1889	-2.4446	2.4446	
2006	92	3555858	SR	0.7163			
2006	93	3547477	SR	0.3369			
2006	103	3517736	SR	0.2112			
2006	104	3517818	BCR	1.1113			
2006	105	3564023	BCR	2.0754	-2.7931	2.7931	
2006	107	3517876	SPR	2.8747			
2006	110	3517779	SPR	0.3583			
2006	112	3517733	SPR	-0.0557			
2007	41	3517744	BCR	0.9733			
2007	42	3564018	BCR	1.8283	-0.8810	0.8810	
2007	69	3517678	SR	-2.6820			
2007	70	3517710	SR	-0.6119			
2007	71	3517742	SR	0.0227			
2007	78	3517673	ECR	-0.8144			
2007	79	3564020	ECR	0.8436	-4.4403	0.7733	3.6670
2007	80	3517757	SPR	1.0880			
2007	82	3517759	SPR	0.5501			
2007	83	3517719	BCR	1.5471			
2007	84	3564021	BCR	0.7817	-2.6186	2.6186	
2007	92	3555858	SR	0.6673			
2007	93	3547477	SR	0.0680			
2007	103	3517736	SR	0.0790			
2007	104	3517818	BCR	1.1456			
2007	105	3564023	BCR	1.1416	-2.2500	2.2500	
2007	107	3517876	SPR	2.7529			
2007	110	3517779	SPR	-0.7021			
2007	112	3517733	SPR	-0.0370			

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

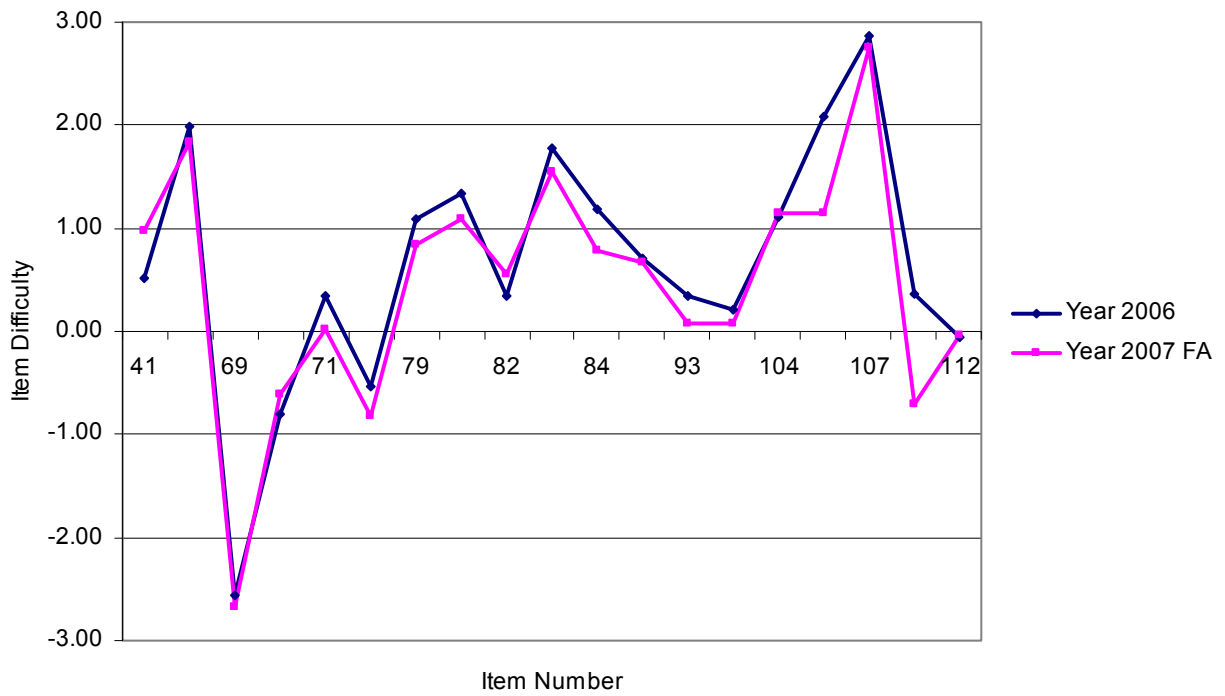
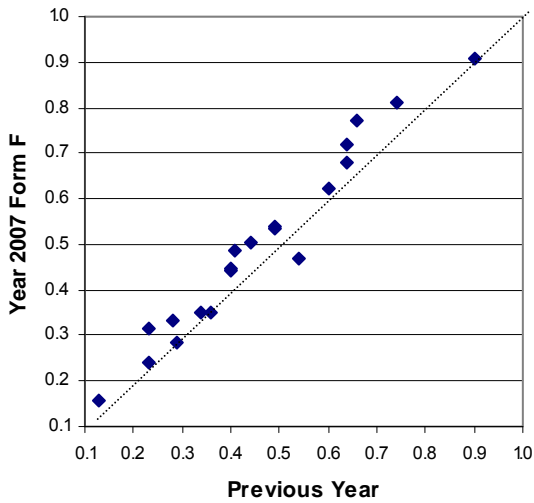


Figure 1.10 Augmented IRT Item Difficulty Comparison Plot for Previous Year vs. Year 2007: Grade 7 Form A

Table 1.64 Augmented Item P-Value Comparison for Previous Year vs. Year 2007: Grade 7 Form F



Item CID	Previous Year	Year 07 Form F
3517706	0.54	0.47
3564025	0.29	0.28
3555861	0.64	0.72
3517679	0.41	0.49
3517740	0.49	0.53
3517741	0.90	0.91
3517812	0.49	0.54
3517695	0.36	0.35
3517729	0.64	0.68
3517757	0.28	0.33
3517693	0.13	0.16
3564028	0.40	0.45
3517752	0.60	0.62
3517885	0.34	0.35
3517715	0.74	0.81
3564030	0.44	0.50
3517758	0.23	0.24
3547487	0.66	0.77
3564031	0.23	0.31
3517756	0.40	0.44

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

Table 1.65 Score-Point Distribution Comparison for Previous Year vs. Year 2007: Grade 7 Form F

Year	Item CID	Item Type	N	Mean	SD	Score-Point Distribution (%)				
						0	1	2	3	Omit
2006	3517706	BCR	3,422	0.54	0.50	36.09	54.47	N/A	N/A	9.44
2006	3564025	BCR	3,422	0.58	0.49	44.24	34.86	11.43	N/A	9.47
2006	3517693	BCR	3,438	0.13	0.34	76.61	12.91	N/A	N/A	10.47
2006	3564028	BCR	3,438	0.80	0.49	24.20	48.78	15.47	N/A	11.55
2006	3517715	BCR	3,422	0.74	0.44	19.46	73.73	N/A	N/A	6.81
2006	3564030	BCR	3,422	0.88	0.36	7.69	11.81	72.82	N/A	7.69
2006	3547487	ECR	13,123	0.66	0.47	26.34	65.77	N/A	N/A	7.89
2006	3564031	ECR	13,123	0.70	0.33	26.59	59.00	5.49	0.14	8.78
2007	3517706	BCR	32,000	0.47	0.50	45.48	46.67	N/A	N/A	7.85
2007	3564025	BCR	32,000	0.57	0.71	48.26	30.38	13.08	N/A	8.28
2007	3517693	BCR	32,000	0.16	0.36	76.92	15.57	N/A	N/A	7.51
2007	3564028	BCR	32,000	0.90	0.70	21.54	49.89	19.95	N/A	8.62
2007	3517715	BCR	32,000	0.81	0.39	17.02	80.97	N/A	N/A	2.01
2007	3564030	BCR	32,000	1.01	0.46	6.94	78.89	10.88	N/A	3.29
2007	3547487	ECR	32,000	0.77	0.42	19.42	77.24	N/A	N/A	3.34
2007	3564031	ECR	32,000	0.94	0.62	16.25	62.26	15.38	0.48	5.63

Table 1.66 Augment IRT Item Difficulty Comparison for Previous Year vs. Year 2007: Grade 7 Form F

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2	Step 2-3
2006	41	3517706	BCR	-0.2503			
2006	42	3564025	BCR	1.3767	-0.9842	0.9842	
2006	44	3555861	SR	-0.9715			
2006	48	3517679	SR	0.6718			
2006	51	3517740	SR	0.1924			
2006	69	3517741	SR	-2.7212			
2006	70	3517812	SR	0.2492			
2006	80	3517695	SPR	0.8441			
2006	81	3517729	SPR	-0.6657			
2006	82	3517757	SPR	1.3453			
2006	83	3517693	BCR	2.6009			
2006	84	3564028	BCR	0.6356	-1.4998	1.4998	
2006	92	3517752	SR	-0.3369			
2006	93	3517885	SR	1.0752			
2006	104	3517715	BCR	-1.4639			
2006	105	3564030	BCR	0.5617	-2.6859	2.6859	
2006	107	3517758	SPR	1.8098			
2006	108	3547487	ECR	-1.0830			
2006	109	3564031	ECR	2.8049	-3.8213	0.685	3.1363
2006	112	3517756	SPR	0.6904			
2007	41	3517706	BCR	0.2566			
2007	42	3564025	BCR	1.4706	-0.8554	0.8554	
2007	44	3555861	SR	-1.1968			
2007	48	3517679	SR	0.2781			
2007	51	3517740	SR	-0.0121			
2007	69	3517741	SR	-3.1184			
2007	70	3517812	SR	-0.1150			
2007	80	3517695	SPR	0.9921			
2007	81	3517729	SPR	-1.0032			
2007	82	3517757	SPR	1.0880			
2007	83	3517693	BCR	2.4839			
2007	84	3564028	BCR	0.4116	-1.5038	1.5038	
2007	92	3517752	SR	-0.5723			
2007	93	3517885	SR	1.0861			
2007	104	3517715	BCR	-1.8006			
2007	105	3564030	BCR	0.1441	-2.9105	2.9105	
2007	107	3517758	SPR	1.7915			
2007	108	3547487	ECR	-1.5658			
2007	109	3564031	ECR	2.1233	-3.8495	0.2592	3.5903
2007	112	3517756	SPR	0.4675			

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

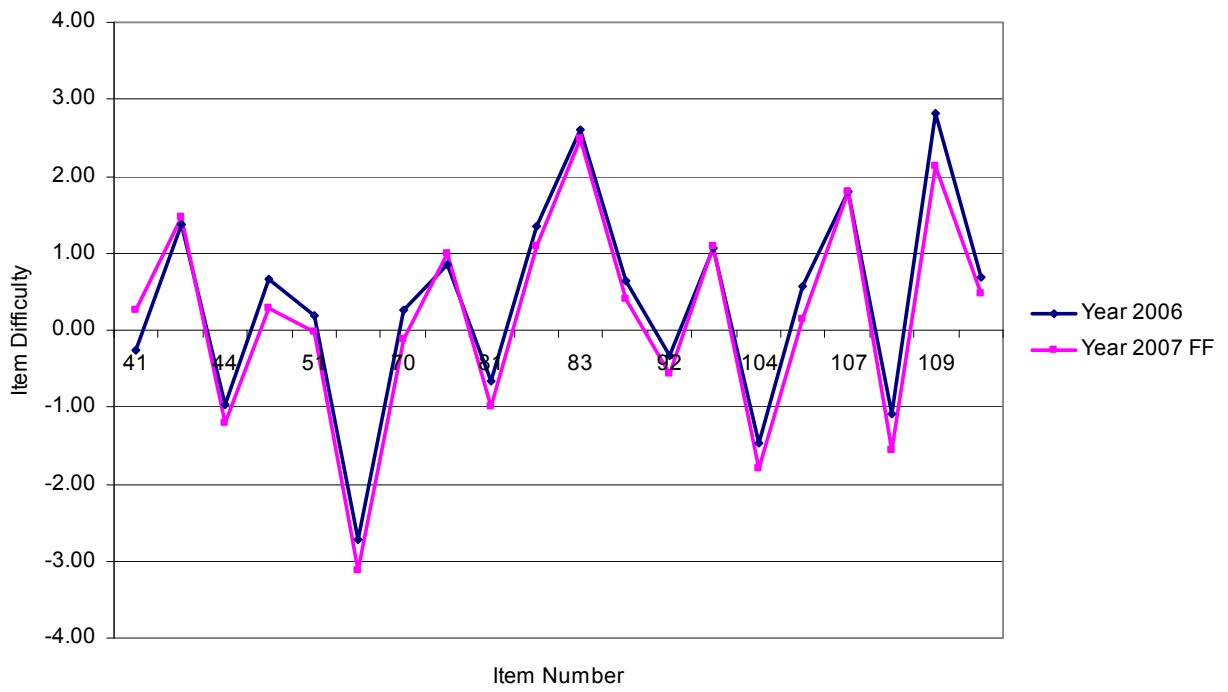
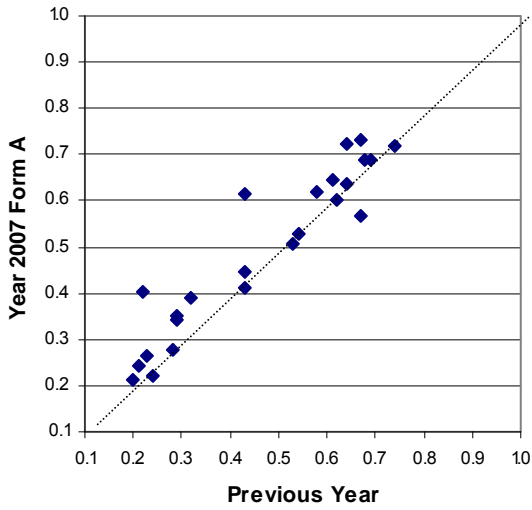


Figure 1.11 Augmented IRT Item Difficulty Comparison Plot for Previous Year vs. Year 2007: Grade 7 Form F

Table 1.67 Augmented Item P-Value Comparison for Previous Year vs. Year 2007: Grade 8 Form A



Item CID	Previous Year	Year 07 Form A
3547550	0.67	0.57
3514702	0.28	0.28
3564108	0.29	0.34
3514276	0.43	0.45
3514127	0.24	0.22
3514125	0.62	0.60
3514121	0.68	0.69
3514139	0.64	0.73
3514611	0.61	0.65
3514608	0.43	0.41
3514287	0.58	0.62
3514267	0.29	0.35
3564110	0.43	0.62
3514275	0.74	0.72
3514279	0.20	0.21
3514131	0.32	0.39
3514607	0.23	0.26
3564112	0.21	0.24
3514118	0.08	0.09
3564113	0.22	0.40
3514291	0.67	0.73
3514606	0.69	0.69
3514669	0.53	0.51
3564114	0.64	0.63
3514710	0.54	0.53

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

Table 1.68 Score-Point Distribution Comparison for Previous Year vs. Year 2007: Grade 8 Form A

Year	Item CID	Item Type	N	Mean	SD	Score-Point Distribution (%)				
						0	1	2	3	Omit
2006	3514702	ECR	3,524	0.28	0.45	60.36	28.04	N/A	N/A	11.61
2006	3564108	ECR	3,524	0.86	0.63	39.87	22.50	9.85	14.76	13.02
2006	3514267	BCR	3,520	0.29	0.46	55.99	29.49	N/A	N/A	14.52
2006	3564110	BCR	3,520	0.86	0.56	24.23	34.57	25.88	N/A	15.31
2006	3514607	ECR	3,478	0.23	0.42	60.93	22.97	N/A	N/A	16.10
2006	3564112	ECR	3,478	0.62	0.57	49.80	12.56	12.77	7.88	16.99
2006	3514118	BCR	3,573	0.08	0.27	83.18	7.70	N/A	N/A	9.12
2006	3564113	BCR	3,573	0.45	0.38	47.52	41.06	1.79	N/A	9.63
2006	3514669	BCR	3,478	0.53	0.50	42.38	52.65	N/A	N/A	4.97
2006	3564114	BCR	3,478	1.27	0.58	17.94	24.93	51.24	N/A	5.89
2007	3514702	ECR	32,836	0.28	0.45	65.83	27.65	N/A	N/A	6.51
2007	3564108	ECR	32,836	1.03	1.13	34.62	26.39	11.53	17.81	9.66
2007	3514267	BCR	32,836	0.35	0.48	61.06	34.98	N/A	N/A	3.96
2007	3564110	BCR	32,836	1.23	0.67	8.73	49.35	36.87	N/A	5.05
2007	3514607	ECR	32,836	0.26	0.44	64.57	26.32	N/A	N/A	9.12
2007	3564112	ECR	32,836	0.73	1.05	49.17	12.90	15.01	10.02	12.89
2007	3514118	BCR	32,836	0.09	0.29	86.62	9.37	N/A	N/A	4.00
2007	3564113	BCR	32,836	0.80	0.49	18.42	72.25	3.99	N/A	5.34
2007	3514669	BCR	32,836	0.51	0.50	41.96	50.51	N/A	N/A	7.53
2007	3564114	BCR	32,836	1.27	0.81	14.37	26.39	50.27	N/A	8.97

Table 1.69 Augment IRT Item Difficulty Comparison for Previous Year vs. Year 2007: Grade 8 Form A

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step	Step	Step
					0-1	1-2	2-3
2006	47	3547550	SR	-1.0816			
2006	58	3514702	ECR	1.0288			
2006	59	3564108	ECR	0.7810	-0.5187	0.4650	0.0537
2006	61	3514276	SPR	0.2970			
2006	62	3514127	SPR	1.3774			
2006	63	3514125	SPR	-0.8524			
2006	64	3514121	SR	-1.0964			
2006	65	3514139	SR	-0.8722			
2006	73	3514611	SPR	-0.6597			
2006	83	3514608	SR	0.3077			
2006	84	3514287	SR	-0.4312			
2006	85	3514267	BCR	0.9172			
2006	86	3564110	BCR	0.0297	-0.8109	0.8109	
2006	88	3514275	SPR	-1.3908			
2006	94	3514279	SPR	1.8130			
2006	96	3514131	SR	0.8165			
2006	98	3514607	ECR	1.3483			
2006	99	3564112	ECR	1.3596	-0.1059	-0.6317	0.7376
2006	102	3514118	BCR	2.9738			
2006	103	3564113	BCR	2.2349	-2.1441	2.1441	
2006	104	3514291	SR	-0.9785			
2006	105	3514606	SR	-1.0884			
2006	113	3514669	BCR	-0.2451			
2006	114	3564114	BCR	-0.8169	-0.2221	0.2221	
2006	116	3514710	SR	-0.2307			
2007	47	3547550	SR	-0.4694			
2007	58	3514702	ECR	1.2761			
2007	59	3564108	ECR	0.6901	-0.7491	0.5272	0.2219
2007	61	3514276	SPR	0.2809			
2007	62	3514127	SPR	1.6861			
2007	63	3514125	SPR	-0.6461			
2007	64	3514121	SR	-1.0563			
2007	65	3514139	SR	-1.3743			
2007	73	3514611	SPR	-0.9362			
2007	83	3514608	SR	0.3422			
2007	84	3514287	SR	-0.8039			
2007	85	3514267	BCR	0.8169			
2007	86	3564110	BCR	-0.9309	-1.4936	1.4936	
2007	88	3514275	SPR	-1.3750			
2007	94	3514279	SPR	1.6979			
2007	96	3514131	SR	0.5831			
2007	98	3514607	ECR	1.2953			
2007	99	3564112	ECR	1.2629	0.1082	-0.8532	0.7450
2007	102	3514118	BCR	2.8471			
2007	103	3564113	BCR	1.0451	-2.7281	2.7281	
2007	104	3514291	SR	-1.4001			
2007	105	3514606	SR	-1.1060			
2007	113	3514669	BCR	-0.1522			
2007	114	3564114	BCR	-0.8897	-0.4608	0.4608	
2007	116	3514710	SR	-0.1424			

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

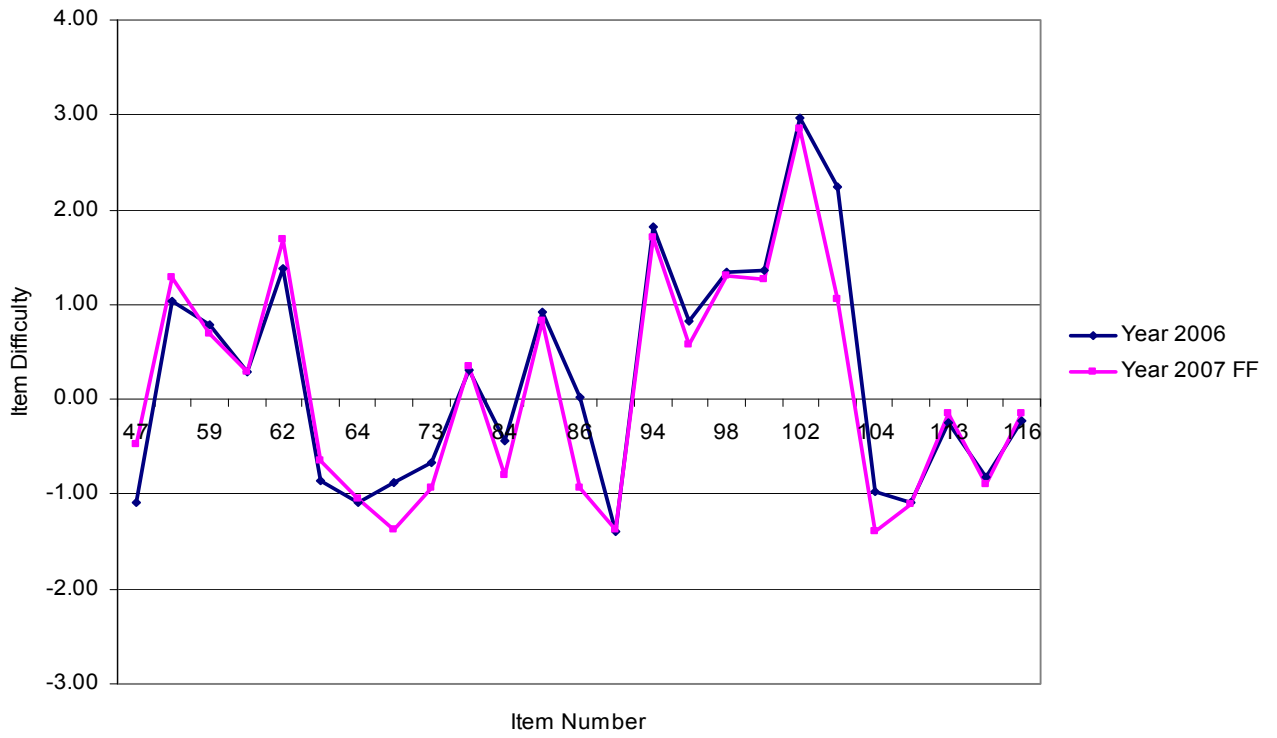
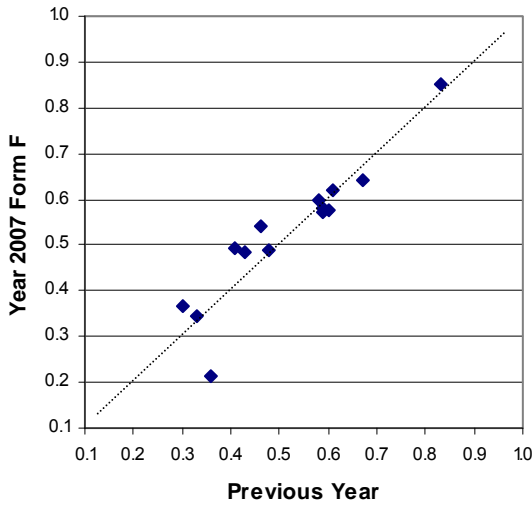


Figure 1.12 Augmented IRT Item Difficulty Comparison Plot for Previous Year vs. Year 2007: Grade 8 Form A

Table 1.70 Augmented Item P-Value Comparison for Previous Year vs. Year 2007: Grade 8 Form F



Item CID	Previous Year	Year 07 Form F
3514283	0.33	0.34
3564116	0.43	0.49
3514122	0.58	0.60
3514281	0.36	0.21
3514138	0.60	0.58
3514708	0.59	0.57
3547550	0.67	0.64
3547551	0.83	0.85
3547547	0.46	0.54
3514288	0.59	0.58
3514611	0.61	0.62
3514133	0.30	0.37
3564121	0.41	0.49
3547536	0.48	0.49

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

Table 1.71 Score-Point Distribution Comparison for Previous Year vs. Year 2007: Grade 8 Form F

Year	Item CID	Item Type	N	Mean	SD	Score-Point Distribution (%)				
						0	1	2	3	Omit
2006	3514283	ECR	3,525	0.33	0.47	55.77	33.42	N/A	N/A	10.81
2006	3564116	ECR	3,525	1.30	0.61	13.73	39.04	16.03	19.63	11.57
2006	3514133	BCR	3,573	0.30	0.46	54.46	29.95	N/A	N/A	15.59
2006	3564121	BCR	3,573	0.83	0.51	19.70	45.51	18.50	N/A	16.29
2007	3514283	ECR	32,480	0.34	0.48	59.90	34.44	N/A	N/A	5.66
2007	3564116	ECR	32,480	1.46	1.00	7.40	46.89	15.97	22.24	7.52
2007	3514133	BCR	32,480	0.37	0.48	54.78	36.53	N/A	N/A	8.70
2007	3564121	BCR	32,480	0.99	0.65	11.68	57.95	20.33	N/A	10.03

Table 1.72 Augment IRT Item Difficulty Comparison for Previous Year vs. Year 2007: Grade 8 Form F

Year	Item Seq. No.	Item CID	Item Type	Item Difficulty	Step 0-1	Step 1-2	Step 2-3
2006	58	3514283	ECR	0.6798			
2006	59	3564116	ECR	-0.0487	-1.6928	0.9468	0.746
2006	64	3514122	SR	-0.5723			
2006	74	3514281	SPR	0.7098			
2006	81	3514138	SR	-0.6746			
2006	94	3514708	SPR	-0.5929			
2006	100	3547550	SR	-1.0816			
2006	101	3547551	SR	-2.1845			
2006	104	3547547	SR	-0.0354			
2006	105	3514288	SR	-0.4589			
2006	112	3514611	SPR	-0.6597			
2006	113	3514133	BCR	0.7426			
2006	114	3564121	BCR	0.0346	-1.3926	1.3926	
2006	116	3547536	SR	-0.1400			
2007	58	3514283	ECR	0.8146			
2007	59	3564116	ECR	-0.2444	-2.2962	1.2817	1.0145
2007	64	3514122	SR	-0.5576			
2007	74	3514281	SPR	1.7603			
2007	81	3514138	SR	-0.4768			
2007	94	3514708	SPR	-0.3665			
2007	100	3547550	SR	-0.4694			
2007	101	3547551	SR	-2.2204			
2007	104	3547547	SR	-0.2056			
2007	105	3514288	SR	-0.4203			
2007	112	3514611	SPR	-0.9362			
2007	113	3514133	BCR	0.6858			
2007	114	3564121	BCR	-0.1650	-1.8706	-1.8706	
2007	116	3547536	SR	-0.0487			

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



Figure 1.13 Augmented IRT Item Difficulty Comparison Plot for Previous Year vs. Year 2007: Grade 8 Form F

1.9 Field Test Analyses

All field test items embedded in operational forms were subjected to rigorous analyses for their properties because these analyses will provide information about which items would be included as operational items in the future. All statistical results concerning field test items were reserved in the 2007 item bank. Information on item bank can be found in section 1.14, Item Bank Construction. 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 all students (i.e., nonfunctional distractor), or selected by a large number of high ability students, with low selection from other ability groupings (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 wrong answer.

BCR and *ECR* 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 was less than .20 or greater than .90.
- An item-total correlation was less than .10.

Any items needed 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 dropping as a possible operational item. If the item represented important content that had not been extensively taught, however, it would be justified to be included in 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 group was Caucasians. The gender focal group was females and the ethnic focal group was African-Americans. Because

the 2007 MSA-Math included both the *SATIO* items and the “Maryland-specific” items on each field test form, the total score as the matching variable consisted of selected SAT items and Maryland-specific items.

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 if the differential difficulty of the item was unfairly related to group membership:

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

For further information about the *DIF* procedures used for the 2007 MSA-Math, please see the section 3.7, *Differential Item Functioning*.

Item Response Theory (IRT) Analyses

To put field test items on the same scale of the operational test items, field test items were calibrated by fixing the parameters of the operational test items within each test form. Then, item difficulties, step difficulties, and fit statistics were stored in the 2007 item bank.

1.10 Linking, Equating, and Scaling Procedures

The 2007 MSA-Math was calibrated, equated, and scaled using Rasch fixed method. It should be noted that only SR items were considered as potential year-to-year linking items.

Stratified Random Sampling Procedures

To select equating samples to conduct linking and equating with, stratified random sampling procedures were used in 2007. To verify that the sample was representative of the statewide examinee population in terms of gender and ethnicity, the distributions of gender and ethnicity in the 2007 sample were compared with the total 2007 MSA population distributions. Appendix A, The 2007 MSA-Math Stratified Random Sampling provides the results of sampling. The results indicated that the calibration sample were representative of the statewide examinee population in terms of gender and ethnicity.

Robust Z Procedures

Robust z values were calculated by the following calculations (South Carolina Department of Education, 2001):

- The mean and standard deviation of the linking pool's item difficulties for each form
- The ratio of the standard deviations between form 1 and the rest of the forms
- The correlation between test form 1 and other test form item difficulties
- The difference between test form 1 and other test form item difficulties for each item in the linking pool
- The mean of the differences calculated above
- The median of the differences
- The interquartile range of the differences
- The robust z for each item in the linking pool where 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 Possible Linking Items

Once the above calculations were made, the following guidelines were taken in determining possible sets of common items to be used for the Rasch equating (SCDE, 2001):

- Do not include those items with an absolute value of robust z exceeding 1.645. In addition, if one difficulty or step from a *SR* item is eliminated from the pool based on robust z , all other difficulties are also removed.
- Do not eliminate more than 20 percent of the pool linking items.
- Consider that the ratio of the standard deviations of the test form 1 and other test form item difficulties should be in the 90 to 110 percent range.
- It is assumed that the correlation of the test form 1 and other test form item difficulties is greater than .95.

The reason to apply these guidelines was to exclude items that changed in difficulty more than the other items.

Form-to-Form Linking Procedures

The stability of Maryland-specific common items appearing on both form A and form B was verified at each grade level:

- Calibrate the two operational test forms separately
- Calculate robust z with Rasch difficulties for form A and form B
- Correlate Rasch difficulties for form A and form B

After examining the robust z and correlations from the two separate calibration, 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

Year 2007 operational form A and form B contained a set of Maryland-specific common items that appeared in previous years including Year 2006. It should be note that the Rasch fixed method was applied to all items to put them on a same scale within each grade.

The stability of the equating common items was evaluated using robust z , correlation coefficients, and standard deviations.

Tables 1.56 through 1.61 included Rasch item difficulties used for calculating robust z values, correlation coefficients, and standard deviations. Figures 1.14 through 1.37 depicts common item difficulty between the previous years and either 2007 form A or B. It should be noted that the item difficulties in 2007 form A or B were obtained from independent calibration, and those in previous years were on a common scale (e.g., linked to 2006 item parameters).

Table 1.73 Common Linking Item Difficulties of Year 2006 vs. Year 2007 MSA-Math: Grade 3

Item Seq. No.	Item CID	Y06 FA	Y07 FA	Item Seq. No.	Item CID	Y06 FF	Y07 FF
43	3509931	0.9627	0.6837	46	3510071	0.9317	0.7153
45	3510009	0.0690	-0.1842	48	3509955	1.8411	1.2869
46	3509953	-1.6881	-1.9647	53	3509964	-0.0360	-0.0539
47	3548054	-1.7100	-1.6588	54	3509966	-0.7332	-1.1353
48	3509955	1.8411	1.1119	55	3509923	0.0147	-0.5749
53	3509964	-0.0360	0.0899	56	3509959	0.8740	0.4752
54	3509966	-0.7332	-1.3466	59	3509926	2.4187	2.2610
55	3509974	1.0359	0.6713	61	3509927	0.4123	-0.1538
56	3509979	-0.0209	-0.6789	62	3509928	-0.6271	-1.2844
57	3509987	0.9682	0.6222	63	3510009	0.0690	-0.1055
61	3510003	-0.4214	-0.7608	64	3510069	2.8084	2.5339
62	3510006	1.2257	0.8755	66	3509929	1.8021	1.3531
63	3548055	-2.4386	-1.9474	67	3509930	-1.9318	-2.2234
64	3510011	0.9634	0.7961	68	3510018	0.2953	-0.1660
66	3510018	0.2953	-0.1075	69	3510027	-0.5906	-1.0539
68	3510023	1.8271	1.5209	70	3510029	-1.3693	-2.4609
69	3510027	-0.5906	-0.9837	72	3510035	-0.6165	-0.7741
70	3510029	-1.3693	-2.1718	78	3510053	-0.2691	-0.6839
71	3510032	-1.0976	-0.9166	79	3509933	-1.2635	-1.2463
72	3510035	-0.6165	-0.9137	80	3510051	1.4814	1.4787
78	3510051	1.4814	1.2881	81	3509962	-0.6247	-1.1088
79	3510053	-0.2691	-0.7478	87	3510062	-0.3652	-0.7752
80	3510055	1.2952	0.8052	88	3510063	0.4861	-0.1525
81	3510058	-0.6059	-0.9048	90	3509935	1.2515	0.5663
87	3510062	-0.3652	-0.7452	93	3510006	1.2257	0.6824
88	3510063	0.4861	-0.1890	100	3548063	-1.4037	-2.0495
90	3510065	-2.1822	-2.2558	105	3509958	-0.3242	-1.0244
91	3510066	0.0425	-0.3184	106	3509961	-1.3667	-1.6120
97	3510071	0.9317	0.6059	107	3510066	0.0425	-0.5789
105	3509958	-0.3242	-0.9357	108	3509938	-1.6759	-1.8554
106	3509961	-1.3667	-1.8030	109	3510070	-2.6459	-3.0487
107	3510068	-0.3305	-0.4760	113	3510041	-1.8190	-1.7124
108	3510069	2.8084	2.2797	114	3510043	0.0444	-0.0284
109	3510070	-2.6459	-3.1687	117	3510044	-0.5231	-0.6076
113	3510041	-1.8190	-1.6254				
114	3510043	0.0444	0.0422				
117	3510044	-0.5231	-0.8977				

Form Statistics	Y06 FA	Y07 FA	Y06 FF	Y07 FF
Mean	-.132	-.441	-.064	-.445
SD	1.276	1.209	1.284	1.304

Comparison of Each Form with Base Form				
Correlation with Base	1.000	.977	1.000	.980
SD Ratio	100%	95%	100%	102%

Mean Diff	N/A	-.309	N/A	-.380
Median Diff	N/A	-.346	N/A	-.406
IQR Diff	N/A	.285	N/A	.387

Based on robust z and item difficulty plot, none of items was dropped from the year-to-year linking item pool.

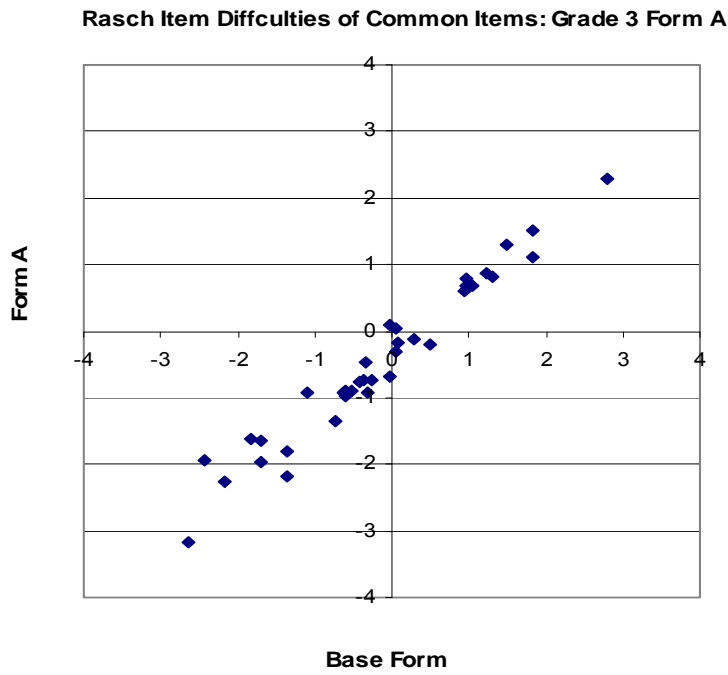


Figure 1.14 Item Difficulty Plot of Base Year Form vs. Current Year Form: Grade 3 Form A

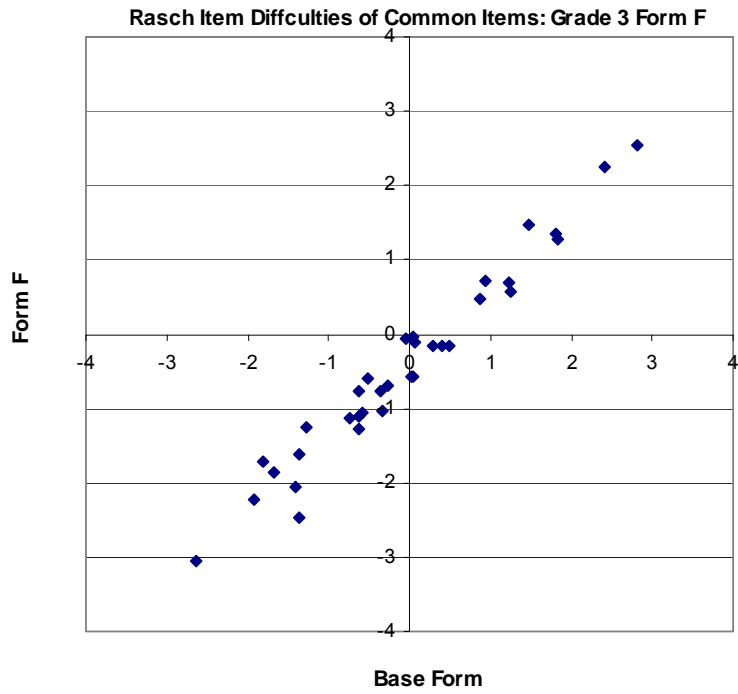


Figure 1.15 Item Difficulty Plot of Base Year Form vs. Current Year Form: Grade 3 Form F

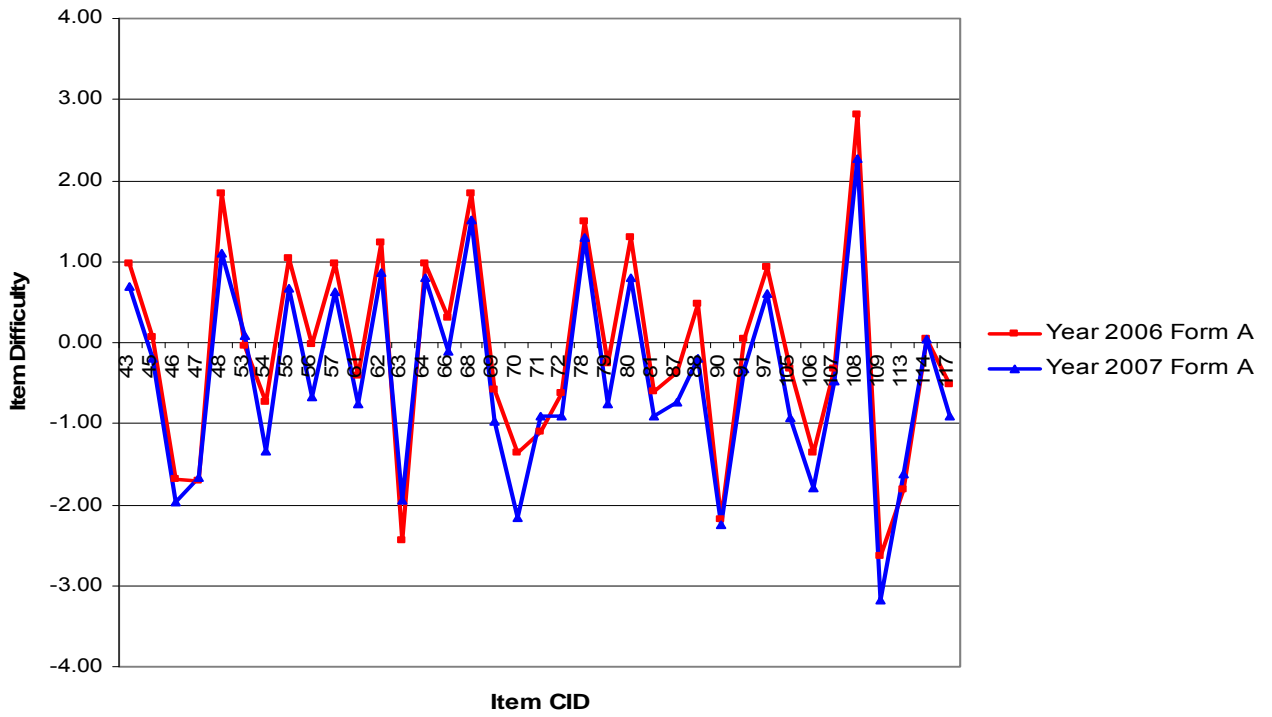


Figure 1.16 Free Calibration Item Difficulty Comparison of Year 2006 vs. Year 2007: Grade 3 Form A

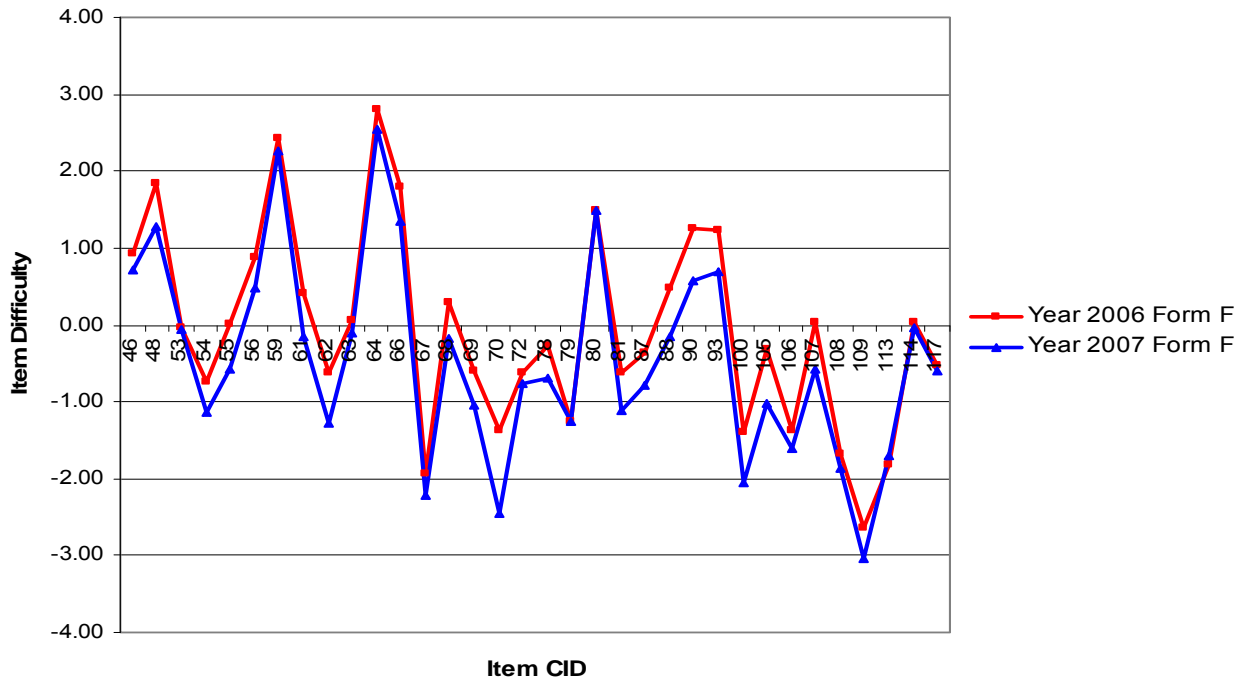


Figure 1.17 Free Calibration Item Difficulty Comparison of Year 2006 vs. Year 2007: Grade 3 Form F

Table 1.74 Common Linking Item Difficulties of Year 2006 vs. Year 2007 MSA-Math: Grade 4

Item Seq. No.	Item CID	Y06 FA	Y07 FA	Item Seq. No.	Item CID	Y06 FF	Y07 FF
43	3515406	0.6241	0.6808	43	3515407	-0.799	-0.9891
44	3515407	-0.799	-1.1104	44	3515596	-0.5201	-0.4596
45	3515408	0.1763	0.1875	45	3515447	1.4979	1.4064
46	3515410	-1.055	-0.7743	46	3515408	0.1763	0.0715
47	3515411	-0.6969	-0.915	47	3515599	0.223	0.0209
48	3515421	-0.6701	-0.8543	48	3515410	-1.055	-0.8837
53*	3515425	0.5403	0.4166	53	3515600	-0.3709	-0.2448
54	3515426	1.6228	1.4429	54	3515601	-0.0452	0.0123
55	3515428	-1.7288	-2.5015	55	3515602	1.0231	0.982
56	3515447	1.4979	1.4194	56	3515428	-1.7288	-2.3651
59	3515604	0.394	0.4531	59	3515604	0.394	0.3731
60	3515456	-0.7475	-0.6217	60	3515605	0.9009	0.9469
61*	3515467	-2.1248	-2.6576	61	3515456	-0.7475	-0.718
63	3515470	0.0797	0.0716	62*	3515467	-2.1248	-2.77
65	3515471	-0.9767	-1.0736	63	3515606	-1.7067	-1.8384
66	3515479	0.0054	-0.0497	65	3515471	-0.9767	-1.2539
67	3515484	-1.7626	-1.8937	67	3515486	0.7468	0.7526
68	3515486	0.7468	0.8056	68	3548078	0.6281	1.1101
69	3515630	0.9291	1.1992	69	3515630	0.9291	1.2086
70	3515631	-0.4674	-0.4493	70	3515631	-0.4674	-0.4745
71	3515490	-1.2672	-1.9834	71	3515632	-0.0118	-0.0831
76	3515514	-1.4725	-1.5693	76	3515634	-0.2435	-0.2938
77	3515519	-0.6898	-0.7244	77	3515635	0.6901	0.6652
78	3515533	-0.7839	-1.0635	79	3515636	0.8456	0.8808
79	3515543	-0.2743	-0.6122	80	3515545	-0.8464	-1.1328
80	3515545	-0.8464	-1.2133	87	3515557	-0.0497	-0.0331
87	3515557	-0.0497	0.1906	88	3515640	1.772	1.3988
88	3515558	2.1761	1.8836	91	3515641	-0.8522	-0.9445
91	3515559	0.1734	-0.0701	92	3515570	0.8666	1.1331
92	3515570	0.8666	1.1297	93	3515571	-0.9395	-1.136
93	3515571	-0.9395	-1.1122	94	3515643	1.757	1.7974
94	3515573	1.3716	1.1774	95	3515645	-0.1355	0.0122
95	3515574	-0.9677	-1.0717	103	3515424	0.7782	0.7214
103*	3515423	-0.2585	-1.6655	104*	3515425	0.5403	-0.1808
104	3515424	0.7782	0.7266	109	3515575	-0.1077	-0.5578
109	3515575	-0.1077	-0.4825	110	3515576	0.5508	0.3789
110	3515576	0.5508	0.5856	117	3515506	-1.2169	-1.4875
116	3515500	-0.3554	0.0348				
117	3515506	-1.2169	-1.5423				
118	3548083	-1.6445	-1.2604				

Form Statistics	Y06 FA	Y07 FA	Y06 FF	Y07 FF
Mean	-.234	-.372	-.017	-.107
SD	1.015	1.132	.968	1.084

Comparison of Each Form with Base Form				
Correlation with Base	1.000	.958	1.000	.976
SD Ratio	100%	112%	100%	112%

Mean Diff	N/A	-.137	N/A	-.091
Median Diff	N/A	-.114	N/A	-.050
IQR Diff	N/A	.305	N/A	.237

Based on robust z and item difficulty plot, item 61 on Form A and item 62 on Form F were dropped from the year-to-year linking item pool because this item appeared on both operational forms. Second, item 103 on Form A was dropped from the year-to-year linking item pool. Finally, item 104 and item 53 were dropped from the year-to-year linking item pool because this item appeared on both operational forms.

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

Comparison of Each Form with Base Form				
Correlation with Base	1.000	.972	1.000	.980
SD Ratio	100%	108%	100%	110%

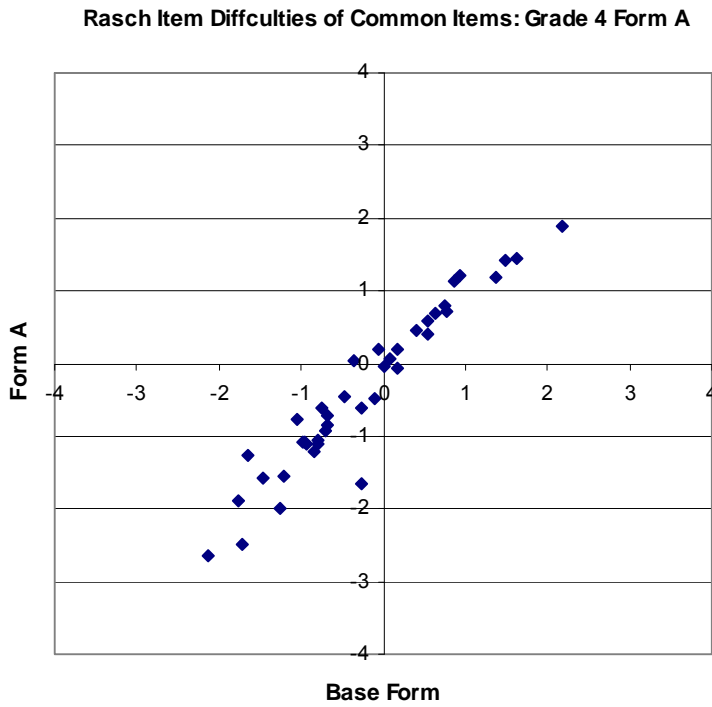


Figure 1.18 Item Difficulty Plot of Base Year Form vs. Current Year Form: Grade 4 Form A

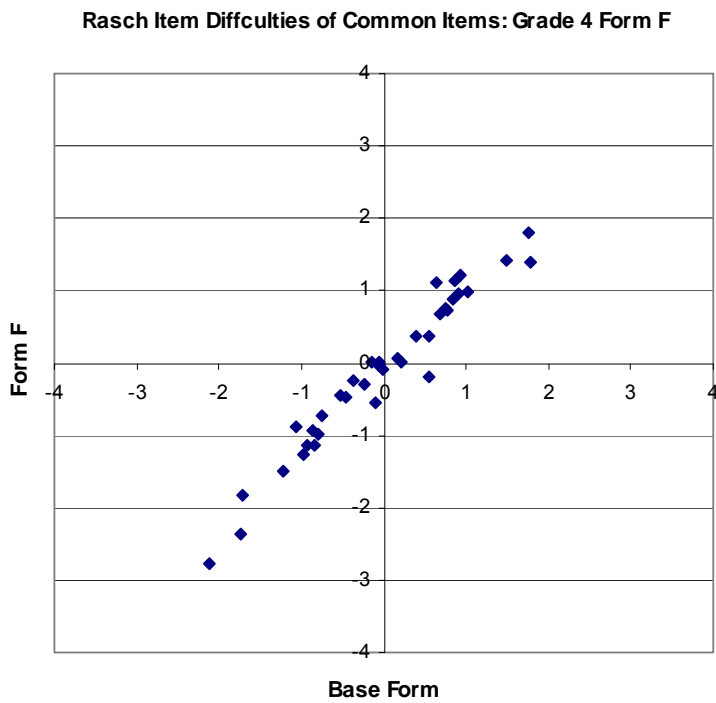


Figure 1.19 Item Difficulty Plot of Base Year Form vs. Current Year Form: Grade 4 Form F

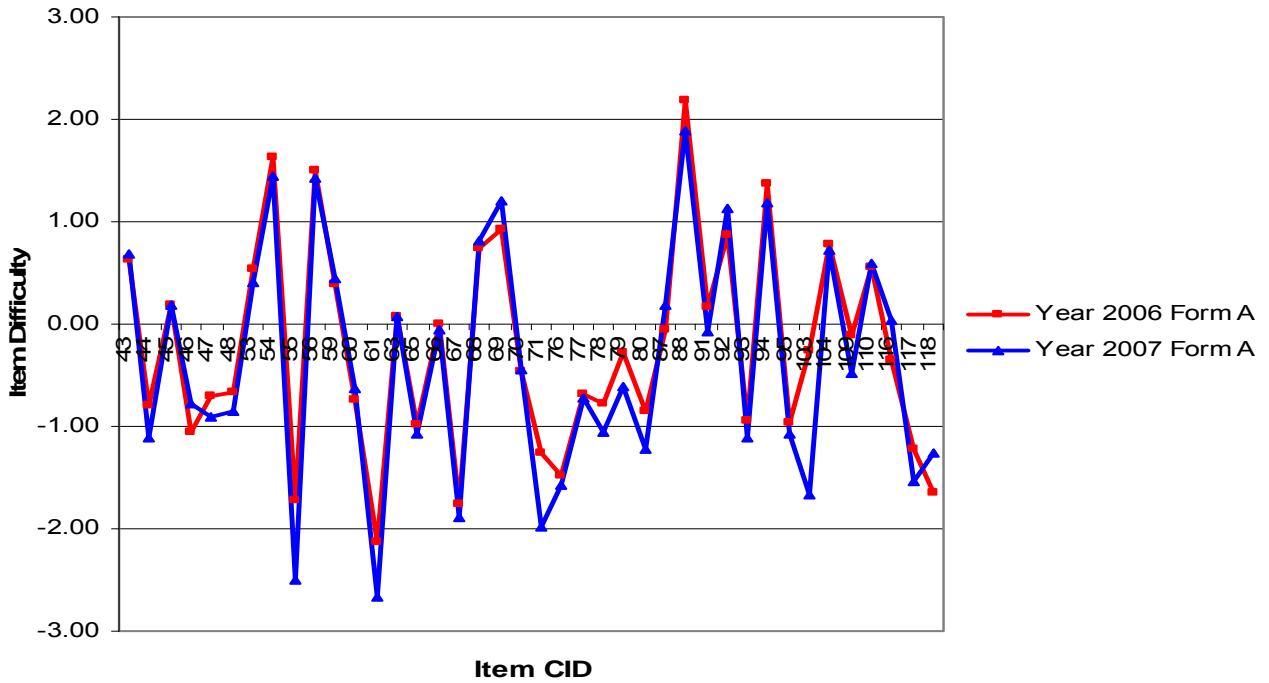


Figure 1.20 Free Calibration Item Difficulty Comparison of Year 2006 vs. Year 2007: Grade 4 Form A

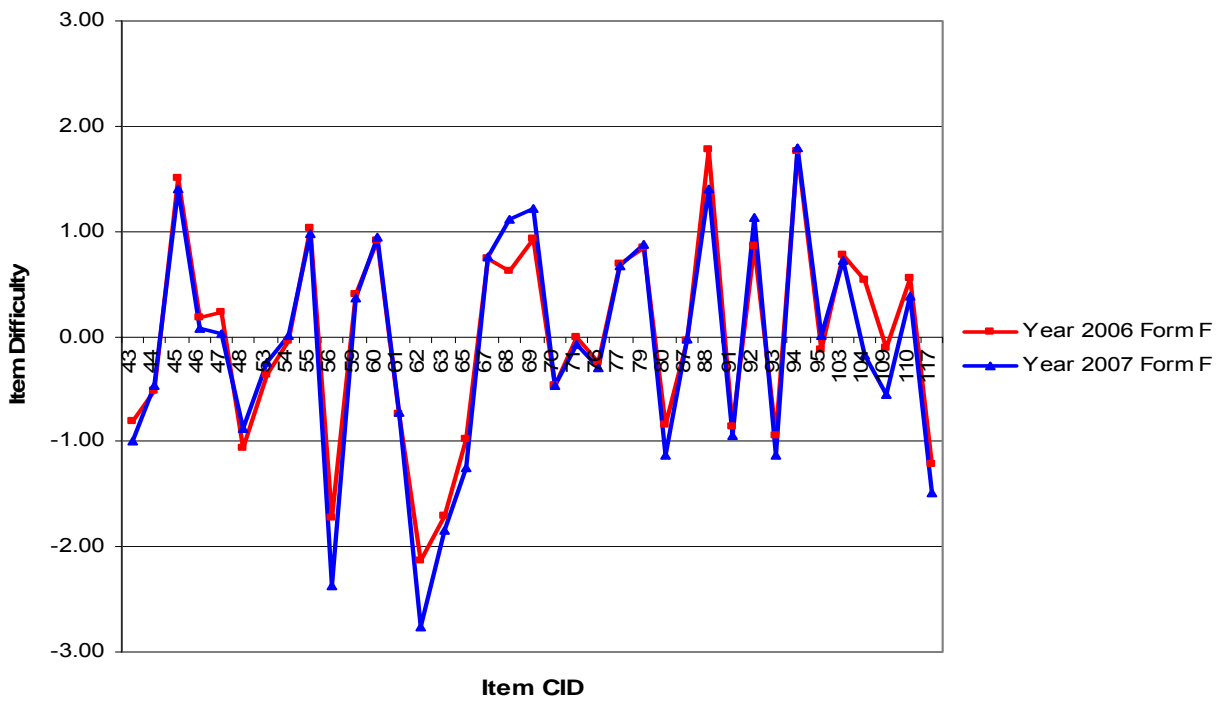


Figure 1.21 Free Calibration Item Difficulty Comparison of Year 2006 vs. Year 2007: Grade 4 Form F

Table 1.75 Common Linking Item Difficulties of Year 2006 vs. Year 2007 MSA-Math: Grade 5

Item Seq. No.	Item CID	Y06 FA	Y07 FA	Item Seq. No.	Item CID	Y06 FF	Y07 FF
43	3511196	0.6094	0.7018	43	3512527	-0.05	0.212
44	3511203	-1.3086	-1.4551	44	3512528	-1.1721	-1.401
45	3511216	0.203	0.0172	46	3511216	0.203	-0.0382
47	3511246	-0.331	-0.6265	47	3511246	-0.331	-0.7657
53	3511307	1.5483	1.473	48	3512529	0.4459	0.5238
54	3511312	1.5795	1.5909	53	3511307	1.5483	1.2787
59	3511339	0.4633	0.2294	54	3511312	1.5795	1.381
60	3511345	-1.6886	-2.1475	59	3512534	0.0331	-0.2011
61	3511348	0.8118	0.5502	60	3511345	-1.6886	-2.3045
63	3511371	0.8516	0.7913	61	3511348	0.8118	0.488
64	3511376	-0.9892	-0.8515	62	3512540	0.4738	0.5593
66	3511396	-1.1516	-1.1272	63	3511371	0.8516	0.5825
67	3511410	-0.0507	0.1043	64	3512543	-0.342	-0.2709
70	3511429	-0.5025	-0.3514	65	3512546	-1.0402	-1.2427
71*	3511433	-2.4669	-3.4859	67	3512553	0.4855	0.4293
72	3511439	-0.5779	-0.7847	70	3511439	-0.5779	-0.6998
82	3511458	-1.7042	-1.9448	71	3511410	-0.0507	-0.2172
83	3511467	-0.9093	-1.3621	72	3511396	-1.1516	-1.1562
85	3511470	-0.6898	-0.9032	82	3512578	-1.362	-1.695
86	3511479	0.6218	0.9952	83	3511467	-0.9093	-1.2808
91	3511504	-1.255	-1.9101	85	3511470	-0.6898	-1.0443
92	3511513	-1.1293	-1.1966	86	3511479	0.6218	0.3728
93	3511521	0.2895	-0.0159	91	3511504	-1.255	-1.6049
99	3511266	0.0148	-0.1144	92	3511513	-1.1293	-1.3747
100	3511320	-1.4191	-1.9041	93	3511521	0.2895	-0.2296
101	3512595	-0.6828	-0.7769	99	3511266	0.0148	-0.2322
104	3511499	0.1746	0.2666	100	3511320	-1.4191	-2.2311
105	3511330	0.6342	0.2373	101	3512595	-0.6828	-0.6063
107	3511269	-1.0845	-0.8993	104	3511499	0.1746	0.1529
111	3511442	0.5383	0.4517	105	3511330	0.6342	0.1631
115	3511448	-0.6839	-0.5046	107	3511269	-1.0845	-0.9209
				111	3511442	0.5383	0.269
				115	3511448	-0.6839	-0.8143

Form Statistics	Y06 FA	Y07 FA	Y06 FF	Y07 FF
Mean	-.332	-.482	-.210	-.422
SD	.992	1.142	.867	.931

Comparison of Each Form with Base Form

Correlation with Base	1.000	.974	1.000	.970
SD Ratio	100%	115%	100%	107%

Mean Diff	N/A	.264	N/A	-.212
Median Diff	N/A	.186	N/A	-.241
IQR Diff	N/A	1.993	N/A	.277

Item 71 on Form A was dropped from the year-to-year linking item pool based on robust z and item difficulty plot.

The following correlation and SD ratio are based on dropping that item:

Comparison of Each Form with Base Form

Correlation with Base	1.000	.974	1.000	.970
SD Ratio	100%	110%	100%	107%

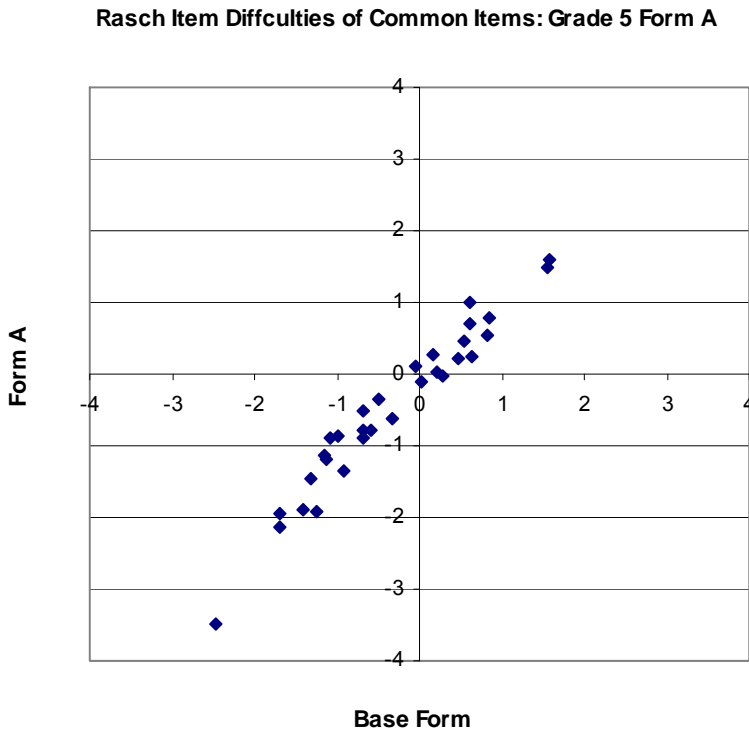


Figure 1.22 Item Difficulty Plot of Base Year Form vs. Current Year Form: Grade 5 Form A

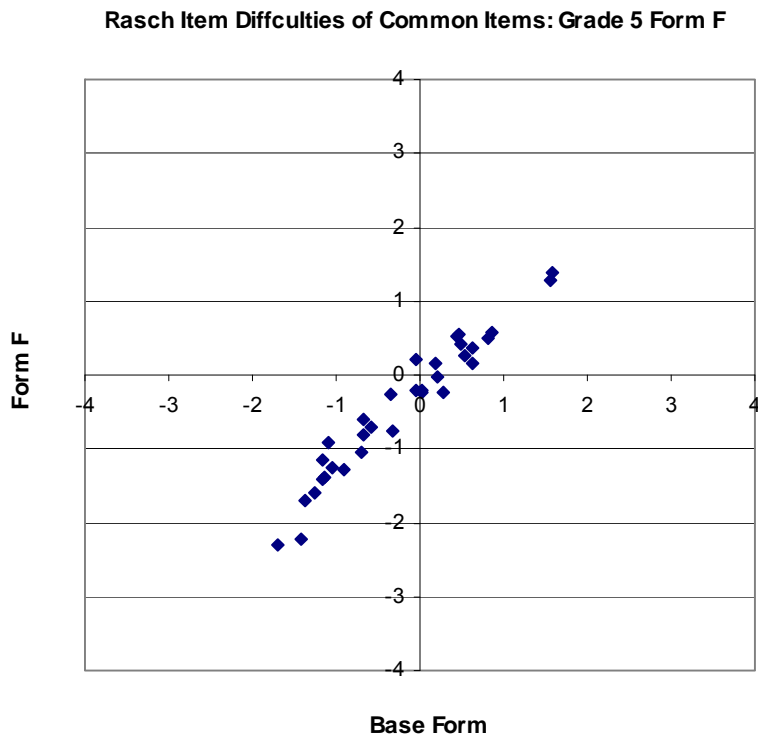


Figure 1.23 Item Difficulty Plot of Base Year Form vs. Current Year Form: Grade 5 Form F

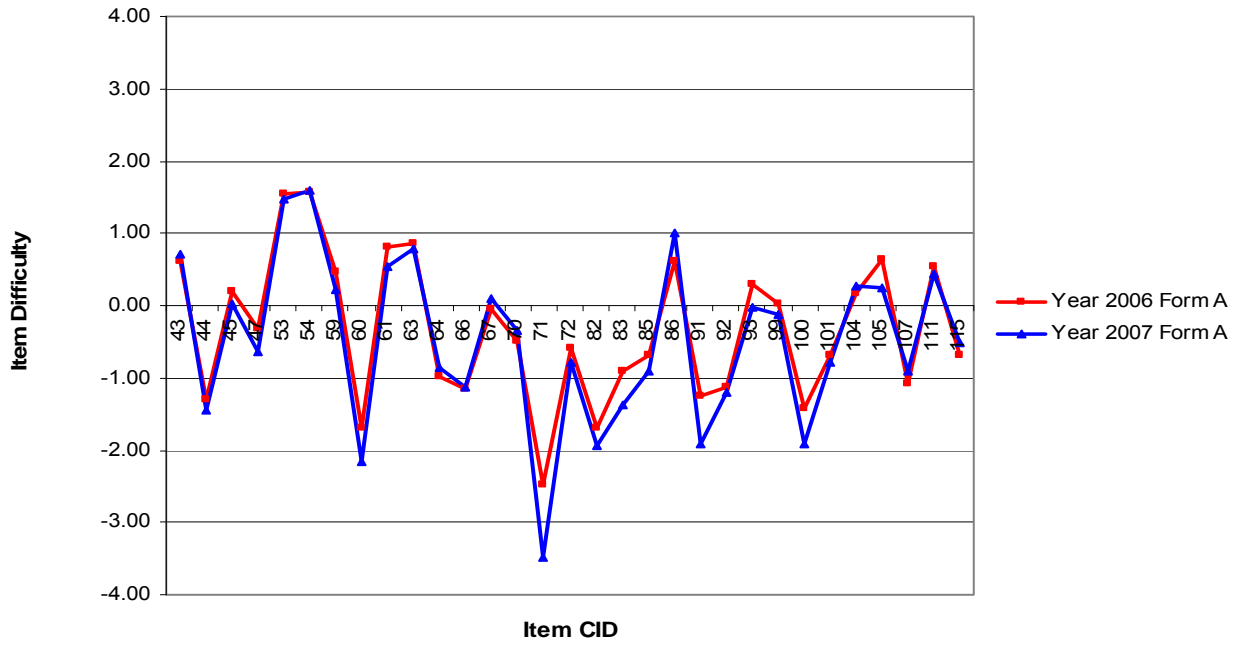


Figure 1.24 Free Calibration Item Difficulty Comparison of Year 2006 vs. Year 2007: Grade 5 Form A

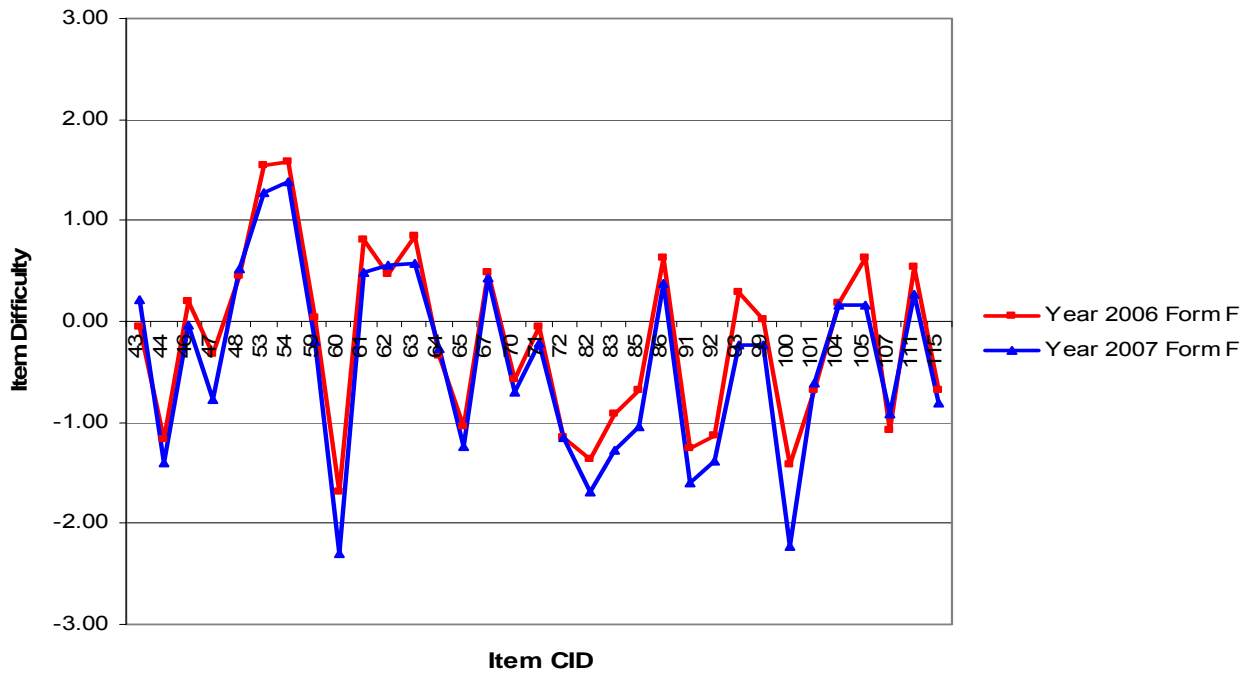


Figure 1.25 Free Calibration Item Difficulty Comparison of Year 2006 vs. Year 2007: Grade 5 Form F

Table 1.76 Common Linking Item Difficulties of Year 2006 vs. Year 2007 MSA-Math: Grade 6

Item Seq. No.	Item CID	Y06 FA	Y07 FA	Item Seq. No.	Item CID	Y06 FF	Y07 FF
41	3516240	0.2409	0.3261	41	3516240	0.2409	0.3147
42	3516241	-1.47	-1.4286	42	3516429	-2.1599	-2.2951
43	3516243	-0.284	-0.4469	43	3516242	1.2969	1.2199
44	3516242	1.2969	1.2646	45	3516243	-0.2844	-0.3867
46	3516248	-0.728	-0.7815	46	3516247	0.3674	0.2915
47	3516247	0.3674	0.3193	47	3516248	-0.7278	-0.6479
48	3516249	-0.409	-0.4048	48	3516451	-0.7288	-0.7314
51	3516255	-0.47	-0.4865	51	3516255	-0.4703	-0.5764
52	3516256	0.135	0.0774	52	3516256	0.135	0.0709
53	3516257	-1.205	-1.3342	53	3516280	0.6666	0.6641
54	3516258	0.3254	0.3466	54	3516453	-0.816	-0.8582
55	3516279	-0.664	-0.6689	55	3516454	-1.1295	-1.1634
56	3516280	0.6666	0.6066	56	3516455	0.5348	0.7063
57	3516281	0.8563	0.9184	58	3516517	1.4277	1.6545
58	3516283	0.9203	0.9967	61	3516559	-1.4432	-1.4389
61	3516285	0.3104	0.3886	62	3516565	0.8786	0.9057
62	3516290	-0.14	-0.2788	63	3516571	1.3093	1.4981
63	3516291	0.6406	0.7515	66	3516291	0.6406	0.8261
66	3516298	1.7544	1.7661	67	3516573	-0.3209	-0.4822
67	3516573	-0.321	-0.5068	68	3516301	-0.2182	-0.5785
68	3516301	-0.218	-0.3874	69	3516302	-0.4092	-0.3939
69	3516302	-0.409	-0.2799	70	3516303	0.658	0.4906
70	3516303	0.658	0.4878	71	3516594	-1.0547	-1.0921
71	3516305	-0.258	-0.305	72	3516313	-1.3362	-1.4039
72	3516307	0.2577	0.0152	73	3516613	0.4071	0.3893
73	3516310	-0.35	-0.4757	76	3516305	-0.2581	-0.3954
76	3516313	-1.336	-1.3814	77	3516320	-1.6189	-2.3998
77	3516318	-1.83	-1.786	86	3516328	-0.7001	-0.6845
86	3516328	-0.7	-0.7878	87	3516293	1.0083	0.844
87	3516293	1.0083	0.8819	88	3516618	1.3357	1.5791
88	3516330	-0.311	-1.082	89	3516621	-1.2026	-0.4359
89	3516331	1.1378	1.0437	94	3516623	-0.7259	-0.5891
94	3516352	-0.834	-0.8714	95	3516624	1.9065	2.1527
95	3516353	0.0893	0.2476	96	3516625	-1.2475	-1.4366
96	3516354	-0.784	-0.6552	97	3516354	-0.7843	-0.7022
97	3516355	-0.185	-0.2654	102	3516332	0.5885	0.4543
102	3516351	0.4777	0.5648	103	3516351	0.4777	0.5405
103	3516332	0.5885	0.5398	104	3516329	0.5144	-0.2431
104	3516329	0.5144	0.0445	105	3516295	0.1004	-0.057
105	3516295	0.1004	-0.0852	114	3516318	-1.8302	-1.5518
114	3516320	-1.619	-2.1421	115	3516323	-0.0894	-0.2161
115	3516323	-0.089	-0.2875				

Form Statistics	Y06 FA	Y07 FA	Y06 FF	Y07 FF
Mean	-.054	-.132	-.123	-.150
SD	.803	.844	.984	1.045

Comparison of Each Form with Base Form				
Correlation with Base	.978	.978	1.000	.971
SD Ratio	100%	105%	100%	106%

Mean Diff	N/A	-.075	N/A	-.024
Median Diff	N/A	-.048	N/A	-.026
IQR Diff	N/A	.171	N/A	.215

Based on robust z and item difficulty plot, item, none of items was dropped from the year-to-year linking item pool.

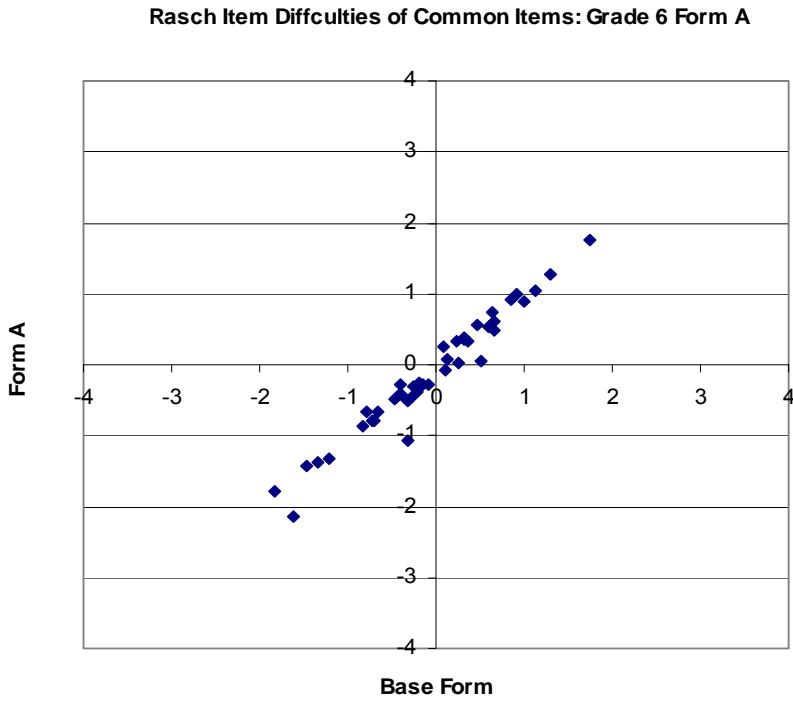


Figure 1.26 Item Difficulty Plot of Base Year Form vs. Current Year Form: Grade 6 Form A

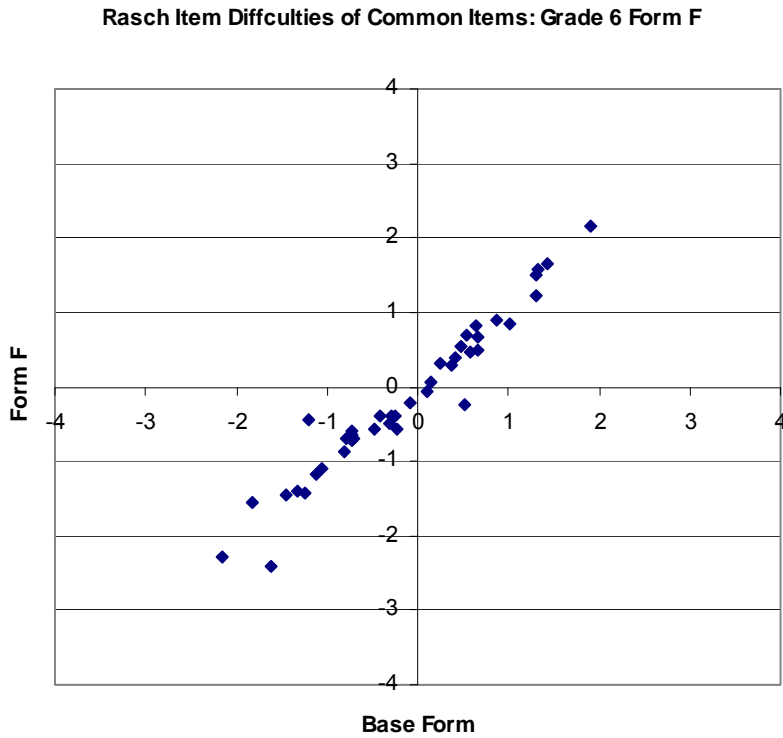


Figure 1.27 Item Difficulty Plot of Base Year Form vs. Current Year Form: Grade 6 Form F

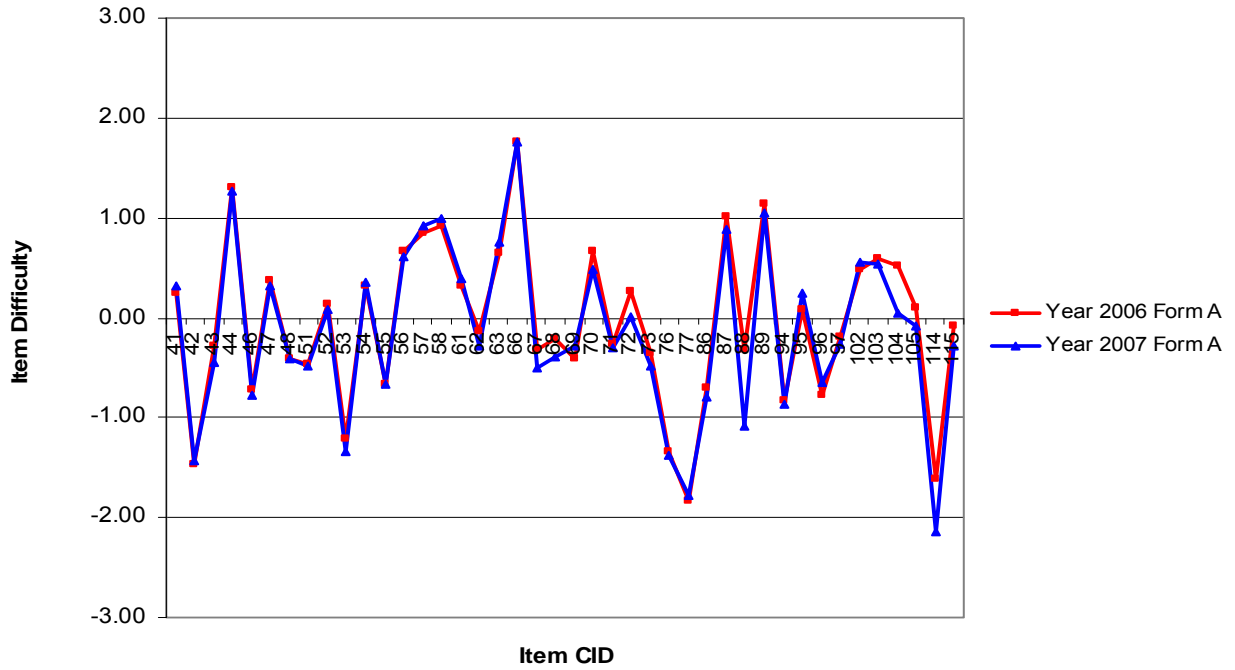


Figure 1.28 Free Calibration Item Difficulty Comparison of Year 2006 vs. Year 2007: Grade 6 Form A

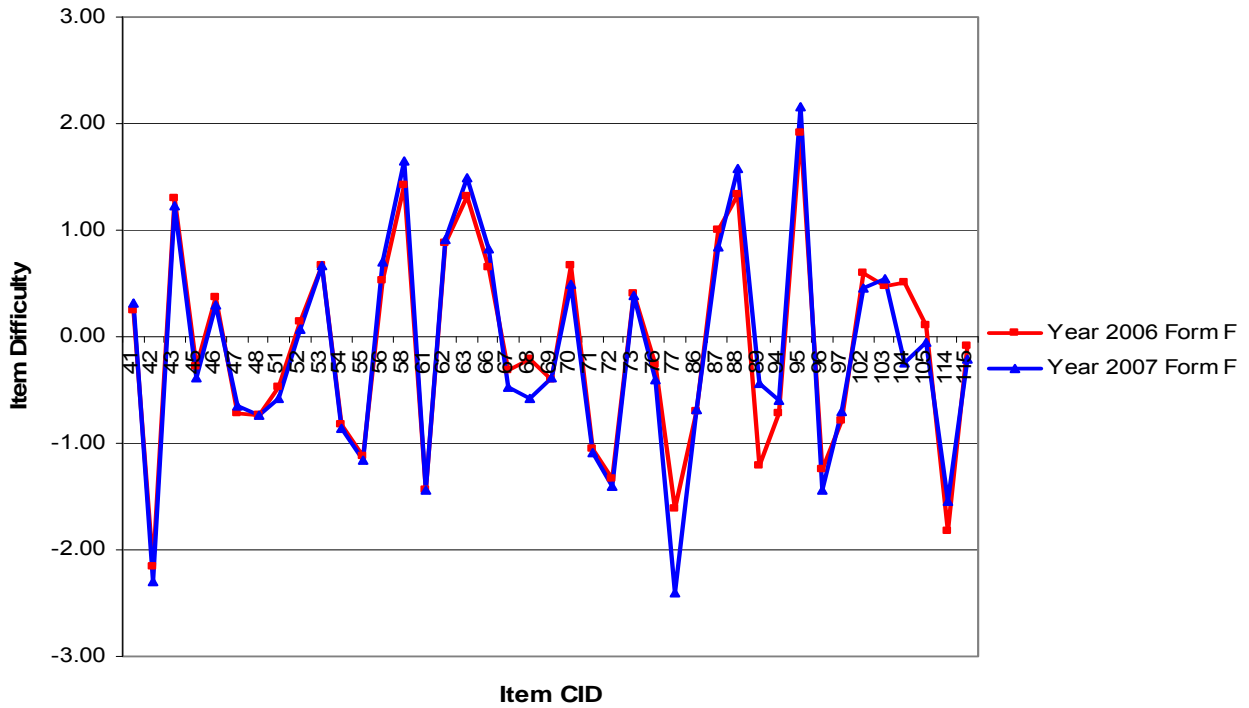


Figure 1.29 Free Calibration Item Difficulty Comparison of Year 2006 vs. Year 2007: Grade 6 Form F

Table 1.77 Common Linking Item Difficulties of Year 2006 vs. Year 2007 MSA-Math: Grade 7

Item Seq. No.	Item CID	Y06 FA	Y07 FA	Item Seq. No.	Item CID	Y06 FF	Y07 FF
43	3517604	1.0539	0.8998	43	3517613	-0.642	-0.4785
44	3517601	0.4455	0.1906	45	3517604	1.0539	1.2557
45	3517609	0.1508	-0.0066	46	3517602	0.7735	0.5138
46	3517613	-0.642	-0.7191	47	3517638	-1.1551	-0.9644
47	3517616	-0.14	-0.3203	49	3517609	0.1508	0.2495
48	3517634	-0.471	-0.7756	50	3517643	-0.6035	-0.7369
49	3517642	0.3982	0.3973	52	3517631	-1.1518	-1.1993
50	3517638	-1.155	-1.1761	53	3517634	-0.4706	-0.5127
51	3517647	-0.662	-1.0126	54	3517665	0.9745	1.1563
52	3517643	-0.604	-1.029	59	3517635	-0.9569	-0.9516
53	3517650	-0.468	-0.5976	60	3517615	-0.7793	-0.9715
54	3517652	-0.636	-1.0265	61	3517637	-1.1275	-1.2431
59	3547473	-1.124	-1.8105	62	3517639	1.4497	1.5914
60	3517663	1.5825	1.3037	71*	3547535	-0.7473	-1.6587
61	3517665	0.9745	0.8688	72	3517687	-0.0583	-0.1884
62	3517667	-0.515	-0.479	73	3517692	-1.4991	-1.6751
72	3517687	-0.058	-0.4005	74	3517694	-1.2172	-1.3918
73	3517692	-1.499	-1.9087	85	3517709	-0.7302	-0.762
74	3517694	-1.217	-1.4742	86	3517712	0.5663	0.459
85	3517709	-0.73	-0.9238	87	3517714	0.0092	-0.1811
86	3517712	0.5663	0.1605	88	3517716	-0.4333	-0.5728
87	3517714	0.0092	-0.3799	89	3517662	0.3081	0.256
88	3517716	-0.433	-0.8327	90	3517721	0.5231	0.5546
89	3517718	-0.296	-0.8678	91	3517664	-1.621	-1.9417
90	3517721	0.5231	0.3243	102	3517650	-0.4683	-0.391
91	3517723	0.6126	0.4626	103	3517652	-0.6359	-0.8357
102	3517656	-0.409	-0.8084	111	3517718	-0.2963	-0.5278
111	3517697	1.2314	0.7277	113	3555859	-1.4603	-1.4769
113	3555859	-1.46	-1.5				

Form Statistics	Y06 FA	Y07 FA	Y06 FF	Y07 FF
Mean	-.171	-.438	-.366	-.451
SD	.810	.839	.831	.923

Comparison of Each Form with Base Form

Correlation with Base	1.000	.977	1.000	.974
SD Ratio	100%	104%	100%	111%

Mean Diff	N/A	-.267	N/A	-.085
Median Diff	N/A	-.257	N/A	-.080
IQR Diff	N/A	.249	N/A	.223

Based on robust z and item difficulty plot, item 71 on Form F was dropped from the year-to-year linking item pool.

The following correlation and SD ratio were calculated after dropping the item:

Comparison of Each Form with Base Form

Correlation with Base	1.000	.977	1.000	.988
SD Ratio	100%	104%	100%	108%

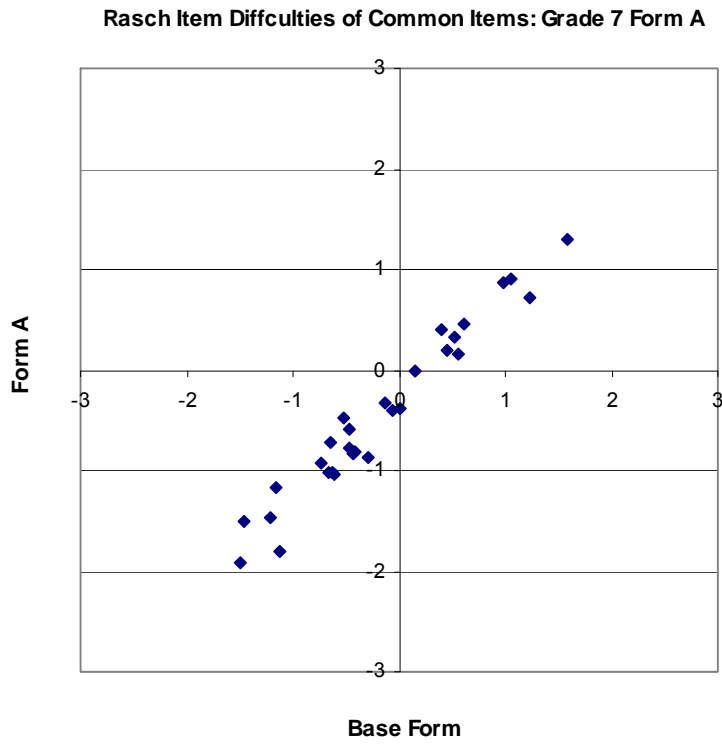


Figure 1.30 Item Difficulty Plot of Base Year Form vs. Current Year Form: Grade 7 Form A

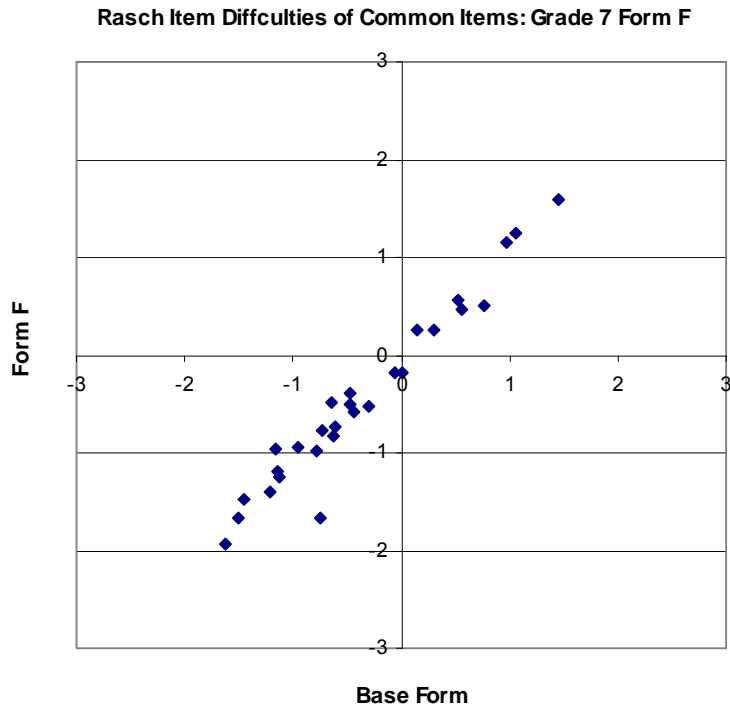


Figure 1.31 Item Difficulty Plot of Base Year Form vs. Current Year Form: Grade 7 Form F

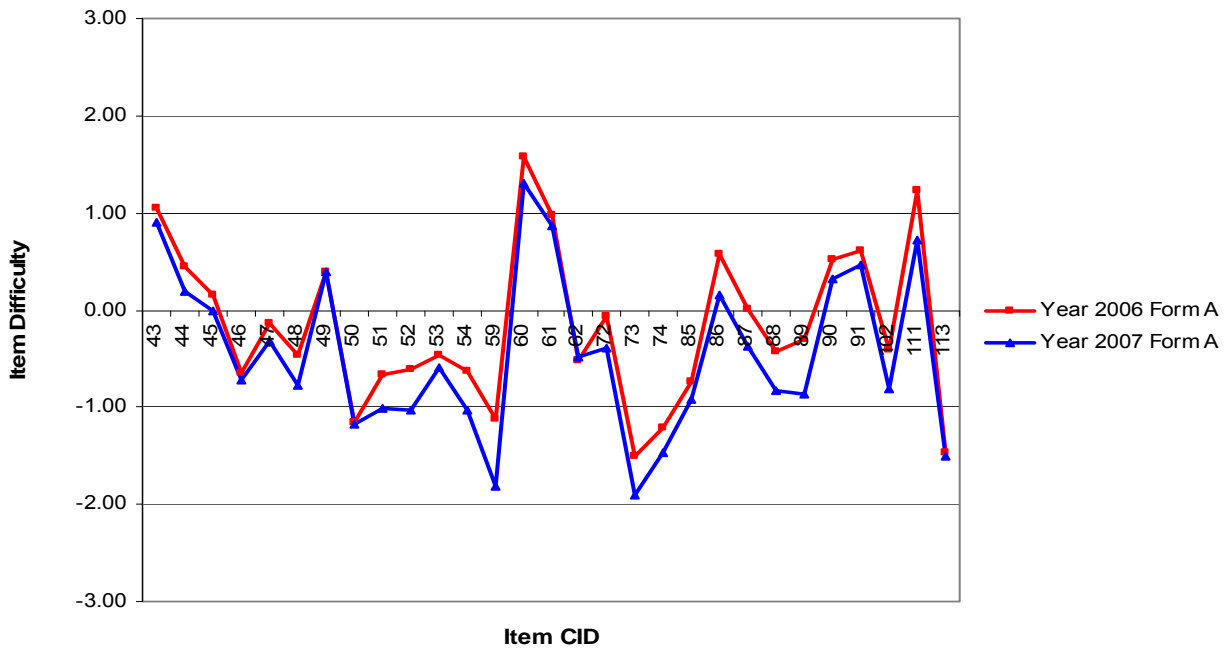


Figure 1.32 Free Calibration Item Difficulty Comparison of Year 2006 vs. Year 2007: Grade 7 Form A

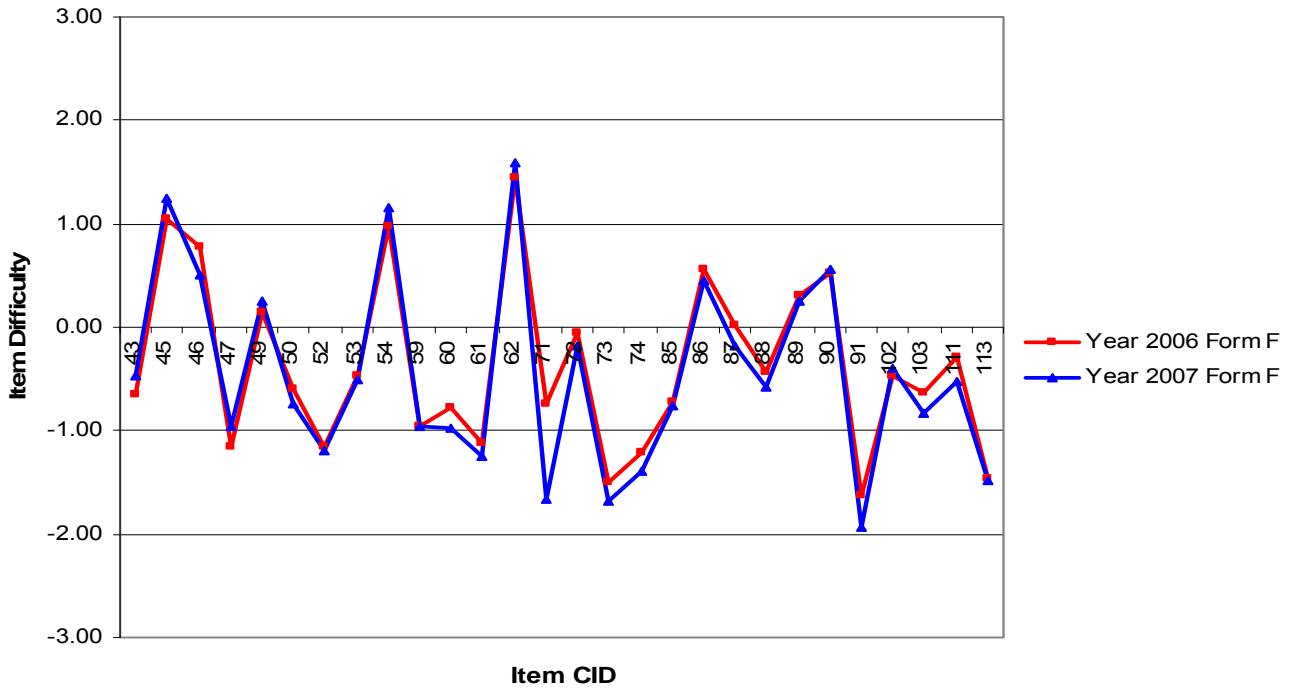


Figure 1.33 Free Calibration Item Difficulty Comparison of Year 2006 vs. Year 2007: Grade 7 Form F

Table 1.78 Common Linking Item Difficulties of Year 2006 vs. Year 2007 MSA-Math: Grade 8

Item Seq. No.	Item CID	Y06 FA	Y07 FA	Item Seq. No.	Item CID	Y06 FF	Y07 FF
41	3514015	1.4965	1.5748	41	3514015	1.4965	1.6124
42	3514014	-0.2177	-0.4332	42	3514014	-0.2177	-0.434
43	3514016	-1.3613	-1.525	43	3514016	-1.3613	-1.6123
44	3514046	-0.1452	-0.266	44	3514055	-0.2581	-0.5373
53*	3514056	-1.4852	-2.1083	47	3514052	-0.1085	-0.1131
54	3514053	-1.2003	-1.3134	53	3514058	1.0306	1.0909
55	3514058	1.0306	1.0853	54	3514062	0.5139	0.37
56	3514059	-0.5815	-0.7848	55	3514059	-0.5815	-0.7641
57	3514062	0.5139	0.3858	56	3514156	-1.4579	-1.4167
66	3514073	-0.4061	-0.412	57*	3514056	-1.4852	-1.3956
67	3514074	0.3257	0.2186	65	3514092	0.2379	0.3826
68	3514075	-0.6275	-0.8553	66	3514075	-0.6275	-0.8298
76	3514092	0.2379	0.2284	67	3514073	-0.4061	-0.273
77	3514102	-0.4851	-0.7808	68	3514076	0.1649	0.0838
78	3514095	1.2102	0.9362	76	3514173	0.0215	-0.1
80	3514093	0.8718	0.7389	77	3514095	1.2102	1.1593
81	3514107	2.3547	2.4035	78	3514174	0.1391	-0.5804
82	3514103	-0.533	-0.8017	80	3514100	-1.0918	-1.2854
97	3514057	-0.938	-0.9027	82	3514213	-0.6097	-0.9327
100	3514055	-0.2581	-0.4687	83	3514103	-0.533	-0.628
101	3514052	-0.1085	-0.2249	84	3547555	-0.5164	-0.2558
106	3514076	0.1649	0.0528	97	3514046	-0.1452	-0.238
107	3514100	-1.0918	-1.6524	106	3514074	0.3257	0.4216
				107	3514102	-0.4851	-0.8236

Form Statistics	Y06 FA	Y07 FA	Y06 FF	Y07 FF
Mean	-.054	-.213	-.198	-.296
SD	.968	1.075	.777	.833

Comparison of Each Form with Base Form				
Correlation with Base	1.000	.991	1.000	.969
SD Ratio	100%	111%	100%	107%

Mean Diff	N/A	-.160	N/A	-.098
Median Diff	N/A	-.128	N/A	-.094
IQR Diff	N/A	.163	N/A	.273

Based on robust z and item difficulty plot, item 53 on Form A was dropped from the year-to-year linking item pool, and item 57 on Form F was also dropped because this item appeared on both operational forms.

The following correlation and SD ratio were calculated after dropping this item:

Comparison of Each Form with Base Form				
Correlation with Base	1.000	.992	1.000	.968
SD Ratio	100%	108%	100%	110%

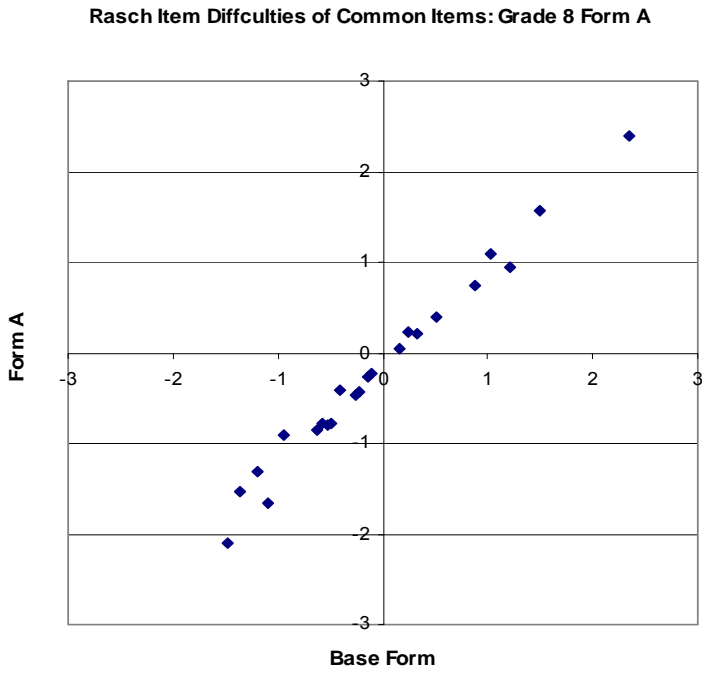


Figure 1.34 Item Difficulty Plot of Base Year Form vs. Current Year Form: Grade 8 Form A

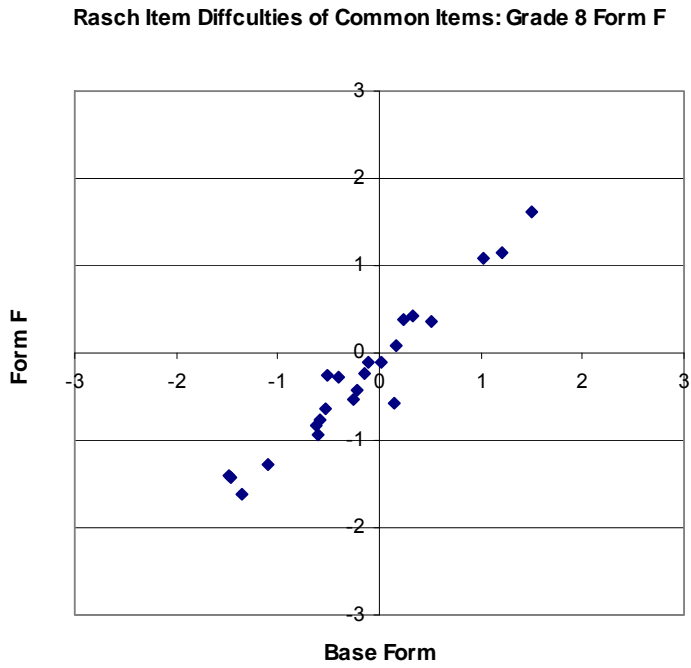


Figure 1.35 Item Difficulty Plot of Base Year Form vs. Current Year Form: Grade 8 Form F

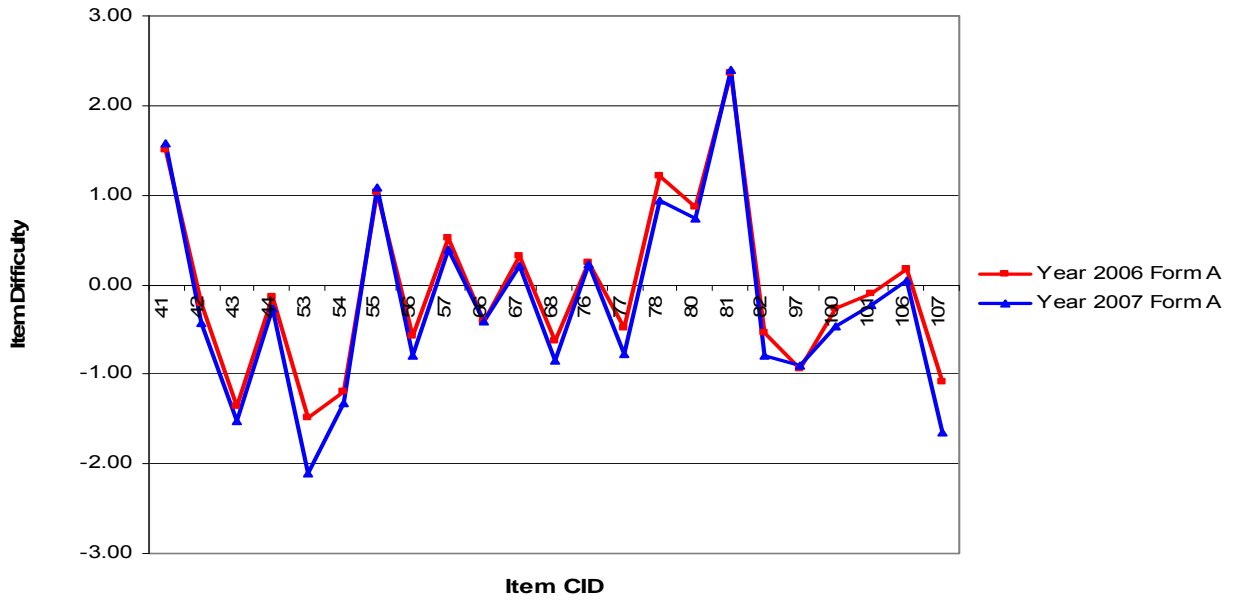


Figure 1.36 Free Calibration Item Difficulty Comparison of Year 2006 vs. Year 2007: Grade 8 Form A

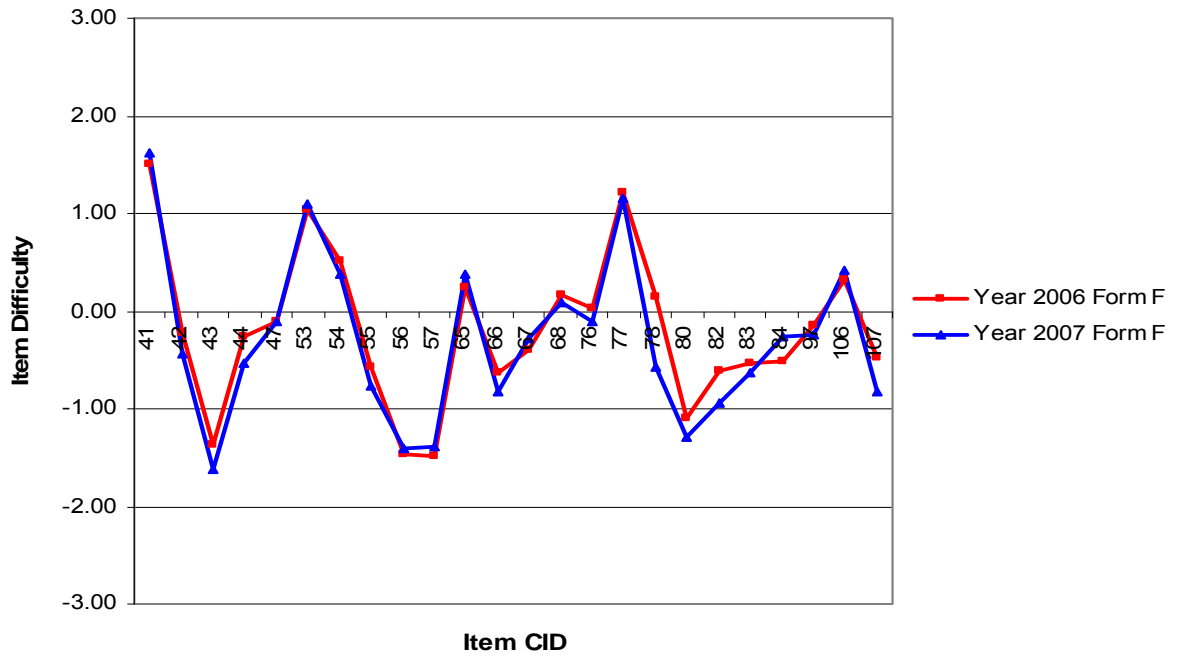


Figure 1.37 Free Calibration Item Difficulty Comparison of Year 2006 vs. Year 2007: Grade 8 Form F

Reporting Scale Scores

In order to facilitate the use and interpretation of the results of the 2007 MSA-Math, MSDE provided Harcourt with specifications about the score scale (Mean = 400, SD = 40, LOSS = 240, HOSS = 650). For grade 4, for example, the following is the formula to convert each student's ability or theta to scale score:

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

$$\text{ReportingSEM} = 32.8398 \cdot \text{SEM}$$

where

theta = the *IRT* ability estimate, and

SEM = the conditional *SEM* of the ability estimate.

Table 1.79 depicts the slope and intercept to use for each grade. It should be noted that these same slopes and intercepts were used for both Year 2006 recalibration and scaling, and Year 2007 scaling.

Table 1.79 The 2007 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

1.11 Score Interpretation

To help provide appropriate interpretation of the 2007 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 1.10, *Linking, Equating, and Scaling*, the 2007 MSA-Math produced scale scores that ranged between 240 and 650. Those scale scores have the same meaning within the same grade, but those scores are not comparable across grade levels.

It should be noted that those scale scores have only simple meaning that higher scale scores represent higher performance in 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 2007 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.

As 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 MSA-Math standard. This level is considered a realistic and rigorous level of achievement. Further information about the 2007 MSA-Math score interpretation can be obtained from MSDE.

1.12 Test Validity

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 on-going 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 2007 MSA-Math, content-related evidence, item development procedures, information on different item functioning (DIF) with respect to 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 2007 MSA-Math blueprints provide extensive evidence regarding the alignment between the content in the 2007 MSA-Math and the *VSC*. The 2007 MSA-Math operational test forms were created from the item bank which contained both operational and field-test items which had been administered as operational items or field-test items in 2006 and before. Information on the item composition of these tests can be obtained from section 1.5, Test Structure of the 2007 MSA-Math. In addition, 2007 MSA-Math blueprints are presented in Appendix E.

Item Development

Test development for MSA-Math is ongoing and continuous. Content specialists, teachers all over Maryland, Harcourt, and MSDE were greatly involved in developing and reviewing test items. Committees such as content review, bias review, and vision review reviewed all of the items which were finally stored in the item bank. Specifically, an internal review by MSDE and Harcourt staff for 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 1.4, Development and Review of the 2007 MSA-Math.

Field testing was conducted within a test window scheduled. Once field-test items were scored, MSDE and Harcourt conducted additional item analysis and content review. Any field-test items

that exhibited statistics that suggested potential problems were carefully reviewed by content specialists within MSDE and Harcourt. A determination was then made as to whether the item should be eliminated or revised and field-tested again. Information on statistical analyses for field test items can be obtained in section 1.9, Field Test Analyses.

Differential Item Functioning (DIF)

1) Bias Review of Field Test Items

A separate Bias Review Committee examined each item on math tests looking for indications of bias that would 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 to either reference or focal groups. For 2007 MSA-Math, males and whites were assigned to the reference group and females and African-Americans were assigned to the focal group.

For SR and SPR items, Harcourt applied Mantel-Haenszel procedure, and standardized mean difference (SMD) and standard deviation (SD) were calculated for BCR and ECR DIF analyses. All items were placed in severity classifications based on Educational Testing Service (ETS) guidelines. More information on DIF analyses can be obtained in section 3.7, Differential Item Functioning.

Evidence from Internal Structure

The 2007 MSA-Math has five math reporting strands: *Algebra, Geometry and Measurement, Statistics and Probability, Numbers and Computations, and Process*. Tables 4.3 through 4.8 show the correlations among the math strands.

1.13 Unidimensionality Analyses

Measurement implies order and magnitude on a single dimension (Andrich, 1989). Consequently, in the case of scholastic achievement, this requires a linear scale to reflect this idea of measurement. Such a test is considered to be unidimensional (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 2007 MSA-Math, polychoric correlation coefficients were computed with *LISREL 8.5* (Jöreskog & Sörbom, 1993) because they were polytomously scored on math tests. Principal component analysis was then applied to produce eigenvalues. The first and the second principal component eigenvalues were compared without rotation. Table 1.80 summarizes the results of the first and second principal component eigenvalues of the 2007 MSA-Math.

In general, the first factor extracted somewhat large amount of eigenvalues across all grades. With regard to factor analysis and eigenvalues, there is one unit of information per item so that the eigenvalues sum to the number of items. The rule of thumb to determine the unidimensionality of a test requires that the eigenvalue of the first component or factor should be at least three times larger than the second one. As can be seen, the size of the eigenvalue of the first component meets the criterion for the unidimensionality. Thus, we can conclude that the assumption of unidimensionality for the 2007 MSA-Math was met.

Table 1.80 The 2007 MSA-Math Eigenvalues between the First and Second Components

Grade	Form	Number of Items	First Eigenvalue	Second Eigenvalue
3	A	64	23.44	2.37
	F	64	23.06	2.62
4	A	64	22.75	2.17
	F	64	22.73	2.21
5	A	65	23.03	2.29
	F	63	20.97	2.17
6	A	62	23.00	2.12
	F	62	21.75	2.34
7	A	62	27.48	2.34
	F	62	26.82	2.38
8	A	62	25.67	2.18
	F	62	24.70	1.93

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. Analyses were conducted based on a whole population.

1.14 Item Bank Construction

The number of test forms to be constructed each year and the need to replace items that would be released to the public necessitated the availability of a large pool of items. The 2007 MSA-Math item bank continues to be maintained by Harcourt as computer files and paper copies. This enables test items to be readily available to both Harcourt and MSDE staff for reference, test construction, test book design, and printing.

Harcourt maintains a computerized statistical item bank to store supporting and identification information on each item. The information stored in this item bank for each item is as follows:

- CID
- Test administration year and season
- Test form
- Grade level
- Item type
- Item stem and options
- Passage code and title
- Subject code and description
- Process code and description
- Standard code and description
- Indicator code and description
- Objective code and description
- Item status
- Item statistics

In terms of Rasch item statistics data, all field test items were calibrated by fixing the parameters of the operational test items within each operational test form. For example, each unique field test items of math test forms A, B, C, D, and E were independently calibrated after fixing the same operational items appearing across the field test forms with the same Rasch difficulties because these field test forms belonged to the same operational form A (e.g., contained the same operational items on each field test form). Then, item difficulties, step difficulties, and fit statistics were stored in the 2007 item bank.

1.15 Quality Control Procedures

A standard quality procedure at Harcourt Assessment, Inc. 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:

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

- Verify data descriptions for accuracy against data file
- Create 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 couldn't 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 Harcourt.

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 expert Harcourt staff prior to release of the information to MSDE.

Upon completion of the processing of all district level data, Harcourt Scoring Operations provided the Quality Assurance Department with a state level data file(s) and state data for review and approval. Harcourt Quality Assurance programmers duplicated all data independently to assure accurate interpretation of the expected results. A series of SAS programs were run on these files to assure 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 are 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. RESULTS OF THE 2007 MSA-MATH

This section provides information about the 2007 MSA-Math results for students in grades 3 through 8. Table 2.1 contains information about the cutoff score of each performance level. Table 2.2 contains the pass rate of each performance level based on the cutoff score. It should be noted that the same cutoff scores had been applied since 2003.

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. These cut scores have been applied since 2003 (grades 3, 5, and 8) and 2004 (grades 4, 6, and 7).

Table 2.2 The 2007 MSA- Mathematics Pass Rates: Grades 3 through 8

Grade	<i>N</i>	Percentage of Performance Level		
		Basic	Proficient	Advanced
3	59,755	21.65	53.63	24.72
4	60,505	14.30	47.90	37.80
5	61,958	21.95	57.44	20.61
6	62,816	28.31	48.23	23.46
7	64,264	38.85	43.26	17.89
8	65,316	43.33	31.72	24.96

Note. Percentages may not add to 100% due to rounding. Percentages are calculated based on raw scores from data files.

Note. Analyses were conducted with a whole population.

3. OVERVIEW OF STATISTICAL SUMMARIES

This section provides general information about statistical and psychometric summaries used for the 2007 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 2007 MSA-Math tests included *SR*, *SPR*, *BCR*, and *ECR* items. Consequently, it was asked to use an adequate reliability coefficient that addressed the important factor, different item type. The following formula depicts the reliability coefficient, *Stratified Cronbach Alpha*:

$$\text{Stratified } a = 1 - \frac{\sum \sigma_i^2 (1 - \rho_{ii'})}{\sigma_t^2}$$

where

σ_i^2 = variance of score on different item type i ,

σ_t^2 = variance of total score, and

$\rho_{ii'}$ = reliability coefficient of score on different item type i .

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 students' 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 Measurement (Based on Item Response Theory)

Under the Rasch model, the *SEM* 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

$$\hat{\beta} \pm SEM$$

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
- Number of items
- 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 (Interquartile Range= Q3-Q1)
- Conditional *standard errors of measurement (SEM)* for the proficient and advanced cut scores

In addition, Appendix A provides frequency distributions and histograms of the scale scores of the 2007 MSA-Math.

3.3 Classical and *IRT* Item Parameters

Appendix D provides both classical and *IRT*-based 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* 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 difficulty estimate
- Standard error of the Rasch difficulty
- Mean-square infit
- Mean-square outfit

Item sequence numbers represents merely those items that were chosen to be in the final "score form."

Fit Statistics for 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 4.39 through 4.44 (pages 200-205) contain information about the scoring agreement between rater 1 and rater 2. 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 differed by two or more score points were in discrepancy. For further information about inter-rater agreement, please see section 1.7, *Scoring Procedures*. For the 2007 MSA-Math, the adjacent agreement rates were above 99%, and perfect agreement rates were above 96% for Step A and above 80% for Step B for all items across all grades.

3.5 Correlations among Mathematics Strands

The 2007 MSA-Math consisted of five reporting strands: *Algebra, Geometry and Measurement, Statistics and Probability, Numbers and Computations, and Process*. Tables 4.3 through 4.8 (pages 147-149) contain correlation coefficients among these math strands.

3.6 Decision Accuracy and Consistency at the Cut Scores

Tables 4.9 through 4.14 (pages 150-151) contain the results of analyses performed to estimate the accuracy and consistency of the decisions for passing (proficient) on the 2007 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 2007 MSA-Math, Tables 4.9 through 4.14 include:

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

The tables illustrated 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 2007 MSA-Math. For the 2007 MSA-Math *DIF* analyses, the *reference* group was either male or Caucasian students, and the *focal* group was either female or African-American students.

Since the 2007 MSA-Math was a mixed-format examination, comprising of both *BCR*, *ECR*, *SR*, and *SRP* items, the *DIF* procedure used consists of Mantel's (1963) extension of the Mantel-Haenszel procedure (the Mantel Chi-square) for the *BCR* and *ECR* items and the Mantel-Haenszel procedure (Mantel & Haenszel, 1959) for the *SR* and *SRP* 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, 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 statistics 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 statistics 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.

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

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) in conjunction with the M-H odds ratio that is transferred to what ETS calls, the delta scale (D).

The Odds Ratio

The odds of a correct response (proportion passing divided by proportion failing) 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:

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

And, 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 4.15 through 4.38 contain the 2007 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 *IRT* 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).

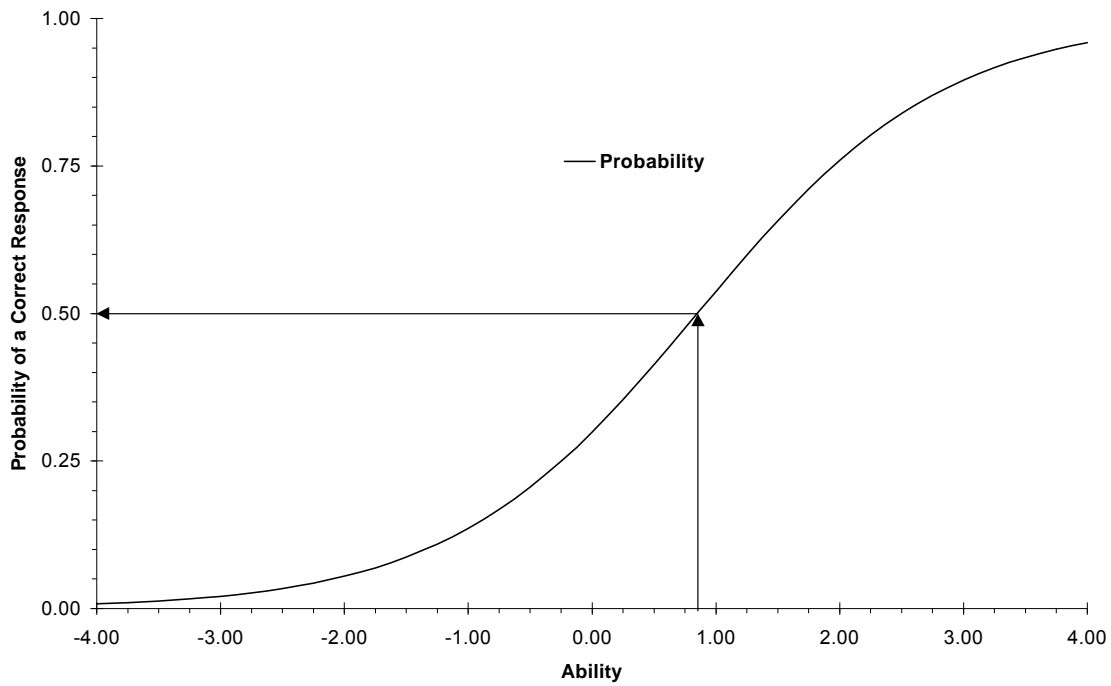


Figure 3.1 Item Characteristic Curve

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).

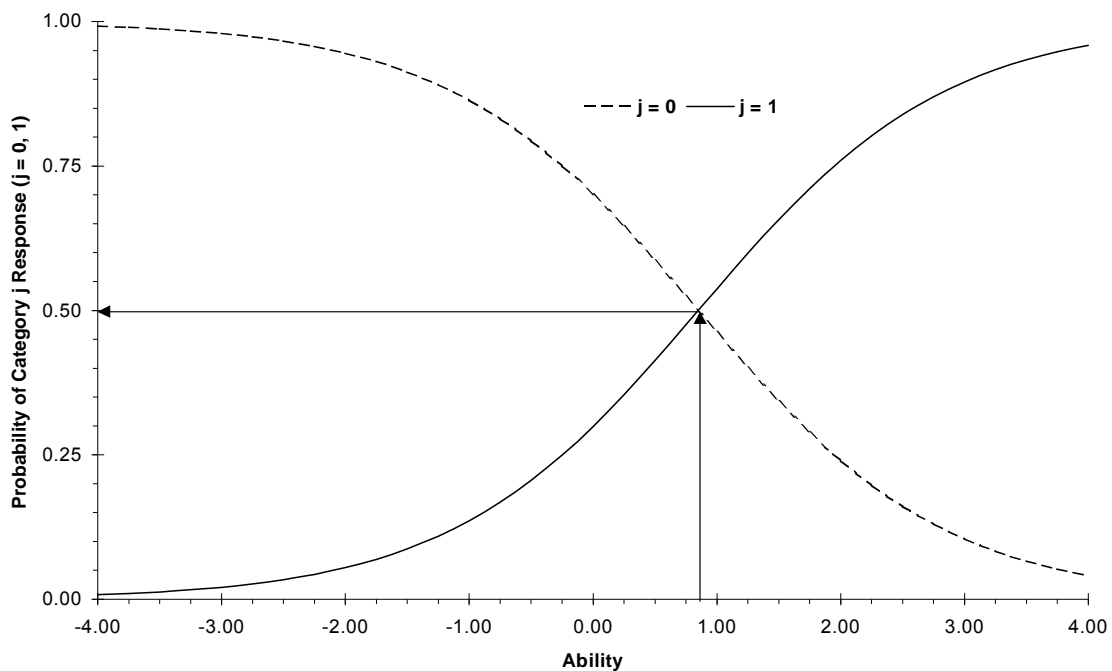


Figure 3.2 Category Response Curves for a One-Step Item

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 (e.g., 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.

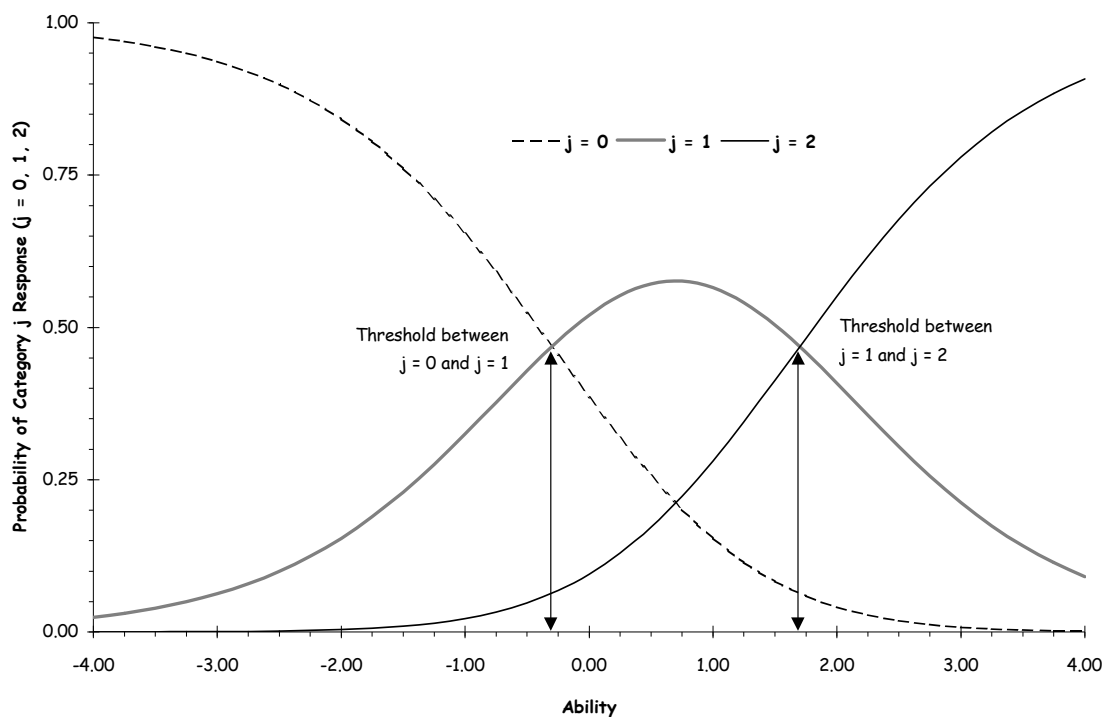


Figure 3.3 Category Response Curves for a Two-Step Item

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: 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 then can 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 *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

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

where

$$x = 0, 1, \dots, m_i, \text{ and by definition, } \sum_{j=0}^0 (\theta - D_{ij}) = 0.$$

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 2007 MSA-MATH STATISTICAL SUMMARY

Table 4.1 The 2007 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	64	29,897	49.47	12.31	0.94	3.12
	F	64	29,858	49.63	11.77	0.93	3.10
4	A	64	30,402	47.21	13.21	0.94	3.26
	F	64	30,103	46.78	13.71	0.94	3.32
5	A	65	31,083	46.26	14.21	0.94	3.45
	F*	63	30,875	43.63	13.43	0.93	3.44
6	A	62	31,558	41.64	15.08	0.95	3.47
	F	62	31,258	41.56	14.24	0.94	3.46
7	A	62	32,264	33.31	16.37	0.96	3.36
	F	62	32,000	36.30	15.82	0.95	3.37
8	A	62	32,836	33.80	16.41	0.95	3.54
	F	62	32,480	34.34	16.53	0.95	3.58

Note. Grade 5 Form F excluded one of BCR items (both Step A and Step B) from the operational form.

Note. Analyses were conducted with a whole population.

Table 4.2 The 2007 MSA-Math Scale Score Descriptive Statistics: Grades 3 through 8

Grade	Form	N	M	SD	P10	Q1	Mdn	Q3	P90	IQR	SEM at Cut-Points	
											Prof.	Adv.
3	A	29,897	411.1	43.5	357	383	413	440	468	57	9	12
	F	29,858	412.5	42.2	360	386	414	442	465	56	9	13
	Overall	59,755	411.8	42.9	357	383	413	440	465	57	N/A	N/A
4	A	30,402	419.9	42.7	366	390	419	450	475	60	9	11
	F	30,103	418.0	42.4	364	388	418	447	476	59	9	10
	Overall	60,505	419.0	42.5	366	390	418	447	475	57	N/A	N/A
5	A	31,083	421.7	39.0	372	395	420	448	470	53	8	10
	F	30,875	422.7	37.3	376	395	421	446	470	51	9	10
	Overall	61,958	422.2	38.2	374	395	421	448	470	53	N/A	N/A
6	A	31,558	419.0	37.9	370	392	418	444	468	52	8	9
	F	31,258	417.8	36.2	373	393	416	442	465	49	8	9
	Overall	62,816	418.4	37.1	372	392	416	444	468	52	N/A	N/A
7	A	32,264	410.3	41.3	361	378	407	440	467	62	8	9
	F	32,000	410.8	41.1	359	379	409	439	465	60	8	9
	Overall	64,264	410.5	41.20	359	379	407	440	467	61	N/A	N/A
8	A	32,836	417.7	38.8	372	388	412	445	471	57	8	8
	F	32,480	417.9	38.0	373	391	414	442	470	51	8	8
	Overall	65,316	417.8	38.4	372	389	414	442	471	53	N/A	N/A

Note. Analyses were conducted with a whole population.

Table 4.3 The 2007 MSA-Math Strand (Cluster) Correlations: Grade 3

Form	N	1	2	3	4	5
Form A						
1. Algebra	29,897	1.00				
2. Geometry and Measurement	29,897	0.72	1.00			
3. Statistics and Probability	29,897	0.71	0.72	1.00		
4. Numbers and Computation	29,897	0.74	0.75	0.75	1.00	
5. Process	29,897	0.68	0.68	0.67	0.71	1.00
Form F						
1. Algebra	29,858	1.00				
2. Geometry and Measurement	29,858	0.69	1.00			
3. Statistics and Probability	29,858	0.71	0.66	1.00		
4. Numbers and Computation	29,858	0.74	0.73	0.73	1.00	
5. Process	29,858	0.64	0.67	0.64	0.70	1.00

Note. Analyses were conducted with a whole population.

Table 4.4 The 2007 MSA-Math Strand (Cluster) Correlations: Grade 4

Form	N	1	2	3	4	5
Form A						
1. Algebra	30,402	1.00				
2. Geometry and Measurement	30,402	0.70	1.00			
3. Statistics and Probability	30,402	0.74	0.72	1.00		
4. Numbers and Computation	30,402	0.72	0.70	0.74	1.00	
5. Process	30,402	0.71	0.70	0.74	0.70	1.00
Form F						
1. Algebra	30,103	1.00				
2. Geometry and Measurement	30,103	0.70	1.00			
3. Statistics and Probability	30,103	0.75	0.74	1.00		
4. Numbers and Computation	30,103	0.74	0.71	0.74	1.00	
5. Process	30,103	0.72	0.71	0.76	0.71	1.00

Note. Analyses were conducted with a whole population.

Table 4.5 The 2007 MSA-Math Strand (Cluster) Correlations: Grade 5

Form	N	1	2	3	4	5
Form A						
1. Algebra	31,083	1.00				
2. Geometry and Measurement	31,083	0.69	1.00			
3. Statistics and Probability	31,083	0.74	0.70	1.00		
4. Numbers and Computation	31,083	0.74	0.74	0.74	1.00	
5. Process	31,083	0.74	0.76	0.75	0.76	1.00
Form F						
1. Algebra	30,875	1.00				
2. Geometry and Measurement	30,875	0.68	1.00			
3. Statistics and Probability	30,875	0.71	0.70	1.00		
4. Numbers and Computation	30,875	0.72	0.72	0.72	1.00	
5. Process	30,875	0.70	0.77	0.71	0.74	1.00

Note. Analyses were conducted with a whole population.

Table 4.6 The 2007 MSA-Math Strand (Cluster) Correlations: Grade 6

Form	N	1	2	3	4	5
Form A						
1. Algebra	31,558	1.00				
2. Geometry and Measurement	31,558	0.74	1.00			
3. Statistics and Probability	31,558	0.75	0.72	1.00		
4. Numbers and Computation	31,558	0.78	0.74	0.74	1.00	
5. Process	31,558	0.80	0.77	0.77	0.78	1.00
Form F						
1. Algebra	31,258	1.00				
2. Geometry and Measurement	31,258	0.69	1.00			
3. Statistics and Probability	31,258	0.73	0.68	1.00		
4. Numbers and Computation	31,258	0.75	0.70	0.72	1.00	
5. Process	31,258	0.77	0.75	0.76	0.77	1.00

Note. Analyses were conducted with a whole population.

Table 4.7 The 2007 MSA-Math Strand (Cluster) Correlations: Grade 7

Form	N	1	2	3	4	5
Form A						
1. Algebra	32,264	1.00				
2. Geometry and Measurement	32,264	0.78	1.00			
3. Statistics and Probability	32,264	0.79	0.77	1.00		
4. Numbers and Computation	32,264	0.82	0.79	0.77	1.00	
5. Process	32,264	0.78	0.79	0.79	0.75	1.00
Form F						
1. Algebra	32,000	1.00				
2. Geometry and Measurement	32,000	0.78	1.00			
3. Statistics and Probability	32,000	0.78	0.76	1.00		
4. Numbers and Computation	32,000	0.79	0.77	0.76	1.00	
5. Process	32,000	0.78	0.79	0.81	0.75	1.00

Note. Analyses were conducted with a whole population.

Table 4.8 The 2007 MSA-Math Strand (Cluster) Correlations: Grade 8

Form	N	1	2	3	4	5
Form A						
1. Algebra	32,836	1.00				
2. Geometry and Measurement	32,836	0.75	1.00			
3. Statistics and Probability	32,836	0.78	0.73	1.00		
4. Numbers and Computation	32,836	0.78	0.73	0.75	1.00	
5. Process	32,836	0.85	0.79	0.81	0.77	1.00
Form F						
1. Algebra	32,480	1.00				
2. Geometry and Measurement	32,480	0.73	1.00			
3. Statistics and Probability	32,480	0.77	0.69	1.00		
4. Numbers and Computation	32,480	0.79	0.71	0.76	1.00	
5. Process	32,480	0.83	0.76	0.79	0.76	1.00

Note. Analyses were conducted with a whole population.

Table 4.9 The 2007 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	0.03	0.03	0.92
	<i>BP : A</i>	0.93	0.04	0.03	0.91
F	<i>B : PA</i>	0.94	0.03	0.04	0.91
	<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 2007 MSA- Mathematics Decision Accuracy and Consistency Indices: Grade 4

Form	Performance Cut	Accuracy	False Positive	False Negative	Consistency
A	<i>B : PA</i>	0.95	0.02	0.03	0.93
	<i>BP : A</i>	0.93	0.04	0.04	0.90
F	<i>B : PA</i>	0.95	0.02	0.03	0.93
	<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 4.11 The 2007 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	0.04	0.91
	<i>BP : A</i>	0.95	0.03	0.02	0.93
F	<i>B : PA</i>	0.94	0.03	0.03	0.91
	<i>BP : A</i>	0.94	0.03	0.02	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 2007 MSA- Mathematics Decision Accuracy and Consistency Indices: Grade 6

Form	Performance Cut	Accuracy	False Positive	False Negative	Consistency
A	<i>B : PA</i>	0.94	0.03	0.03	0.91
	<i>BP : A</i>	0.95	0.03	0.02	0.93
F	<i>B : PA</i>	0.93	0.03	0.04	0.90
	<i>BP : A</i>	0.94	0.03	0.02	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 2007 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	0.91
	<i>BP : A</i>	0.96	0.02	0.02	0.95
F	<i>B : PA</i>	0.94	0.03	0.03	0.91
	<i>BP : A</i>	0.96	0.02	0.02	0.94

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

Table 4.14 The 2007 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	0.03	0.90
	<i>BP : A</i>	0.95	0.02	0.02	0.93
F	<i>B : PA</i>	0.93	0.03	0.04	0.90
	<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 4.15 The 2007 MSA-Math Total Raw Score to Scale Score Conversion Table: Grade 3 Form A

Form A				
Raw Score	Scale Score (SS)	Standard Error (SEM)	SS - 1SEM	SS + 1SEM
0	240 ^a	47	240 ^a	240 ^a
1	240 ^a	33	240 ^a	240 ^a
2	240 ^a	24	240 ^a	247
3	240 ^a	20	240 ^a	258
4	249	18	240 ^a	267
5	258	16	242	274
6	265	15	250	280
7	272	14	258	286
8	277	13	264	290
9	283	13	270	296
10	287	12	275	299
11	292	12	280	304
12	296	12	284	308
13	300	11	289	311
14	304	11	293	315
15	308	11	297	319
16	311	11	300	322
17	314	10	304	324
18	318	10	308	328
19	321	10	311	331
20	324	10	314	334
21	327	10	317	337
22	330	10	320	340
23	332	10	322	342
24	335	10	325	345
25	338	9	329	347
26	341	9	332	350
27	343	9	334	352
28	346	9	337	355
29	349	9	340	358
30	351	9	342	360
31	354	9	345	363
32	357	9	348	366
33	359	9	350	368
34	362	9	353	371
35	364	9	355	373
36	367	9	358	376
37	369	9	360	378
38	372	9	363	381
39	375	9	366	384
40	377	9	368	386
41	380	9	371	389
42	383	9	374	392
43	385	9	376	394
44	388	10	378	398
45	391	10	381	401

<u>Form A</u>				
Raw Score	Scale Score (SS)	Standard Error (SEM)	SS - 1SEM	SS + 1SEM
46	394	10	384	404
47	397	10	387	407
48	400	10	390	410
49	403	10	393	413
50	406	10	396	416
51	409	10	399	419
52	413	10	403	423
53	416	11	405	427
54	420	11	409	431
55	423	11	412	434
56	427	11	416	438
57	431	12	419	443
58	435	12	423	447
59	440	12	428	452
60	445	13	432	458
61	450	13	437	463
62	455	14	441	469
63	461	14	447	475
64	468	15	453	483
65	475	16	459	491
66	483	17	466	500
67	493	19	474	512
68	505	21	484	526
69	521	25	496	546
70	547	34	513	581
71	571	47	524	618

Note. ^aLOSS was set to 240.

Table 4.16 The 2007 Total MSA-Math Total Raw Score to Scale Score Conversion Table: Grade 3 Form F

<u>Form F</u>				
Raw Score	Scale Score (SS)	Standard Error (SEM)	SS - 1SEM	SS + 1SEM
0	240 ^a	47	240 ^a	240 ^a
1	240 ^a	34	240 ^a	240 ^a
2	240 ^a	24	240 ^a	246
3	240 ^a	20	240 ^a	257
4	248	18	240 ^a	266
5	257	16	241	273
6	264	15	249	279
7	271	14	257	285
8	276	13	263	289
9	282	13	269	295
10	287	12	275	299
11	291	12	279	303
12	295	12	283	307
13	300	11	289	311
14	303	11	292	314
15	307	11	296	318
16	311	11	300	322
17	314	10	304	324
18	317	10	307	327
19	320	10	310	330
20	324	10	314	334
21	327	10	317	337
22	330	10	320	340
23	332	10	322	342
24	335	10	325	345
25	338	10	328	348
26	341	9	332	350
27	344	9	335	353
28	346	9	337	355
29	349	9	340	358
30	352	9	343	361
31	354	9	345	363
32	357	9	348	366
33	360	9	351	369
34	362	9	353	371
35	365	9	356	374
36	367	9	358	376
37	370	9	361	379
38	373	9	364	382
39	375	9	366	384
40	378	9	369	387
41	381	9	372	390
42	383	9	374	392
43	386	10	376	396
44	389	10	379	399
45	392	10	382	402

<u>Form F</u>				
Raw Score	Scale Score (SS)	Standard Error (SEM)	SS - 1SEM	SS + 1SEM
46	395	10	385	405
47	398	10	388	408
48	401	10	391	411
49	404	10	394	414
50	407	10	397	417
51	410	10	400	420
52	414	11	403	425
53	417	11	406	428
54	421	11	410	432
55	424	11	413	435
56	428	12	416	440
57	433	12	421	445
58	437	12	425	449
59	442	13	429	455
60	447	13	434	460
61	452	14	438	466
62	458	14	444	472
63	465	15	450	480
64	472	16	456	488
65	480	17	463	497
66	490	19	471	509
67	502	21	481	523
68	517	23	494	540
69	536	28	508	564
70	566	36	530	602
71	593	49	544	642

Note. ^aLOSS was set to 240.

Table 4.17 The 2007 MSA-Math Subtotal Raw Score to Scale Score Conversion Table: Grade 3 Form A

Form A					
Strand	RS	SS	SEM	SS-SEM	SS+SEM
AL	0	240	49	240 ^a	289
AL	1	247	36	240 ^a	283
AL	2	277	28	249	305
AL	3	299	25	274	324
AL	4	317	24	293	341
AL	5	334	23	311	357
AL	6	349	23	326	372
AL	7	365	23	342	388
AL	8	381	23	358	404
AL	9	398	24	374	422
AL	10	417	26	391	443
AL	11	439	29	410	468
AL	12	472	37	435	509
AL	13	499	49	450	548
GM	0	240	48	240 ^a	288
GM	1	252	35	240 ^a	287
GM	2	280	27	253	307
GM	3	298	23	275	321
GM	4	313	21	292	334
GM	5	326	20	306	346
GM	6	338	19	319	357
GM	7	349	19	330	368
GM	8	361	19	342	380
GM	9	372	20	352	392
GM	10	384	20	364	404
GM	11	397	21	376	418
GM	12	412	23	389	435
GM	13	431	26	405	457
GM	14	458	35	423	493
GM	15	484	48	436	532
SP	0	240	49	240 ^a	289
SP	1	245	36	240 ^a	281
SP	2	274	27	247	301
SP	3	293	24	269	317
SP	4	309	22	287	331
SP	5	322	21	301	343
SP	6	335	20	315	355
SP	7	347	20	327	367
SP	8	359	20	339	379
SP	9	372	21	351	393
SP	10	385	22	363	407
SP	11	401	23	378	424
SP	12	420	27	393	447
SP	13	448	35	413	483
SP	14	473	48	425	521
NC	0	240	48	240 ^a	288
NC	1	262	35	240 ^a	297
NC	2	290	26	264	316

<u>Form A</u>					
Strand	RS	SS	SEM	SS-SEM	SS+SEM
NC	3	308	23	285	331
NC	4	322	21	301	343
NC	5	335	20	315	355
NC	6	346	19	327	365
NC	7	357	19	338	376
NC	8	368	19	349	387
NC	9	379	19	360	398
NC	10	391	20	371	411
NC	11	405	21	384	426
NC	12	420	23	397	443
NC	13	439	27	412	466
NC	14	468	36	432	504
NC	15	494	48	446	542
PR	0	281	48	240 ^a	329
PR	1	306	35	271	341
PR	2	334	27	307	361
PR	3	354	24	330	378
PR	4	370	22	348	392
PR	5	384	22	362	406
PR	6	399	22	377	421
PR	7	413	22	391	435
PR	8	428	22	406	450
PR	9	443	23	420	466
PR	10	459	24	435	483
PR	11	477	25	452	502
PR	12	499	28	471	527
PR	13	529	36	493	565
PR	14	555	49	506	604

Note. ^aLOSS was set to 240.

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

Table 4.18 The 2007 MSA-Math Subtotal Raw Score to Scale Score Conversion Table: Grade 3 Form F

<u>Form F</u>					
Strand	RS	SS	SEM	SS-SEM	SS+SEM
AL	0	240	50	240 ^a	290
AL	1	249	37	240 ^a	286
AL	2	281	29	252	310
AL	3	303	25	278	328
AL	4	321	23	298	344
AL	5	336	22	314	358
AL	6	350	21	329	371
AL	7	363	21	342	384
AL	8	376	21	355	397
AL	9	390	22	368	412
AL	10	407	24	383	431
AL	11	427	28	399	455
AL	12	457	37	420	494
AL	13	484	49	435	533
GM	0	249	48	240 ^a	297
GM	1	274	35	240 ^a	309
GM	2	301	26	275	327
GM	3	320	23	297	343
GM	4	334	21	313	355
GM	5	347	20	327	367
GM	6	359	19	340	378
GM	7	370	19	351	389
GM	8	381	19	362	400
GM	9	392	19	373	411
GM	10	403	20	383	423
GM	11	415	21	394	436
GM	12	429	22	407	451
GM	13	447	26	421	473
GM	14	474	35	439	509
GM	15	498	48	450	546
SP	0	240	48	240 ^a	288
SP	1	240	35	240 ^a	275
SP	2	265	27	240 ^a	292
SP	3	284	24	260	308
SP	4	299	22	277	321
SP	5	313	21	292	334
SP	6	325	20	305	345
SP	7	338	20	318	358
SP	8	350	20	330	370
SP	9	362	21	341	383
SP	10	376	22	354	398
SP	11	391	24	367	415
SP	12	411	27	384	438
SP	13	439	36	403	475
SP	14	465	48	417	513
NC	0	240	48	240 ^a	288
NC	1	257	35	240 ^a	292
NC	2	285	27	258	312

<u>Form F</u>					
Strand	RS	SS	SEM	SS-SEM	SS+SEM
NC	3	303	23	280	326
NC	4	318	21	297	339
NC	5	332	20	312	352
NC	6	344	20	324	364
NC	7	356	20	336	376
NC	8	369	20	349	389
NC	9	381	20	361	401
NC	10	394	21	373	415
NC	11	409	22	387	431
NC	12	425	24	401	449
NC	13	445	27	418	472
NC	14	474	36	438	510
NC	15	500	48	452	548
PR	0	254	50	240 ^a	304
PR	1	282	38	244	320
PR	2	315	29	286	344
PR	3	338	26	312	364
PR	4	357	24	333	381
PR	5	374	23	351	397
PR	6	391	23	368	414
PR	7	408	24	384	432
PR	8	426	25	401	451
PR	9	445	26	419	471
PR	10	467	27	440	494
PR	11	491	29	462	520
PR	12	519	32	487	551
PR	13	556	39	517	595
PR	14	585	50	535	635

Note. ^aLOSS was set to 240.

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

Table 4.19 The 2007 MSA-Math Total Raw Score to Scale Score Conversion Table: Grade 4 Form A

Raw Score	Scale Score (SS)	Form A		
		Standard Error (SEM)	SS – 1SEM	SS + 1SEM
0	240 ^a	47	240 ^a	247
1	240 ^a	34	240 ^a	257
2	247	24	240 ^a	271
3	262	20	242	282
4	273	18	255	291
5	281	16	265	297
6	288	15	273	303
7	295	14	281	309
8	300	13	287	313
9	305	13	292	318
10	310	12	298	322
11	314	12	302	326
12	318	11	307	329
13	322	11	311	333
14	326	11	315	337
15	329	11	318	340
16	332	10	322	342
17	336	10	326	346
18	339	10	329	349
19	342	10	332	352
20	344	10	334	354
21	347	10	337	357
22	350	9	341	359
23	353	9	344	362
24	355	9	346	364
25	358	9	349	367
26	360	9	351	369
27	363	9	354	372
28	366	9	357	375
29	368	9	359	377
30	370	9	361	379
31	373	9	364	382
32	375	9	366	384
33	378	9	369	387
34	380	9	371	389
35	383	9	374	392
36	385	9	376	394
37	387	9	378	396
38	390	9	381	399
39	392	9	383	401
40	395	9	386	404
41	397	9	388	406
42	400	9	391	409
43	402	9	393	411
44	405	9	396	414
45	408	9	399	417

<u>Form A</u>				
Raw Score	Scale Score (SS)	Standard Error (SEM)	SS - 1SEM	SS + 1SEM
46	410	9	401	419
47	413	10	403	423
48	416	10	406	426
49	419	10	409	429
50	422	10	412	432
51	425	10	415	435
52	428	10	418	438
53	431	10	421	441
54	435	11	424	446
55	438	11	427	449
56	442	11	431	453
57	446	11	435	457
58	450	12	438	462
59	454	12	442	466
60	459	12	447	471
61	464	13	451	477
62	469	13	456	482
63	475	14	461	489
64	481	15	466	496
65	488	16	472	504
66	496	17	479	513
67	506	19	487	525
68	518	21	497	539
69	533	25	508	558
70	559	34	525	593
71	583	47	536	630

Note. ^aLOSS was set to 240.

Table 4.20 The 2007 MSA-Math Total Raw Score to Scale Score Conversion Table: Grade 4 Form F

Raw Score	Scale Score (SS)	Form F		
		Standard Error (SEM)	SS - 1SEM	SS + 1SEM
0	240 ^a	47	240 ^a	247
1	240 ^a	34	240 ^a	258
2	248	24	240 ^a	272
3	263	20	243	283
4	273	18	255	291
5	282	16	266	298
6	289	15	274	304
7	296	14	282	310
8	301	13	288	314
9	306	13	293	319
10	311	12	299	323
11	316	12	304	328
12	320	11	309	331
13	323	11	312	334
14	327	11	316	338
15	331	11	320	342
16	334	10	324	344
17	337	10	327	347
18	340	10	330	350
19	343	10	333	353
20	346	10	336	356
21	349	10	339	359
22	352	9	343	361
23	354	9	345	363
24	357	9	348	366
25	359	9	350	368
26	362	9	353	371
27	364	9	355	373
28	367	9	358	376
29	369	9	360	378
30	372	9	363	381
31	374	9	365	383
32	377	9	368	386
33	379	9	370	388
34	381	9	372	390
35	384	9	375	393
36	386	9	377	395
37	388	9	379	397
38	391	9	382	400
39	393	9	384	402
40	395	9	386	404
41	398	9	389	407
42	400	9	391	409
43	403	9	394	412
44	405	9	396	414
45	408	9	399	417

<u>Form F</u>				
Raw Score	Scale Score (SS)	Standard Error (SEM)	SS - 1SEM	SS + 1SEM
46	410	9	401	419
47	413	9	404	422
48	415	9	406	424
49	418	9	409	427
50	421	10	411	431
51	424	10	414	434
52	426	10	416	436
53	430	10	420	440
54	433	10	423	443
55	436	10	426	446
56	439	11	428	450
57	443	11	432	454
58	447	11	436	458
59	451	12	439	463
60	455	12	443	467
61	459	13	446	472
62	464	13	451	477
63	470	14	456	484
64	476	14	462	490
65	483	15	468	498
66	491	17	474	508
67	500	18	482	518
68	511	21	490	532
69	527	25	502	552
70	552	34	518	586
71	577	47	530	624

Note. ^aLOSS was set to 240.

Table 4.21 The 2007 MSA-Math Subtotal Raw Score to Scale Score Conversion Table: Grade 4 Form A

Form A					
Strand	RS	SS	SEM	SS-SEM	SS+SEM
AL	0	258	48	240 ^a	306
AL	1	283	35	248	318
AL	2	311	27	284	338
AL	3	329	23	306	352
AL	4	344	22	322	366
AL	5	358	21	337	379
AL	6	370	20	350	390
AL	7	383	20	363	403
AL	8	396	21	375	417
AL	9	410	22	388	432
AL	10	425	23	402	448
AL	11	442	25	417	467
AL	12	465	29	436	494
AL	13	497	38	459	535
AL	14	525	50	475	575
GM	0	254	49	240 ^a	303
GM	1	281	37	244	318
GM	2	311	28	283	339
GM	3	331	24	307	355
GM	4	347	22	325	369
GM	5	360	20	340	380
GM	6	372	20	352	392
GM	7	384	19	365	403
GM	8	395	20	375	415
GM	9	407	20	387	427
GM	10	420	21	399	441
GM	11	434	23	411	457
GM	12	452	26	426	478
GM	13	479	35	444	514
GM	14	504	48	456	552
SP	0	255	48	240 ^a	303
SP	1	279	35	244	314
SP	2	306	26	280	332
SP	3	323	22	301	345
SP	4	337	20	317	357
SP	5	349	19	330	368
SP	6	360	19	341	379
SP	7	370	18	352	388
SP	8	381	18	363	399
SP	9	391	19	372	410
SP	10	402	19	383	421
SP	11	414	20	394	434
SP	12	428	22	406	450
SP	13	445	26	419	471
SP	14	472	35	437	507
SP	15	497	48	449	545
NC	0	250	48	240 ^a	298
NC	1	275	35	240	310

<u>Form A</u>					
Strand	RS	SS	SEM	SS-SEM	SS+SEM
NC	2	303	26	277	329
NC	3	321	23	298	344
NC	4	335	21	314	356
NC	5	348	20	328	368
NC	6	360	19	341	379
NC	7	371	19	352	390
NC	8	383	20	363	403
NC	9	395	20	375	415
NC	10	408	21	387	429
NC	11	422	23	399	445
NC	12	441	27	414	468
NC	13	469	35	434	504
NC	14	494	48	446	542
PR	0	260	51	240 ^a	311
PR	1	290	39	251	329
PR	2	324	30	294	354
PR	3	348	26	322	374
PR	4	367	24	343	391
PR	5	383	23	360	406
PR	6	399	22	377	421
PR	7	414	23	391	437
PR	8	430	23	407	453
PR	9	447	24	423	471
PR	10	464	24	440	488
PR	11	483	26	457	509
PR	12	505	28	477	533
PR	13	536	36	500	572
PR	14	562	49	513	611

Note. ^aLOSS was set to 240.

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

Table 4.22 The 2007 MSA-Math Subtotal Raw Score to Scale Score Conversion Table: Grade 4 Form F

<u>Form F</u>					
Strand	RS	SS	SEM	SS-SEM	SS+SEM
AL	0	259	48	240 ^a	307
AL	1	284	35	249	319
AL	2	311	26	285	337
AL	3	329	22	307	351
AL	4	343	20	323	363
AL	5	355	19	336	374
AL	6	366	19	347	385
AL	7	376	19	357	395
AL	8	387	19	368	406
AL	9	398	19	379	417
AL	10	410	21	389	431
AL	11	424	23	401	447
AL	12	442	26	416	468
AL	13	469	35	434	504
AL	14	495	48	447	543
GM	0	252	49	240 ^a	301
GM	1	279	37	242	316
GM	2	310	28	282	338
GM	3	331	24	307	355
GM	4	347	22	325	369
GM	5	362	21	341	383
GM	6	374	20	354	394
GM	7	386	20	366	406
GM	8	398	20	378	418
GM	9	410	20	390	430
GM	10	423	21	402	444
GM	11	437	23	414	460
GM	12	455	26	429	481
GM	13	482	35	447	517
GM	14	507	48	459	555
SP	0	252	48	240 ^a	300
SP	1	278	36	242	314
SP	2	306	27	279	333
SP	3	325	23	302	348
SP	4	340	21	319	361
SP	5	353	20	333	373
SP	6	365	19	346	384
SP	7	376	19	357	395
SP	8	387	19	368	406
SP	9	398	19	379	417
SP	10	410	20	390	430
SP	11	422	21	401	443
SP	12	436	22	414	458
SP	13	454	26	428	480
SP	14	480	35	445	515
SP	15	505	48	457	553
NC	0	247	48	240 ^a	295
NC	1	272	35	240 ^a	307

<u>Form F</u>					
Strand	RS	SS	SEM	SS-SEM	SS+SEM
NC	2	300	27	273	327
NC	3	319	23	296	342
NC	4	334	21	313	355
NC	5	347	20	327	367
NC	6	358	19	339	377
NC	7	370	19	351	389
NC	8	381	19	362	400
NC	9	392	20	372	412
NC	10	405	21	384	426
NC	11	419	22	397	441
NC	12	436	26	410	462
NC	13	463	35	428	498
NC	14	488	48	440	536
PR	0	276	50	240 ^a	326
PR	1	304	38	266	342
PR	2	336	29	307	365
PR	3	357	25	332	382
PR	4	374	23	351	397
PR	5	389	21	368	410
PR	6	402	21	381	423
PR	7	416	21	395	437
PR	8	430	22	408	452
PR	9	444	22	422	466
PR	10	461	24	437	485
PR	11	479	25	454	504
PR	12	501	28	473	529
PR	13	531	37	494	568
PR	14	558	49	509	607

Note. ^aLOSS was set to 240.

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

Table 4.23 The 2007 MSA-Math Total Raw Score to Scale Score Conversion Table: Grade 5 Form A

Form A				
Raw Score	Scale Score (SS)	Standard Error (SEM)	SS - 1SEM	SS + 1SEM
0	240 ^a	44	240 ^a	259
1	240 ^a	32	240 ^a	270
2	261	23	240 ^a	284
3	275	19	256	294
4	286	17	269	303
5	294	15	279	309
6	301	14	287	315
7	307	13	294	320
8	313	13	300	326
9	318	12	306	330
10	322	12	310	334
11	327	11	316	338
12	331	11	320	342
13	334	11	323	345
14	338	10	328	348
15	341	10	331	351
16	344	10	334	354
17	347	10	337	357
18	350	10	340	360
19	353	9	344	362
20	356	9	347	365
21	359	9	350	368
22	362	9	353	371
23	364	9	355	373
24	367	9	358	376
25	369	9	360	378
26	372	9	363	381
27	374	9	365	383
28	377	9	368	386
29	379	9	370	388
30	381	8	373	389
31	384	8	376	392
32	386	8	378	394
33	388	8	380	396
34	390	8	382	398
35	393	8	385	401
36	395	8	387	403
37	397	8	389	405
38	400	8	392	408
39	402	8	394	410
40	404	8	396	412
41	406	8	398	414
42	408	8	400	416
43	411	8	403	419
44	413	8	405	421
45	415	8	407	423

<u>Form A</u>				
Raw Score	Scale Score (SS)	Standard Error (SEM)	SS - 1SEM	SS + 1SEM
46	418	8	410	426
47	420	8	412	428
48	422	9	413	431
49	425	9	416	434
50	427	9	418	436
51	430	9	421	439
52	432	9	423	441
53	435	9	426	444
54	437	9	428	446
55	440	9	431	449
56	443	9	434	452
57	445	9	436	454
58	448	10	438	458
59	452	10	442	462
60	455	10	445	465
61	458	10	448	468
62	462	11	451	473
63	466	11	455	477
64	470	11	459	481
65	474	12	462	486
66	479	13	466	492
67	485	13	472	498
68	491	14	477	505
69	498	15	483	513
70	506	17	489	523
71	517	19	498	536
72	531	23	508	554
73	554	32	522	586
74	576	44	532	620

Note. ^aLOSS was set to 240.

Table 4.24 The 2007 MSA-Math Total Raw Score to Scale Score Conversion Table: Grade 5 Form F

<u>Form F</u>				
Raw Score	Scale Score (SS)	Standard Error (SEM)	SS - 1SEM	SS + 1SEM
0	240 ^a	44	240 ^a	267
1	246	32	240 ^a	278
2	269	23	246	292
3	283	19	264	302
4	293	17	276	310
5	301	15	286	316
6	308	14	294	322
7	314	13	301	327
8	320	13	307	333
9	324	12	312	336
10	329	12	317	341
11	333	11	322	344
12	337	11	326	348
13	341	10	331	351
14	344	10	334	354
15	347	10	337	357
16	351	10	341	361
17	354	10	344	364
18	357	10	347	367
19	360	9	351	369
20	363	9	354	372
21	365	9	356	374
22	368	9	359	377
23	371	9	362	380
24	373	9	364	382
25	376	9	367	385
26	378	9	369	387
27	381	9	372	390
28	383	9	374	392
29	386	9	377	395
30	388	9	379	397
31	390	9	381	399
32	393	9	384	402
33	395	8	387	403
34	397	8	389	405
35	400	8	392	408
36	402	8	394	410
37	404	8	396	412
38	407	8	399	415
39	409	8	401	417
40	411	8	403	419
41	414	8	406	422
42	416	8	408	424
43	418	9	409	427
44	421	9	412	430
45	423	9	414	432

<u>Form F</u>				
Raw Score	Scale Score (SS)	Standard Error (SEM)	SS - 1SEM	SS + 1SEM
46	426	9	417	435
47	428	9	419	437
48	430	9	421	439
49	433	9	424	442
50	436	9	427	445
51	438	9	429	447
52	441	9	432	450
53	444	9	435	453
54	446	9	437	455
55	449	10	439	459
56	452	10	442	462
57	456	10	446	466
58	459	10	449	469
59	462	11	451	473
60	466	11	455	477
61	470	11	459	481
62	474	12	462	486
63	479	12	467	491
64	484	13	471	497
65	490	14	476	504
66	497	15	482	512
67	505	17	488	522
68	515	19	496	534
69	529	23	506	552
70	552	31	521	583
71	574	44	530	618

Note. ^aLOSS was set to 240.

Table 4.25 The 2007 MSA-Math Subtotal Raw Score to Scale Score Conversion Table: Grade 5 Form A

<u>Form A</u>					
Strand	RS	SS	SEM	SS-SEM	SS+SEM
AL	0	264	45	240 ^a	309
AL	1	287	32	255	319
AL	2	311	24	287	335
AL	3	327	21	306	348
AL	4	340	19	321	359
AL	5	351	18	333	369
AL	6	361	17	344	378
AL	7	371	17	354	388
AL	8	380	17	363	397
AL	9	390	17	373	407
AL	10	400	18	382	418
AL	11	411	19	392	430
AL	12	424	21	403	445
AL	13	441	24	417	465
AL	14	465	32	433	497
AL	15	489	45	444	534
GM	0	294	46	248	340
GM	1	319	34	285	353
GM	2	347	26	321	373
GM	3	365	22	343	387
GM	4	380	20	360	400
GM	5	392	19	373	411
GM	6	404	18	386	422
GM	7	415	18	397	433
GM	8	425	18	407	443
GM	9	436	19	417	455
GM	10	448	19	429	467
GM	11	461	21	440	482
GM	12	478	24	454	502
GM	13	503	33	470	536
GM	14	526	45	481	571
SP	0	252	47	240 ^a	299
SP	1	279	35	244	314
SP	2	309	27	282	336
SP	3	329	23	306	352
SP	4	345	21	324	366
SP	5	358	20	338	378
SP	6	371	19	352	390
SP	7	383	19	364	402
SP	8	396	20	376	416
SP	9	409	21	388	430
SP	10	424	22	402	446
SP	11	442	25	417	467
SP	12	469	33	436	502
SP	13	493	45	448	538
NC	0	273	45	240 ^a	318
NC	1	296	33	263	329
NC	2	322	25	297	347

<u>Form A</u>					
Strand	RS	SS	SEM	SS-SEM	SS+SEM
NC	3	339	21	318	360
NC	4	352	19	333	371
NC	5	364	18	346	382
NC	6	374	18	356	392
NC	7	384	18	366	402
NC	8	394	18	376	412
NC	9	404	18	386	422
NC	10	415	18	397	433
NC	11	427	19	408	446
NC	12	440	21	419	461
NC	13	457	24	433	481
NC	14	482	33	449	515
NC	15	505	45	460	550
PR	0	270	49	240 ^a	319
PR	1	299	38	261	337
PR	2	335	30	305	365
PR	3	360	25	335	385
PR	4	378	22	356	400
PR	5	392	20	372	412
PR	6	404	18	386	422
PR	7	414	17	397	431
PR	8	423	17	406	440
PR	9	432	17	415	449
PR	10	441	17	424	458
PR	11	451	17	434	468
PR	12	461	18	443	479
PR	13	473	20	453	493
PR	14	487	22	465	509
PR	15	505	25	480	530
PR	16	532	33	499	565
PR	17	556	45	511	601

Note. ^aLOSS was set to 240.

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

Table 4.26 The 2007 MSA-Math Subtotal Raw Score to Scale Score Conversion Table: Grade 5 Form F

<u>Form F</u>					
Strand	RS	SS	SEM	SS-SEM	SS+SEM
AL	0	263	45	240 ^a	308
AL	1	286	32	254	318
AL	2	311	24	287	335
AL	3	328	21	307	349
AL	4	341	19	322	360
AL	5	352	18	334	370
AL	6	362	17	345	379
AL	7	372	17	355	389
AL	8	381	17	364	398
AL	9	391	17	374	408
AL	10	401	18	383	419
AL	11	412	19	393	431
AL	12	425	21	404	446
AL	13	441	24	417	465
AL	14	466	32	434	498
AL	15	489	45	444	534
GM	0	291	46	245	337
GM	1	316	34	282	350
GM	2	344	26	318	370
GM	3	362	23	339	385
GM	4	378	21	357	399
GM	5	391	20	371	411
GM	6	403	19	384	422
GM	7	414	18	396	432
GM	8	425	18	407	443
GM	9	436	19	417	455
GM	10	448	20	428	468
GM	11	462	21	441	483
GM	12	479	25	454	504
GM	13	504	33	471	537
GM	14	527	45	482	572
SP	0	276	45	240 ^a	321
SP	1	300	33	267	333
SP	2	326	25	301	351
SP	3	344	22	322	366
SP	4	358	20	338	378
SP	5	371	20	351	391
SP	6	384	20	364	404
SP	7	396	20	376	416
SP	8	410	21	389	431
SP	9	425	22	403	447
SP	10	443	25	418	468
SP	11	470	33	437	503
SP	12	494	45	449	539
NC	0	287	45	242	332
NC	1	310	32	278	342
NC	2	334	24	310	358
NC	3	350	21	329	371

<u>Form F</u>					
Strand	RS	SS	SEM	SS-SEM	SS+SEM
NC	4	363	19	344	382
NC	5	374	18	356	392
NC	6	384	17	367	401
NC	7	393	17	376	410
NC	8	403	17	386	420
NC	9	412	17	395	429
NC	10	422	18	404	440
NC	11	433	19	414	452
NC	12	446	21	425	467
NC	13	462	24	438	486
NC	14	487	32	455	519
NC	15	510	45	465	555
PR	0	270	50	240 ^a	320
PR	1	301	39	262	340
PR	2	342	32	310	374
PR	3	372	28	344	400
PR	4	393	23	370	416
PR	5	408	20	388	428
PR	6	420	18	402	438
PR	7	430	17	413	447
PR	8	440	17	423	457
PR	9	449	17	432	466
PR	10	460	18	442	478
PR	11	471	19	452	490
PR	12	484	21	463	505
PR	13	501	25	476	526
PR	14	527	33	494	560
PR	15	551	45	506	596

Note. ^aLOSS was set to 240.

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

Table 4.27 The 2007 MSA-Math Total Raw Score to Scale Score Conversion Table: Grade 6 Form A

<u>Form A</u>				
Raw Score	Scale Score (SS)	Standard Error (SEM)	SS – 1SEM	SS + 1SEM
0	244	42	240 ^a	286
1	265	30	240 ^a	295
2	286	22	264	308
3	299	18	281	317
4	308	16	292	324
5	316	14	302	330
6	322	13	309	335
7	327	12	315	339
8	332	12	320	344
9	337	11	326	348
10	341	11	330	352
11	344	10	334	354
12	348	10	338	358
13	351	10	341	361
14	354	9	345	363
15	357	9	348	366
16	360	9	351	369
17	362	9	353	371
18	365	9	356	374
19	368	9	359	377
20	370	8	362	378
21	372	8	364	380
22	375	8	367	383
23	377	8	369	385
24	379	8	371	387
25	381	8	373	389
26	384	8	376	392
27	386	8	378	394
28	388	8	380	396
29	390	8	382	398
30	392	8	384	400
31	394	8	386	402
32	396	8	388	404
33	398	8	390	406
34	400	8	392	408
35	402	8	394	410
36	404	8	396	412
37	406	8	398	414
38	408	8	400	416
39	410	8	402	418
40	412	8	404	420
41	414	8	406	422
42	416	8	408	424
43	418	8	410	426
44	420	8	412	428
45	423	8	415	431

<u>Form A</u>				
Raw Score	Scale Score (SS)	Standard Error (SEM)	SS - 1SEM	SS + 1SEM
46	425	8	417	433
47	427	8	419	435
48	429	8	421	437
49	432	8	424	440
50	434	8	426	442
51	437	9	428	446
52	439	9	430	448
53	442	9	433	451
54	444	9	435	453
55	447	9	438	456
56	450	10	440	460
57	453	10	443	463
58	457	10	447	467
59	460	10	450	470
60	464	11	453	475
61	468	11	457	479
62	473	12	461	485
63	478	12	466	490
64	483	13	470	496
65	490	14	476	504
66	497	16	481	513
67	507	18	489	525
68	520	22	498	542
69	542	30	512	572
70	563	42	521	605

Note. ^aLOSS was set to 240.

Table 4.28 The 2007 MSA-Math Total Raw Score to Scale Score Conversion Table: Grade 6 Form F

<u>Form F</u>				
Raw Score	Scale Score (SS)	Standard Error (SEM)	SS – 1SEM	SS + 1SEM
0	240 ^a	42	240 ^a	281
1	260	30	240 ^a	290
2	282	22	260	304
3	295	18	277	313
4	304	16	288	320
5	312	14	298	326
6	318	13	305	331
7	324	12	312	336
8	329	12	317	341
9	333	11	322	344
10	337	11	326	348
11	341	10	331	351
12	344	10	334	354
13	348	10	338	358
14	351	10	341	361
15	354	9	345	363
16	357	9	348	366
17	360	9	351	369
18	362	9	353	371
19	365	9	356	374
20	368	9	359	377
21	370	9	361	379
22	373	8	365	381
23	375	8	367	383
24	377	8	369	385
25	380	8	372	388
26	382	8	374	390
27	384	8	376	392
28	386	8	378	394
29	388	8	380	396
30	391	8	383	399
31	393	8	385	401
32	395	8	387	403
33	397	8	389	405
34	399	8	391	407
35	401	8	393	409
36	403	8	395	411
37	405	8	397	413
38	408	8	400	416
39	410	8	402	418
40	412	8	404	420
41	414	8	406	422
42	416	8	408	424
43	418	8	410	426
44	420	8	412	428
45	423	8	415	431

<u>Form F</u>				
Raw Score	Scale Score (SS)	Standard Error (SEM)	SS - 1SEM	SS + 1SEM
46	425	8	417	433
47	427	8	419	435
48	429	8	421	437
49	432	8	424	440
50	434	9	425	443
51	437	9	428	446
52	439	9	430	448
53	442	9	433	451
54	445	9	436	454
55	448	9	439	457
56	451	10	441	461
57	454	10	444	464
58	457	10	447	467
59	461	10	451	471
60	465	11	454	476
61	469	11	458	480
62	473	12	461	485
63	478	13	465	491
64	484	13	471	497
65	490	14	476	504
66	498	16	482	514
67	508	18	490	526
68	521	22	499	543
69	543	30	513	573
70	564	42	522	606

Note. ^aLOSS was set to 240.

Table 4.29 The 2007 MSA-Math Subtotal Raw Score to Scale Score Conversion Table: Grade 6 Form A

<u>Form A</u>					
Strand	RS	SS	SEM	SS-SEM	SS+SEM
AL	0	289	43	246	332
AL	1	311	31	280	342
AL	2	335	23	312	358
AL	3	351	20	331	371
AL	4	364	18	346	382
AL	5	375	17	358	392
AL	6	384	17	367	401
AL	7	394	17	377	411
AL	8	403	17	386	420
AL	9	413	17	396	430
AL	10	423	18	405	441
AL	11	435	20	415	455
AL	12	450	23	427	473
AL	13	474	31	443	505
AL	14	496	43	453	539
GM	0	306	43	263	349
GM	1	328	31	297	359
GM	2	352	23	329	375
GM	3	368	20	348	388
GM	4	380	18	362	398
GM	5	390	17	373	407
GM	6	400	17	383	417
GM	7	409	17	392	426
GM	8	419	17	402	436
GM	9	429	17	412	446
GM	10	439	18	421	457
GM	11	452	20	432	472
GM	12	467	23	444	490
GM	13	491	31	460	522
GM	14	513	43	470	556
SP	0	289	43	246	332
SP	1	312	32	280	344
SP	2	337	24	313	361
SP	3	354	21	333	375
SP	4	367	19	348	386
SP	5	379	18	361	397
SP	6	390	18	372	408
SP	7	401	18	383	419
SP	8	412	18	394	430
SP	9	424	19	405	443
SP	10	437	21	416	458
SP	11	453	24	429	477
SP	12	477	31	446	508
SP	13	500	43	457	543
NC	0	292	43	249	335
NC	1	315	31	284	346
NC	2	339	23	316	362
NC	3	355	20	335	375

<u>Form A</u>					
Strand	RS	SS	SEM	SS-SEM	SS+SEM
NC	4	367	19	348	386
NC	5	378	18	360	396
NC	6	388	17	371	405
NC	7	398	17	381	415
NC	8	408	17	391	425
NC	9	418	18	400	436
NC	10	429	19	410	448
NC	11	442	20	422	462
NC	12	458	24	434	482
NC	13	482	31	451	513
NC	14	505	43	462	548
PR	0	291	44	247	335
PR	1	314	32	282	346
PR	2	341	25	316	366
PR	3	358	22	336	380
PR	4	373	20	353	393
PR	5	385	19	366	404
PR	6	397	18	379	415
PR	7	408	18	390	426
PR	8	419	18	401	437
PR	9	430	18	412	448
PR	10	442	19	423	461
PR	11	454	20	434	474
PR	12	469	22	447	491
PR	13	487	25	462	512
PR	14	513	32	481	545
PR	15	537	44	493	581

Note. ^aLOSS was set to 240.

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

Table 4.30 The 2007 MSA-Math Subtotal Raw Score to Scale Score Conversion Table: Grade 6 Form F

<u>Form F</u>					
Strand	RS	SS	SEM	SS-SEM	SS+SEM
AL	0	281	43	240 ^a	324
AL	1	303	32	271	335
AL	2	328	24	304	352
AL	3	345	21	324	366
AL	4	358	19	339	377
AL	5	370	18	352	388
AL	6	381	18	363	399
AL	7	392	18	374	410
AL	8	403	18	385	421
AL	9	414	18	396	432
AL	10	426	19	407	445
AL	11	440	21	419	461
AL	12	457	24	433	481
AL	13	482	32	450	514
AL	14	505	44	461	549
GM	0	291	44	247	335
GM	1	315	32	283	347
GM	2	341	24	317	365
GM	3	358	21	337	379
GM	4	371	19	352	390
GM	5	383	18	365	401
GM	6	393	17	376	410
GM	7	403	17	386	420
GM	8	413	17	396	430
GM	9	423	18	405	441
GM	10	434	19	415	453
GM	11	447	20	427	467
GM	12	463	23	440	486
GM	13	487	31	456	518
GM	14	509	43	466	552
SP	0	283	43	240	326
SP	1	306	32	274	338
SP	2	330	24	306	354
SP	3	347	21	326	368
SP	4	360	19	341	379
SP	5	372	19	353	391
SP	6	383	18	365	401
SP	7	395	18	377	413
SP	8	406	19	387	425
SP	9	419	20	399	439
SP	10	433	21	412	454
SP	11	450	24	426	474
SP	12	476	32	444	508
SP	13	498	43	455	541
NC	0	300	43	257	343
NC	1	323	31	292	354
NC	2	347	23	324	370
NC	3	362	20	342	382

<u>Form F</u>					
Strand	RS	SS	SEM	SS-SEM	SS+SEM
NC	4	375	18	357	393
NC	5	386	18	368	404
NC	6	396	17	379	413
NC	7	406	17	389	423
NC	8	415	17	398	432
NC	9	425	17	408	442
NC	10	436	18	418	454
NC	11	448	20	428	468
NC	12	464	23	441	487
NC	13	488	31	457	519
NC	14	510	43	467	553
PR	0	293	44	249	337
PR	1	317	32	285	349
PR	2	343	25	318	368
PR	3	360	22	338	382
PR	4	375	20	355	395
PR	5	387	19	368	406
PR	6	399	18	381	417
PR	7	409	17	392	426
PR	8	419	17	402	436
PR	9	430	18	412	448
PR	10	441	18	423	459
PR	11	453	20	433	473
PR	12	467	22	445	489
PR	13	485	25	460	510
PR	14	512	33	479	545
PR	15	536	44	492	580

Note. ^aLOSS was set to 240.

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

Table 4.31 The 2007 MSA-Math Total Raw Score to Scale Score Conversion Table: Grade 7 Form A

<u>Form A</u>				
Raw Score	Scale Score (SS)	Standard Error (SEM)	SS – 1SEM	SS + 1SEM
0	251	41	240 ^a	292
1	271	29	242	300
2	293	21	272	314
3	307	18	289	325
4	316	16	300	332
5	324	14	310	338
6	331	13	318	344
7	337	12	325	349
8	342	12	330	354
9	346	11	335	357
10	350	11	339	361
11	354	10	344	364
12	358	10	348	368
13	361	10	351	371
14	364	9	355	373
15	367	9	358	376
16	370	9	361	379
17	373	9	364	382
18	376	9	367	385
19	378	8	370	386
20	381	8	373	389
21	383	8	375	391
22	386	8	378	394
23	388	8	380	396
24	390	8	382	398
25	392	8	384	400
26	395	8	387	403
27	397	8	389	405
28	399	8	391	407
29	401	8	393	409
30	403	8	395	411
31	405	8	397	413
32	407	8	399	415
33	410	8	402	418
34	412	8	404	420
35	414	8	406	422
36	416	8	408	424
37	418	8	410	426
38	420	8	412	428
39	422	8	414	430
40	424	8	416	432
41	426	8	418	434
42	429	8	421	437
43	431	8	423	439
44	433	8	425	441
45	435	8	427	443

<u>Form A</u>				
Raw Score	Scale Score (SS)	Standard Error (SEM)	SS - 1SEM	SS + 1SEM
46	438	8	430	446
47	440	8	432	448
48	442	8	434	450
49	445	8	437	453
50	447	8	439	455
51	450	9	441	459
52	453	9	444	462
53	455	9	446	464
54	458	9	449	467
55	461	9	452	470
56	464	9	455	473
57	467	10	457	477
58	471	10	461	481
59	474	10	464	484
60	478	10	468	488
61	482	11	471	493
62	487	11	476	498
63	491	12	479	503
64	496	12	484	508
65	502	13	489	515
66	508	14	494	522
67	516	15	501	531
68	524	16	508	540
69	535	18	517	553
70	549	22	527	571
71	572	30	542	602
72	593	41	552	634

Note. ^aLOSS was set to 240.

Table 4.32 The 2007 MSA-Math Total Raw Score to Scale Score Conversion Table: Grade 7 Form F

<u>Form F</u>				
Raw Score	Scale Score (SS)	Standard Error (SEM)	SS – 1SEM	SS + 1SEM
0	247	40	240 ^a	287
1	267	29	240 ^a	296
2	288	21	267	309
3	301	17	284	318
4	310	15	295	325
5	317	14	303	331
6	324	13	311	337
7	329	12	317	341
8	334	11	323	345
9	338	11	327	349
10	342	10	332	352
11	346	10	336	356
12	349	10	339	359
13	353	9	344	362
14	356	9	347	365
15	359	9	350	368
16	362	9	353	371
17	364	9	355	373
18	367	9	358	376
19	370	9	361	379
20	372	8	364	380
21	375	8	367	383
22	377	8	369	385
23	379	8	371	387
24	382	8	374	390
25	384	8	376	392
26	386	8	378	394
27	389	8	381	397
28	391	8	383	399
29	393	8	385	401
30	396	8	388	404
31	398	8	390	406
32	400	8	392	408
33	402	8	394	410
34	404	8	396	412
35	407	8	399	415
36	409	8	401	417
37	411	8	403	419
38	413	8	405	421
39	416	8	408	424
40	418	8	410	426
41	420	8	412	428
42	422	8	414	430
43	425	8	417	433
44	427	8	419	435
45	429	8	421	437

<u>Form F</u>				
Raw Score	Scale Score (SS)	Standard Error (SEM)	SS - 1SEM	SS + 1SEM
46	432	8	424	440
47	434	8	426	442
48	437	8	429	445
49	439	8	431	447
50	442	9	433	451
51	444	9	435	453
52	447	9	438	456
53	450	9	441	459
54	453	9	444	462
55	456	9	447	465
56	459	9	450	468
57	462	10	452	472
58	465	10	455	475
59	469	10	459	479
60	473	10	463	483
61	477	11	466	488
62	481	11	470	492
63	486	12	474	498
64	491	12	479	503
65	497	13	484	510
66	503	14	489	517
67	511	15	496	526
68	521	17	504	538
69	533	20	513	553
70	549	24	525	573
71	575	32	543	607
72	599	43	556	642

Note. ^aLOSS was set to 240.

Table 4.33 The 2007 MSA-Math Subtotal Raw Score to Scale Score Conversion Table: Grade 7 Form A

<u>Form A</u>					
Strand	RS	SS	SEM	SS-SEM	SS+SEM
AL	0	307	41	266	348
AL	1	328	30	298	358
AL	2	351	22	329	373
AL	3	365	19	346	384
AL	4	377	18	359	395
AL	5	387	17	370	404
AL	6	397	16	381	413
AL	7	407	16	391	423
AL	8	416	17	399	433
AL	9	427	17	410	444
AL	10	438	18	420	456
AL	11	451	20	431	471
AL	12	468	23	445	491
AL	13	492	31	461	523
AL	14	515	42	473	557
GM	0	320	41	279	361
GM	1	342	30	312	372
GM	2	365	23	342	388
GM	3	381	20	361	401
GM	4	394	18	376	412
GM	5	405	18	387	423
GM	6	416	17	399	433
GM	7	427	18	409	445
GM	8	438	18	420	456
GM	9	450	19	431	469
GM	10	463	20	443	483
GM	11	480	23	457	503
GM	12	505	31	474	536
GM	13	527	42	485	569
SP	0	298	41	257	339
SP	1	319	30	289	349
SP	2	343	23	320	366
SP	3	358	20	338	378
SP	4	371	18	353	389
SP	5	382	17	365	399
SP	6	392	17	375	409
SP	7	402	17	385	419
SP	8	412	17	395	429
SP	9	422	17	405	439
SP	10	433	18	415	451
SP	11	446	20	426	466
SP	12	461	23	438	484
SP	13	485	30	455	515
SP	14	506	41	465	547
NC	0	297	43	254	340
NC	1	320	32	288	352
NC	2	346	24	322	370
NC	3	364	20	344	384

<u>Form A</u>					
Strand	RS	SS	SEM	SS-SEM	SS+SEM
NC	4	377	18	359	395
NC	5	388	17	371	405
NC	6	398	17	381	415
NC	7	408	16	392	424
NC	8	417	16	401	433
NC	9	427	17	410	444
NC	10	437	18	419	455
NC	11	449	19	430	468
NC	12	464	22	442	486
NC	13	486	30	456	516
NC	14	507	41	466	548
PR	0	285	46	240 ^a	331
PR	1	314	36	278	350
PR	2	349	28	321	377
PR	3	373	24	349	397
PR	4	391	21	370	412
PR	5	405	20	385	425
PR	6	419	19	400	438
PR	7	431	18	413	449
PR	8	442	18	424	460
PR	9	454	18	436	472
PR	10	465	18	447	483
PR	11	477	18	459	495
PR	12	489	19	470	508
PR	13	502	20	482	522
PR	14	517	21	496	538
PR	15	535	24	511	559
PR	16	560	31	529	591
PR	17	583	42	541	625

Note. ^aLOSS was set to 240.

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

Table 4.34 The 2007 MSA-Math Subtotal Raw Score to Scale Score Conversion Table: Grade 7 Form F

<u>Form F</u>					
Strand	RS	SS	SEM	SS-SEM	SS+SEM
AL	0	301	41	260	342
AL	1	323	30	293	353
AL	2	346	23	323	369
AL	3	362	20	342	382
AL	4	374	18	356	392
AL	5	385	17	368	402
AL	6	395	17	378	412
AL	7	405	17	388	422
AL	8	416	17	399	433
AL	9	426	18	408	444
AL	10	438	19	419	457
AL	11	451	20	431	471
AL	12	468	24	444	492
AL	13	493	31	462	524
AL	14	516	42	474	558
GM	0	310	41	269	351
GM	1	332	30	302	362
GM	2	356	23	333	379
GM	3	372	20	352	392
GM	4	386	19	367	405
GM	5	398	18	380	416
GM	6	409	18	391	427
GM	7	420	18	402	438
GM	8	432	18	414	450
GM	9	444	19	425	463
GM	10	457	20	437	477
GM	11	473	23	450	496
GM	12	497	30	467	527
GM	13	518	41	477	559
SP	0	287	41	246	328
SP	1	308	30	278	338
SP	2	331	22	309	353
SP	3	346	19	327	365
SP	4	358	18	340	376
SP	5	368	17	351	385
SP	6	378	17	361	395
SP	7	388	16	372	404
SP	8	397	17	380	414
SP	9	408	17	391	425
SP	10	419	18	401	437
SP	11	432	20	412	452
SP	12	448	23	425	471
SP	13	472	30	442	502
SP	14	493	41	452	534
NC	0	287	43	244	330
NC	1	311	32	279	343
NC	2	339	25	314	364
NC	3	357	21	336	378

<u>Form F</u>					
Strand	RS	SS	SEM	SS-SEM	SS+SEM
NC	4	372	19	353	391
NC	5	384	18	366	402
NC	6	395	17	378	412
NC	7	405	17	388	422
NC	8	415	17	398	432
NC	9	426	17	409	443
NC	10	437	18	419	455
NC	11	450	20	430	470
NC	12	465	23	442	488
NC	13	489	30	459	519
NC	14	511	41	470	552
PR	0	295	42	253	337
PR	1	318	31	287	349
PR	2	343	24	319	367
PR	3	361	21	340	382
PR	4	376	21	355	397
PR	5	391	21	370	412
PR	6	406	20	386	426
PR	7	420	19	401	439
PR	8	432	19	413	451
PR	9	444	18	426	462
PR	10	456	18	438	474
PR	11	468	19	449	487
PR	12	481	19	462	500
PR	13	495	21	474	516
PR	14	512	23	489	535
PR	15	533	27	506	560
PR	16	565	34	531	599
PR	17	592	44	548	636

Note. ^aLOSS was set to 240.

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

Table 4.35 The 2007 MSA-Math Total Raw Score to Scale Score Conversion Table: Grade 8 Form A

Form A				
Raw Score	Scale Score (SS)	Standard Error (SEM)	SS - 1SEM	SS + 1SEM
0	264	40	240 ^a	304
1	285	29	256	314
2	305	21	284	326
3	318	17	301	335
4	327	15	312	342
5	334	14	320	348
6	340	13	327	353
7	346	12	334	358
8	351	11	340	362
9	355	11	344	366
10	359	10	349	369
11	363	10	353	373
12	366	10	356	376
13	369	9	360	378
14	372	9	363	381
15	375	9	366	384
16	378	9	369	387
17	381	9	372	390
18	383	9	374	392
19	386	8	378	394
20	388	8	380	396
21	391	8	383	399
22	393	8	385	401
23	395	8	387	403
24	398	8	390	406
25	400	8	392	408
26	402	8	394	410
27	404	8	396	412
28	406	8	398	414
29	408	8	400	416
30	410	8	402	418
31	412	8	404	420
32	415	8	407	423
33	417	8	409	425
34	419	8	411	427
35	421	8	413	429
36	423	8	415	431
37	425	7	418	432
38	427	7	420	434
39	428	7	421	435
40	430	7	423	437
41	432	8	424	440
42	434	8	426	442
43	436	8	428	444
44	438	8	430	446
45	440	8	432	448

<u>Form A</u>				
Raw Score	Scale Score (SS)	Standard Error (SEM)	SS - 1SEM	SS + 1SEM
46	442	8	434	450
47	445	8	437	453
48	447	8	439	455
49	449	8	441	457
50	451	8	443	459
51	453	8	445	461
52	455	8	447	463
53	458	8	450	466
54	460	8	452	468
55	463	8	455	471
56	465	9	456	474
57	468	9	459	477
58	471	9	462	480
59	473	9	464	482
60	477	9	468	486
61	480	10	470	490
62	483	10	473	493
63	487	11	476	498
64	491	11	480	502
65	496	12	484	508
66	501	12	489	513
67	506	13	493	519
68	513	14	499	527
69	521	16	505	537
70	530	18	512	548
71	543	21	522	564
72	565	29	536	594
73	586	41	545	627

Note. ^aLOSS was set to 240.

Table 4.36 The 2007 MSA-Math Total Raw Score to Scale Score Conversion Table: Grade 8 Form F

Raw Score	Form F			
	Scale Score (SS)	Standard Error (SEM)	SS - 1SEM	SS + 1SEM
0	264	41	240 ^a	305
1	284	29	255	313
2	305	21	284	326
3	318	17	301	335
4	327	15	312	342
5	334	14	320	348
6	341	13	328	354
7	346	12	334	358
8	351	11	340	362
9	355	11	344	366
10	359	10	349	369
11	363	10	353	373
12	366	10	356	376
13	370	9	361	379
14	373	9	364	382
15	376	9	367	385
16	378	9	369	387
17	381	9	372	390
18	384	8	376	392
19	386	8	378	394
20	389	8	381	397
21	391	8	383	399
22	393	8	385	401
23	396	8	388	404
24	398	8	390	406
25	400	8	392	408
26	402	8	394	410
27	404	8	396	412
28	406	8	398	414
29	408	8	400	416
30	410	7	403	417
31	412	7	405	419
32	414	7	407	421
33	416	7	409	423
34	418	7	411	425
35	420	7	413	427
36	421	7	414	428
37	423	7	416	430
38	425	7	418	432
39	427	7	420	434
40	429	7	422	436
41	431	7	424	438
42	433	7	426	440
43	435	7	428	442
44	436	7	429	443
45	438	7	431	445

<u>Form F</u>				
Raw Score	Scale Score (SS)	Standard Error (SEM)	SS - 1SEM	SS + 1SEM
46	440	7	433	447
47	442	7	435	449
48	444	8	436	452
49	446	8	438	454
50	448	8	440	456
51	450	8	442	458
52	452	8	444	460
53	455	8	447	463
54	457	8	449	465
55	459	8	451	467
56	462	8	454	470
57	464	9	455	473
58	467	9	458	476
59	470	9	461	479
60	473	9	464	482
61	476	10	466	486
62	479	10	469	489
63	483	10	473	493
64	487	11	476	498
65	492	12	480	504
66	497	12	485	509
67	502	13	489	515
68	509	14	495	523
69	517	16	501	533
70	528	19	509	547
71	543	23	520	566
72	568	31	537	599
73	591	43	548	634

Note. ^aLOSS was set to 240.

Table 4.37 The 2007 MSA-Math Subtotal Raw Score to Scale Score Conversion Table: Grade 8 Form A

<u>Form A</u>					
Strand	RS	SS	SEM	SS-SEM	SS+SEM
AL	0	308	41	267	349
AL	1	330	30	300	360
AL	2	354	23	331	377
AL	3	369	20	349	389
AL	4	382	18	364	400
AL	5	392	17	375	409
AL	6	402	17	385	419
AL	7	412	16	396	428
AL	8	421	16	405	437
AL	9	431	17	414	448
AL	10	441	18	423	459
AL	11	453	19	434	472
AL	12	466	21	445	487
AL	13	484	24	460	508
AL	14	510	32	478	542
AL	15	533	43	490	576
GM	0	327	42	285	369
GM	1	349	31	318	380
GM	2	373	23	350	396
GM	3	389	20	369	409
GM	4	402	19	383	421
GM	5	414	18	396	432
GM	6	425	18	407	443
GM	7	436	17	419	453
GM	8	447	18	429	465
GM	9	458	19	439	477
GM	10	471	20	451	491
GM	11	487	23	464	510
GM	12	511	30	481	541
GM	13	533	41	492	574
SP	0	314	41	273	355
SP	1	336	30	306	366
SP	2	359	23	336	382
SP	3	375	20	355	395
SP	4	387	18	369	405
SP	5	399	18	381	417
SP	6	409	17	392	426
SP	7	420	17	403	437
SP	8	431	18	413	449
SP	9	443	19	424	462
SP	10	456	20	436	476
SP	11	471	22	449	493
SP	12	490	25	465	515
SP	13	517	32	485	549
SP	14	540	43	497	583
NC	0	318	42	276	360
NC	1	339	30	309	369
NC	2	364	23	341	387

<u>Form A</u>					
Strand	RS	SS	SEM	SS-SEM	SS+SEM
NC	3	380	20	360	400
NC	4	393	19	374	412
NC	5	406	18	388	424
NC	6	417	18	399	435
NC	7	429	18	411	447
NC	8	441	19	422	460
NC	9	455	20	435	475
NC	10	471	23	448	494
NC	11	495	30	465	525
NC	12	517	42	475	559
PR	0	299	42	257	341
PR	1	322	31	291	353
PR	2	348	24	324	372
PR	3	365	21	344	386
PR	4	379	19	360	398
PR	5	391	18	373	409
PR	6	402	17	385	419
PR	7	411	16	395	427
PR	8	419	15	404	434
PR	9	427	15	412	442
PR	10	434	14	420	448
PR	11	441	14	427	455
PR	12	448	14	434	462
PR	13	455	14	441	469
PR	14	463	15	448	478
PR	15	472	17	455	489
PR	16	484	19	465	503
PR	17	500	24	476	524
PR	18	527	33	494	560
PR	19	552	44	508	596

Note. ^aLOSS was set to 240.

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

Table 4.38 The 2007 MSA-Math Subtotal Raw Score to Scale Score Conversion Table: Grade 8 Form F

<u>Form F</u>					
Strand	RS	SS	SEM	SS-SEM	SS+SEM
AL	0	311	41	270	352
AL	1	332	30	302	362
AL	2	356	23	333	379
AL	3	371	19	352	390
AL	4	383	18	365	401
AL	5	393	17	376	410
AL	6	403	16	387	419
AL	7	412	16	396	428
AL	8	421	16	405	437
AL	9	429	16	413	445
AL	10	439	17	422	456
AL	11	449	18	431	467
AL	12	461	19	442	480
AL	13	476	22	454	498
AL	14	499	30	469	529
AL	15	520	41	479	561
GM	0	323	41	282	364
GM	1	344	30	314	374
GM	2	368	23	345	391
GM	3	384	20	364	404
GM	4	396	18	378	414
GM	5	408	18	390	426
GM	6	419	17	402	436
GM	7	429	18	411	447
GM	8	441	18	423	459
GM	9	453	19	434	472
GM	10	467	21	446	488
GM	11	484	24	460	508
GM	12	510	31	479	541
GM	13	532	42	490	574
SP	0	308	42	266	350
SP	1	330	31	299	361
SP	2	355	23	332	378
SP	3	371	20	351	391
SP	4	384	18	366	402
SP	5	395	17	378	412
SP	6	405	17	388	422
SP	7	415	17	398	432
SP	8	424	17	407	441
SP	9	435	17	418	452
SP	10	446	18	428	464
SP	11	459	20	439	479
SP	12	475	23	452	498
SP	13	499	31	468	530
SP	14	521	42	479	563
NC	0	325	41	284	366
NC	1	347	30	317	377
NC	2	370	23	347	393

<u>Form F</u>					
Strand	RS	SS	SEM	SS-SEM	SS+SEM
NC	3	386	20	366	406
NC	4	398	18	380	416
NC	5	410	18	392	428
NC	6	420	17	403	437
NC	7	431	18	413	449
NC	8	443	18	425	461
NC	9	455	20	435	475
NC	10	471	23	448	494
NC	11	495	30	465	525
NC	12	517	41	476	558
PR	0	298	42	256	340
PR	1	321	32	289	353
PR	2	348	25	323	373
PR	3	367	22	345	389
PR	4	383	20	363	403
PR	5	395	18	377	413
PR	6	406	17	389	423
PR	7	415	15	400	430
PR	8	423	15	408	438
PR	9	430	14	416	444
PR	10	437	14	423	451
PR	11	443	14	429	457
PR	12	450	14	436	464
PR	13	457	15	442	472
PR	14	465	16	449	481
PR	15	475	18	457	493
PR	16	487	21	466	508
PR	17	506	26	480	532
PR	18	541	38	503	579
PR	19	572	48	524	620

Note. ^aLOSS was set to 240.

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

Table 4. 39 The 2007 MSA-Math Score Difference between Rater 1 and Rater 2: Grade 3

Form	Item CID	Perfect		Adjacent		Discrepancy		Total	
		N	%	N	%	N	%	N	%
A	3509918	29,653	99.18	244	0.82			29,897	100.00
	3564076	26,867	89.87	3,009	10.06	21	0.07	29,897	100.00
	3509919	28,776	96.25	1,121	3.75			29,897	100.00
	3564077	24,364	81.49	5,405	18.08	128	0.43	29,897	100.00
	3510060	29,537	98.80	360	1.20			29,897	100.00
	3564078	26,114	87.35	3,752	12.55	31	0.10	29,897	100.00
	3509936	29,612	99.05	285	0.95			29,897	100.00
	3564079	26,009	87.00	3,876	12.96	12	0.04	29,897	100.00
	3510072	29,822	99.75	75	0.25			29,897	100.00
	3564080	24,704	82.63	5,095	17.04	98	0.33	29,897	100.00
	3509957	29,440	98.47	457	1.53			29,897	100.00
	3564081	26,100	87.30	3,780	12.64	17	0.06	29,897	100.00
	3510034	29,590	98.97	307	1.03			29,897	100.00
	3564082	23,945	80.09	5,930	19.83	22	0.07	29,897	100.00
F	3509918	29,630	99.24	228	0.76			29,858	100.00
	3564076	26,906	90.11	2,919	9.78	33	0.11	29,858	100.00
	3509919	28,739	96.25	1,119	3.75			29,858	100.00
	3564077	23,883	79.99	5,815	19.48	160	0.54	29,858	100.00
	3510060	29,553	98.98	305	1.02			29,858	100.00
	3564078	26,097	87.40	3,723	12.47	38	0.13	29,858	100.00
	3510067	29,666	99.36	192	0.64			29,858	100.00
	3564083	24,905	83.41	4,895	16.39	58	0.19	29,858	100.00
	3509963	29,420	98.53	438	1.47			29,858	100.00
	3564084	28,717	96.18	1,134	3.80	7	0.02	29,858	100.00
	3509922	29,481	98.74	377	1.26			29,858	100.00
	3564085	25,752	86.25	4,098	13.72	8	0.03	29,858	100.00
	3509932	29,618	99.20	240	0.80			29,858	100.00
	3564086	26,274	88.00	3,562	11.93	22	0.07	29,858	100.00

Note. Analyses were conducted with a whole population.

Table 4. 40 The 2007 MSA- Mathematics Score Difference between Rater 1 and Rater 2: Grade 4

Form	Item CID	Perfect		Adjacent		Discrepancy		Total	
		N	%	N	%	N	%	N	%
A	3515405	30,051	98.85	351	1.15			30,402	100.00
	3564160	25,644	84.35	4,723	15.54	35	0.12	30,402	100.00
	3515451	30,020	98.74	382	1.26			30,402	100.00
	3564161	24,373	80.17	5,800	19.08	229	0.75	30,402	100.00
	3515886	29,621	97.43	781	2.57			30,402	100.00
	3564162	25,738	84.66	4,638	15.26	26	0.09	30,402	100.00
	3515648	29,949	98.51	453	1.49			30,402	100.00
	3564163	24,676	81.17	5,536	18.21	190	0.62	30,402	100.00
	3515577	29,869	98.25	533	1.75			30,402	100.00
	3564164	24,620	80.98	5,764	18.96	18	0.06	30,402	100.00
	3515807	30,223	99.41	179	0.59			30,402	100.00
	3564165	24,421	80.33	5,922	19.48	59	0.19	30,402	100.00
	3515585	29,915	98.40	487	1.60			30,402	100.00
	3564166	26,827	88.24	3,537	11.63	38	0.12	30,402	100.00
	F	3515595	29,867	99.22	236	0.78			30,103
3564167		24,121	80.13	5,942	19.74	40	0.13	30,103	100.00
3515603		29,675	98.58	428	1.42			30,103	100.00
3564168		26,608	88.39	3,407	11.32	88	0.29	30,103	100.00
3515638		29,016	96.39	1,087	3.61			30,103	100.00
3564169		24,900	82.72	5,159	17.14	44	0.15	30,103	100.00
3515648		29,651	98.50	452	1.50			30,103	100.00
3564163		24,198	80.38	5,685	18.89	220	0.73	30,103	100.00
3515862		29,909	99.36	194	0.64			30,103	100.00
3564170		26,148	86.86	3,906	12.98	49	0.16	30,103	100.00
3515807		29,947	99.48	156	0.52			30,103	100.00
3564165		24,552	81.56	5,517	18.33	34	0.11	30,103	100.00
3515830		29,912	99.37	191	0.63			30,103	100.00
3564171		24,756	82.24	5,306	17.63	41	0.14	30,103	100.00

Note. Analyses were conducted with a whole population.

Table 4. 41 The 2007 MSA- Mathematics Score Difference between Rater 1 and Rater 2: Grade 5

Form	Item CID	Perfect		Adjacent		Discrepancy		Total	
		N	%	N	%	N	%	N	%
A	3511531	30,634	98.56	449	1.44			31,083	100.00
	3563986	26,092	83.94	4,947	15.92	44	0.14	31,083	100.00
	3511336	29,939	96.32	1,144	3.68			31,083	100.00
	3563987	28,643	92.15	2,427	7.81	13	0.04	31,083	100.00
	3512618	30,585	98.40	498	1.60			31,083	100.00
	3563988	27,306	87.85	3,775	12.14	2	0.01	31,083	100.00
	3512649	30,913	99.45	170	0.55			31,083	100.00
	3563989	28,919	93.04	1,839	5.92	325	1.05	31,083	100.00
	3556476	30,647	98.60	436	1.40			31,083	100.00
	3563990	26,472	85.17	4,146	13.34	465	1.50	31,083	100.00
	3511258	30,797	99.08	286	0.92			31,083	100.00
	3563991	25,063	80.63	5,935	19.09	85	0.27	31,083	100.00
	3511483	30,725	98.85	358	1.15			31,083	100.00
	3563992	25,702	82.69	5,357	17.23	24	0.08	31,083	100.00
	3511455	30,229	97.25	854	2.75			31,083	100.00
3563993	27,769	89.34	3,158	10.16	156	0.50	31,083	100.00	
F	3511336	29,905	96.86	970	3.14			30,875	100.00
	3563987	28,626	92.72	2,232	7.23	17	0.06	30,875	100.00
	3512618	30,338	98.26	537	1.74			30,875	100.00
	3563988	27,022	87.52	3,848	12.46	5	0.02	30,875	100.00
	3512649	30,685	99.38	190	0.62			30,875	100.00
	3563989	29,019	93.99	1,529	4.95	327	1.06	30,875	100.00
	3556476	30,584	99.06	291	0.94			30,875	100.00
	3563990	26,455	85.68	4,181	13.54	239	0.77	30,875	100.00
	3512530	28,931	93.70	1,944	6.30			30,875	100.00
	3563999	26,740	86.61	3,973	12.87	162	0.52	30,875	100.00
	3511483	30,584	99.06	291	0.94			30,875	100.00
	3563992	25,078	81.22	5,774	18.70	23	0.07	30,875	100.00
	3512559	30,685	99.38	190	0.62			30,875	100.00
	3564001	27,957	90.55	2,912	9.43	6	0.02	30,875	100.00

Note. Analyses were conducted with a whole population.

Table 4. 42 The 2007 MSA- Mathematics Score Difference between Rater 1 and Rater 2: Grade 6

Form	Item CID	Perfect		Adjacent		Discrepancy		Total	
		N	%	N	%	N	%	N	%
A	3516452	30,793	97.58	765	2.42			31,558	100.00
	3564002	25,711	81.47	5,587	17.70	260	0.82	31,558	100.00
	3517013	31,341	99.31	217	0.69			31,558	100.00
	3564004	29,459	93.35	2,083	6.60	16	0.05	31,558	100.00
	3516327	30,923	97.99	635	2.01			31,558	100.00
	3564005	26,822	84.99	4,488	14.22	248	0.79	31,558	100.00
	3516627	31,131	98.65	427	1.35			31,558	100.00
	3564006	28,278	89.61	3,266	10.35	14	0.04	31,558	100.00
	3516284	31,219	98.93	339	1.07			31,558	100.00
	3564007	27,952	88.57	3,569	11.31	37	0.12	31,558	100.00
	3516333	31,034	98.34	524	1.66			31,558	100.00
	3564008	25,914	82.12	5,539	17.55	105	0.33	31,558	100.00
	3516326	31,174	98.78	384	1.22			31,558	100.00
	3564009	29,809	94.46	1,648	5.22	101	0.32	31,558	100.00
F	3517004	31,105	99.51	153	0.49			31,258	100.00
	3564010	26,163	83.70	4,747	15.19	348	1.11	31,258	100.00
	3517013	31,050	99.33	208	0.67			31,258	100.00
	3564004	29,253	93.59	1,988	6.36	17	0.05	31,258	100.00
	3516327	30,687	98.17	571	1.83			31,258	100.00
	3564005	26,923	86.13	4,137	13.24	198	0.63	31,258	100.00
	3516627	30,948	99.01	310	0.99			31,258	100.00
	3564006	28,420	90.92	2,827	9.04	11	0.04	31,258	100.00
	3516284	30,919	98.92	339	1.08			31,258	100.00
	3564007	28,128	89.99	3,099	9.91	31	0.10	31,258	100.00
	3516622	30,594	97.88	664	2.12			31,258	100.00
	3564011	26,429	84.55	4,545	14.54	284	0.91	31,258	100.00
	3516616	30,826	98.62	432	1.38			31,258	100.00
	3564012	29,121	93.16	1,991	6.37	146	0.47	31,258	100.00

Note. Analyses were conducted with a whole population.

Table 4. 43 The 2007 MSA- Mathematics Score Difference between Rater 1 and Rater 2: Grade 7

Form	Item CID	Perfect		Adjacent		Discrepancy		Total	
		N	%	N	%	N	%	N	%
A	3517744	32,051	99.34	213	0.66			32,264	100.00
	3564018	28,154	87.26	3,944	12.22	166	0.51	32,264	100.00
	3517670	31,907	98.89	357	1.11			32,264	100.00
	3564019	27,605	85.56	4,497	13.94	162	0.50	32,264	100.00
	3517673	31,379	97.26	885	2.74			32,264	100.00
	3564020	27,870	86.38	4,339	13.45	55	0.17	32,264	100.00
	3517719	32,019	99.24	245	0.76			32,264	100.00
	3564021	29,131	90.29	3,122	9.68	11	0.03	32,264	100.00
	3517725	32,067	99.39	197	0.61			32,264	100.00
	3564022	29,182	90.45	3,040	9.42	42	0.13	32,264	100.00
	3517818	32,035	99.29	229	0.71			32,264	100.00
	3564023	27,768	86.06	4,493	13.93	3	0.01	32,264	100.00
	3547482	31,921	98.94	343	1.06			32,264	100.00
	3564024	26,512	82.17	5,587	17.32	165	0.51	32,264	100.00
F	3517706	30,770	96.16	1,230	3.84			32,000	100.00
	3564025	27,531	86.03	4,311	13.47	158	0.49	32,000	100.00
	3517670	31,584	98.70	416	1.30			32,000	100.00
	3564019	27,498	85.93	4,320	13.5	182	0.57	32,000	100.00
	3517648	31,583	98.70	417	1.30			32,000	100.00
	3564027	28,813	90.04	3,035	9.48	152	0.48	32,000	100.00
	3517693	31,151	97.35	849	2.65			32,000	100.00
	3564028	27,478	85.87	4,439	13.87	83	0.26	32,000	100.00
	3517666	31,810	99.41	190	0.59			32,000	100.00
	3564029	28,998	90.62	2,959	9.25	43	0.13	32,000	100.00
	3517715	31,519	98.50	481	1.50			32,000	100.00
	3564030	28,362	88.63	3,624	11.33	14	0.04	32,000	100.00
	3547487	31,811	99.41	189	0.59			32,000	100.00
	3564031	29,455	92.05	2,520	7.88	25	0.08	32,000	100.00

Note. Analyses were conducted with a whole population.

Table 4. 44 The 2007 MSA- Mathematics Score Difference between Rater 1 and Rater 2: Grade 8

Form	Item CID	Perfect		Adjacent		Discrepancy		Total	
		N	%	N	%	N	%	N	%
A	3514013	32,585	99.24	251	0.76			32,836	100.00
	3564107	29,373	89.45	3,431	10.45	32	0.10	32,836	100.00
	3514702	32,660	99.46	176	0.54			32,836	100.00
	3564108	28,823	87.78	3,819	11.63	194	0.59	32,836	100.00
	3514078	32,604	99.29	232	0.71			32,836	100.00
	3564109	27,057	82.40	5,555	16.92	224	0.68	32,836	100.00
	3514267	32,629	99.37	207	0.63			32,836	100.00
	3564110	29,219	88.98	3,580	10.90	37	0.11	32,836	100.00
	3514117	32,388	98.64	448	1.36			32,836	100.00
	3564111	28,814	87.75	3,985	12.14	37	0.11	32,836	100.00
	3514607	32,668	99.49	168	0.51			32,836	100.00
	3564112	29,016	88.37	3,576	10.89	244	0.74	32,836	100.00
	3514118	32,737	99.70	99	0.30			32,836	100.00
	3564113	30,568	93.09	2,262	6.89	6	0.02	32,836	100.00
	3514669	32,603	99.29	233	0.71			32,836	100.00
3564114	30,256	92.14	2,511	7.65	69	0.21	32,836	100.00	
F	3514147	32,204	99.15	276	0.85			32,480	100.00
	3564115	27,993	86.19	4,192	12.91	295	0.91	32,480	100.00
	3514283	32,220	99.20	260	0.80			32,480	100.00
	3564116	29,815	91.79	2,534	7.80	131	0.40	32,480	100.00
	3514164	31,569	97.20	911	2.80			32,480	100.00
	3564117	27,014	83.17	5,275	16.24	191	0.59	32,480	100.00
	3514108	31,318	96.42	1,162	3.58			32,480	100.00
	3564118	29,690	91.41	2,790	8.59			32,480	100.00
	3514117	31,974	98.44	506	1.56			32,480	100.00
	3564111	28,728	88.45	3,705	11.41	47	0.14	32,480	100.00
	3514152	32,191	99.11	289	0.89			32,480	100.00
	3564119	26,963	83.01	5,154	15.87	363	1.12	32,480	100.00
	3514266	32,231	99.23	249	0.77			32,480	100.00
	3564120	27,981	86.15	4,472	13.77	27	0.08	32,480	100.00
	3514133	32,128	98.92	352	1.08			32,480	100.00
3564121	29,294	90.19	3,175	9.78	11	0.03	32,480	100.00	

Note. Analyses were conducted with a whole population.

REFERENCES

- AERA, APA, & NCME (1999). *Standards for educational and psychological testing*. Washington, D.C.: Author.
- Allen, N. L., Donoghue, J. R., & Schoeps, T. L. (2001). *The NAEP 1998 technical report* (Technical Report). Washington, DC: National Center for Educational Statistics.
- Andrich, A. (1988). *Rasch models for measurement*. Newbury Park, CA: SAGE Publications, Inc.
- Andrich, A. (1989). Distinctions between assumptions and requirements in measurement in the social sciences. In J. A. Keats, R. Taft, R. A. Heath, & H. H. Lovibond (Eds.) *Mathematical and theoretical systems*. North-Holland: Elsevier Science Publisher B.V.
- Andrich, A., & Luo, G. (2004). *Modern measurement and analysis in social science*. Murdoch University, Perth, Western Australia.
- Camilli, G., & Shepard, L. A. (1994). *Methods for identifying biased test items*. Thousand Oaks, CA: SAGE Publications.
- Crocker, L., & Algina, J. (1986). *Introduction to classical and modern test theory*. New York, NY: Holt Rinehart Wilson.
- CTB/McGraw-Hill (2004, August). *The Maryland standard setting technical report*. (Technical Report). Monterey, CA: CTB/McGraw-Hill.
- Dorans, N. J., & Schmitt, A. P. (1991). *Constructed-response and differential item functioning: A pragmatic approach* (ETS Research Report No. 91-49). Princeton, NJ: Educational Testing Service.
- Embretson, S., & Reise, S. (2000). *Item response theory for psychologists*. New Jersey: Lawrence Erlbaum Associates, Publishers.
- Haertel, E. H. (1996). *Estimating the decision consistency from a single administration of a performance assessment battery. A report on the National Board of Professional Teaching Standards McGEN Assessment*. Palo Alto, CA: Stanford University.
- Hambleton, R. K., Swaminathan, H., & Rogers, H. J. (1991). *Fundamentals of item response theory*. Newbury Park, CA: SAGE Publications, Inc.
- Harvill, L. M. (1991). Standard error of measurement. *Educational Measurement: Issues and Practice*, 10, 181-189.
- Harcourt, Inc. (2007, January). *Maryland School Assessment-Reading and Mathematics: Test administration and coordination manual*. San Antonio, TX: Harcourt Inc.
- Huynh, H., Meyer III, J. P., & Barton, K. (2000). *Technical documentation for the 1999 Palmetto achievement challenge tests of English language arts and mathematics, grades three through eight* (Technical Report). Columbia: South Carolina Department of Education.
- Jöreskog, K. G., & Sörbom, D. (1993). *LISREL 8 & PRELIS 2: User's reference guide*. Chicago: Scientific Software International.
- Kolen, M. J., and Brennan, R. L. (1995). *Test equating methods and practices*. New York: Springer-Verlag.

- Linacre, J. M., & Wright, B. D. (2000). *A user's guide to WINSTEPS: Rasch-model computer program*. Chicago, IL: MESA Press.
- Livingston, S. A., & Lewis, C. (1995). Estimating the consistency and accuracy of classifications based on test scores. *Journal of Educational Measurement, 32*, 179-197.
- Lord, F. M., & Wingersky, M. S. (1984). Comparison of IRT true-score and equipercentile observed-score "equatings." *Applied Psychological Measurement, 8*, 452-461.
- Mantel, N. (1963). Chi-square tests with one degree of freedom: Extensions of the Mantel-Haenszel procedure. *Journal of the American Statistical Association, 58*, 690-700.
- Mantel, N., & Haenszel, W. (1959). Statistical aspects of the analysis of data from retrospective studies of disease. *Journal of the National Cancer Institute, 22*, 719-748.
- Masters, G. N. (1982). A Rasch model for partial credit scoring. *Psychometrica, 47*, 149-174.
- Messick, S. (1989). Meaning and values in test validation: The science and ethics of assessment. *Educational Researcher, 18*, 5-11.
- Mitzel, H. C., Lewis, D. M., Patz, R. J., & Green, D. R. (2001). The Bookmark procedure: Psychological perspectives. In G. J. Cizek (Ed.), *Setting performance standards* (pp. 249-282). Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.
- Qualls, A. L. (1995). Estimating the reliability of a test containing multiple item formats. *Applied Measurement in Education, 8*, 111-120.
- Rasch, G. (1980). *Probabilistic models for some intelligence and attainment tests*. Chicago, IL: University of Chicago Press.
- Ryan, J. P. (1983). Introduction to latent trait analysis and item response theory. In W. E. Hathaway (Ed.), *Testing in the schools. New directions for testing and measurement, 19*, San Francisco: Jossey-Bass.
- South Carolina Department of Education. (2001). *Technical documentation for the 2000 Palmetto achievement challenge tests of English language arts and mathematics* (Technical Report). Columbia: South Carolina Department of Education.
- Suen, H. K. (1990). *Principles of test theories*. Hillsdale, New Jersey: Lawrence Erlbaum Associates, Publishers.
- Thissen, D., & Steinberg, L. (1986). A taxonomy of item response models. *Psychometrica, 51*, 567-577.
- Young, M. J., & Yoon, B. (1998, April). *Estimating the consistency and accuracy of classifications in a standards-referenced assessment*. (CSE Technical Report 475). Center for the Study of Evaluation, Standards, and Student Testing. Los Angeles, CA: University of California, Los Angeles.
- Zwick, R., Donoghue, J. R., & Grima, A. (1993). Assessment of differential item functioning for performance tasks. *Journal of Educational Measurement, 30*, 233-251.

APPENDIX A: THE 2007 MSA-MATH STRATIFIED RANDOM SAMPLING

Table A.1 2007 MSA-Math Population and Stratified Random Sampling (S.R.S.): Grade 3 LEA

LEA	Operational Form A				Operational Form F			
	2007 Pop.	2007	% of 2007	% of Differ.	2007	% of 2007	% of Differ.	
	%	S. R. S.	S. R. S.		S. R. S.	S. R. S.		
1	1.09	33	1.10	-0.01	1.09	33	1.10	-0.01
2	8.92	267	8.90	0.02	8.92	267	8.90	0.02
3	12.19	366	12.20	-0.01	12.19	366	12.20	-0.01
4	2.01	60	2.00	0.01	2.01	60	2.00	0.01
5	0.59	18	0.60	-0.01	0.59	18	0.60	-0.01
6	3.37	101	3.37	0.00	3.37	101	3.37	0.00
7	2.00	60	2.00	0.00	2.00	60	2	0.00
8	2.96	89	2.97	-0.01	2.96	89	2.97	-0.01
9	0.45	14	0.47	-0.02	0.45	14	0.47	-0.02
10	4.87	146	4.87	0.00	4.87	146	4.87	0.00
11	0.53	16	0.53	0.00	0.53	16	0.53	0.00
12	4.79	144	4.80	-0.01	4.79	144	4.80	-0.01
13	5.84	175	5.83	0.01	5.84	175	5.83	0.01
14	0.23	7	0.23	0.00	0.23	7	0.23	0.00
15	16.10	483	16.10	0.00	16.10	483	16.10	0.00
16	14.84	445	14.83	0.01	14.84	445	14.83	0.01
17	0.86	26	0.87	-0.01	0.86	26	0.87	-0.01
18	1.85	55	1.83	0.02	1.85	55	1.83	0.02
19	0.30	9	0.30	0.00	0.30	9	0.30	0.00
20	0.46	14	0.47	-0.01	0.46	14	0.47	-0.01
21	2.68	80	2.67	0.01	2.68	80	2.67	0.01
22	1.81	54	1.80	0.01	1.81	54	1.80	0.01
23	0.71	21	0.70	0.01	0.71	21	0.70	0.01
24	0.18	5	0.17	0.01	0.18	5	0.17	0.01
30	9.86	296	9.87	-0.01	9.86	296	9.87	-0.01
31	0.53	16	0.53	0.00	0.53	16	0.53	0.00
Total	100.00	3000	100.00	0.00	100.00	3000	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; 31. Edison Partnership

Table A.2 2007 MSA-Math Population and Stratified Random Sampling (S.R.S.): Grade 3 Ethnicity

Race	Operational Form A				Operational Form F			
	2007 Pop.	2007	% of 2007	% of Differ.	2007 Pop.	2007	% of 2007	
	%	S. R. S.	S. R. S.		%	S. R. S.	S. R. S.	
1	0.41	13	0.43	-0.02	0.41	16	0.53	-0.12
2	5.59	179	5.97	-0.38	5.59	176	5.87	-0.28
3	37.69	1121	37.37	0.32	37.69	1088	36.27	1.42
4	47.46	1413	47.10	0.36	47.46	1435	47.83	-0.37
5	8.68	267	8.90	-0.22	8.68	279	9.30	-0.62
Miss	0.17	7	0.23	-0.06	0.17	6	0.20	-0.03
Total	100.00	3000	100.00	0.00	100.00	3000	100.00	0.00

Note. 1. American Indian; 2. Asian American; 3. African American; 4. White; 5. Hispanic; Miss: Missing

Table A.3 2007 MSA- Mathematics Population and Stratified Random Sampling (S.R.S.): Grade 3 Gender

Gender	Operational Form A				Operational Form F			
	2007 Pop.	2007	% of 2007	% of Differ.	2007 Pop.	2007	% of 2007	
	%	S. R. S.	S. R. S.		%	S. R. S.	S. R. S.	
F	48.89	1412	47.07	1.82	48.89	1462	48.73	0.16
M	51.00	1584	52.80	-1.80	51.00	1533	51.10	-0.10
Miss	0.11	4	0.13	-0.02	0.11	5	0.17	-0.06
Total	100.00	3000	100.00	0.00	100.00	3000	100.00	0.00

Note. F. Female; M. Male; Miss: Missing

Table A.4 2007 MSA- Mathematics Population and Stratified Random Sampling (S.R.S.): Grade 4 LEA

LEA	Operational Form A				Operational Form F			
	2007 Pop.	2007	% of 2007	% of Differ.	2007 Pop.	2007	% of 2007	
	%	S. R. S.	S. R. S.		%	S. R. S.	S. R. S.	
1	1.14	0	0.00	1.14	1.14	34	1.13	0.01
2	8.69	261	8.80	-0.11	8.69	261	8.70	-0.01
3	12.25	367	12.38	-0.13	12.25	367	12.24	0.01
4	2.00	60	2.02	-0.02	2.00	60	2.00	0.00
5	0.71	21	0.00	0.71	0.71	21	0.70	0.01
6	3.25	97	3.27	-0.02	3.25	97	3.23	0.02
7	1.89	57	1.92	-0.03	1.89	57	1.90	-0.01
8	3.18	95	3.20	-0.02	3.18	95	3.17	0.01
9	0.57	17	0.57	0.00	0.57	17	0.57	0.00
10	4.87	146	4.92	-0.05	4.87	146	4.87	0.00
11	0.50	3	0.51	-0.01	0.50	15	0.50	0.00
12	4.83	145	4.89	-0.06	4.83	145	4.83	0.00
13	5.98	179	6.07	-0.09	5.98	179	5.97	0.01
14	0.29	9	0.30	-0.01	0.29	9	0.30	-0.01
15	16.16	485	16.36	-0.20	16.16	485	16.17	-0.01
16	14.94	448	15.11	-0.17	14.94	448	14.94	0.00
17	0.87	26	0.88	-0.01	0.87	26	0.87	0.00
18	1.96	59	1.99	-0.03	1.96	59	1.97	-0.01
19	0.30	9	0.30	0.00	0.30	9	0.30	0.00
20	0.47	14	0.00	0.47	0.47	14	0.47	0.00
21	2.69	81	2.73	-0.04	2.69	81	2.70	-0.01
22	1.87	56	1.89	-0.02	1.87	56	1.87	0.00
23	0.77	23	0.78	-0.01	0.77	23	0.77	0.00
24	0.18	6	0.20	-0.02	0.18	6	0.20	-0.02
30	9.17	275	9.27	-0.10	9.17	275	9.17	0.00
31	0.46	14	0.47	-0.01	0.46	14	0.47	-0.01
Total	100.00	2953	100.00	0.00	100.00	2999	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; 31. Edison Partnership

Table A.5 2007 MSA- Mathematics Population and Stratified Random Sampling (S.R.S.): Grade 4 Ethnicity

Race	Operational Form A				Operational Form F			
	2007 Pop.	2007	% of 2007	% of Differ.	2007 Pop.	2007	% of 2007	
	%	S. R. S.	S. R. S.		%	S. R. S.	S. R. S.	
1	0.39	16	0.54	-0.15	0.39	9	0.30	0.09
2	5.70	160	5.42	0.28	5.70	159	5.30	0.40
3	37.51	1129	38.23	-0.72	37.51	1161	38.71	-1.21
4	47.52	1386	46.94	0.59	47.52	1419	47.32	0.21
5	8.73	256	8.67	0.06	8.73	247	8.24	0.49
Miss	0.15	6	0.20	-0.06	0.15	4	0.13	0.01
Total	100.00	2953	100.00	0.00	100.00	2999	100.00	0.00

Note. 1. American Indian; 2. Asian American; 3. African American; 4. White; 5. Hispanic; Miss: Missing

Table A.6 2007 MSA- Mathematics Population and Stratified Random Sampling (S.R.S.): Grade 4 Gender

Gender	Operational Form A				Operational Form F			
	2007 Pop.	2007	% of 2007	% of Differ.	2007 Pop.	2007	% of 2007	
	%	S. R. S.	S. R. S.		%	S. R. S.	S. R. S.	
F	48.65	1439	48.73	-0.08	48.65	1497	49.92	-1.27
M	51.26	1510	51.13	0.13	51.26	1500	50.02	1.24
Miss	0.09	4	0.14	-0.04	0.09	2	0.07	0.02
Total	100.00	2953	100.00	0.00	100.00	2999	100.00	0.00

Note. F. Female; M. Male; Miss: Missing

Table A.7 2007 MSA-Math Population and Stratified Random Sampling (S.R.S.): Grade 5 LEA

LEA	Operational Form A				Operational Form F			
	2007 Pop.	2007	% of 2007	% of Differ.	2007 Pop.	2007	% of 2007	
	%	S. R. S.	S. R. S.		%	S. R. S.	S. R. S.	
1	1.06	32	1.07	-0.01	1.06	118	4.19	-3.13
2	8.71	261	8.71	0.00	8.71	511	18.13	-9.42
3	12.28	368	12.27	0.01	12.28	493	17.49	-5.21
4	2.07	62	2.07	0.00	2.07	18	0.64	1.43
5	0.57	17	0.57	0.00	0.57	45	1.60	-1.03
6	3.36	101	3.37	-0.01	3.36	6	0.21	3.15
7	1.92	58	1.93	-0.01	1.92	7	0.25	1.67
8	3.03	91	3.04	-0.01	3.03	91	3.23	-0.20
9	0.51	15	0.50	0.01	0.51	28	0.99	-0.48
10	4.88	146	4.87	0.01	4.88	138	4.90	-0.02
11	0.54	16	0.53	0.01	0.54	7	0.25	0.29
12	4.80	144	4.80	0.00	4.80	26	0.92	3.88
13	5.95	178	5.94	0.01	5.95	216	7.67	-1.72
14	0.23	7	0.23	0.00	0.23	4	0.14	0.09
15	16.36	491	16.38	-0.02	16.36	162	5.75	10.61
16	15.32	459	15.31	0.01	15.32	429	15.22	0.10
17	0.98	29	0.97	0.01	0.98	93	3.30	-2.32
18	1.91	57	1.90	0.01	1.91	90	3.19	-1.28
19	0.35	11	0.37	-0.02	0.35	1	0.04	0.31
20	0.51	15	0.50	0.01	0.51	73	2.59	-2.08
21	2.56	77	2.57	-0.01	2.56	34	1.21	1.35
22	1.72	52	1.73	-0.01	1.72	20	0.71	1.01
23	0.71	21	0.70	0.01	0.71	0	0	0.71
24	0.27	8	0.27	0.00	0.27	28	0.99	-0.72
30	8.95	268	8.94	0.01	8.95	180	6.39	2.56
31	0.45	14	0.47	-0.02	0.45	0	0.00	0.45
Total	100.00	2998	100.00	0.00	100.00	2818	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; 31. Edison Partnership

Table A.8 2007 MSA- Mathematics Population and Stratified Random Sampling (S.R.S.): Grade 5 Ethnicity

Race	Operational Form A				Operational Form F			
	2007 Pop.	2007	% of 2007	% of Differ.	2007 Pop.	2007	% of 2007	% of Differ.
	%	S. R. S.	S. R. S.		%	S. R. S.	S. R. S.	
1	0.35	4	0.13	0.22	0.35	14	0.50	-0.15
2	5.42	160	5.34	0.08	5.42	121	4.29	1.12
3	37.29	1164	38.83	-1.54	37.29	1032	36.62	0.67
4	48.25	1388	46.30	1.95	48.25	1430	50.75	-2.49
5	8.56	279	9.31	-0.75	8.56	217	7.70	0.86
Miss	0.13	3	0.10	0.03	0.13	4	0.14	-0.01
Total	100.00	2998	100.00	0.00	100.00	2818	100.00	0.00

Note. 1. American Indian; 2. Asian American; 3. African American; 4. White; 5. Hispanic; Miss: Missing

Table A.9 2007 MSA- Mathematics Population and Stratified Random Sampling (S.R.S.): Grade 5 Gender

Gender	Operational Form A				Operational Form F			
	2007 Pop.	2007	% of 2007	% of Differ.	2007 Pop.	2007	% of 2007	% of Differ.
	%	S. R. S.	S. R. S.		%	S. R. S.	S. R. S.	
F	49.04	1423	47.46	1.57	49.04	1344	47.69	1.34
M	50.86	1572	52.43	-1.57	50.86	1471	52.20	-1.34
Miss	0.10	3	0.10	0.00	0.10	3	0.11	-0.01
Total	100.00	2998	100.00	0.00	100.00	2818	100.00	0.00

Note. F. Female; M. Male; Miss: Missing

Table A.10 2007 MSA- Mathematics Population and Stratified Random Sampling (S.R.S.): Grade 6 LEA

LEA	Operational Form A				Operational Form F			
	2007 Pop.	2007	% of 2007	% of Differ.	2007 Pop.	2007	% of 2007	% of Differ.
	%	S. R. S.	S. R. S.		%	S. R. S.	S. R. S.	
1	1.04	31	1.04	0.00	1.04	31	1.04	0.00
2	8.76	263	8.78	-0.02	8.76	263	8.80	-0.04
3	12.25	367	12.26	-0.01	12.25	367	12.29	-0.04
4	2.14	64	2.14	0.00	2.14	64	2.14	0.00
5	0.63	19	0.63	0.00	0.63	19	0.64	-0.01
6	3.37	101	3.37	0.00	3.37	101	3.38	-0.01
7	2.00	60	2.00	0.00	2.00	60	2.01	-0.01
8	3.12	94	3.14	-0.02	3.12	94	3.15	-0.03
9	0.49	10	0.33	0.16	0.49	3	0.10	0.39
10	4.93	148	4.94	-0.01	4.93	148	4.95	-0.02
11	0.58	17	0.57	0.01	0.58	17	0.57	0.01
12	4.72	142	4.74	-0.02	4.72	142	4.75	-0.03
13	6.32	189	6.31	0.01	6.32	189	6.33	-0.01
14	0.24	7	0.23	0.01	0.24	7	0.23	0.01
15	16.14	484	16.17	-0.03	16.14	484	16.20	-0.06
16	15.13	454	15.16	-0.03	15.13	454	15.20	-0.07
17	0.87	26	0.87	0.00	0.87	26	0.87	0.00
18	1.91	57	1.90	0.01	1.91	57	1.91	0.00
19	0.33	10	0.33	0.00	0.33	10	0.33	0.00
20	0.51	15	0.50	0.01	0.51	15	0.50	0.01
21	2.42	73	2.44	-0.02	2.42	73	2.44	-0.02
22	1.48	44	1.47	0.01	1.48	44	1.47	0.01
23	0.72	22	0.73	-0.01	0.72	22	0.74	-0.02
24	0.33	10	0.33	0.00	0.33	10	0.33	0.00
30	9.14	274	9.15	-0.01	9.14	274	9.17	-0.03
31	0.43	13	0.43	0.00	0.43	13	0.44	-0.01
Total	100.00	2994	100.00	0.00	100.00	2987	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; 31. Edison Partnership

Table A.11 2007 MSA- Mathematics Population and Stratified Random Sampling (S.R.S.): Grade 6 Ethnicity

Race	Operational Form A				Operational Form F			
	2007 Pop.	2007	% of 2007	% of Differ.	2007 Pop.	2007	% of 2007	% of Differ.
	%	S. R. S.	S. R. S.		%	S. R. S.	S. R. S.	
1	0.41	3	0.10	0.31	0.41	15	0.50	-0.09
2	5.29	174	5.81	-0.52	5.29	183	6.13	-0.83
3	38.41	1177	39.31	-0.90	38.41	1147	38.40	0.01
4	47.66	1390	46.43	1.23	47.66	1425	47.71	-0.05
5	8.02	248	8.28	-0.26	8.02	214	7.16	0.86
Miss	0.20	2	0.07	0.14	0.20	3	0.10	0.10
Total	100.00	2994	100.00	0.00	100.00	2987	100.00	0.00

Note. 1. American Indian; 2. Asian American; 3. African American; 4. White; 5. Hispanic; Miss: Missing

Table A.12 2007 MSA- Mathematics Population and Stratified Random Sampling (S.R.S.): Grade 6 Gender

Gender	Operational Form A				Operational Form F			
	2007 Pop.	2007	% of 2007	% of Differ.	2007 Pop.	2007	% of 2007	% of Differ.
	%	S. R. S.	S. R. S.		%	S. R. S.	S. R. S.	
F	48.65	1455	48.60	0.06	48.65	1468	49.15	-0.49
M	51.20	1537	51.34	-0.13	51.20	1517	50.79	0.42
Miss	0.14	2	0.07	0.08	0.14	2	0.07	0.08
Total	100.00	2994	100.00	0.00	100.00	2987	100.00	0.00

Note. F. Female; M. Male; Miss: Missing

Table A.13 2007 MSA-Math Population and Stratified Random Sampling (S.R.S.): Grade 7 LEA

LEA	Operational Form A				Operational Form F			
	2007 Pop.	2007	% of 2007	% of Differ.	2007 Pop.	2007	% of 2007	
	%	S. R. S.	S. R. S.		%	S. R. S.	S. R. S.	
1	1.02	30	1.00	0.02	1.02	30	1.00	0.02
2	8.49	255	8.50	-0.01	8.49	255	8.50	-0.01
3	12.09	363	12.10	-0.01	12.09	363	12.10	-0.01
4	2.08	62	2.07	0.01	2.08	62	2.07	0.01
5	0.63	19	0.63	0.00	0.63	19	0.63	0.00
6	3.43	103	3.43	0.00	3.43	103	3.43	0.00
7	2.00	60	2.00	0.00	2.00	60	2.00	0.00
8	3.27	98	3.27	0.00	3.27	98	3.27	0.00
9	0.56	17	0.57	-0.01	0.56	17	0.57	-0.01
10	4.67	140	4.67	0.00	4.67	140	4.67	0.00
11	0.56	17	0.57	-0.01	0.56	17	0.57	-0.01
12	4.65	139	4.63	0.02	4.65	139	4.63	0.02
13	5.92	177	5.90	0.02	5.92	177	5.90	0.02
14	0.26	8	0.27	-0.01	0.26	8	0.27	-0.01
15	15.77	473	15.77	0.00	15.77	473	15.77	0.00
16	15.70	471	15.71	-0.01	15.70	471	15.71	-0.01
17	0.93	28	0.93	0.00	0.93	28	0.93	0.00
18	2.01	60	2.00	0.01	2.01	60	2.00	0.01
19	0.35	11	0.37	-0.02	0.35	11	0.37	-0.02
20	0.51	15	0.50	0.01	0.51	15	0.50	0.01
21	2.50	75	2.50	0.00	2.50	75	2.50	0.00
22	1.57	47	1.57	0.00	1.57	47	1.57	0.00
23	0.79	24	0.80	-0.01	0.79	24	0.80	-0.01
24	0.44	13	0.43	0.01	0.44	13	0.43	0.01
30	9.81	294	9.80	0.01	9.81	294	9.80	0.01
Total	100.00	2999	100.00	0.00	100.00	2999	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 2007 MSA- Mathematics Population and Stratified Random Sampling (S.R.S.): Grade 7 Ethnicity

Race	Operational Form A				Operational Form F			
	2007 Pop.	2007	% of 2007	% of Differ.	2007 Pop.	2007	% of 2007	% of Differ.
	%	S. R. S.	S. R. S.		%	S. R. S.	S. R. S.	
1	0.38	7	0.23	0.15	0.38	15	0.50	-0.12
2	5.19	168	5.60	-0.41	5.19	159	5.30	-0.11
3	39.21	1191	39.71	-0.51	39.21	1158	38.61	0.59
4	47.26	1386	46.22	1.05	47.26	1453	48.45	-1.19
5	7.70	240	8.00	-0.30	7.70	207	6.90	0.80
Miss	0.26	7	0.23	0.02	0.26	7	0.23	0.02
Total	100.00	2999	100.00	0.00	100.00	2999	100.00	0.00

Note. 1. American Indian; 2. Asian American; 3. African American; 4. White; 5. Hispanic; Miss: Missing

Table A.15 2007 MSA- Mathematics Population and Stratified Random Sampling (S.R.S.): Grade 7 Gender

Gender	Operational Form A				Operational Form F			
	2007 Pop.	2007	% of 2007	% of Differ.	2007 Pop.	2007	% of 2007	% of Differ.
	%	S. R. S.	S. R. S.		%	S. R. S.	S. R. S.	
F	48.44	1435	47.85	0.59	48.44	1466	48.88	-0.44
M	51.38	1561	52.05	-0.67	51.38	1530	51.02	0.36
Miss	0.18	3	0.10	0.08	0.18	3	0.10	0.08
Total	100.00	2999	100.00	0.00	100.00	2999	100.00	0.00

Note. F. Female; M. Male; Miss: Missing

Table A.16 2007 MSA- Mathematics Population and Stratified Random Sampling (S.R.S.): Grade 8 LEA

LEA	Operational Form A				Operational Form F			
	2007 Pop.	2007	% of 2007	% of Differ.	2007 Pop.	2007	% of 2007	
	%	S. R. S.	S. R. S.		%	S. R. S.	S. R. S.	
1	1.12	34	1.13	-0.01	1.12	34	1.13	-0.01
2	8.39	251	8.37	0.02	8.39	251	8.37	0.02
3	12.16	365	12.17	-0.01	12.16	365	12.17	-0.01
4	2.11	63	2.10	0.01	2.11	63	2.10	0.01
5	0.62	19	0.63	-0.01	0.62	19	0.63	-0.01
6	3.51	105	3.50	0.01	3.51	105	3.50	0.01
7	2.04	61	2.03	0.01	2.04	61	2.03	0.01
8	3.23	97	3.23	0.00	3.23	97	3.23	0.00
9	0.52	16	0.53	-0.01	0.52	16	0.53	-0.01
10	4.70	141	4.70	0.00	4.70	141	4.70	0.00
11	0.63	19	0.63	0.00	0.63	19	0.63	0.00
12	4.56	137	4.57	-0.01	4.56	137	4.57	-0.01
13	6.00	180	6.00	0.00	6.00	180	6.00	0.00
14	0.26	8	0.27	-0.01	0.26	8	0.27	-0.01
15	15.75	472	15.74	0.01	15.75	472	15.74	0.01
16	15.62	468	15.61	0.01	15.62	468	15.61	0.01
17	0.91	27	0.90	0.01	0.91	27	0.90	0.01
18	1.84	55	1.83	0.01	1.84	55	1.83	0.01
19	0.40	12	0.40	0.00	0.40	12	0.40	0.00
20	0.53	16	0.53	0.00	0.53	16	0.53	0.00
21	2.42	73	2.43	-0.01	2.42	73	2.43	-0.01
22	1.66	50	1.67	-0.01	1.66	50	1.67	-0.01
23	0.75	22	0.73	0.02	0.75	22	0.73	0.02
24	0.66	20	0.67	-0.01	0.66	20	0.67	-0.01
30	9.59	288	9.60	-0.01	9.59	288	9.60	-0.01
Total	100.00	2999	100.00	0.00	100.00	2999	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 2007 MSA- Mathematics Population and Stratified Random Sampling (S.R.S.): Grade 8 Ethnicity

Race	Operational Form A				Operational Form F			
	2007 Pop.	2007	% of 2007	% of Differ.	2007 Pop.	2007	% of 2007	% of Differ.
	%	S. R. S.	S. R. S.		%	S. R. S.	S. R. S.	
1	0.38	11	0.37	0.02	0.38	13	0.43	-0.05
2	5.06	149	4.97	0.09	5.06	136	4.53	0.52
3	39.24	1221	40.71	-1.47	39.24	1219	40.65	-1.40
4	47.83	1388	46.28	1.55	47.83	1407	46.92	0.92
5	7.26	223	7.44	-0.18	7.26	216	7.20	0.05
Miss	0.23	7	0.23	-0.01	0.23	8	0.27	-0.04
Total	100.00	2999	100.00	0.00	100.00	2999	100.00	0.00

Note. 1. American Indian; 2. Asian American; 3. African American; 4. White; 5. Hispanic; Miss: Missing

Table A.18 2007 MSA- Mathematics Population and Stratified Random Sampling (S.R.S.): Grade 8 Gender

Gender	Operational Form A				Operational Form F			
	2007 Pop.	2007	% of 2007	% of Differ.	2007 Pop.	2007	% of 2007	% of Differ.
	%	S. R. S.	S. R. S.		%	S. R. S.	S. R. S.	
F	48.94	1475	49.18	-0.25	48.94	1501	50.05	-1.11
M	50.88	1519	50.65	0.23	50.88	1493	49.78	1.10
Miss	0.18	5	0.17	0.02	0.18	5	0.17	0.02
Total	100.00	2999	100.00	0.00	100.00	2999	100.00	0.00

Note. F. Female; M. Male; Miss: Missing

APPENDIX B: SCALE SCORE HISTOGRAMS AND TUKEY CHARTS

Year 2006 Grade=3

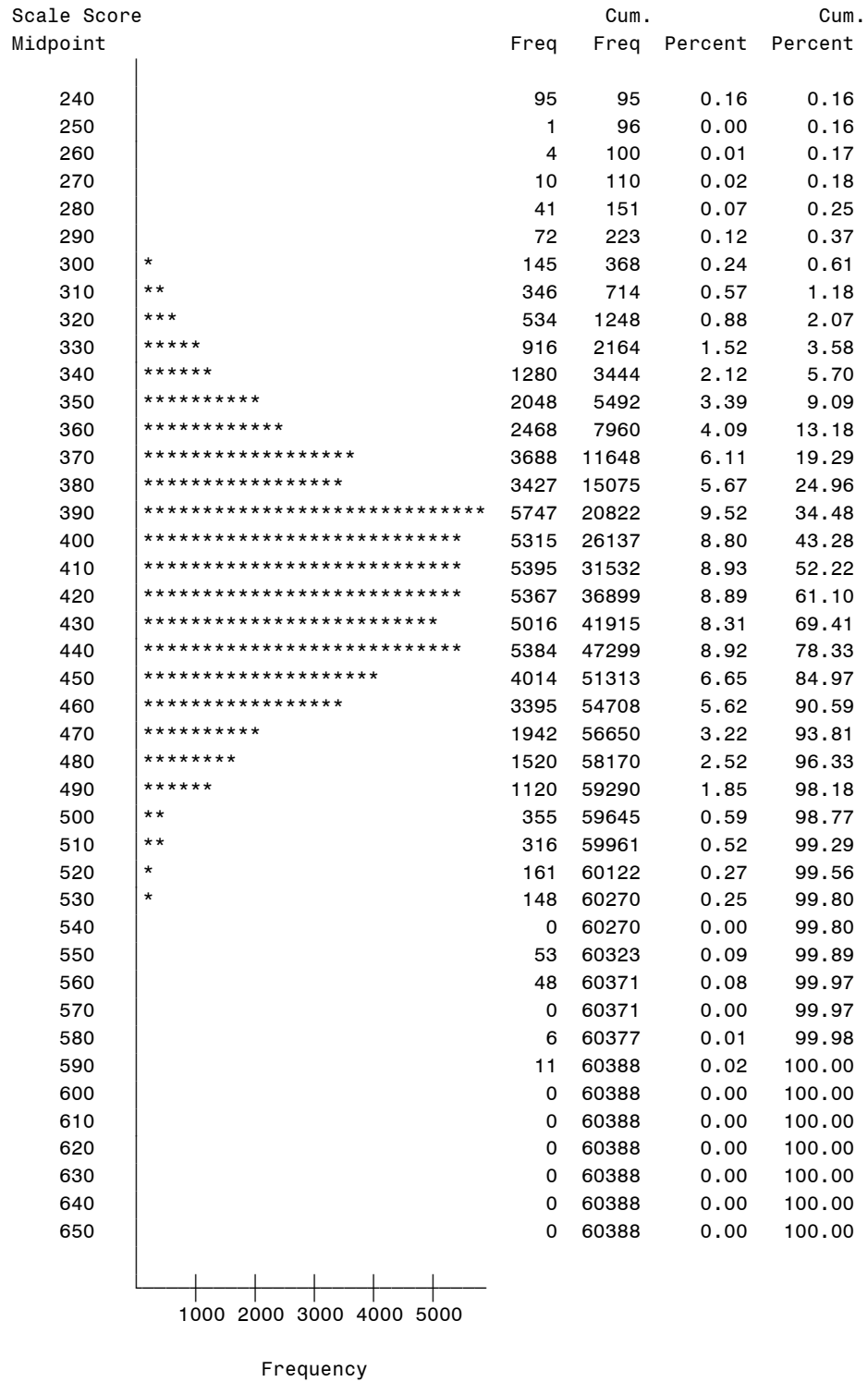


Figure B.1 Year 2006 Scale Score Distribution: Grade3

Year 2007 Grade=3 Form=A

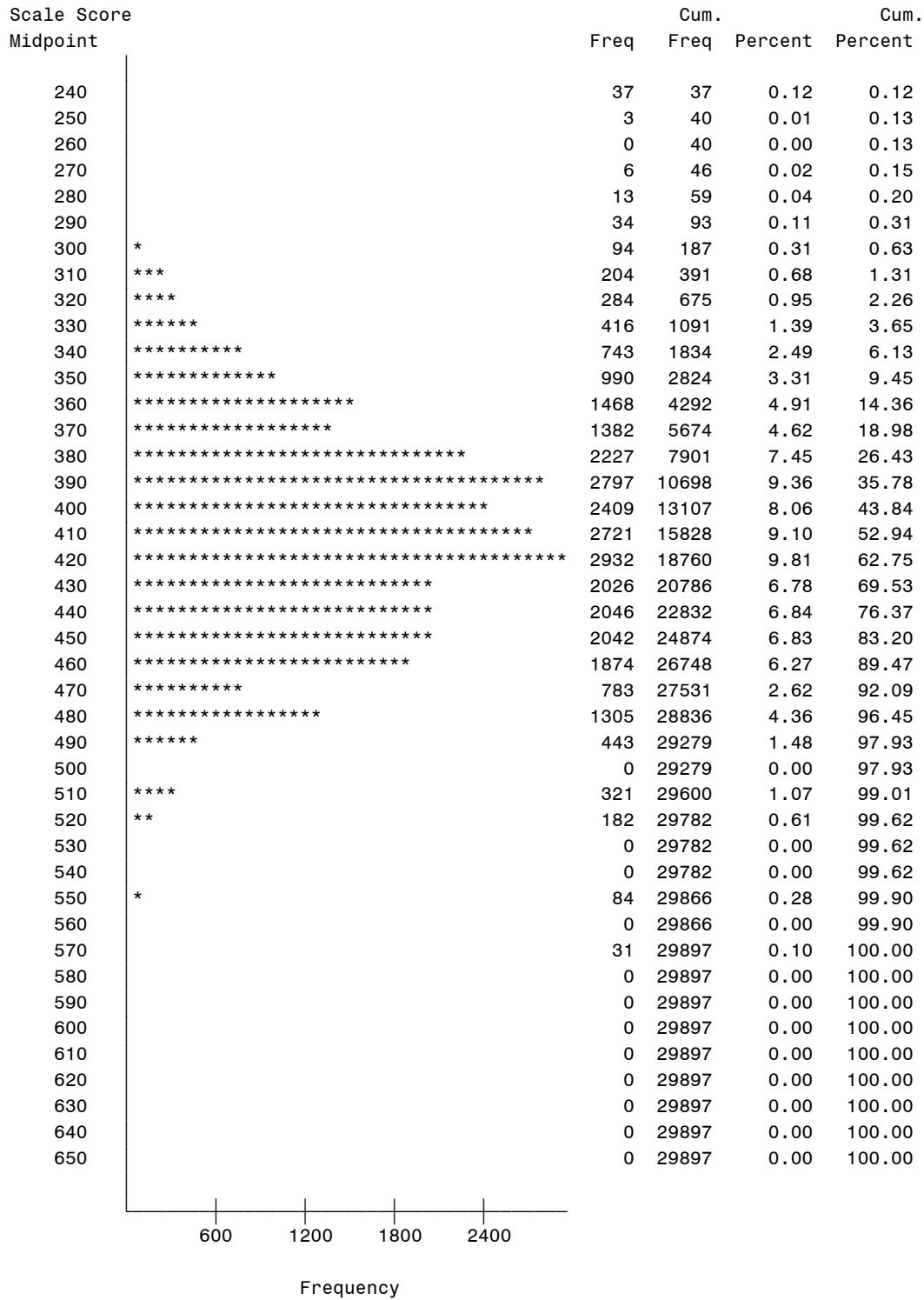


Figure B.2 Year 2007 Scale Score Distribution: Grade 3 Form A

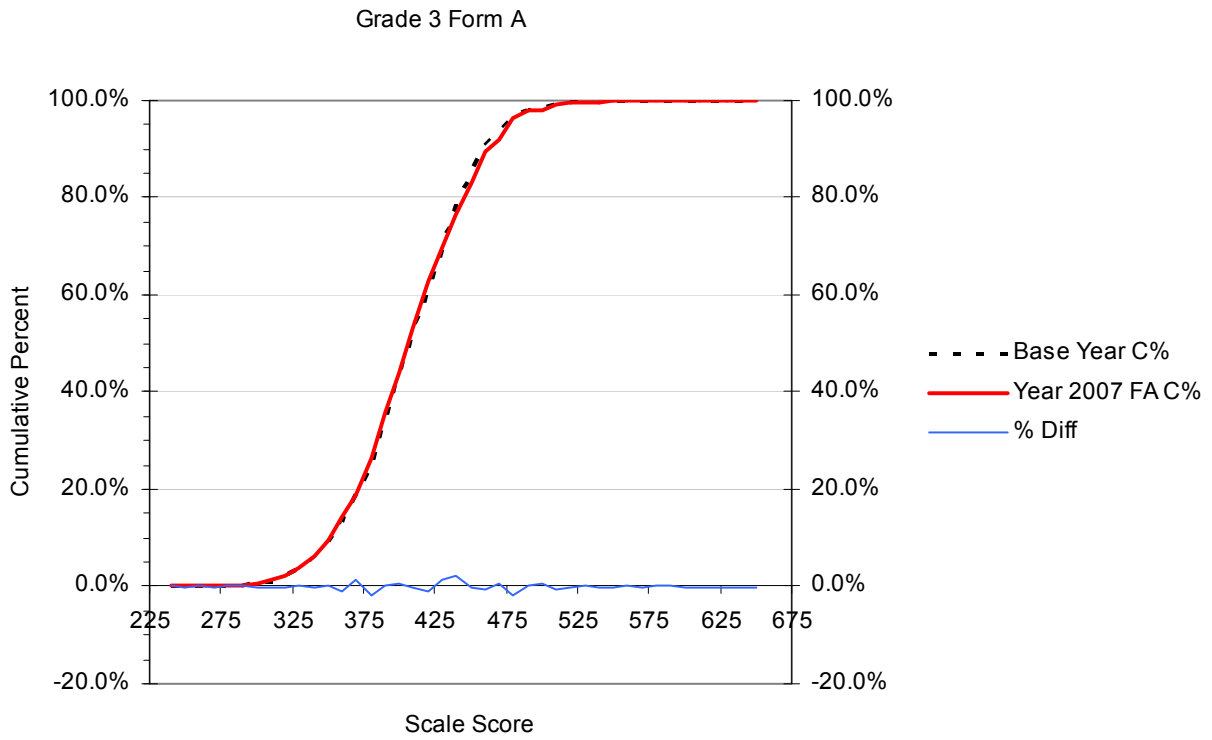


Figure B.3. Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2007 Scale Scores with the Percent Differences between CDFs: Grade 3 Form A

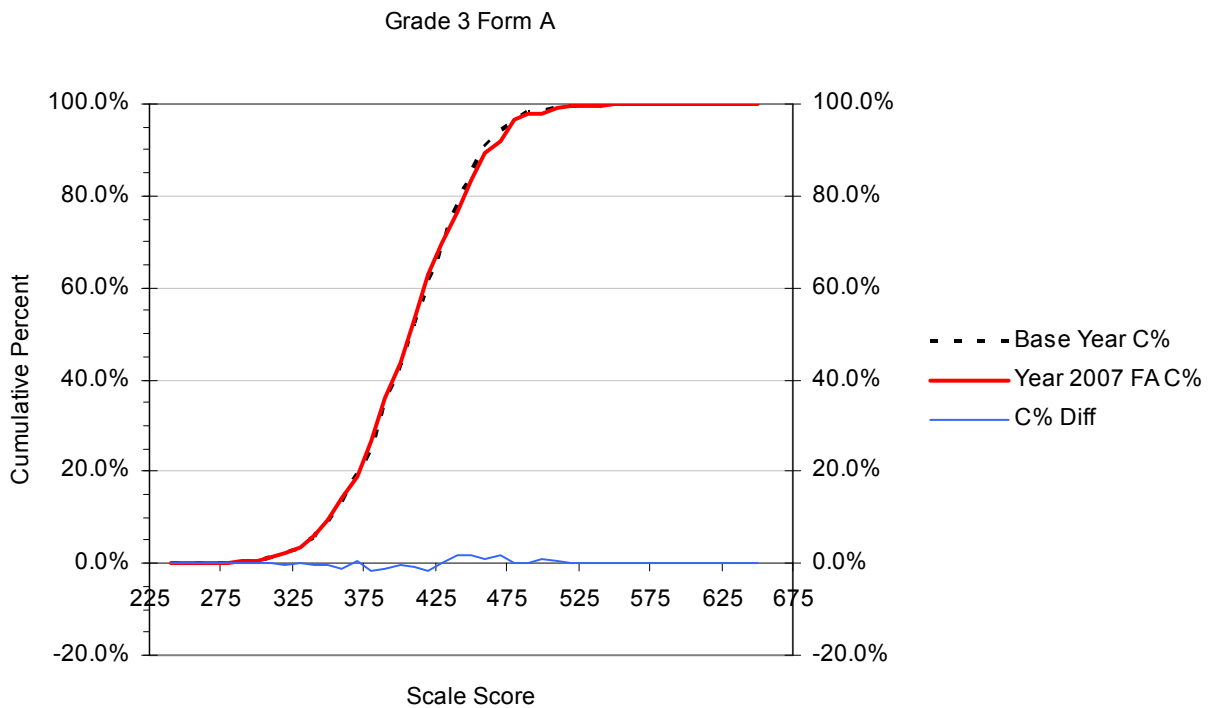


Figure B.4. Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2007 Scale Scores with the Cumulative Percent Differences between CDFs: Grade 3 Form A

Year 2007 Grade=3 Form=F

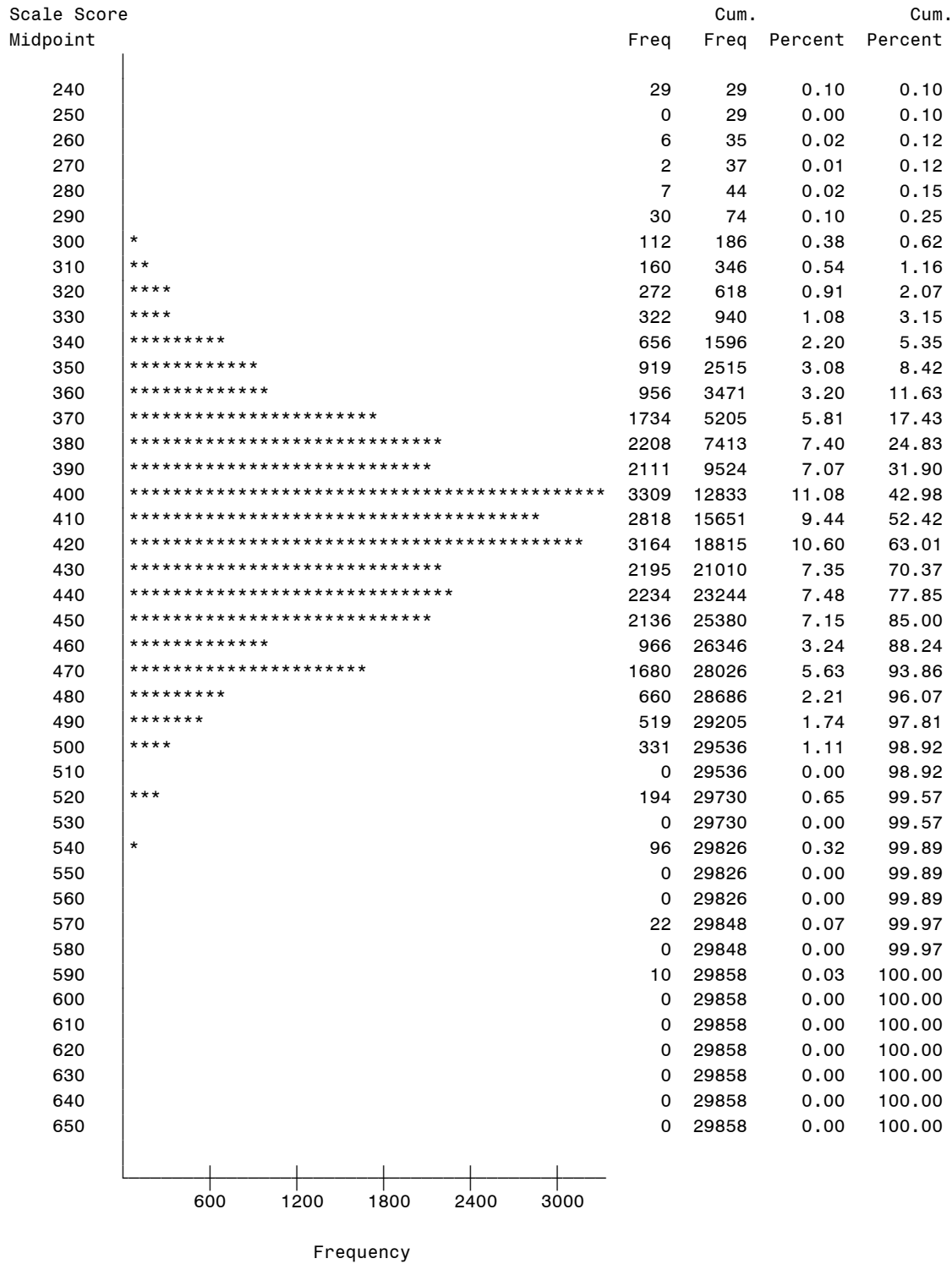


Figure B.5 Year 2007 Scale Score Distribution: Grade 3 Form F

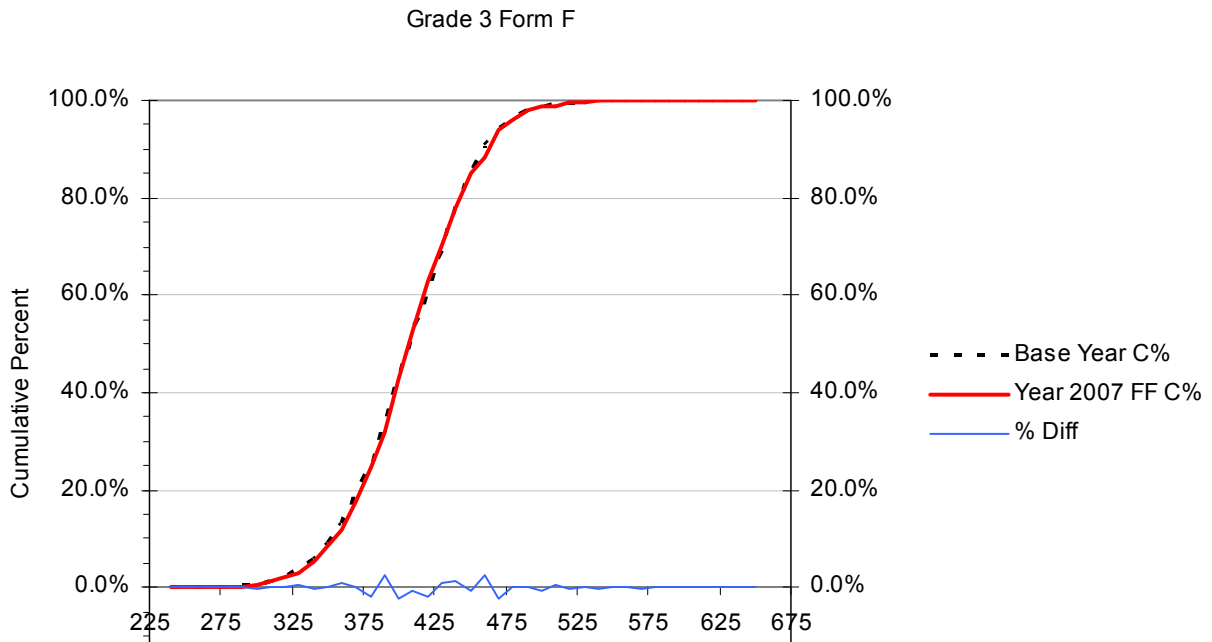


Figure B.6. Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2007 Scale Scores with the Percent Differences between CDFs: Grade 3 Form F

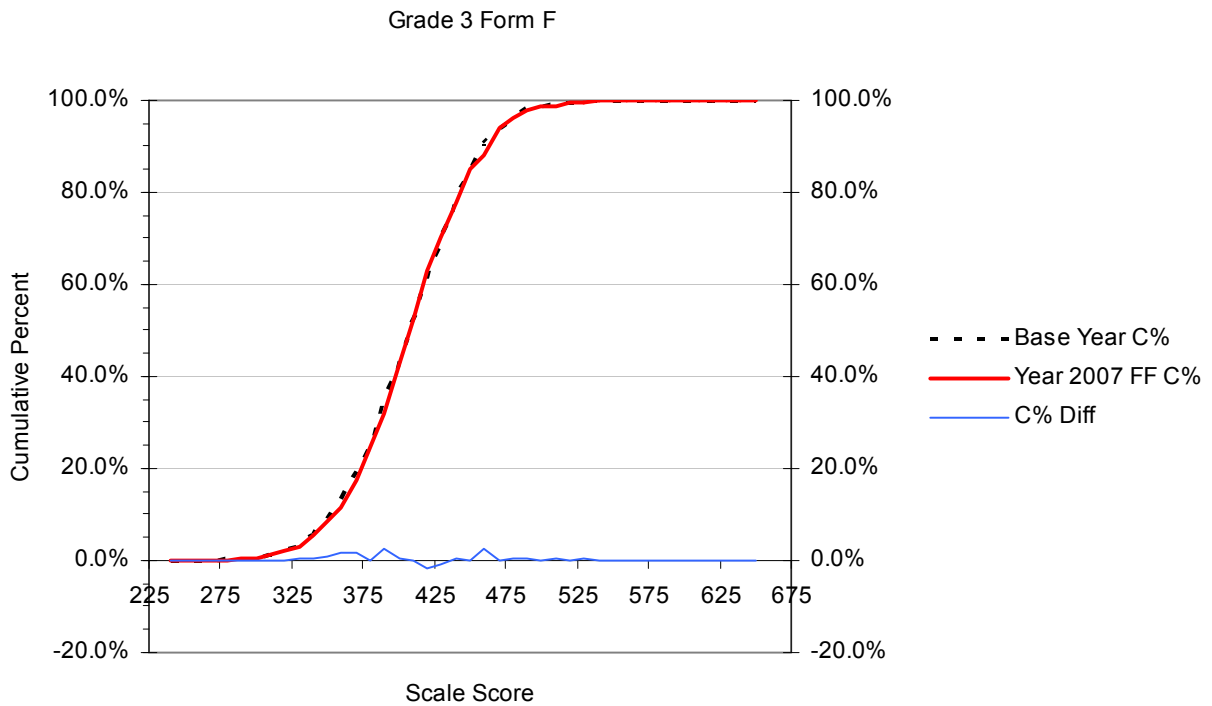


Figure B.7. Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2007 Scale Scores with the Cumulative Percent Differences between CDFs: Grade 3 Form F

Note. The scale score distributions and the Tukey plots for 2007 generated based on raw scores from 2007 data files.

Year 2006 Grade=4

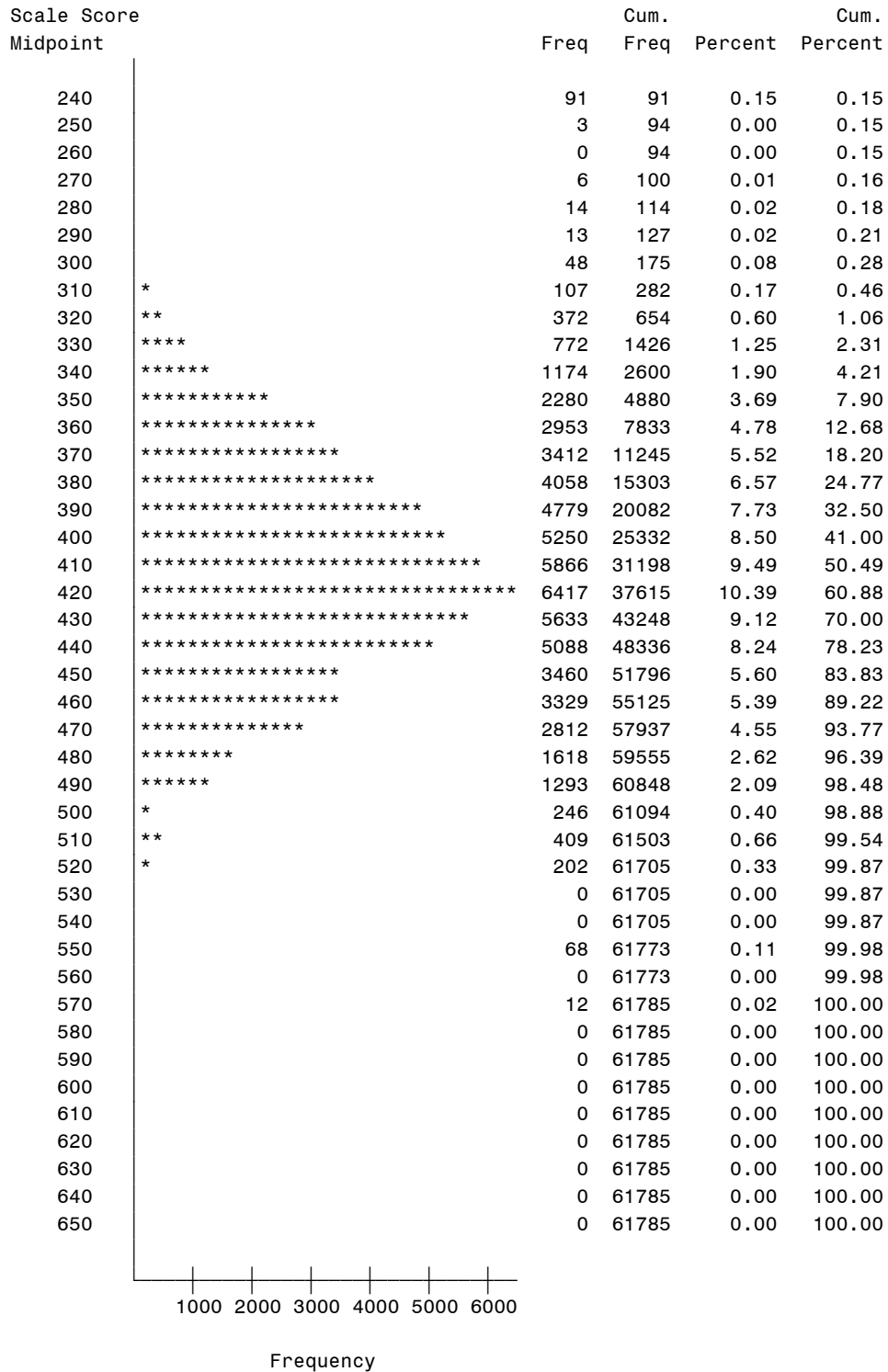


Figure B.8 Year 2006 Scale Score Distribution: Grade 4

Year 2007 Grade=4 Form=A

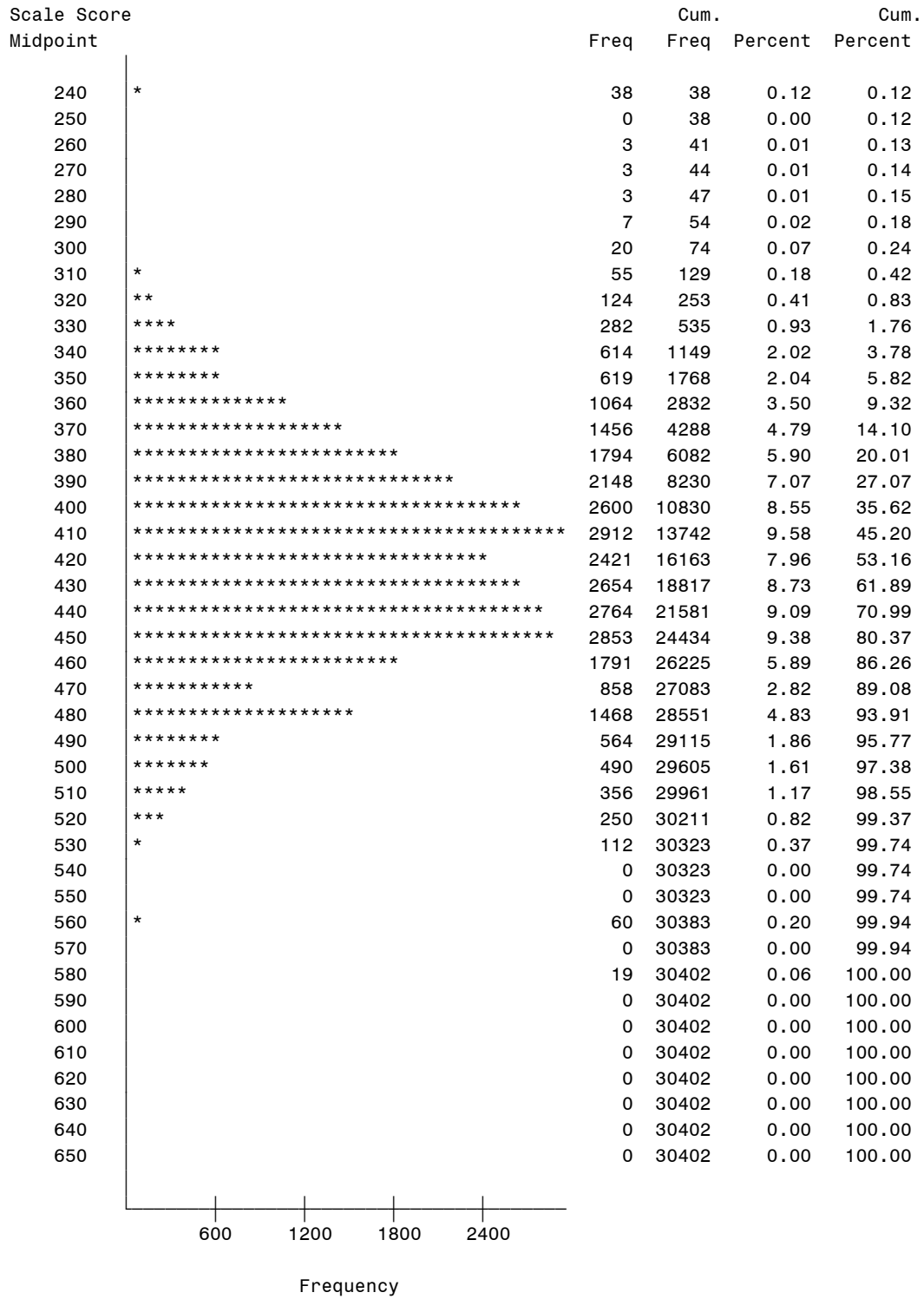


Figure B.9 Year 2007 Scale Score Distribution: Grade 4 Form A

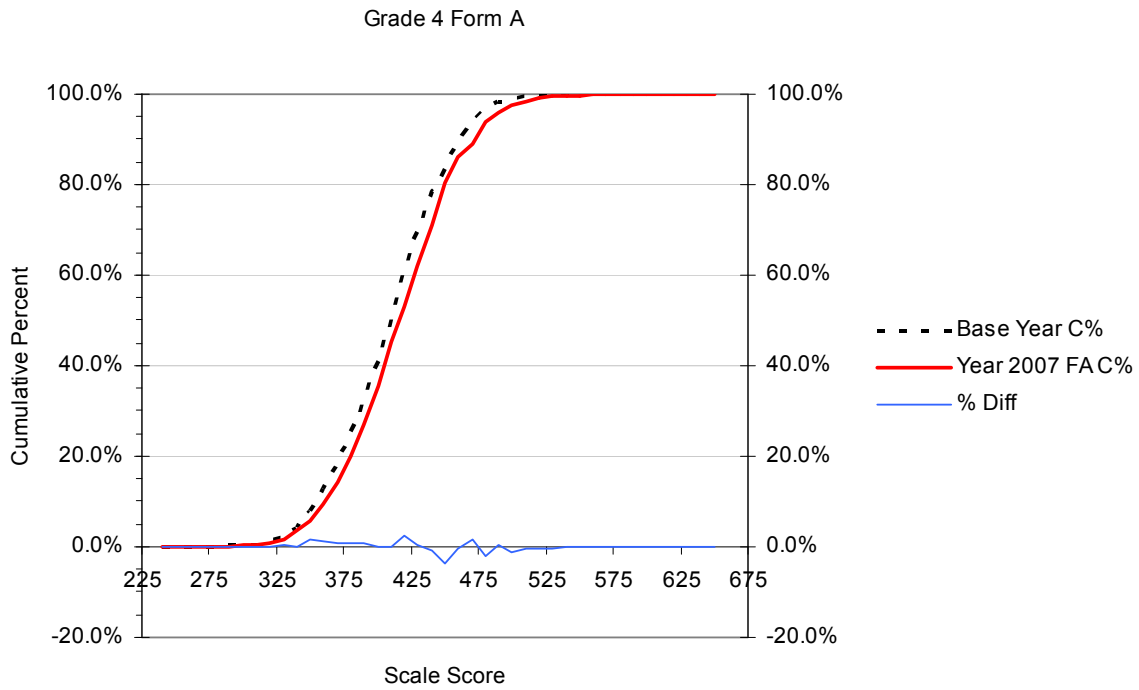


Figure B.10. Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2007 Scale Scores with the Percent Differences between CDFs: Grade 4 Form A

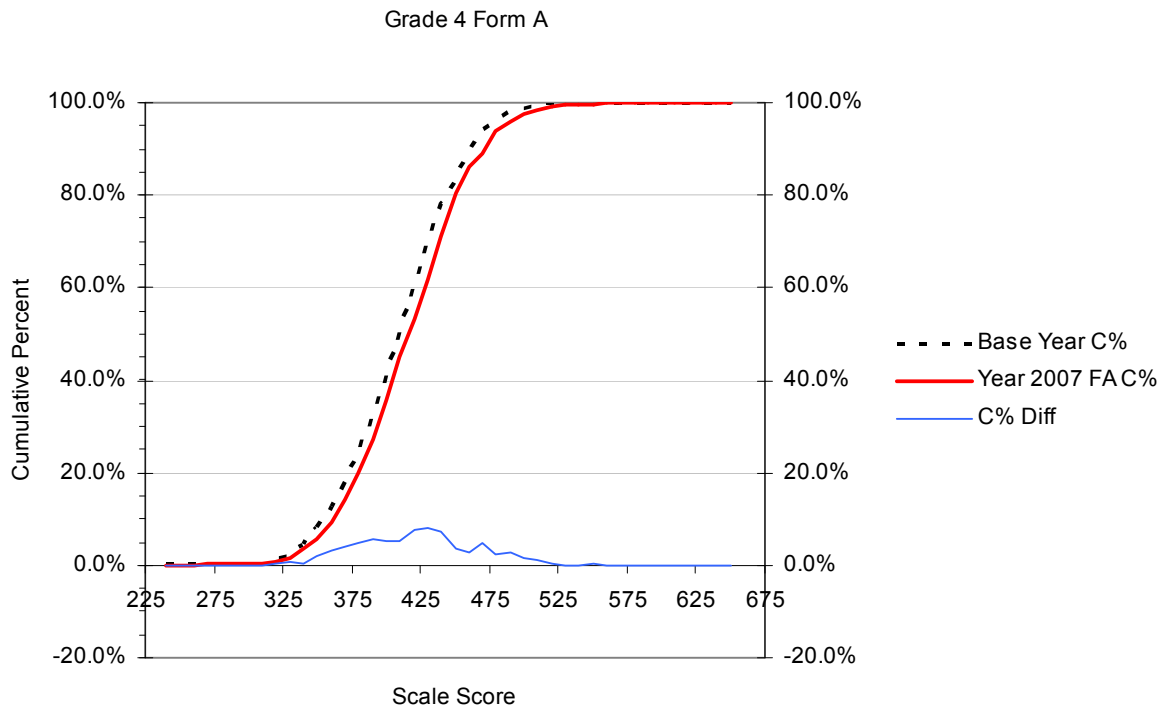


Figure B.11. Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2007 Scale Scores with the Cumulative percent Differences between CDFs: Grade 4 Form A

Year 2007 Grade=4 Form=F

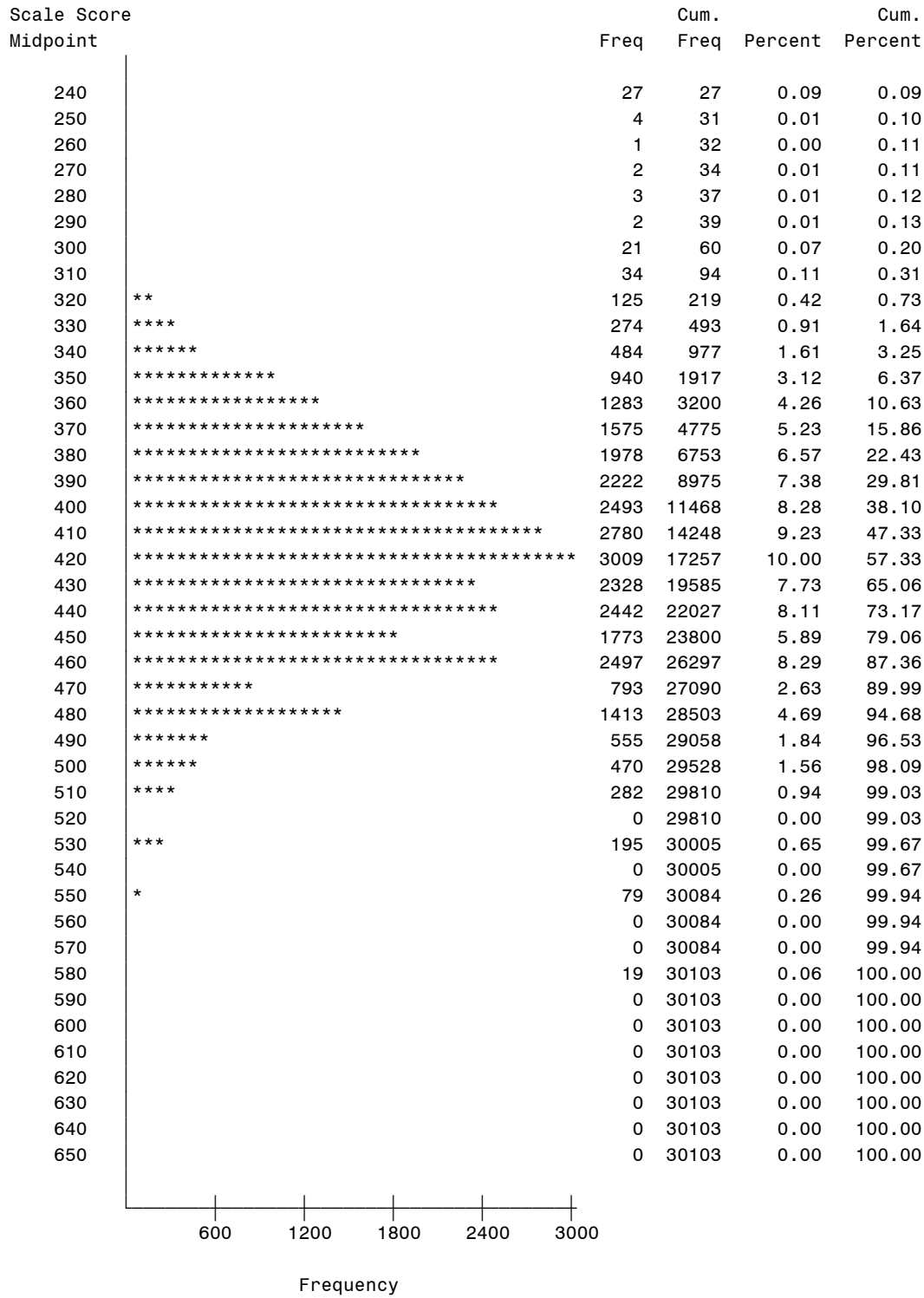


Figure B.12 Year 2007 Scale Score Distribution: Grade 4 Form F

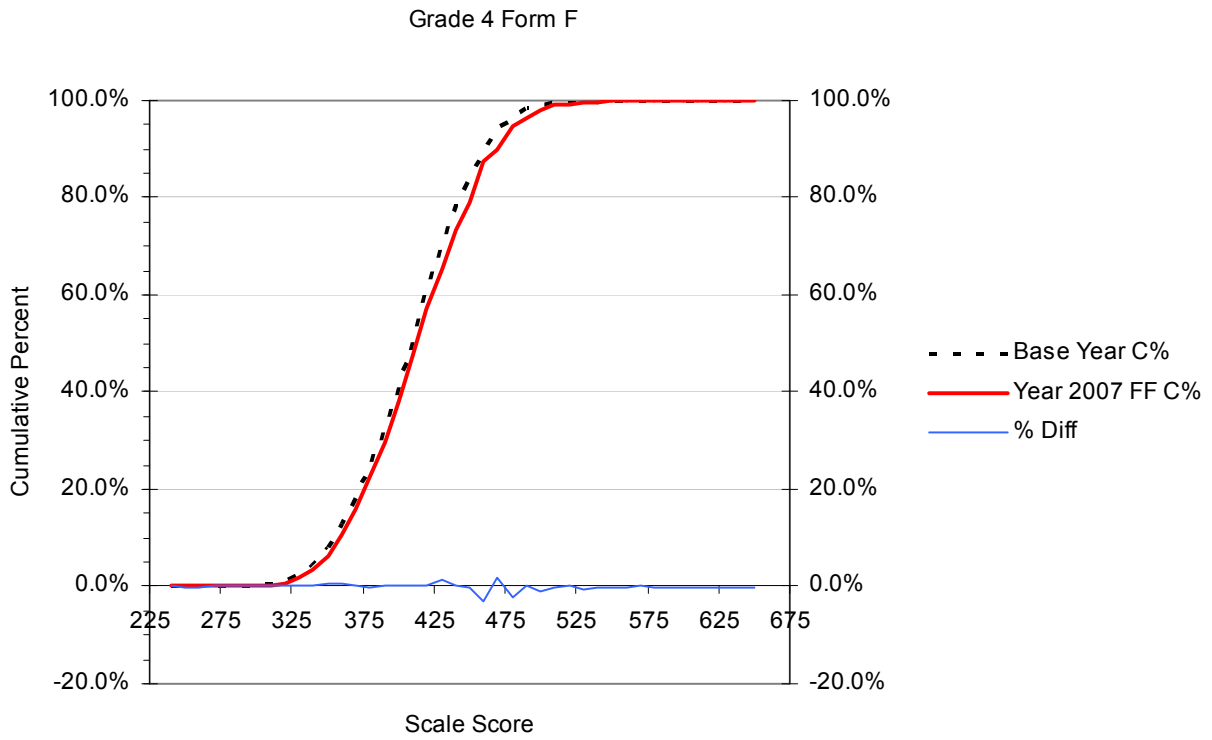


Figure B.13. Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2007 Scale Scores with the Percent Differences between CDFs: Grade 4 Form F

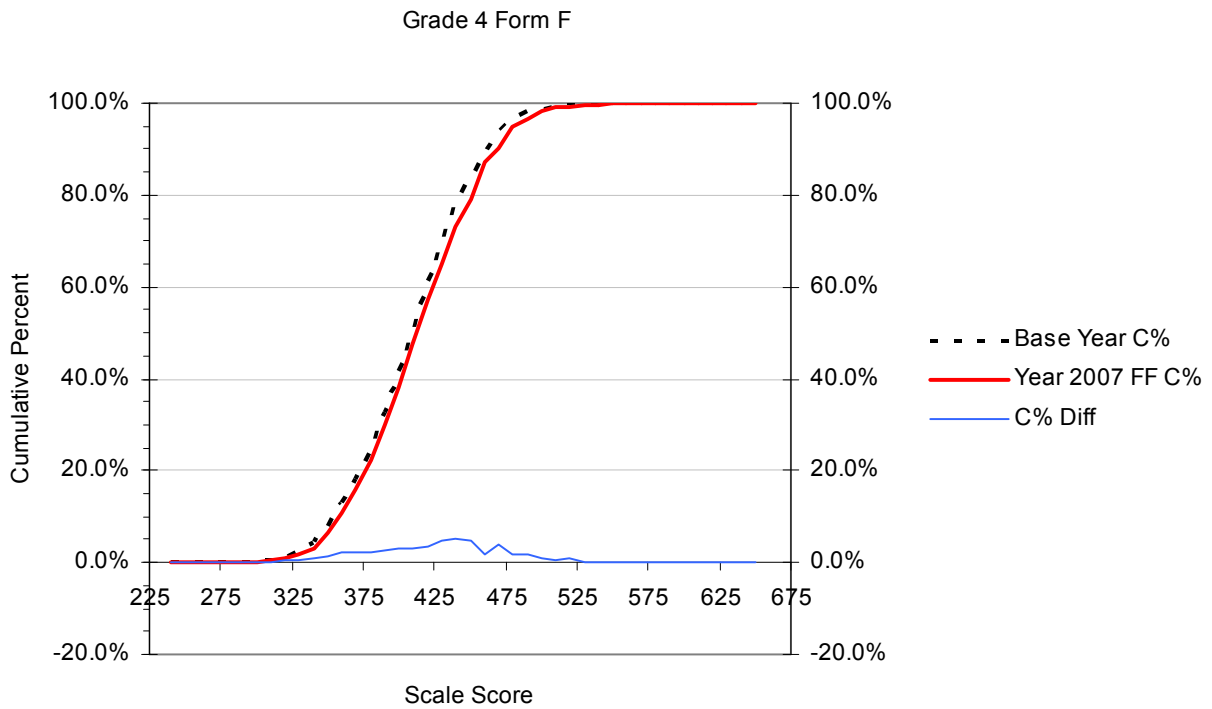


Figure B.14. Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2007 Scale Scores with the Cumulative Percent Differences between CDFs: Grade 4 Form F

Note. The scale score distributions and the Tukey plots for 2007 generated based on raw scores from 2007 data files.

Year 2006 Grade=5

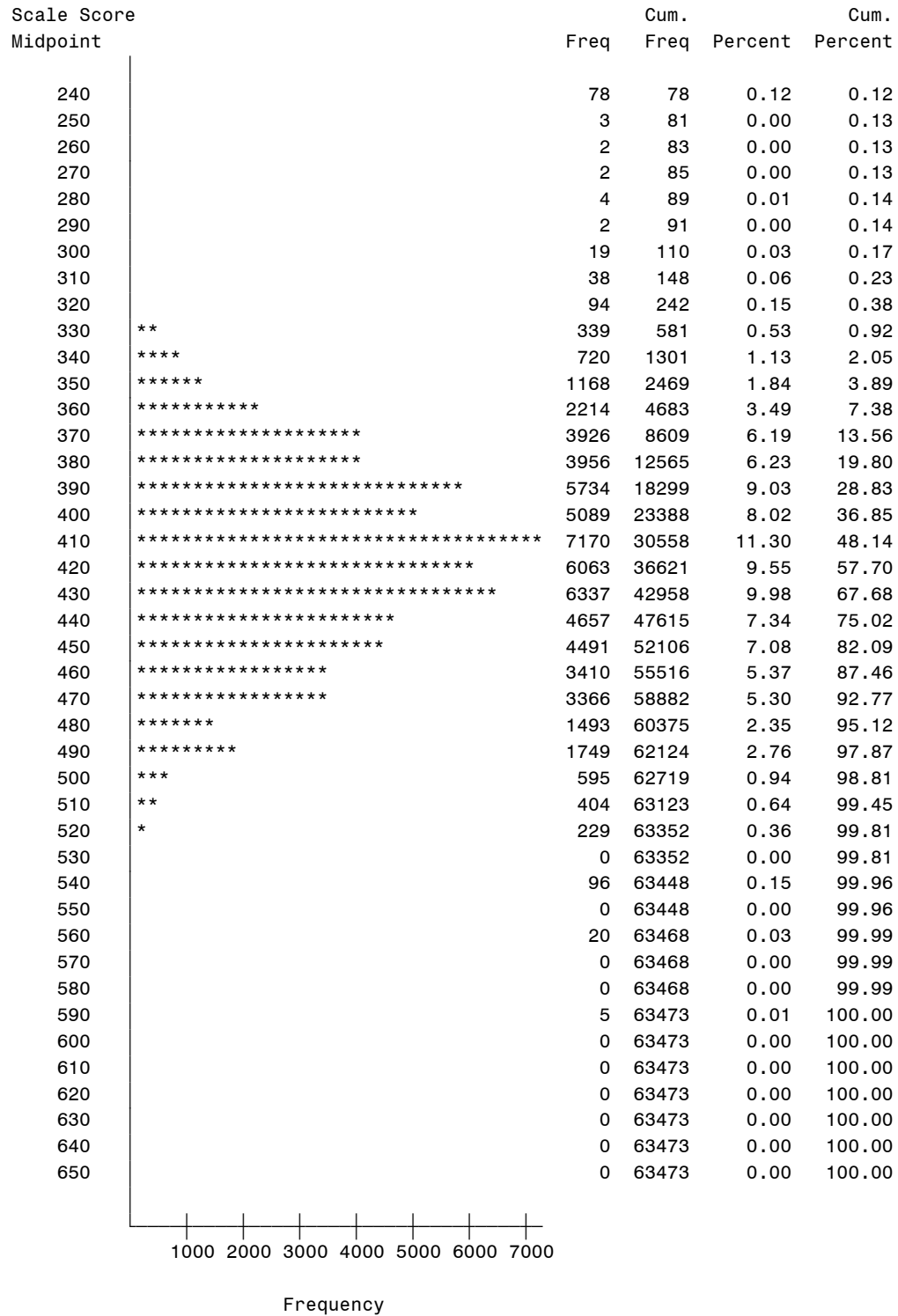


Figure B.15 Year 2006 Scale Score Distribution: Grade 5

Year 2007 Grade=5 Form=A

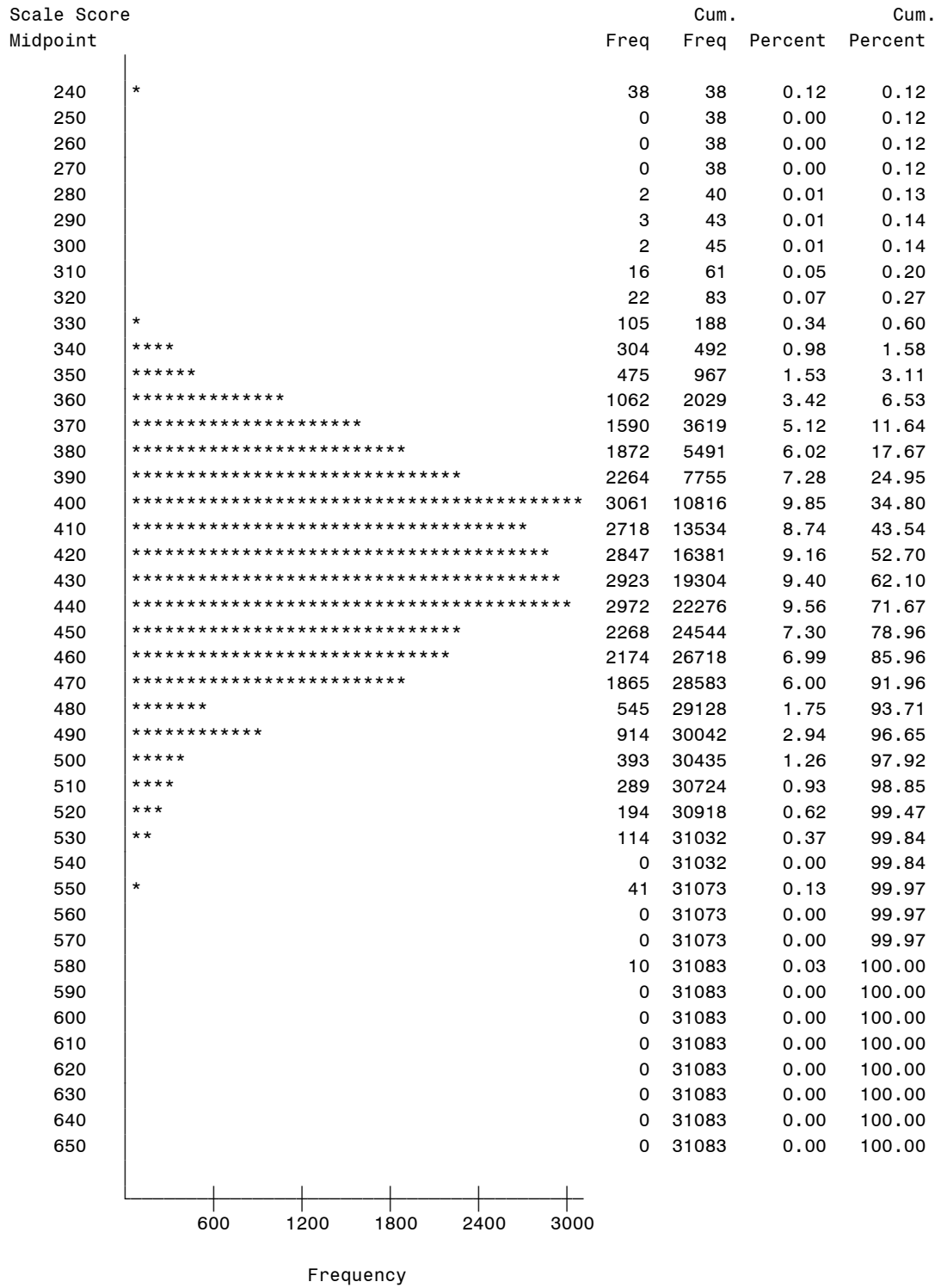


Figure B.16 Year 2007 Scale Score Distribution: Grade 5 Form A

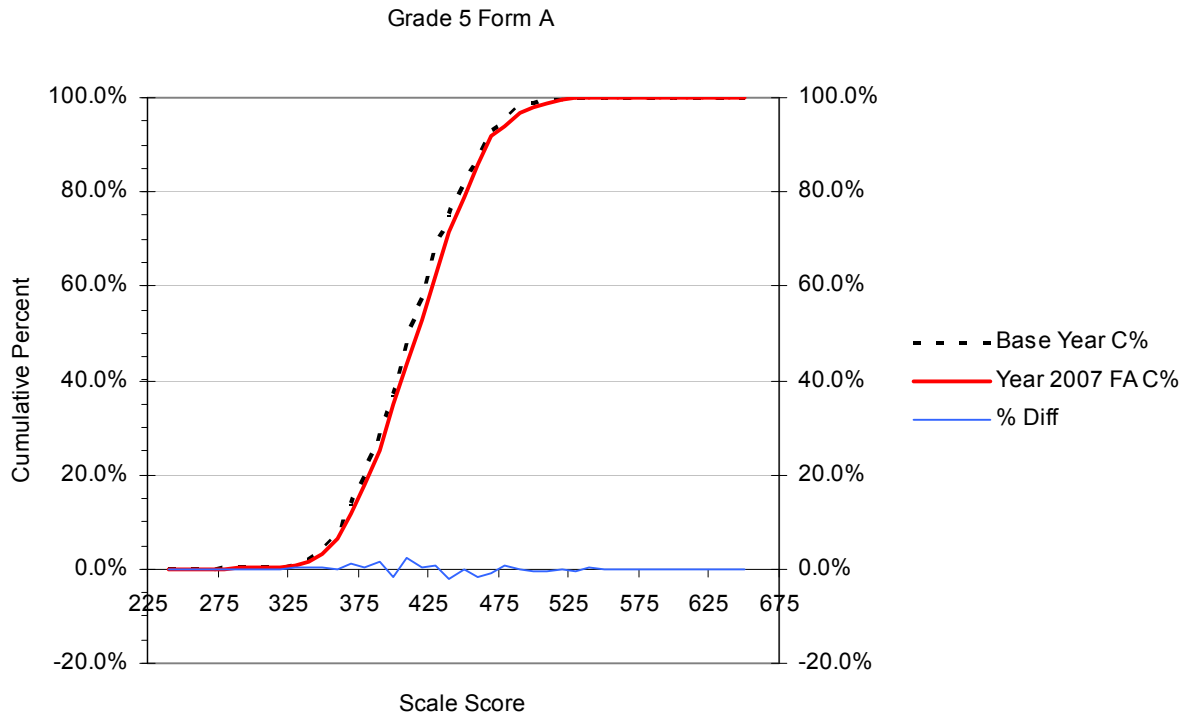


Figure B.17. Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2007 Scale Scores with the Percent Differences between CDFs: Grade 5 Form A

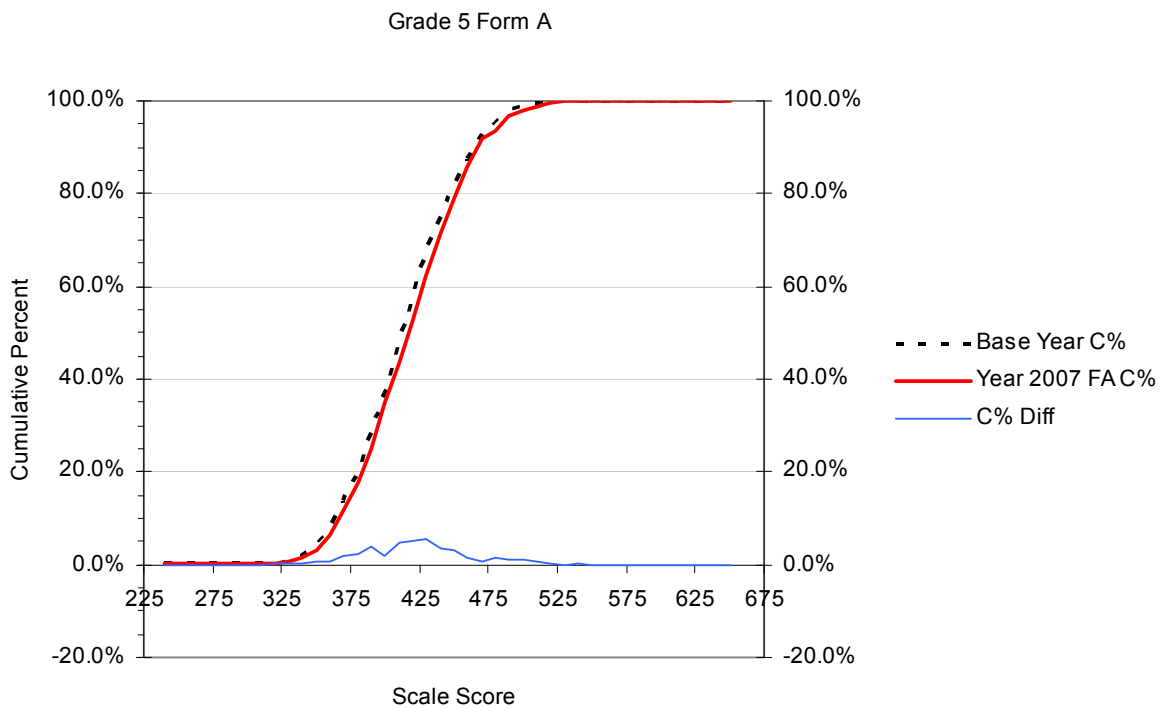


Figure B.18. Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2007 Scale Scores with the Cumulative Percent Differences between CDFs: Grade 5 Form A

Year 2007 Grade=5 Form=F

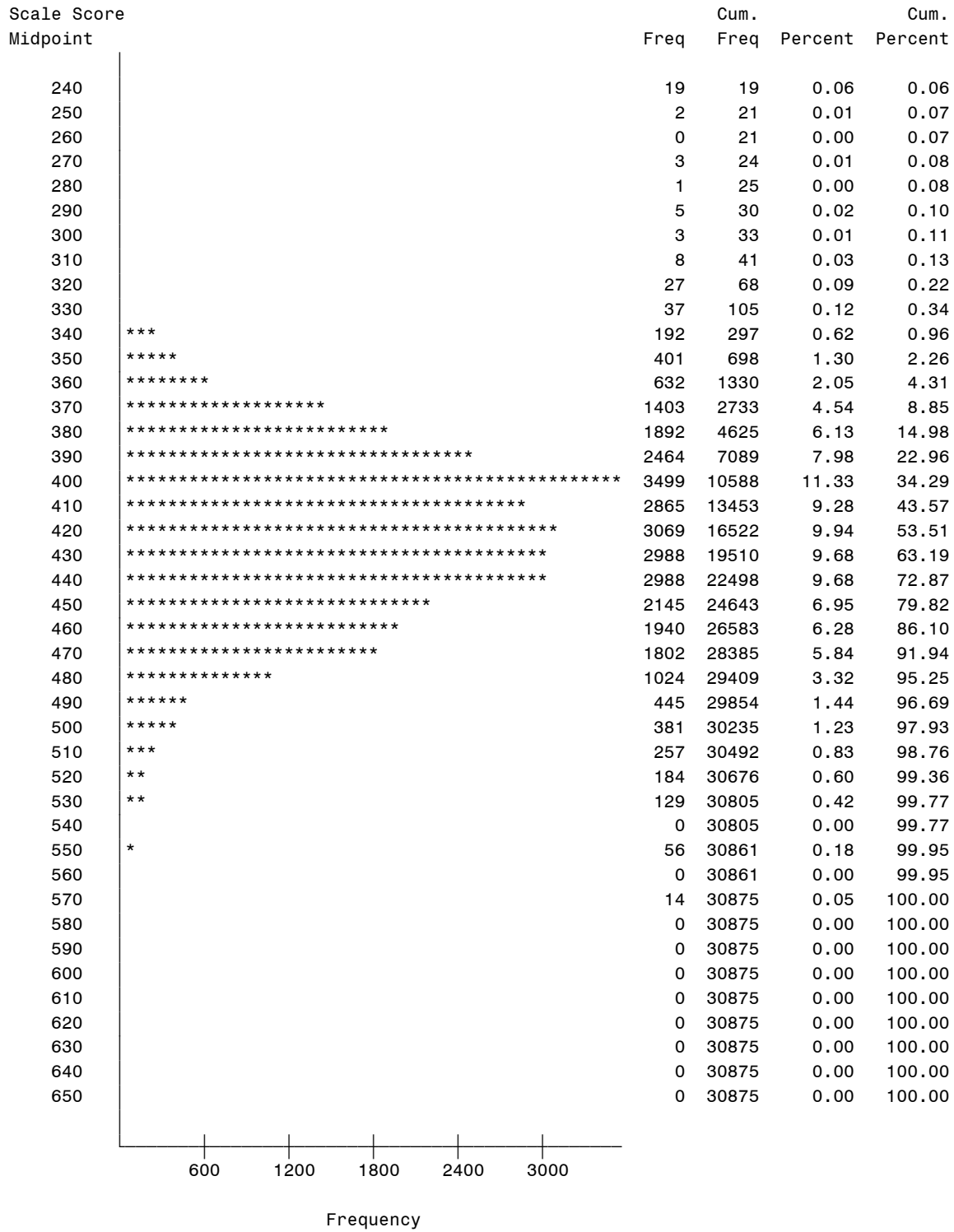


Figure B.19 Year 2007 Scale Score Distribution: Grade 5 Form F

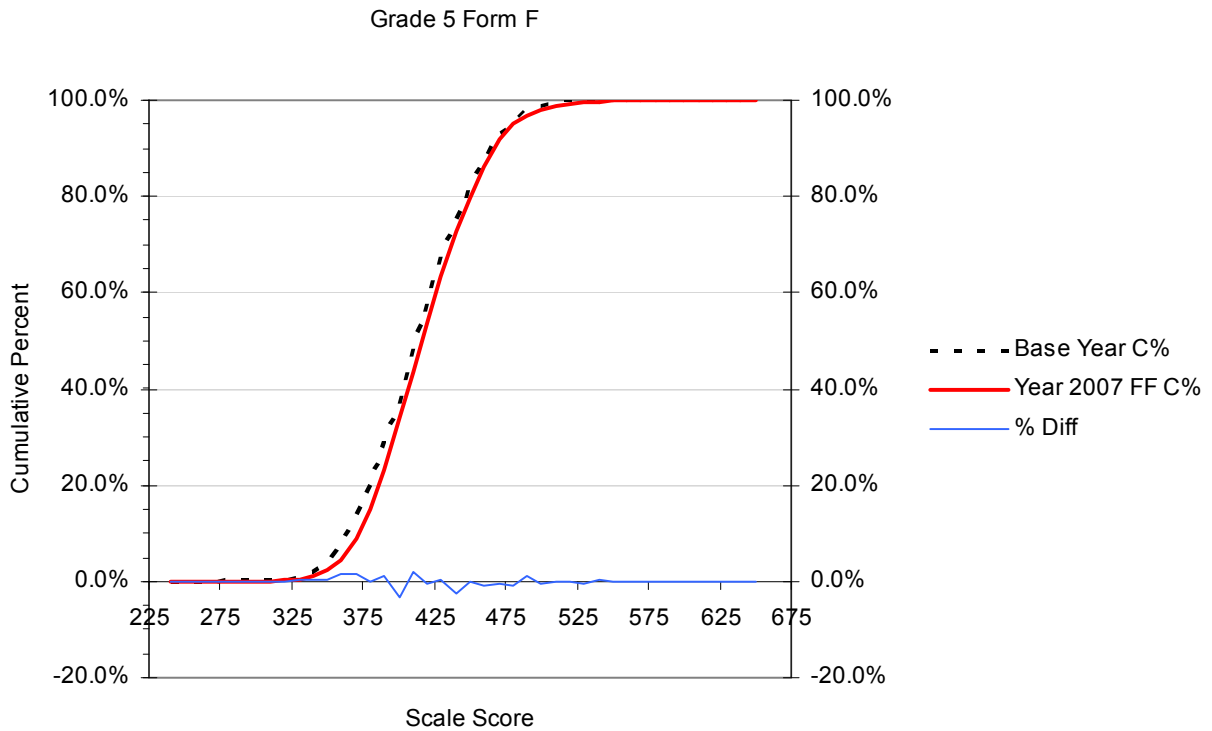


Figure B.20. Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2007 Scale Scores with the Percent Differences between CDFs: Grade 5 Form F

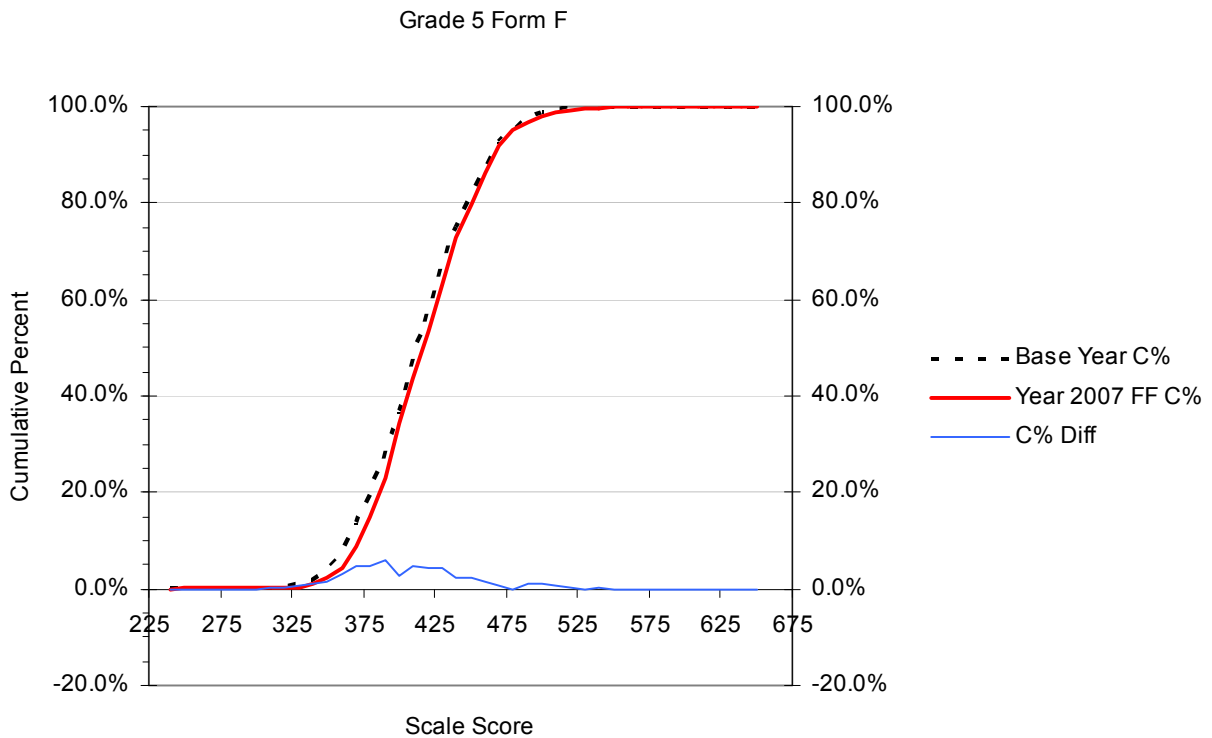


Figure B.21. Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2007 Scale Scores with the Cumulative Percent Differences between CDFs: Grade 5 Form F

Note. The scale score distributions and the Tukey plots for 2007 generated based on raw scores from 2007 data files.

Year 2006 Grade=6

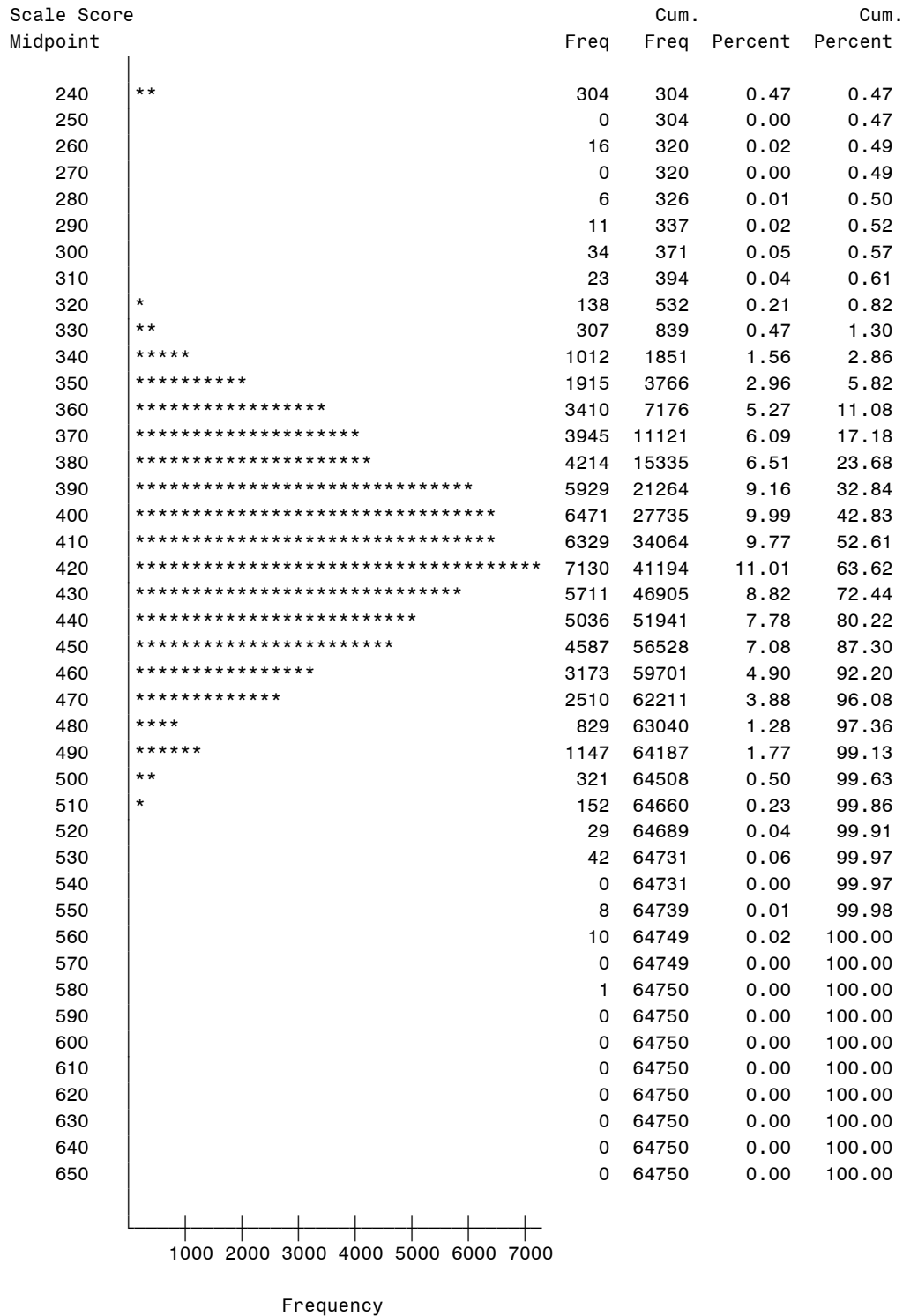


Figure B.22 Year 2006 Scale Score Distribution: Grade 6

Year 2007 Grade=6 Form=A

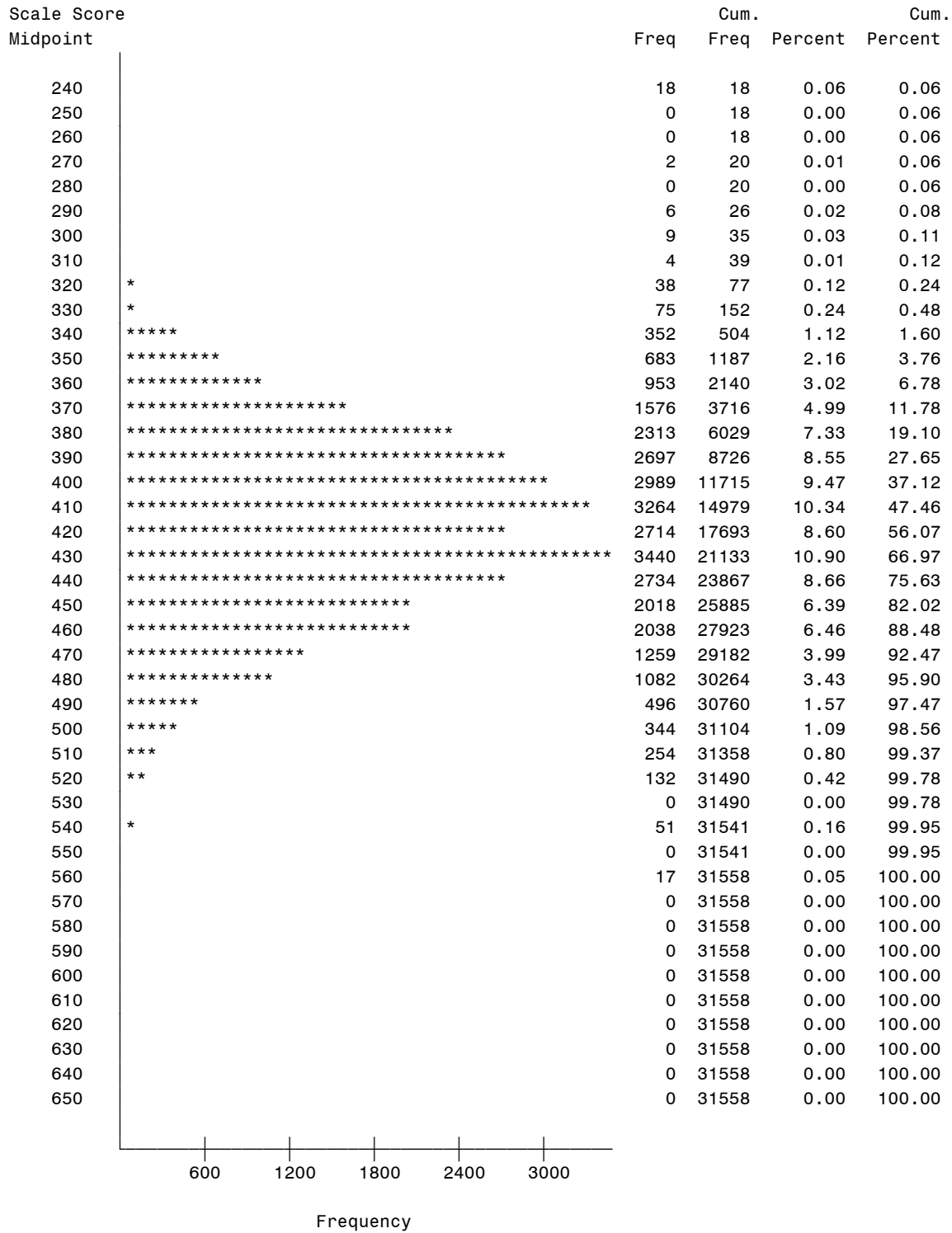


Figure B.23 Year 2007 Scale Score Distribution: Grade 6 Form A

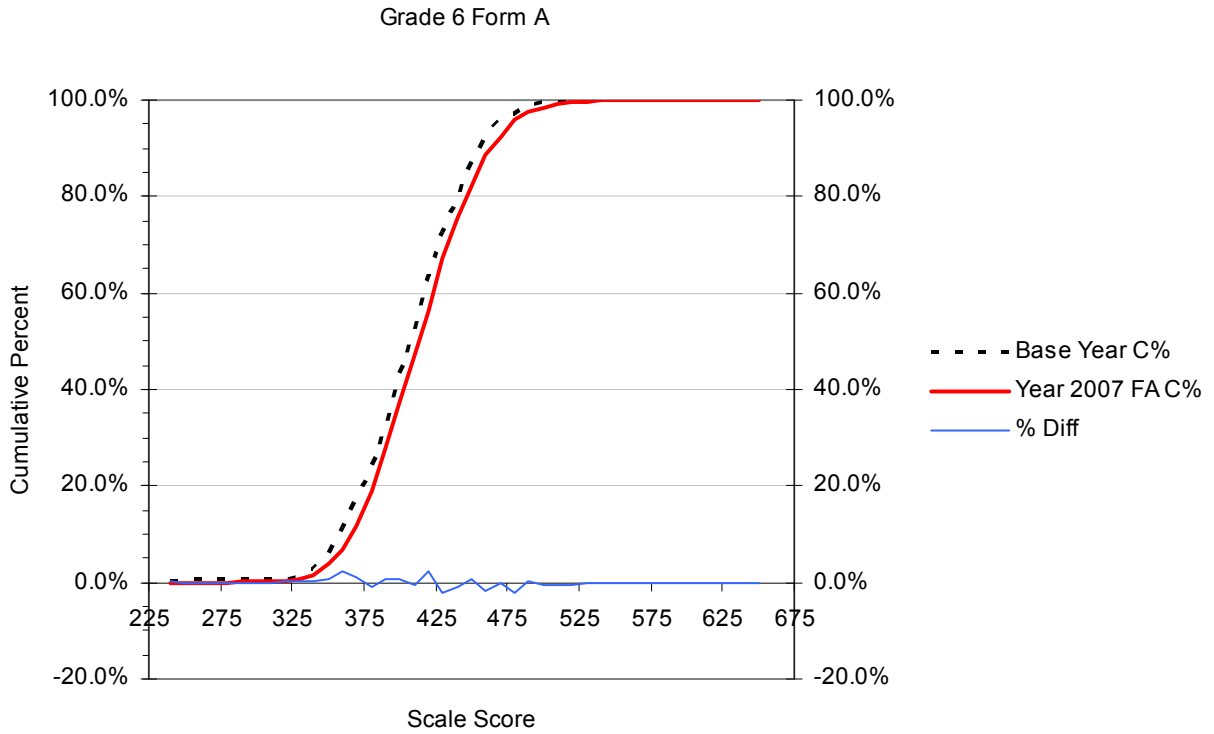


Figure B.24. Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2007 Scale Scores with the Percent Differences between CDFs: Grade 6 Form A

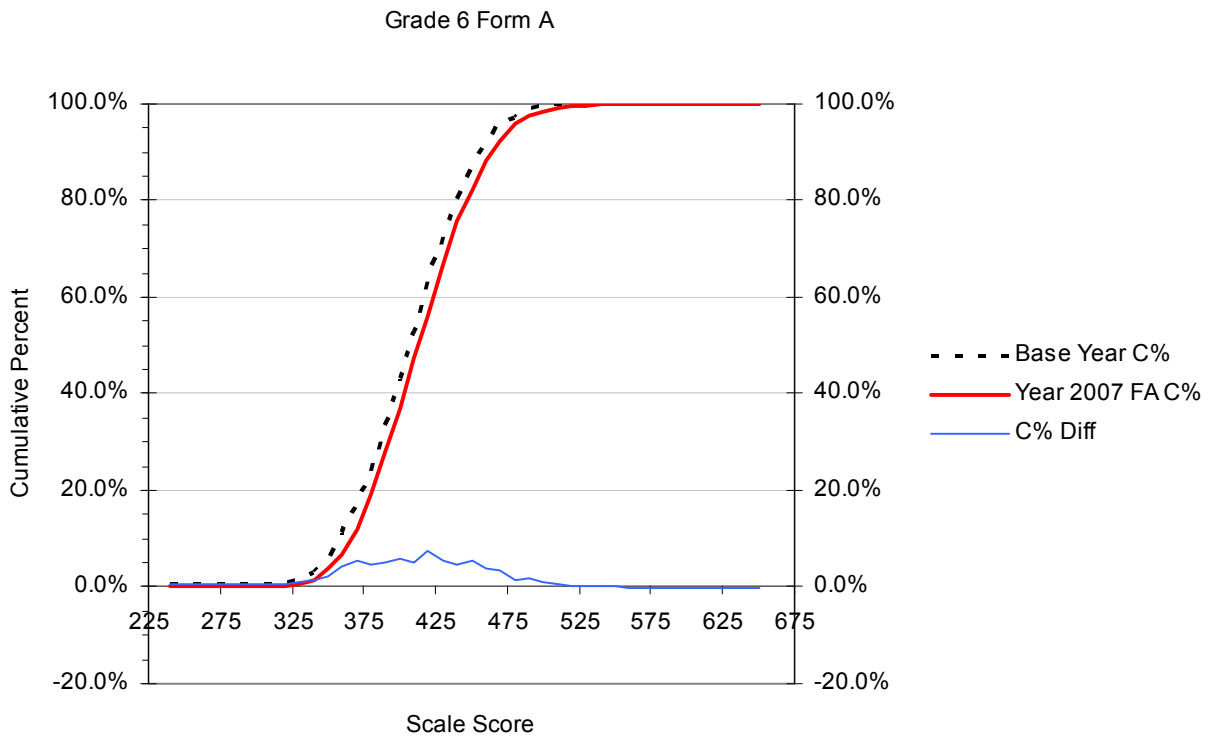


Figure B.25. Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2007 Scale Scores with the Cumulative Percent Differences between CDFs: Grade 6 Form A

Year 2007 Grade=6 Form=F

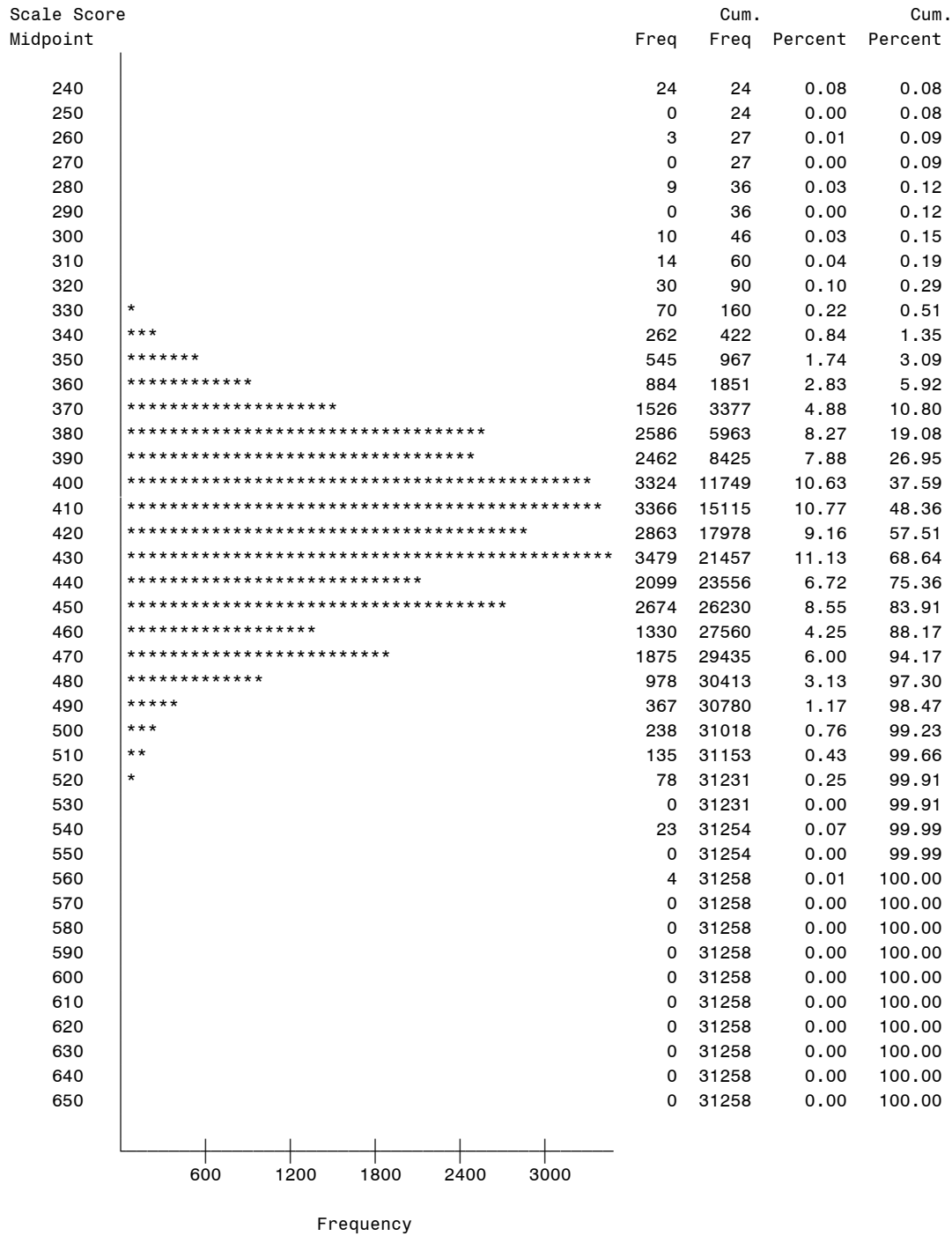


Figure B.26 Year 2007 Scale Score Distribution: Grade 6 Form F

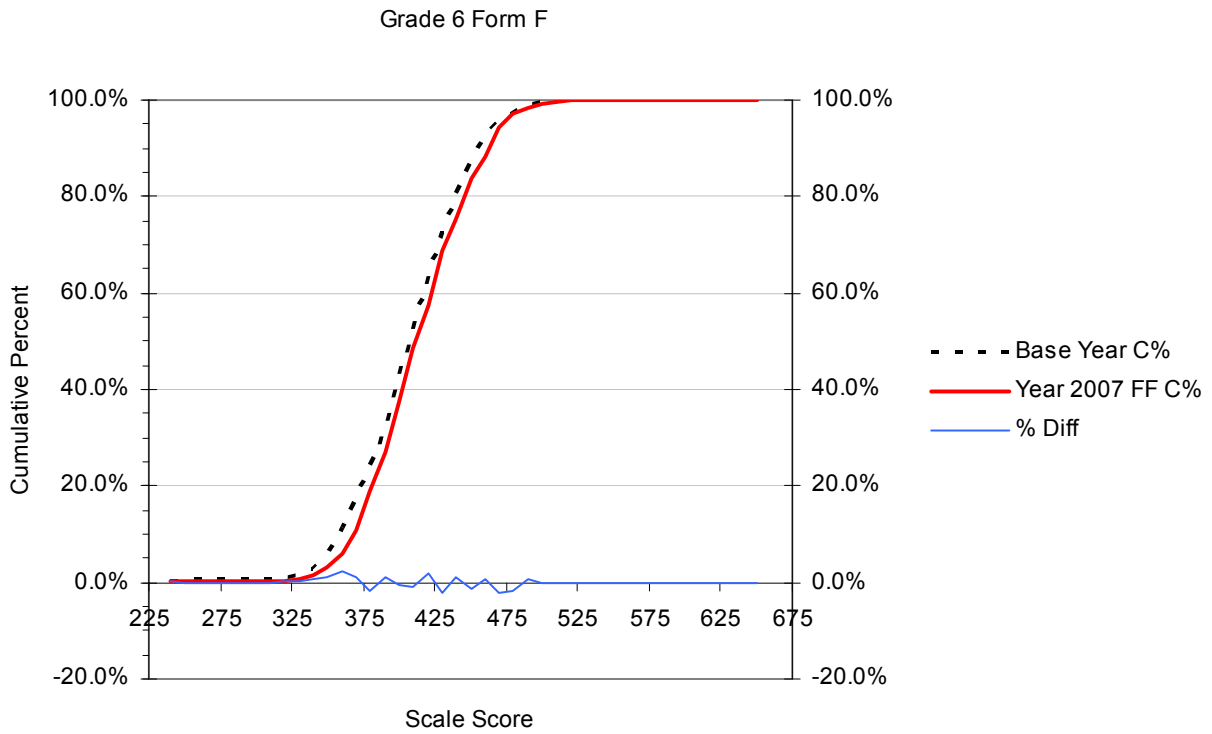


Figure B.27 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2007 Scale Scores with the Percent Differences between CDFs: Grade 6 Form F

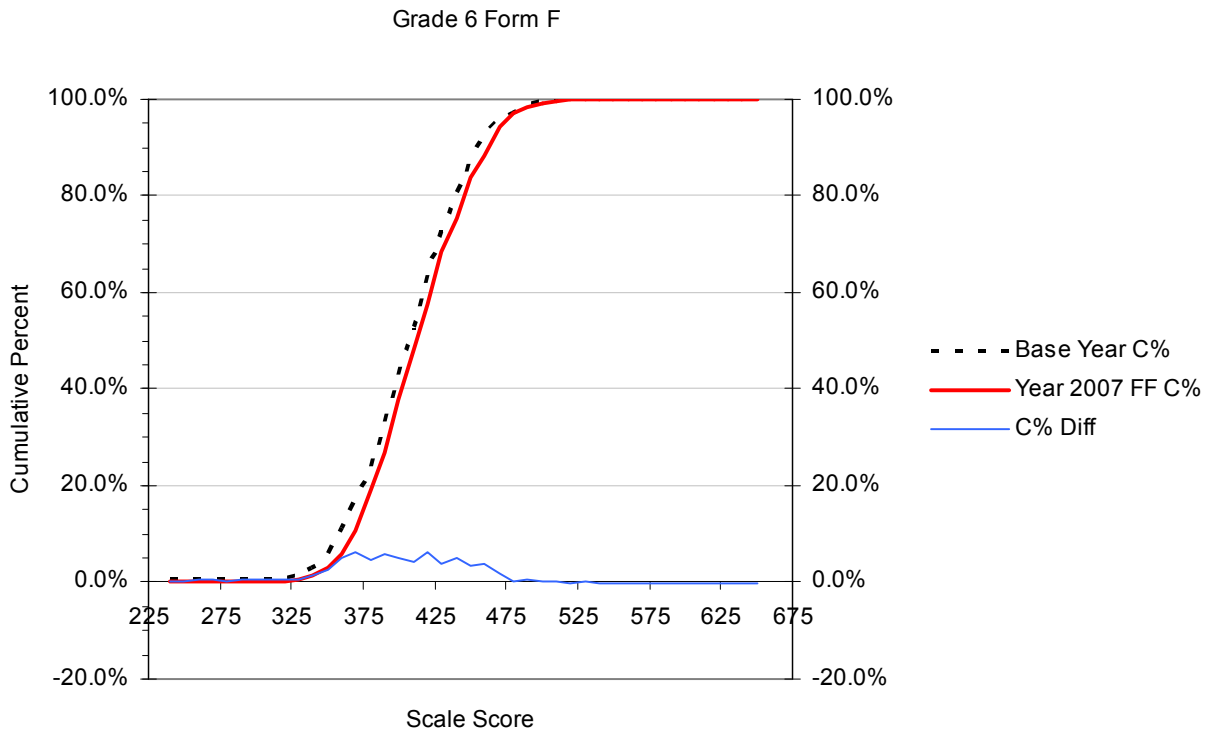


Figure B.28 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2007 Scale Scores with the Cumulative Percent Differences between CDFs: Grade 6 Form F

Note. The scale score distributions and the Tukey plots for 2007 generated based on raw scores from 2007 data files.

Year 2006 Grade=7

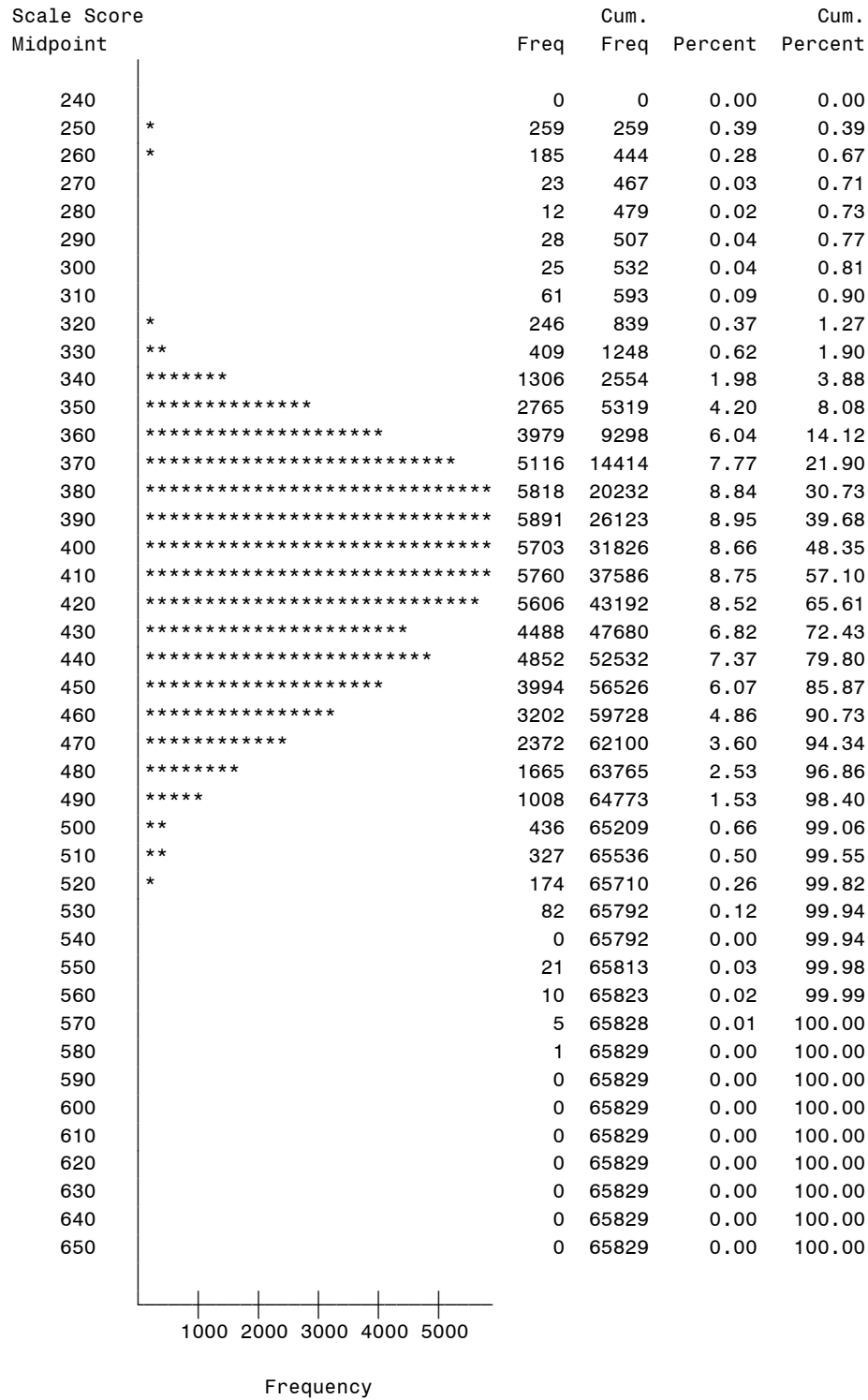


Figure B.29 Year 2006 Scale Score Distribution: Grade 7

Year 2007 Grade=7 Form=A

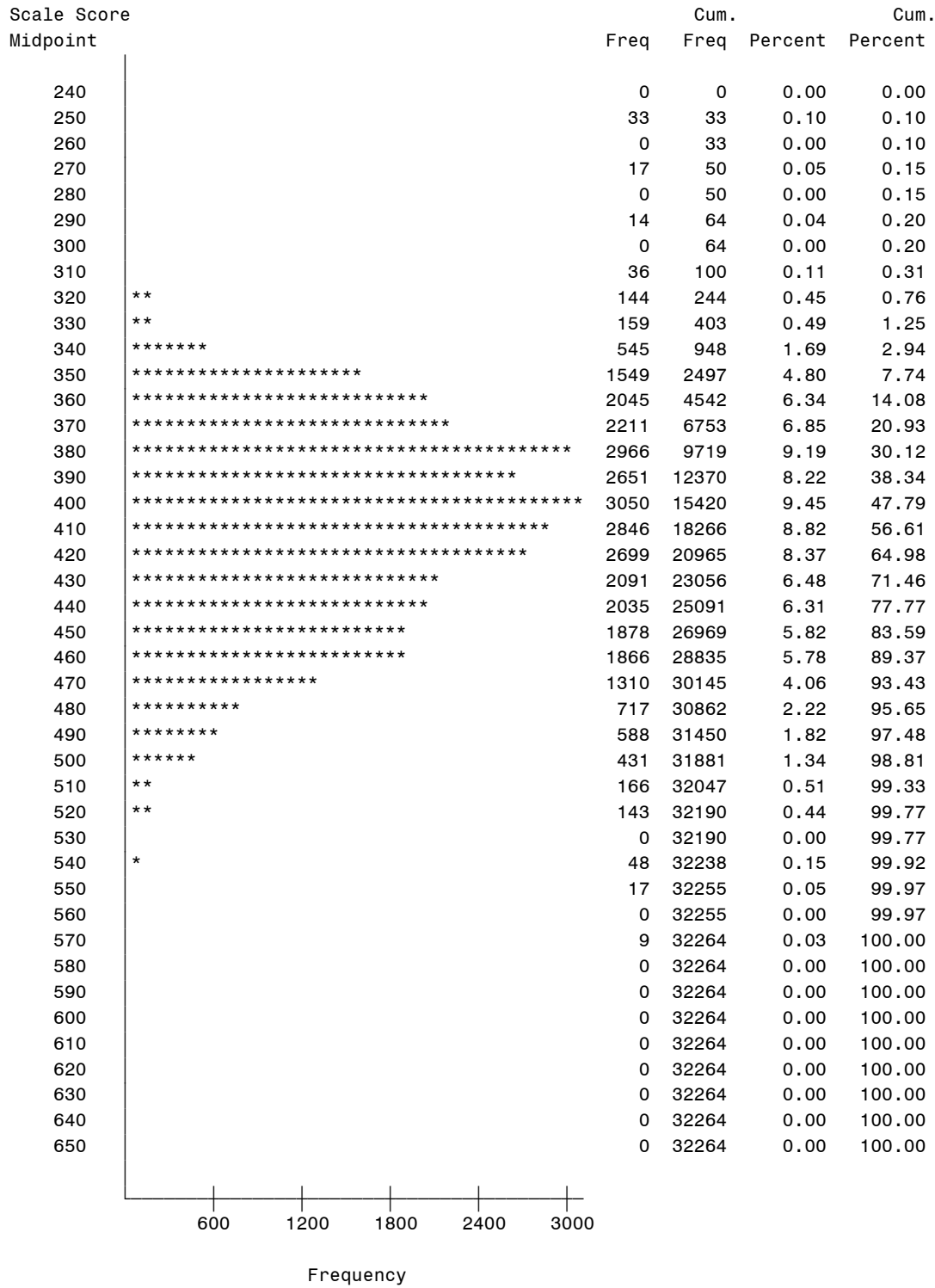


Figure B.30 Year 2007 Scale Score Distribution: Grade 7 Form A

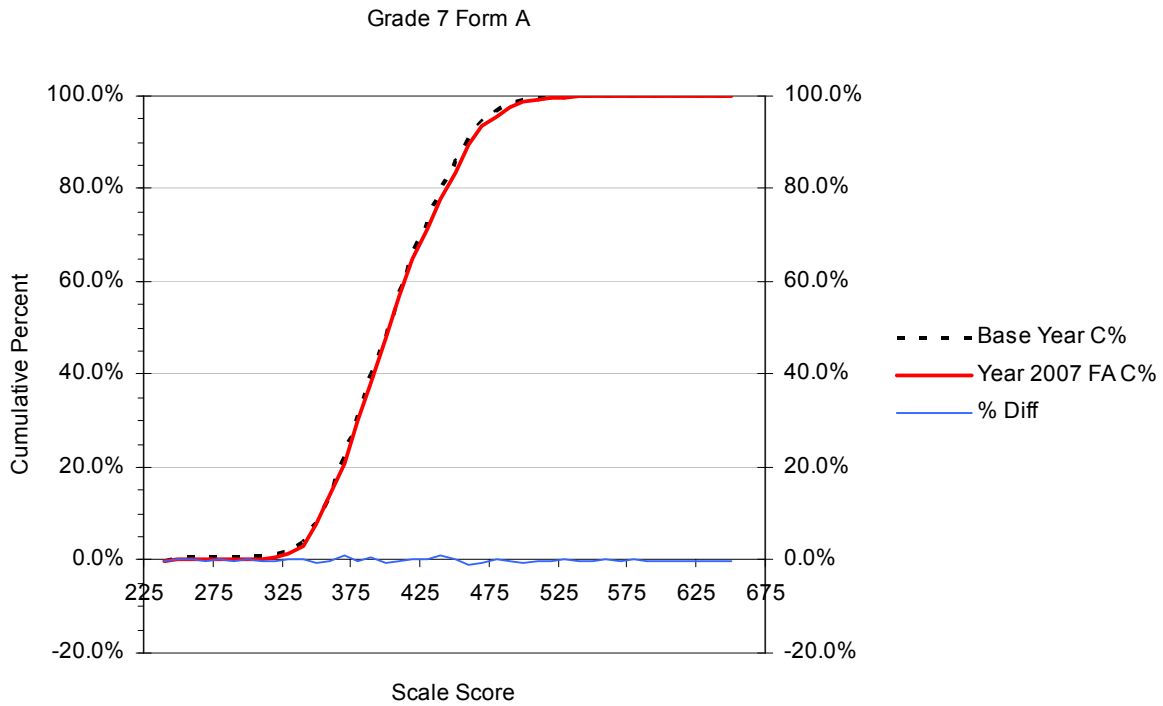


Figure B.31 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2007 Scale Scores with the Percent Differences between CDFs: Grade 7 Form A

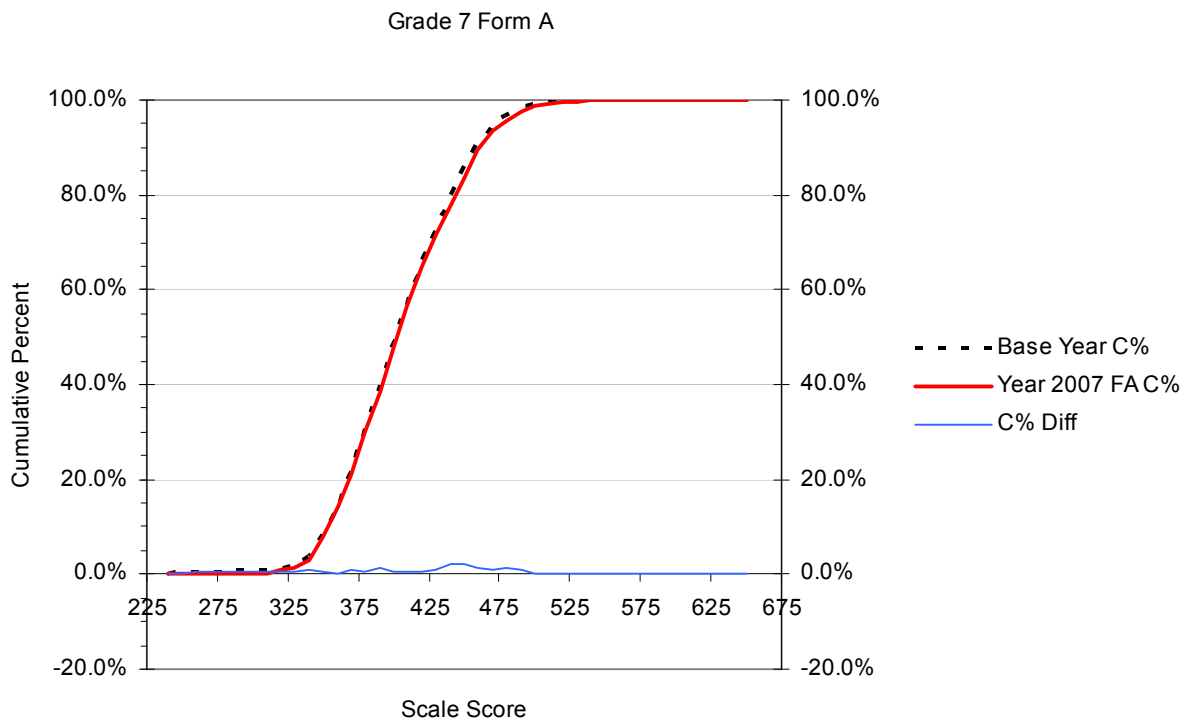


Figure B.32 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2007 Scale Scores with the Cumulative Percent Differences between CDFs: Grade 7 Form A

Year 2007 Grade=7 Form=F

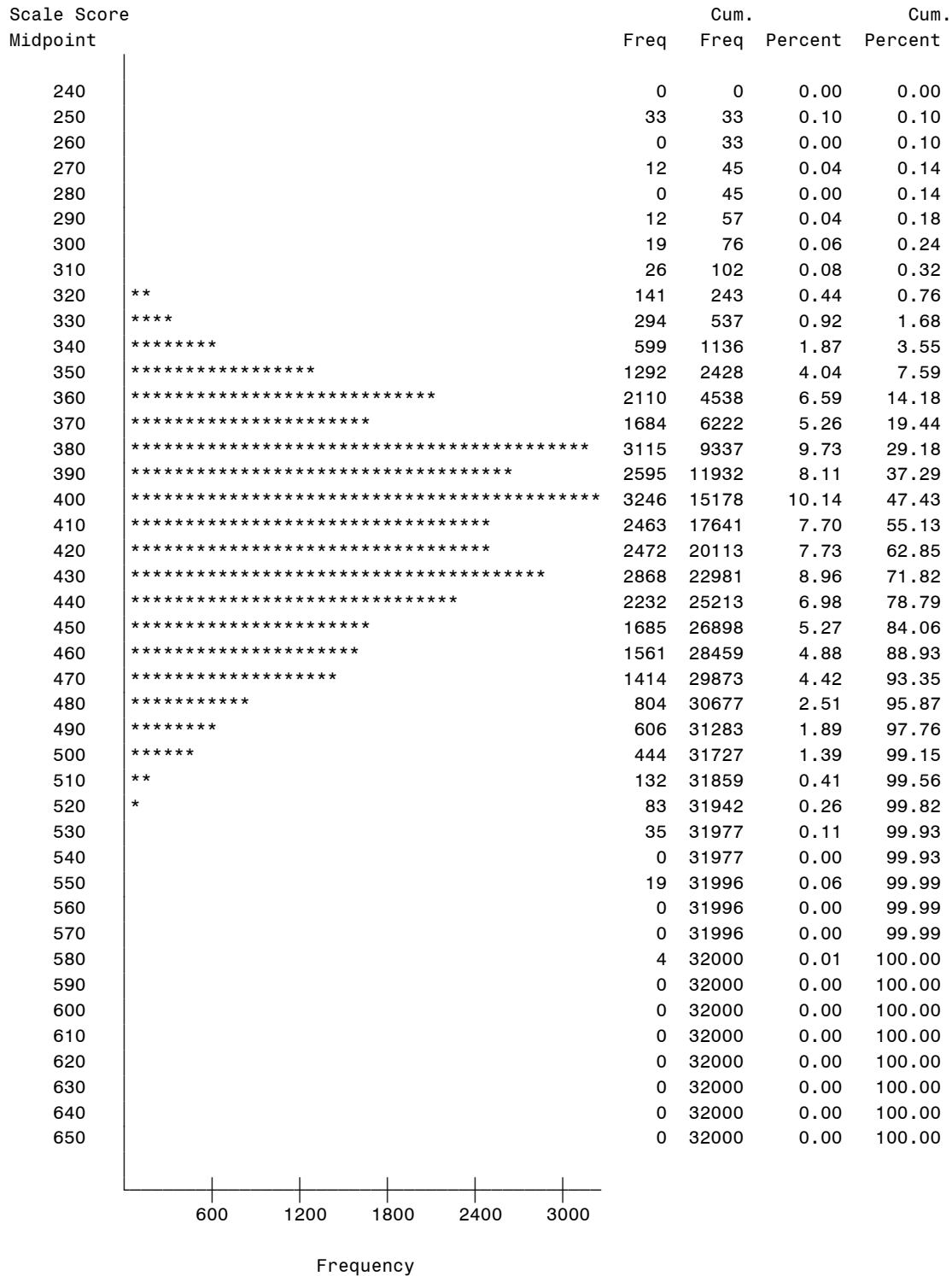


Figure B.33 Year 2007 Scale Score Distribution: Grade 7 Form F

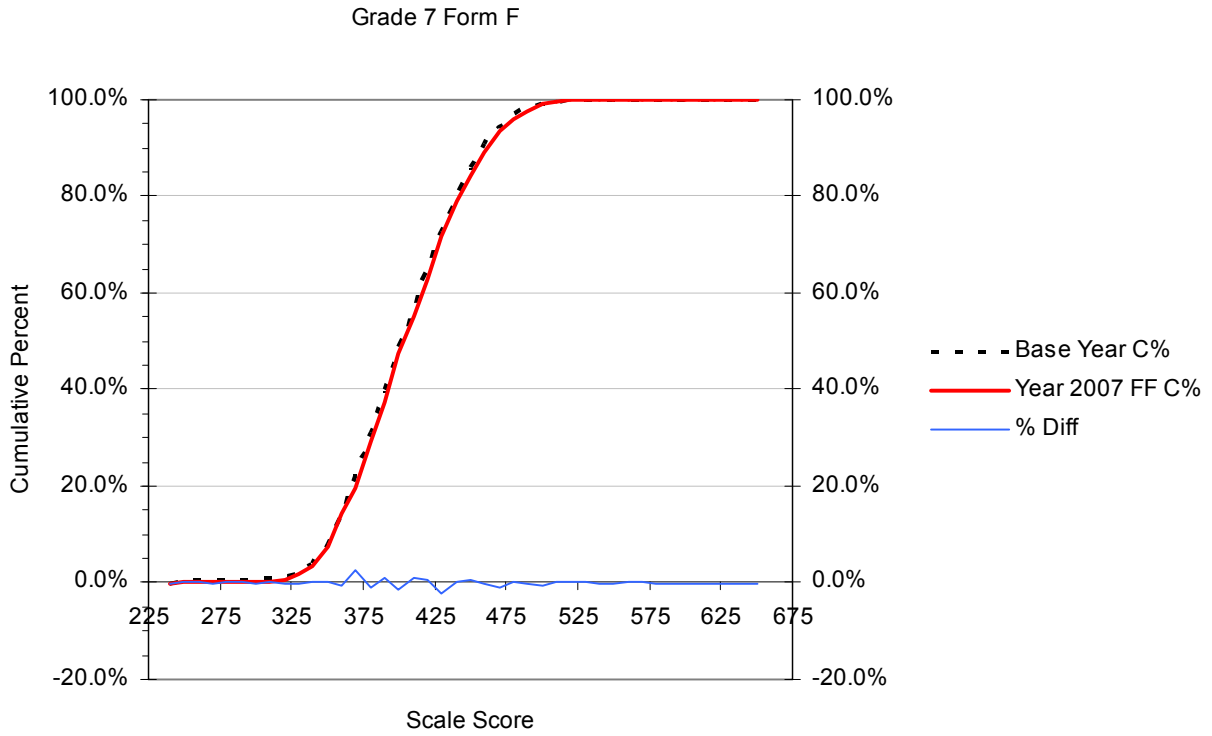


Figure B.34 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2007 Scale Scores with the Percent Differences between CDFs: Grade 7 Form F

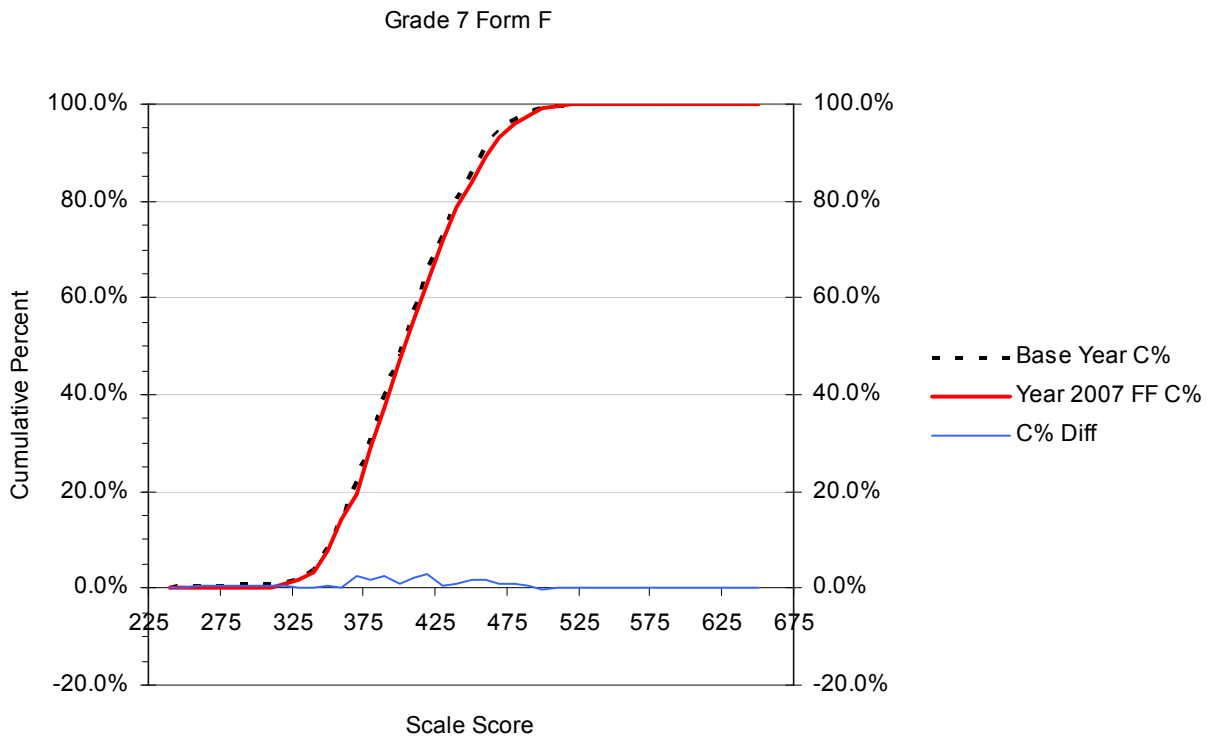


Figure B.35 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2007 Scale Scores with the Percent Differences between CDFs: Grade 7 Form F

Note. The scale score distributions and the Tukey plots for 2007 generated based on raw scores from 2007 data files.

Year 2006 Grade=8

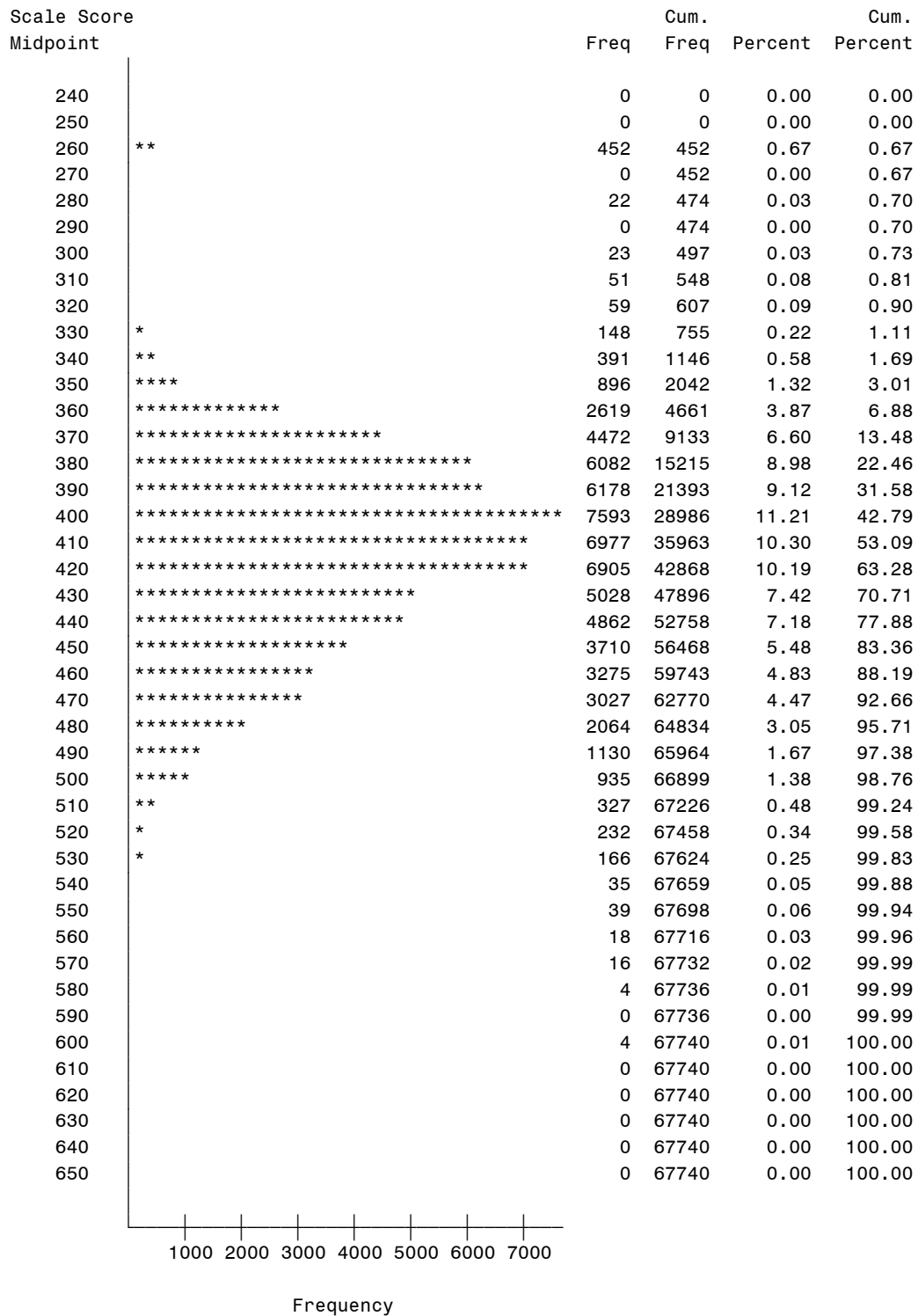


Figure B.36 Year 2006 Scale Score Distribution: Grade 8

Year 2007 Grade=8 Form=A

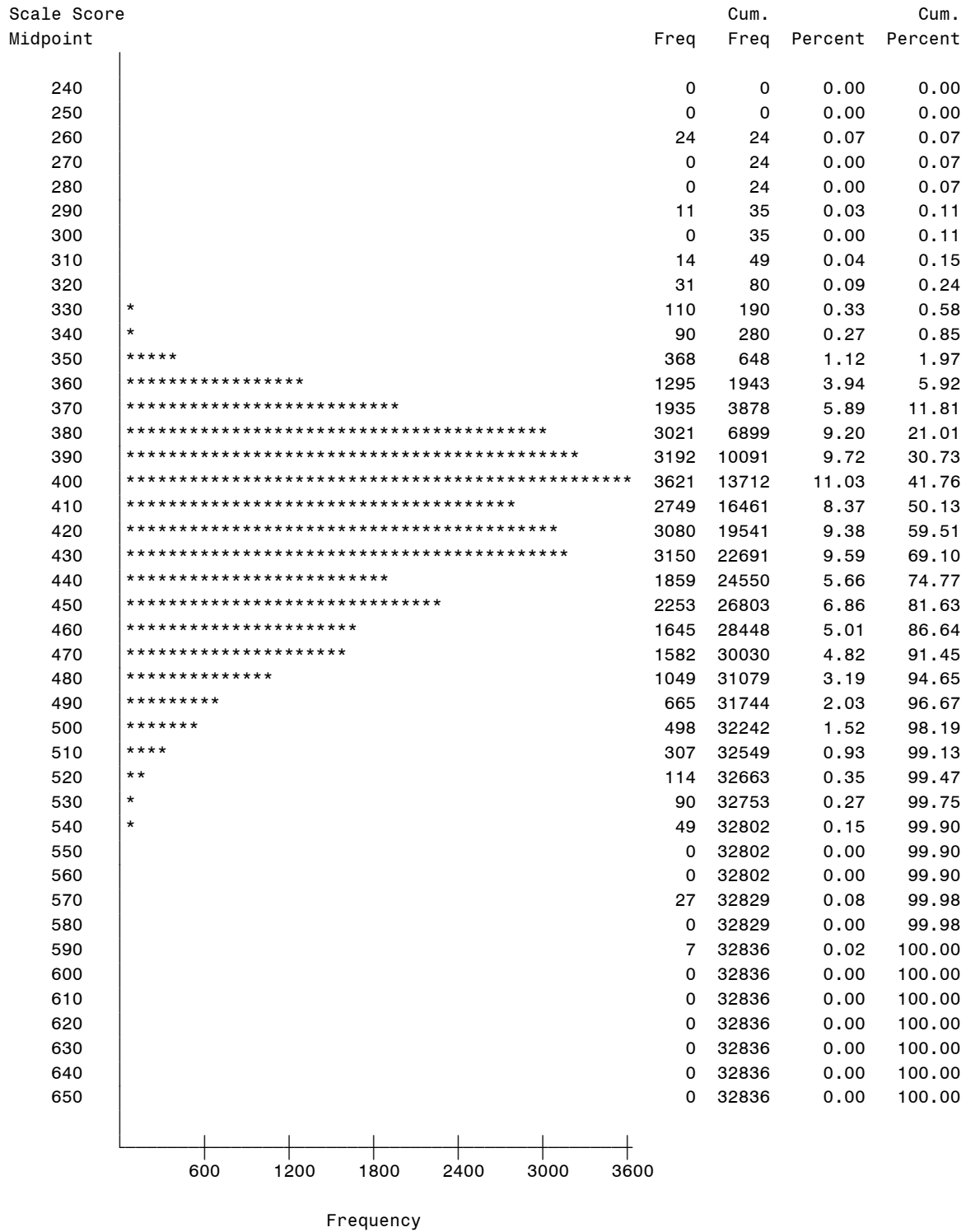


Figure B.37 Year 2007 Scale Score Distribution: Grade 8 Form A

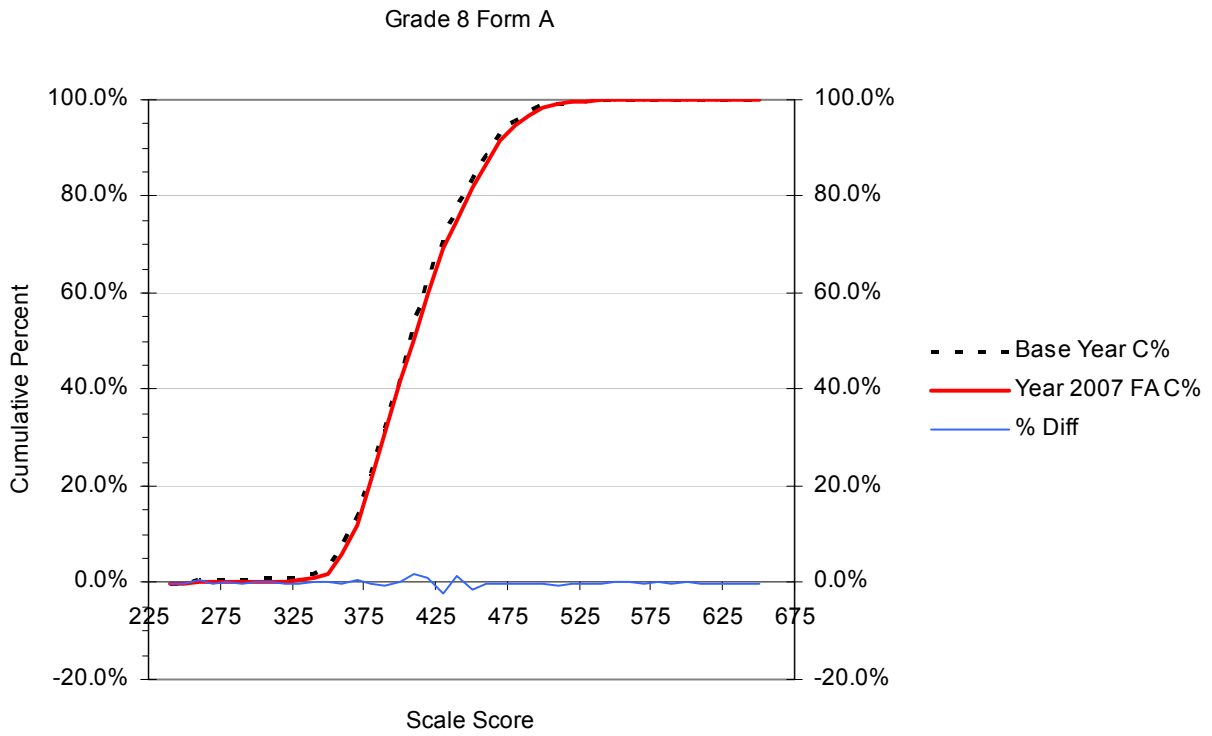


Figure B.38 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2007 Scale Scores with the Percent Differences between CDFs: Grade 8 Form A

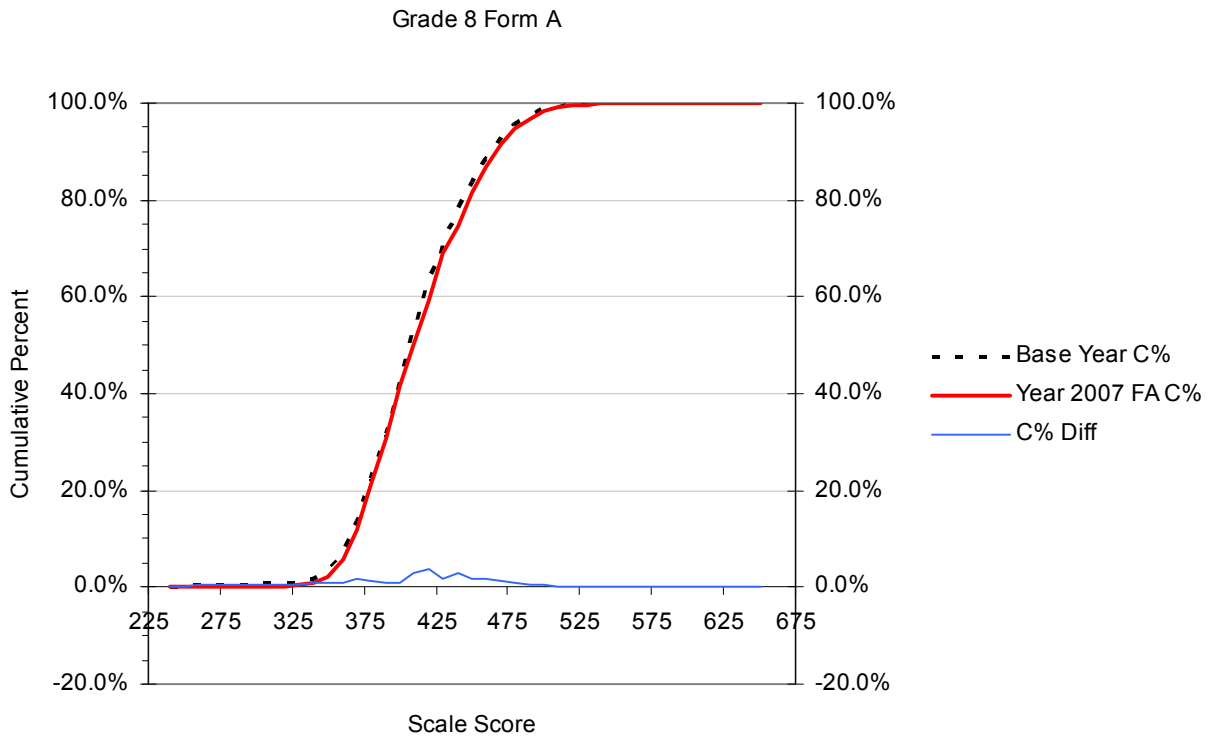


Figure B.39 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2007 Scale Scores with the Cumulative Percent Differences between CDFs: Grade 8 Form A

Year 2007 Grade=8 Form=F

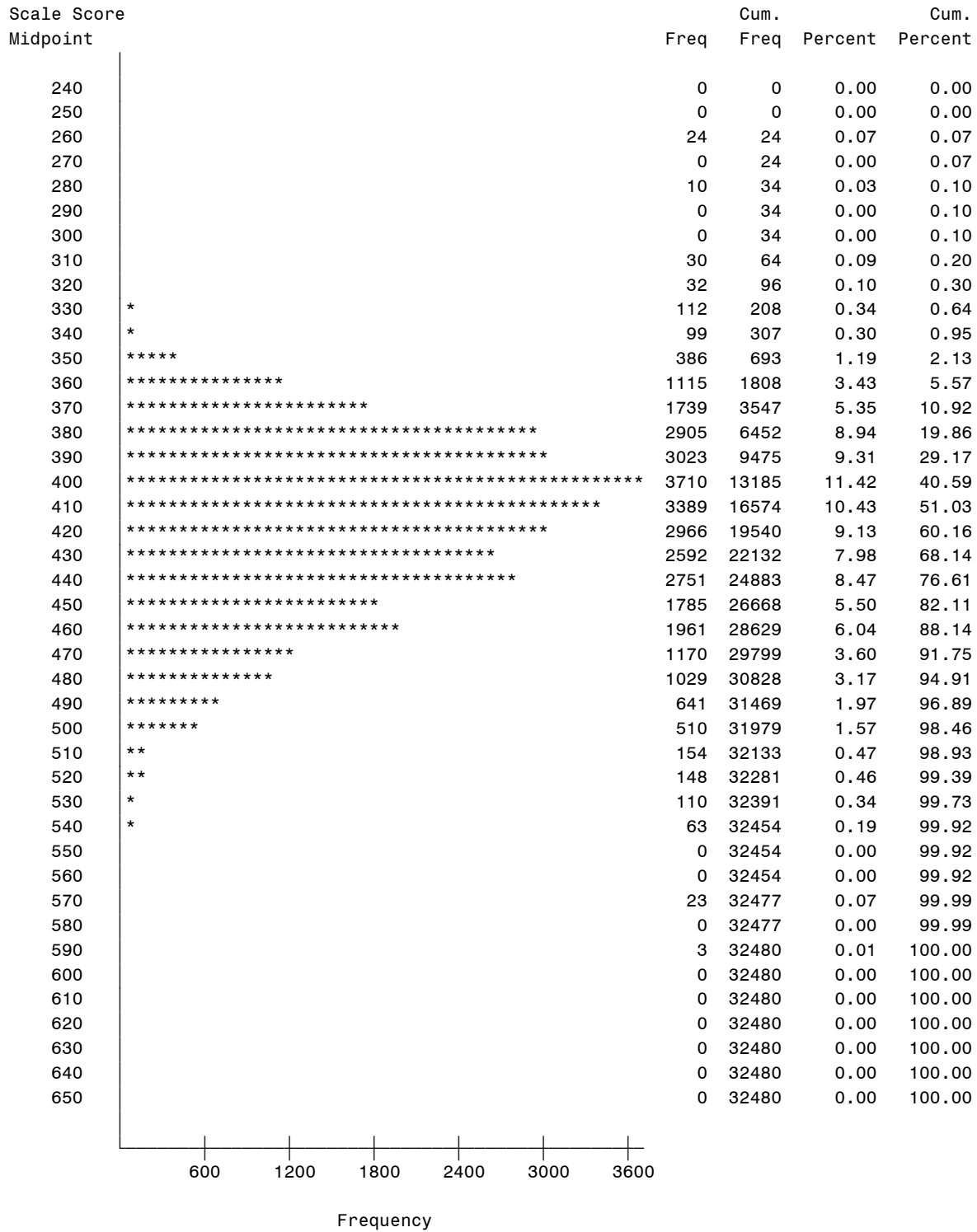


Figure B.40 Year 2007 Scale Score Distribution: Grade 8 Form F

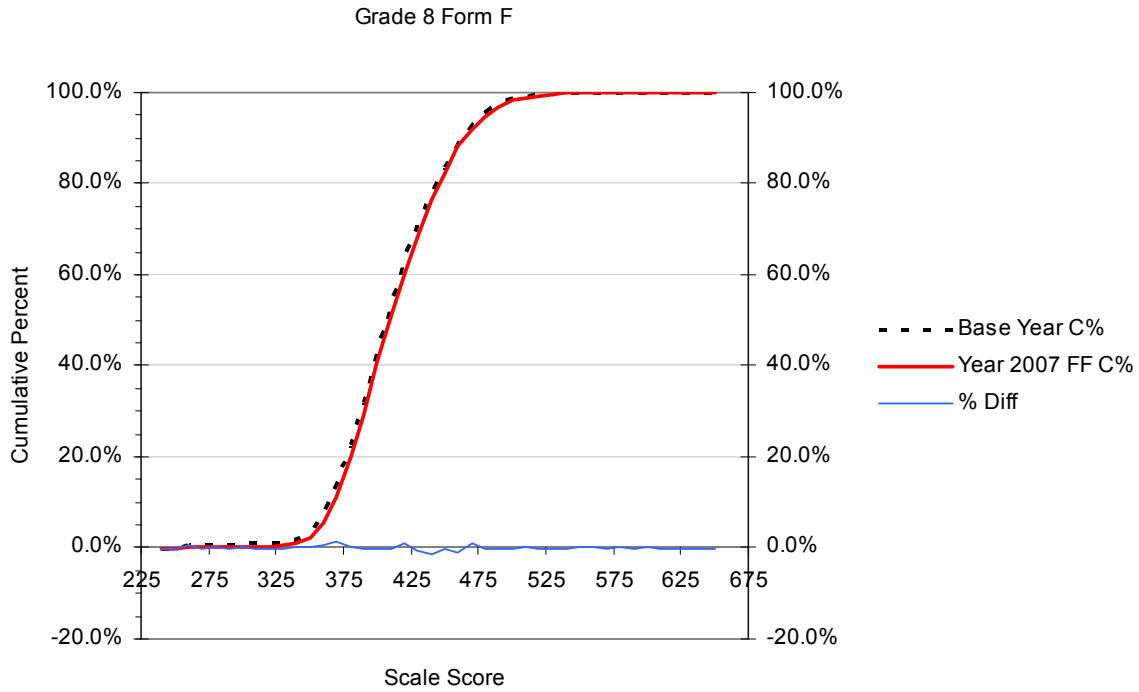


Figure B.41 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2007 Scale Scores with the Percent Differences between CDFs: Grade 8 Form F

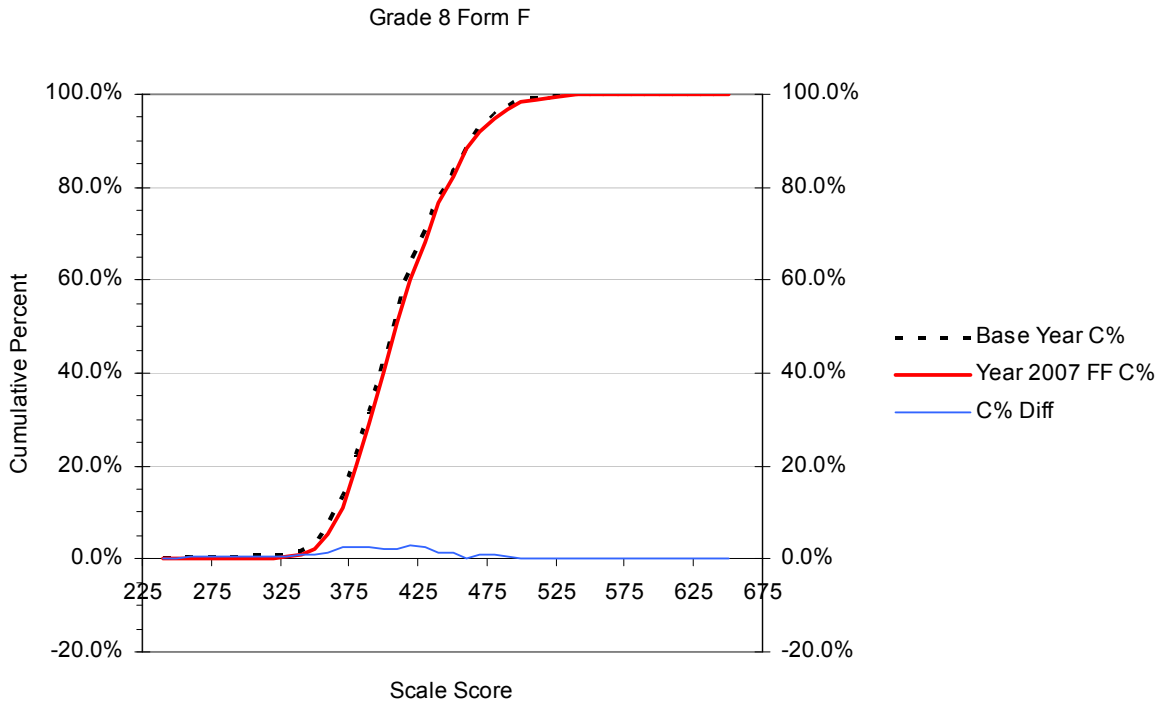


Figure B.42 Cumulative Distribution Functions (CDFs) for the Year 2006 vs. Year 2007 Scale Scores with the Cumulative Percent Differences between CDFs: Grade 8 Form F

APPENDIX C: YEAR 2006 MSA-MATH RECALIBRATION RESULTS FROM 3PL IRT TO THE RASCH MODEL USING EQUIPERCENTILE METHOD

It was required to replace the original calibration and equating IRT model (e.g., the 3PL) due to a change in the administrative structure of a program. Replacing the original model was undertaken with an eye that takes into account the inherent differences that exist between any two IRT models with an effort at preserving, at a minimum, the distribution of the performance classifications of the original model.

Because the data sets were originally run by the 3PL equating model, the 3PL scale scores were considered to be the base or the original scores. The Rasch model was then run to generate the new ability estimates. The equipercentile equating method was applied to link the two types of ability estimates, and the new Rasch ability estimates were linearly transformed to the new reporting scale scores. First, the distribution characteristics of the new scale scores were investigated. Other measures were also calculated to assess the consistency of performance classifications between the two models. These measures include correlation coefficients, kappa indices, overall performance level results, and overall raw score agreement indices.

The goal of equipercentile equating is to have at least some of the same score distribution characteristics in a population of examinees (Kolen & Brennan, 1995) when two tests are placed on the established scale. The equipercentile equating principle is applied in the following manner: For a given Form X score, the percentage of examinees earning scores at or below that Form X score is obtained. Next, the Form Y score that has the same percentage of examinees at or below that observed on Form X is obtained. The scores on Form X and Form Y that provide the same percent of students at or below their respective scores are considered to be equivalent, and Forms X and Y are equated. Thus, the distribution of scores on Form X converted to the Form Y would be equal to the distribution of scores on Form Y in the population at particular score points because the equipercentile function is developed by identifying scores on Form X that have the same percentile ranks as scores on Form Y (Kolen & Brennan, 1995).

The test of each grade had two operational forms and composed of five content standards across all grades. The number of items and score points for each standard were identical between the two operational forms within each grade. Tables C.1 through C.6 show the number of items that were included in each operational form with respect to content standards. Specifically, Table C.7 indicates how many common items appeared on both operational test forms. These common items were used for the purpose of form-to-form calibration and equating.

Each mixed-format operational form with SR, SPR, BCR and ECR within each grade was recalibrated with the dichotomous Rasch (Rasch, 1960) and the Rasch Partial Credit (Masters, 1982) models for the SR and SPR and the BCR and ECR items respectively. Form A of each grade was chosen as a base form, and the common items which appeared across two forms were screened using robust z and Rasch difficulty plots (“b-plots”) (SCDE, 2001) for determining their use as linking items. In addition, correlation coefficients as well as standard deviation ratio were also used for the purpose of the screening. Tables C.8 through C.13 contain more information on robust z values and correlations, and screening guidelines can be obtained from section 1.10, Linking, Equating, and Scaling Procedures. Once the useable linking items were identified from the list of common items, the two operational forms were equated using a fixed item parameter method. The result of this procedure put the two forms within each grade on the same scale.

Now that each form within grades was on the same scale, the Rasch ability estimate for each student was obtained, which in turn had to be equated with their previously estimated ability estimate based on the 3PL model.

Since ability estimates are seldom, if ever, reported directly to the examinees, the new ability estimates are linearly transformed by the use of a multiplicative and additive scaling constant so that they can be used as reporting scale scores. The new reporting scale scores have the same meaning of the original scale scores in terms of the performance cut scores and levels.

Equipercenile equating principle was applied to link and equate the two types of ability estimates. First, the percent of students at or below the two scale score proficient cuts, Basic/Proficient and Proficient/Advanced for the 3PL model were obtained. The theta location of these cuts were matched against their respective scale scores defined as $SS(B/P)$ and $SS(P/A)$ for the Basic/Proficient and Proficient/Advanced., respectively. Next, the Rasch ability estimates (defined as $Theta(B/P)$ and $Theta(P/A)$ for the Basic/Proficient and Proficient/Advanced cuts respectively) that had the same percentage of examinees at or below the cuts obtained from the 3PL model were obtained.

Given these two sets of cuts, the slope and the intercept were calculated such that

$$SS(B/P) = slope \times Theta(B/P) + intercept$$

and

$$SS(P/A) = slope \times Theta(P/A) + intercept$$

The slope and intercept obtained from the two equations above were used to transform the Rasch ability estimate into a Rasch-based scale score for each student in the original data sets. Applying this process produced a Rasch-based scale score system that matched well with the 3PL results with respect to the distribution of students for the Basic, Proficient, and Advanced performance classification categories. Table C.14 shows the slope and intercept of each grade that were obtained for calculating the Rasch scale scores.

The equipercenile method discussed above ensured the similarity in student distribution by performance category classification when the the 3PL IRT model was replaced by the Rasch model. However, in order to establish the accuracy and stability of the model transformation, the central moments of the Rasch scale scores were compared with those of the original 3PL scale scores. As shown in Table C.16, the results indicate that the distribution characteristics of the new Rasch scale scores were very similar to those of the original 3PL scale scores.

To further compare the two types of scale scores, Tukey plots were used as per Huynh (2006). The plots depicted in Figures C1 through C12 compare the cumulative distribution functions (CDFs) for the 3PL and Rasch scale scores and examines the percent and the cumulative percent differences between the two CDFs. As shown in figures, the “smoothness” of the 3PL CDF due to the pattern scoring vs. the step function CDF of the Rasch CDF can be observed. In general, however, there were no real differences between the two CDFs except at the low scale scores for the cumulative percent differences in grades 4 through 8.

As seen from Table C.17, the Pearson-product correlation coefficients between the 3PL and the Rasch scale scores ranged from .98 to .99. The results clearly indicate an almost perfect liner correlation between the two types of scale scores.

One of the main purposes of this study was to investigate how consistently the Rasch model could preserve the original performance levels of the 3PL model. Table C.18 shows the performance classifications of each grade. The results document that the Rasch model preserved the original performance levels as closely as possible in spite of the slightly increasing passing rates for the Rasch model across grades.

The Kappa Index of Agreement (K) which measures the association between the two models and helps evaluate the accuracy of classification results, was also calculated. K values range from -1 to +1 after adjustment for chance agreement. If the two models are in perfect agreement (i.e., if no change occurs), K equals 1. If the two models are completely different, K would equal -1. If the change in the results of the two models occurred by chance, then Kappa would equal 0. As seen in Table C.19, Kappa indices for all grades indicate that the agreement rate between the 3PL and the Rasch models were in excess of 0.90 across all grades.

Table C.20 shows the overall raw agreement rate of each grade. The results indicated that the overall performance levels assigned to students based on the Rasch model matched well with those of the 3PL model across all grades (from 95% to 96%). Tables C.21 through C.23 show the raw agreement rate of each performance level between the 3PL and the Rasch models.

A comparison of scale score distributions, correlation coefficients between scale scores, kappa indices, overall performance level results, and overall raw score agreement indices documented that the distribution of student scores of the original 3PL equating model remained similar when the item and ability estimates were transferred to the Rasch model via equipercentile equating.

Table C.1 Year 2006 Grade 3 Item Type and Score Points Distribution

Form	# of TeraNova	# of CRT SR	# of CRT BCR		Points of TeraNova	Points of CRT SR	Points of CRT BCR		Total Score
			Pt A	Pt B			Pt A	Pt B	
Form 1	11	39	7	7	11	39	7	14	71
Form 2	11	39	7	7	11	39	7	14	71

Table C.2 Year 2006 Grade 4 Item Type and Score Point Distribution

Form	# of TeraNova	# of CRT SR	# of CRT BCR		Points of TeraNova	Points of CRT SR	Points of CRT BCR		Total Score
			Pt A	Pt B			Pt A	Pt B	
Form 1	10	39	7	7	10	39	7	14	70
Form 2	10	40	7	7	10	40	7	14	71

Table C.3 Year 2006 Grade 5 Item Type and Score Point Distribution

	# of TeraNova	# of CRT SR	# of CRT BCR		# of CRT ECR		Points of TeraNova	Points of CRT SR	Points of CRT BCR		Points of CRT ECR		Total Score
			Pt A	Pt B	Pt A	Pt B			Pt A	Pt B	Pt A	Pt B	
F 1	13	36	7	7	1	1	13	36	7	14	1	3	74
F 2	13	36	7	7	1	1	13	36	7	14	1	3	74

Table C.4 Year 2005 Grade 6 Item Type and Score Point Distribution

	# of TeraNova	# of CRT SR	# of CRT BCR		# of CRT ECR		Points of TeraNova	Points of CRT SR	Points of CRT BCR		Points of CRT ECR		Total Score
			Pt A	Pt B	Pt A	Pt B			Pt A	Pt B			
F 1	5	43	6	6	1	1	5	43	6	12	1	3	70
F 2	5	43	6	6	1	1	5	43	6	12	1	3	70

Table C.5 Year 2006 Grade 7 Item Type and Score Point Distribution

	# of TeraNova	# of CRT SR	# of CRT SPR	# of CRT BCR		# of CRT ECR		Points of TeraNova	Points of CRT SR	Points of CRT SPR	Points of CRT BCR		Points of CRT ECR		Total Score
				Pt A	Pt B	Pt A	Pt B				Pt A	Pt B			
F 1	6	30	12	4	4	3	3	6	30	12	4	8	3	9	72
F 2	6	30	12	4	4	3	3	6	30	12	4	8	3	9	72

Table C.6 Year 2006 Grade 8 Item Type and Score Point Distribution

	# of TeraNova	# of CRT SR	# of CRT SPR	# of CRT BCR		# of CRT ECR		Points of TeraNova	Points of CRT SR	Points of CRT SPR	Points of CRT BCR		Points of CRT ECR		Total Score
				Pt A	Pt B	Pt A	Pt B				Pt A	Pt B			
F 1	11	25	12	5	5	3	3	11	25	12	5	10	3	9	75
F 2	11	25	12	5	5	3	3	11	25	12	5	10	3	9	75

Table C.7 Year-to-Year Common and Unique Items of Two Operational Forms

Grade	Form	Terra Nova	MD Common	Total Common	Unique Item	Total Items
3	1	11	27	38	26	64
	2	11	27	38	26	64
4	1	10	22	32	31	63
	2	10	22	32	32	64
5	1	13	27	40	25	65
	2	13	27	40	25	65
6	1	5	26	31	31	62
	2	5	26	31	31	62
7	1	6	28	34	28	62
	2	6	28	34	28	62
8	1	11	27	38	26	64
	2	11	27	38	26	64

Table C.8 Free Calibration Item Difficulties of Linking Items and Robust Z Values: Grade 3

Item Sequential Number	Y06 Form 1	Y06 Form 2	Item Sequential Number	Item Type	11	12	Robust Z
1	-0.5774	-0.538	1	SR	0.00	0.04	.6047
2	-1.3414	-1.3852	2	SR	0.00	-0.04	-.7495
3	-0.989	-0.9818	3	SR	0.00	0.01	.0806
4	-1.0159	-1.0036	4	SR	0.00	0.01	.1636
5	-1.0182	-1.0667	5	SR	0.00	-0.05	-.8260
6	-0.7445	-0.7199	6	SR	0.00	0.02	.3638
7	-1.006	-1.0167	7	SR	0.00	-0.01	-.2108
8	-2.384	-2.4273	8	SR	0.00	-0.04	-.7414
9	-1.231	-1.2693	9	SR	0.00	-0.04	-.6600
10	-2.6951	-2.7146	10	SR	0.00	-0.02	-.3540
11	-2.8	-2.923	11	SR	0.00	-0.12	-2.0386
12	0.9627	1.0445	12	SR	0.00	0.08	1.2948
13	0.7154	0.7913	13	SR	0.00	0.08	1.1988
15	-1.3766	-1.4465	15	SR	0.00	-0.07	-1.1743
16	1.8411	1.9914	16	SR	0.00	0.15	2.4097
17	-0.3242	-0.3574	17	SR	0.00	-0.03	-.5770
18	-1.3667	-1.4108	18	SR	0.00	-0.04	-.7544
19	-0.036	0.0342	19	SR	0.00	0.07	1.1060
20	-0.7332	-0.7336	20	SR	0.00	0.00	-.0431
25	1.2257	1.2649	46	SR	0.00	0.04	.6014
26	0.069	0.1579	26	SR	0.00	0.09	1.4104
28	0.2953	0.2867	30	SR	0.00	-0.01	-.1766
29	-0.1123	-0.1629	33	SR	0.00	-0.05	-.8602
31	-0.5906	-0.6251	31	SR	0.00	-0.03	-.5982
32	-1.3693	-1.7309	32	SR	0.00	-0.36	-5.9222
34	-0.6165	-0.605	34	SR	0.00	0.01	.1506
35	-1.819	-1.8221	35	SR	0.00	0.00	-.0871
36	0.0444	0.0604	36	SR	0.00	0.02	.2238
37	-0.5231	-0.3197	37	SR	0.00	0.20	3.2740
38	1.4814	1.6202	40	SR	0.00	0.14	2.2225
39	-0.2691	-0.2642	38	SR	0.00	0.00	.0431
42	-0.3652	-0.3302	42	SR	0.00	0.04	.5331
43	0.4861	0.5486	43	SR	0.00	0.06	.9807
44	1.3184	1.0151	44	SR	0.00	-0.30	-4.9733
46	0.0425	-0.0727	47	SR	0.00	-0.12	-1.9117
48	2.8084	2.9233	27	SR	0.00	0.11	1.8335
49	-2.6459	-2.8129	49	SR	0.00	-0.17	-2.7548
50	0.9317	0.9462	14	SR	0.00	0.01	.1994

Form Statistics

Mean	-.414	-.423
SD	1.270	1.319

Comparison of Each Form with Base Form (Form 1)

Correlation with Base	1.000	.997
SD ratio	100%	104%
Mean Diff	.000	-.009
Median Diff	.000	.002
IQR Diff	.000	.083

Rasch Item Difficulties of Common Items: Grade 3

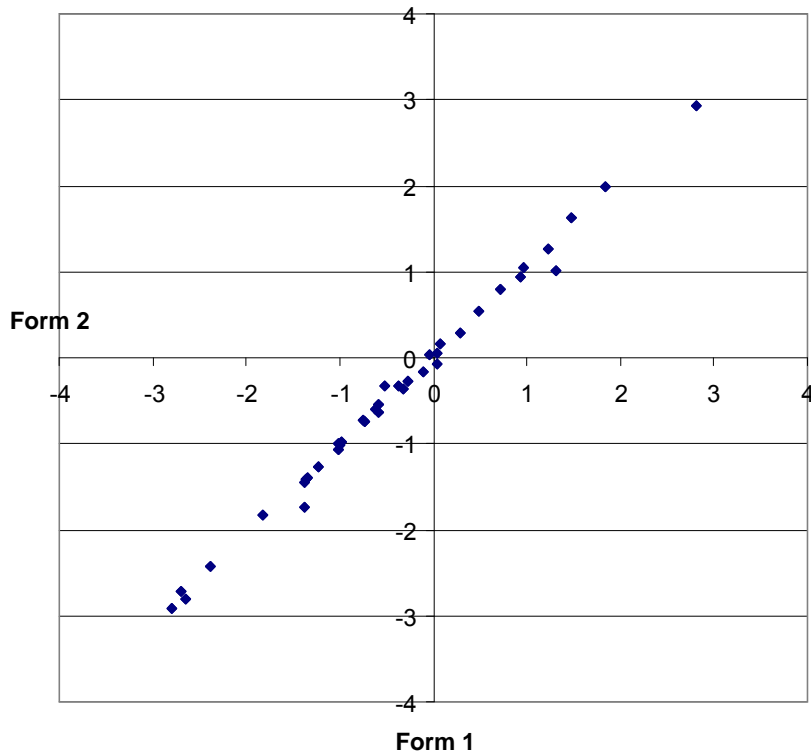


Table C.9 Free Calibration Item Difficulties of Linking Items and Robust Z Values: Grade 4

Item Sequential Number	Y06 Form 1	Y06 Form 2	Item Sequential Number	Item Type	11	12	Robust Z
1	-1.0694	-1.1474	1	SR	0.00	-0.08	.0863
2	-0.0237	-0.0964	2	SR	0.00	-0.07	.1686
3	-1.2632	-1.3609	3	SR	0.00	-0.10	-.2199
4	0.3659	0.2488	4	SR	0.00	-0.12	-.5214
5	0.3731	0.328	5	SR	0.00	-0.05	.5976
6	-2.0134	-2.1005	6	SR	0.00	-0.09	-.0552
7	0.5759	0.4523	7	SR	0.00	-0.12	-.6224
8	-0.3652	-0.4619	8	SR	0.00	-0.10	-.2044
9	0.2603	0.163	9	SR	0.00	-0.10	-.2137
10	0.8463	0.7501	10	SR	0.00	-0.10	-.1966
12	-0.799	-0.8578	11	SR	0.00	-0.06	.3847
13	0.1763	0.0483	14	SR	0.00	-0.13	-.6908
14	-1.055	-1.1127	16	SR	0.00	-0.06	.4018
18	0.7782	0.6761	17	SR	0.00	-0.10	-.2883
19	0.5403	0.3789	18	SR	0.00	-0.16	-1.2099
21	-1.7288	-1.8064	22	SR	0.00	-0.08	.0925
24	-0.7475	-0.6248	25	SR	0.00	0.12	3.2055
25	-2.1248	-2.1129	26	SR	0.00	0.01	1.4835
28	-0.9767	-1.0475	28	SR	0.00	-0.07	.1982
30	-1.7626	-1.7783	29	SR	0.00	-0.02	1.0545
31	0.7468	0.6104	30	SR	0.00	-0.14	-.8214
34	-0.3554	0.1357	35	SR	0.00	0.49	8.9310
35	-1.2169	-1.3526	36	SR	0.00	-0.14	-.8105
39	-0.2743	-0.4401	39	SR	0.00	-0.17	-1.2783
40	-0.8464	-0.7931	41	SR	0.00	0.05	2.1269
41	-0.0497	-0.1297	42	SR	0.00	-0.08	.0552
44	0.8666	0.8699	45	SR	0.00	0.00	1.3498
45	-0.9395	-0.9391	46	SR	0.00	0.00	1.3047
48	-0.1077	-0.5185	49	SR	0.00	-0.41	-5.0860
49	0.5508	0.6046	50	SR	0.00	0.05	2.1347
52	-0.5937	-0.9446	53	CR	0.00	-0.35	-4.1551
53	1.9494	1.8006	54	CR	0.00	-0.15	-1.0141

Form Statistics

Mean	-.321	-.392
SD	.965	.955

Comparison of Each Form with Base Form (Form 1)

Correlation with Base	1.000	.989
SD ratio	100%	99%
Mean Diff	.000	-.071
Median Diff	.000	-.084
IQR Diff	.000	.087

Rasch Item Difficulties of Common Items: Grade 4

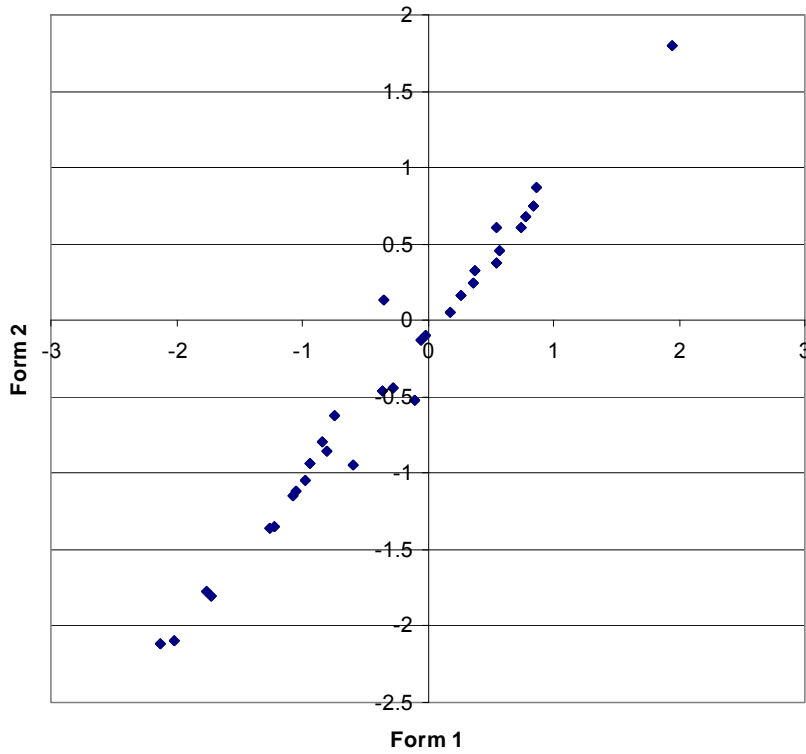


Table C.10 Free Calibration Item Difficulties of Linking Items and Robust Z Values: Grade 5

Item Sequential Number	Y06 Form 1	Y06 Form 2	Item Sequential Number	Item Type	11	12	Robust Z
1	-0.6672	-0.7886	1	SR	0.00	-0.12	.1533
2	-0.2842	-0.3872	2	SR	0.00	-0.10	.4870
3	-1.1777	-1.3356	3	SR	0.00	-0.16	-.5088
4	-0.0008	-0.1369	4	SR	0.00	-0.14	-.1134
5	-0.6322	-0.7773	5	SR	0.00	-0.15	-.2766
6	-0.9107	-1.0586	6	SR	0.00	-0.15	-.3274
7	0.077	-0.0283	7	SR	0.00	-0.11	.4453
8	-0.2025	-0.3463	8	SR	0.00	-0.14	-.2530
9	0.4557	0.2954	9	SR	0.00	-0.16	-.5523
10	-0.1595	-0.334	10	SR	0.00	-0.17	-.8099
11	-0.0496	-0.1994	11	SR	0.00	-0.15	-.3619
12	0.2015	0.0432	12	SR	0.00	-0.16	-.5161
13	-1.5434	-1.706	13	SR	0.00	-0.16	-.5941
16	0.203	0.1804	17	SR	0.00	-0.02	1.9454
17	0.3214	0.1003	16	SR	0.00	-0.22	-1.6552
19	-0.331	-0.4414	18	SR	0.00	-0.11	.3528
20	0.0148	-0.1637	20	SR	0.00	-0.18	-.8825
21	-1.0845	-1.1458	21	SR	0.00	-0.06	1.2434
22	1.5483	1.4255	22	SR	0.00	-0.12	.1279
23	1.5795	1.3911	23	SR	0.00	-0.19	-1.0620
24	-1.4191	-1.6077	24	SR	0.00	-0.19	-1.0657
25	0.6342	0.4653	25	SR	0.00	-0.17	-.7083
27	-1.6886	-1.6946	27	SR	0.00	-0.01	2.2465
28	0.8118	0.7498	28	SR	0.00	-0.06	1.2307
32	1.0449	0.9124	33	SR	0.00	-0.13	-.0481
33	-1.1516	-1.1424	37	SR	0.00	0.01	2.5222
34	-0.0507	-0.2289	36	SR	0.00	-0.18	-.8770
37	-0.5779	-0.7973	35	SR	0.00	-0.22	-1.6243
38	0.5383	0.5367	38	SR	0.00	0.00	2.3263
39	-0.6839	-0.7642	39	SR	0.00	-0.08	.8988

Item Sequential Number	Y06 Form 1	Y06 Form 2	Item Sequential Number	Item Type	11	12	Robust Z
41	-0.9093	-1.1286	41	SR	0.00	-0.22	-1.6225
42	-0.1826	0.001	42	SR	0.00	0.18	5.6857
43	-0.6898	-0.8144	43	SR	0.00	-0.12	.0952
44	0.6218	0.4527	44	SR	0.00	-0.17	-.7120
46	0.1746	0.0818	46	SR	0.00	-0.09	.6720
47	-1.255	-1.2204	47	SR	0.00	0.03	2.9829
48	-1.1293	-1.2424	48	SR	0.00	-0.11	.3038
49	0.2895	0.1785	49	SR	0.00	-0.11	.3419
62	1.7699	1.6427	62	CR	0.00	-0.13	.0481
63	2.2928	2.3586	63	CR	0.00	0.07	3.5489

Form Statistics

Mean	-.105	-.217
SD	.937	.942

Comparison of Each Form with Base Form (Form 1)

Correlation with Base	1.000	.996
SD ratio	100%	101%
Mean Diff	.000	-.112
Median Diff	.000	-.130
IQR Diff	.000	.074

Rasch Item Difficulties of Common Items: Grade 5

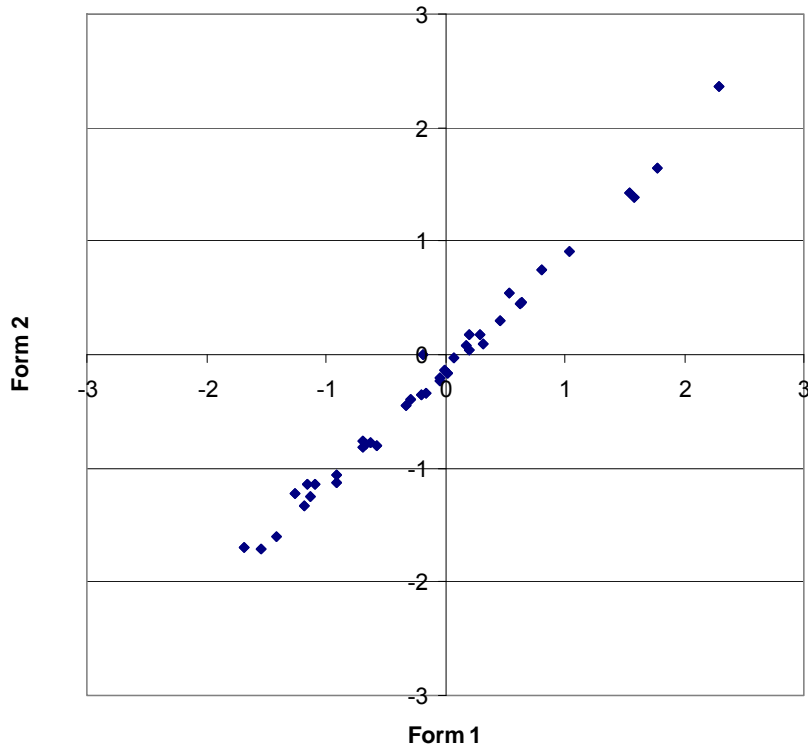


Table C.11 Free Calibration Item Difficulties of Linking Items and Robust Z Values: Grade 6

Item Sequential Number	Y06 Form 1	Y06 Form 2	Item Sequential Number	Item Type	11	12	Robust Z
1	-0.8419	-0.8551	1	SR	0.00	-0.01	-.1482
2	-1.3621	-1.3902	2	SR	0.00	-0.03	-.3805
3	-0.9964	-1.0001	3	SR	0.00	0.00	.0000
4	-1.0753	-1.0614	4	SR	0.00	0.01	.2745
5	-0.6919	-0.7209	5	SR	0.00	-0.03	-.3946
6	0.2409	0.2378	6	SR	0.00	0.00	.0094
8	1.2969	1.1553	8	SR	0.00	-0.14	-2.1506
9	-0.2844	-0.3255	10	SR	0.00	-0.04	-.5833
11	0.3674	0.339	11	SR	0.00	-0.03	-.3852
12	-0.7278	-0.7284	12	SR	0.00	0.00	.0483
14	-0.4703	-0.5421	14	SR	0.00	-0.07	-1.0621
15	0.135	0.1819	15	SR	0.00	0.05	.7891
19	0.6666	0.5973	16	SR	0.00	-0.07	-1.0231
20	0.8563	0.8737	20	SR	0.00	0.02	.3291
24	0.6406	0.7963	27	SR	0.00	0.16	2.4859
25	1.0083	0.9732	25	SR	0.00	-0.04	-.4897
26	0.1004	-0.0817	26	SR	0.00	-0.18	-2.7822
30	-0.4092	-0.4184	31	SR	0.00	-0.01	-.0858
31	0.658	0.6275	32	SR	0.00	-0.03	-.4180
32	-0.2581	-0.0766	35	SR	0.00	0.18	2.8883
35	-1.3362	-1.2695	33	SR	0.00	0.07	1.0979
36	-1.8302	-1.6454	37	SR	0.00	0.18	2.9398
37	-1.6189	-1.6172	36	SR	0.00	0.00	.0842
38	-0.0894	-0.0286	38	SR	0.00	0.06	1.0059
39	-0.7001	-0.5618	39	SR	0.00	0.14	2.2146
40	0.5144	0.279	40	SR	0.00	-0.24	-3.6135
43	0.5885	0.3203	44	SR	0.00	-0.27	-4.1250
44	0.4777	0.4634	43	SR	0.00	-0.01	-.1653
47	-0.7843	-0.7179	48	SR	0.00	0.07	1.0932
57	0.9049	1.0565	57	CR	0.00	0.15	2.4220
58	0.1675	0.1783	58	CR	0.00	0.01	.2261

Form Statistics

Mean	-.157	-.160
SD	.837	.808

Comparison of Each Form with Base Form (Form 1)

Correlation with Base	1.000	.992
SD ratio	100%	97%
Mean Diff	.000	-.003
Median Diff	.000	-.004
IQR Diff	.000	.087

Rasch Item Difficulties of Common Items: Grade 6

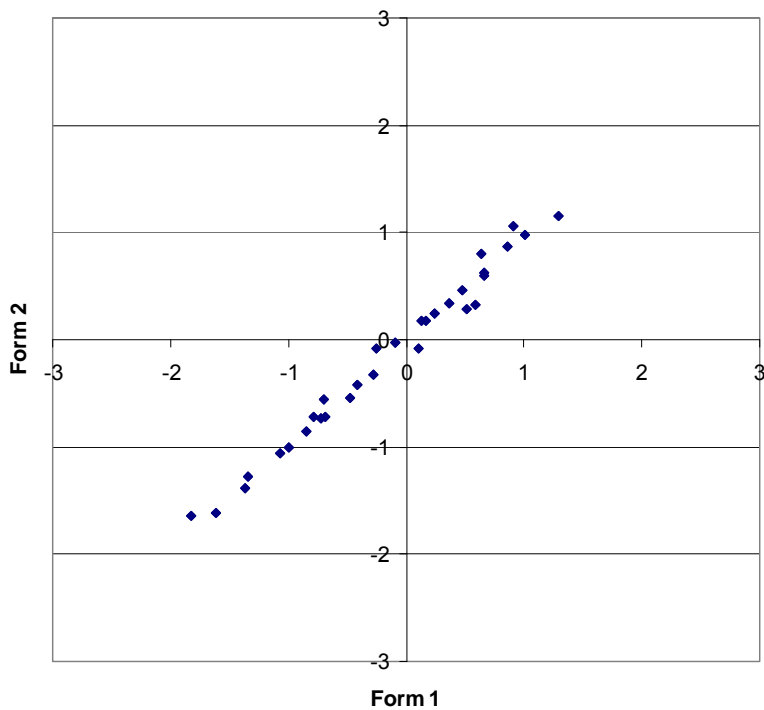


Table C.12 Free Calibration Item Difficulties of Linking Items and Robust Z Values: Grade 7

Item Sequential Number	Y06 Form 1	Y06 Form 2	Item Sequential Number	Item Type	11	12	Robust Z
1	-0.1196	-0.0841	1	SR	0.00	0.04	.3998
2	-1.3674	-1.3401	2	SR	0.00	0.03	.2429
3	-0.6924	-0.6801	3	SR	0.00	0.01	-.0440
4	-2.7317	-2.7636	4	SR	0.00	-0.03	-.8894
5	-0.4273	-0.4097	5	SR	0.00	0.02	.0574
6	-0.0772	-0.0868	6	SR	0.00	-0.01	-.4629
8	1.0539	1.1384	9	SR	0.00	0.08	1.3370
9	0.1508	0.1851	7	SR	0.00	0.03	.3768
10	-0.642	-0.6049	8	SR	0.00	0.04	.4304
12	-0.4706	-0.5243	16	SR	0.00	-0.05	-1.3064
13	-1.1551	-0.9829	10	SR	0.00	0.17	3.0145
15	-0.6035	-0.7209	12	SR	0.00	-0.12	-2.5248
16	-0.6621	-0.6575	11	SR	0.00	0.00	-.1913
17	-0.4683	-0.4628	19	SR	0.00	0.01	-.1741
18	-0.6359	-0.5132	20	SR	0.00	0.12	2.0677
21	0.1104	0.1878	14	SR	0.00	0.08	1.2012
23	0.9745	1.0655	22	SR	0.00	0.09	1.4613
25	-0.0583	-0.0755	25	SR	0.00	-0.02	-.6083
26	-1.4991	-1.5078	26	SR	0.00	-0.01	-.4457
27	-1.2172	-1.1718	27	SR	0.00	0.05	.5891
28	-1.2028	-1.1998	28	SR	0.00	0.00	-.2219
30	-0.7302	-0.8046	30	SR	0.00	-0.07	-1.7023
31	0.5663	0.5356	31	SR	0.00	-0.03	-.8665
32	0.0092	0.0321	32	SR	0.00	0.02	.1588
33	-0.4333	-0.4929	33	SR	0.00	-0.06	-1.4193
34	-0.2963	-0.4138	29	SR	0.00	-0.12	-2.5267
35	0.5231	0.4806	35	SR	0.00	-0.04	-1.0922
49	0.0932	0.1913	49	CR	0.00	0.10	1.5971
50	-0.22	-0.1841	50	CR	0.00	0.04	.4074
51	-0.6284	-0.6736	51	SPR	0.00	-0.05	-1.1438
53	0.2605	0.4123	53	SPR	0.00	0.15	2.6243
58	0.5245	0.5235	55	SPR	0.00	0.00	-.2984
59	1.7931	1.81	59	SPR	0.00	0.02	.0440
62	1.3895	1.4393	60	SPR	0.00	0.05	.6733

Form Statistics

Mean	-.261	-.246
SD	.883	.897

Comparison of Each Form with Base Form (Form 1)

Correlation with Base	1.000	.997
SD ratio	100%	102%
Mean Diff	.000	.016
Median Diff	.000	.015
IQR Diff	.000	.071

Rasch Item Difficulties of Common Items: Grade 7

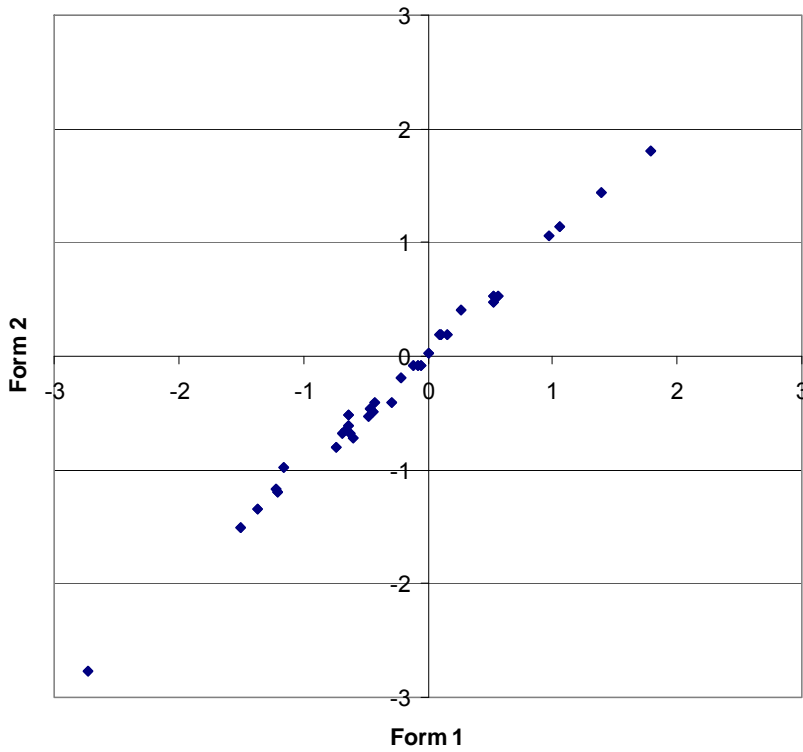


Table C.13 Free Calibration Item Difficulties of Linking Items and Robust Z Values: Grade 8

Item Sequential Number	Y06 Form 1	Y06 Form 2	Item Sequential Number	Item Type	11	12	Robust Z
1	-0.6252	-0.6178	1	SR	0.00	0.01	.7611
2	0.8284	0.7995	2	SR	0.00	-0.03	.0581
3	-0.9965	-1.0054	3	SR	0.00	-0.01	.4454
4	-0.8823	-0.9227	4	SR	0.00	-0.04	-.1646
5	-2.8306	-2.8601	5	SR	0.00	-0.03	.0465
6	-2.5699	-2.6687	6	SR	0.00	-0.10	-1.2957
7	0.2295	0.1833	7	SR	0.00	-0.05	-.2770
8	-1.5057	-1.5467	8	SR	0.00	-0.04	-.1762
9	0.3465	0.3217	9	SR	0.00	-0.02	.1375
10	-0.7124	-0.802	10	SR	0.00	-0.09	-1.1175
11	-0.4901	-0.4764	11	SR	0.00	0.01	.8831
12	-0.2177	-0.2203	12	SR	0.00	0.00	.5675
13	1.4965	1.4771	13	SR	0.00	-0.02	.2421
14	-1.3613	-1.4092	14	SR	0.00	-0.05	-.3099
15	-0.1452	-0.1581	18	SR	0.00	-0.01	.3680
16	-0.0881	-0.109	19	SR	0.00	-0.02	.2130
17	-0.1085	-0.1173	16	SR	0.00	-0.01	.4474
18	-1.2003	-1.2808	17	SR	0.00	-0.08	-.9412
19	-0.2581	-0.4144	15	SR	0.00	-0.16	-2.4093
20	-1.4852	-1.555	24	SR	0.00	-0.07	-.7340
22	1.0306	0.7796	20	SR	0.00	-0.25	-4.2434
23	-0.5815	-0.64	22	SR	0.00	-0.06	-.5152
24	0.5139	0.4796	21	SR	0.00	-0.03	-.0465
26	-0.4061	-0.464	27	SR	0.00	-0.06	-.5035
27	0.3257	0.3438	29	SR	0.00	0.02	.9684
28	-0.6275	-0.7134	26	SR	0.00	-0.09	-1.0458
29	0.1649	0.1207	28	SR	0.00	-0.04	-.2382
30	0.2379	0.2952	25	SR	0.00	0.06	1.7276
32	1.2102	1.0762	31	SR	0.00	-0.13	-1.9774
33	-1.0918	-1.0232	34	SR	0.00	0.07	1.9464
34	-0.4851	-0.4309	33	SR	0.00	0.05	1.6675
35	-0.533	-0.501	36	SR	0.00	0.03	1.2376

Item Sequential Number	Y06 Form 1	Y06 Form 2	Item Sequential Number	Item Type	11	12	Robust Z
51	1.0668	1.1663	51	CR	0.00	0.10	2.5449
52	0.7711	0.8069	52	CR	0.00	0.04	1.3112
59	1.6966	1.6296	58	SPR	0.00	-0.07	-6.798
60	-0.3965	-0.5906	60	SPR	0.00	-0.19	-3.1414
61	0.4163	0.3718	62	SPR	0.00	-0.04	-2.440
63	0.2569	0.3	64	SPR	0.00	0.04	1.4525

Form Statistics

Mean	-.237	-.273
SD	1.000	1.004

Comparison of Each Form with Base Form (Form 1)

Correlation with Base	1.000	.998
SD ratio	100%	100%
Mean Diff	.000	-.036
Median Diff	.000	-.032
IQR Diff	.000	.070

Rasch Item Difficulties of Common Items: Grade 8

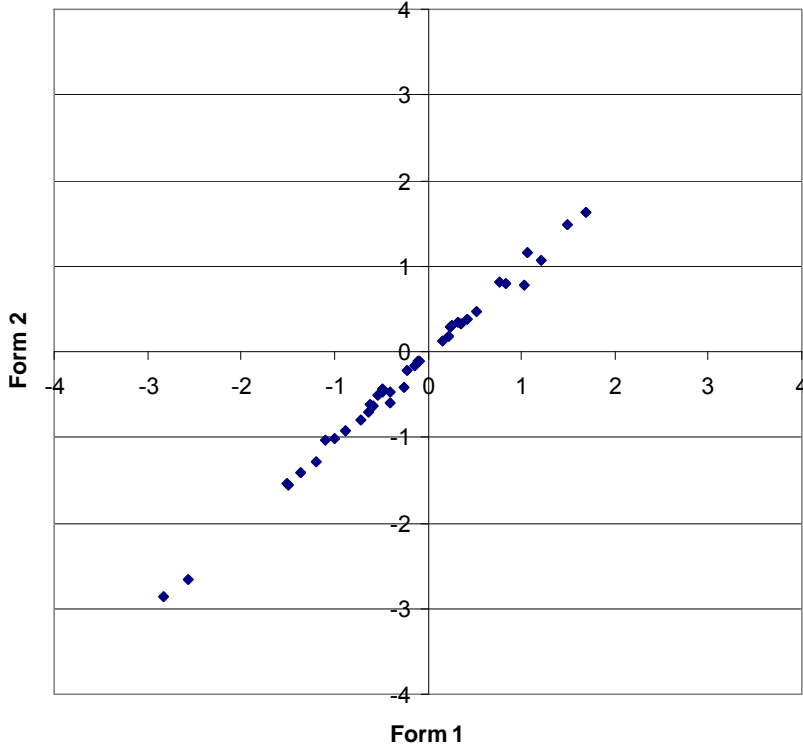


Table C.14 Rasch Equating Slope and Constant of 2006 MSA-Math

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

Table C.15 Performance Level Cut Points of 2006 MSA-Math

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

Table C.16 Scale Score Moments between 3PL and 1PL of Each Grade

Grade	Model	M	SD	P10	Q1	Mdn	Q3	P90	IQR
3	3PL	411.06	43.64	356	384	413	440	463	56
	Rasch	411.57	42.40	357	385	414	441	463	56
4	3PL	410.47	43.54	355	385	414	440	462	55
	Rasch	412.83	40.46	359	386	413	441	465	55
5	3PL	414.91	45.14	360	389	418	445	468	56
	Rasch	417.96	38.63	370	390	417	443	469	53
6	3PL	406.27	48.39	349	383	412	439	460	56
	Rasch	411.44	38.36	364	385	411	439	460	54
7	3PL	402.02	50.92	338	374	408	438	461	64
	Rasch	408.17	41.85	357	378	406	438	464	60
8	3PL	408.10	47.74	352	383	412	440	464	57
	Rasch	414.78	39.63	369	388	411	440	468	52

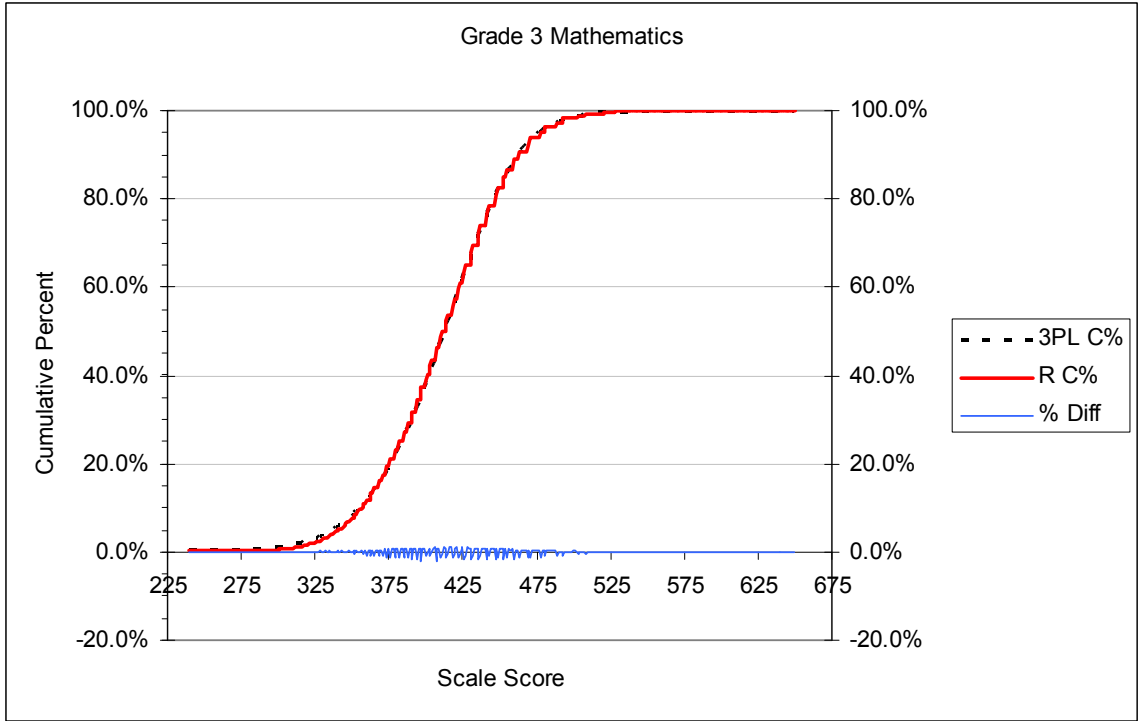


Figure C.1 Cumulative distribution functions (CDFs) for the 3PL and the Rasch scale scores with the percent differences between CDFs: Grade 3

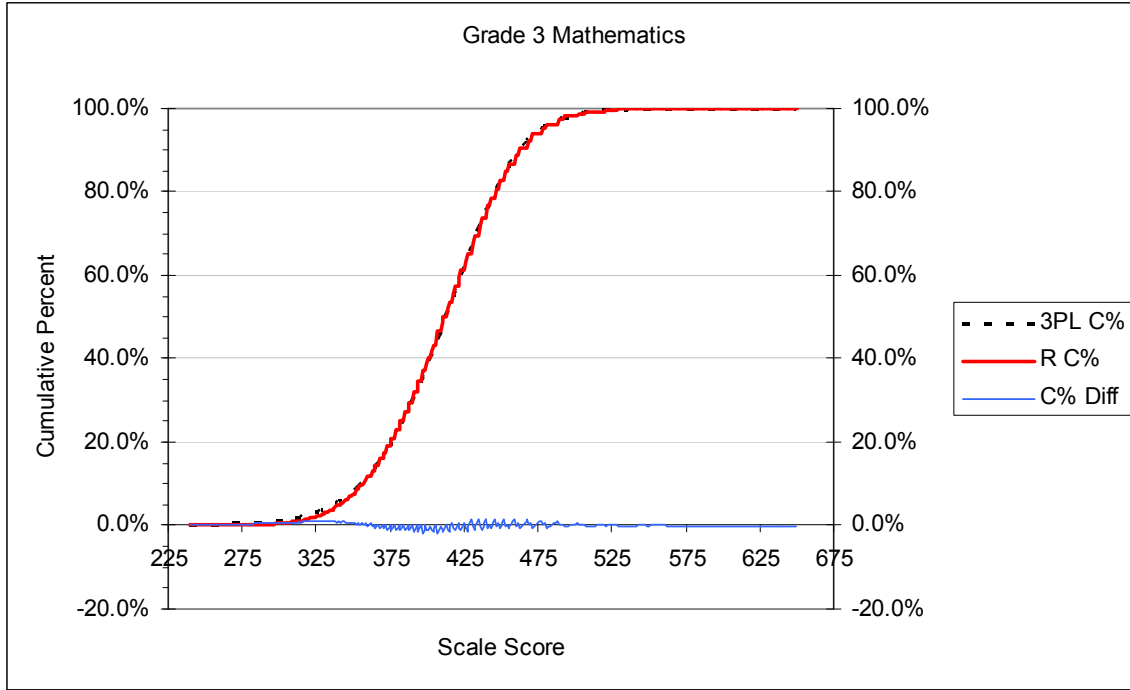


Figure C.2 Cumulative distribution functions (CDFs) for the 3PL and the Rasch scale scores with the cumulative percent differences between CDFs: Grade 3

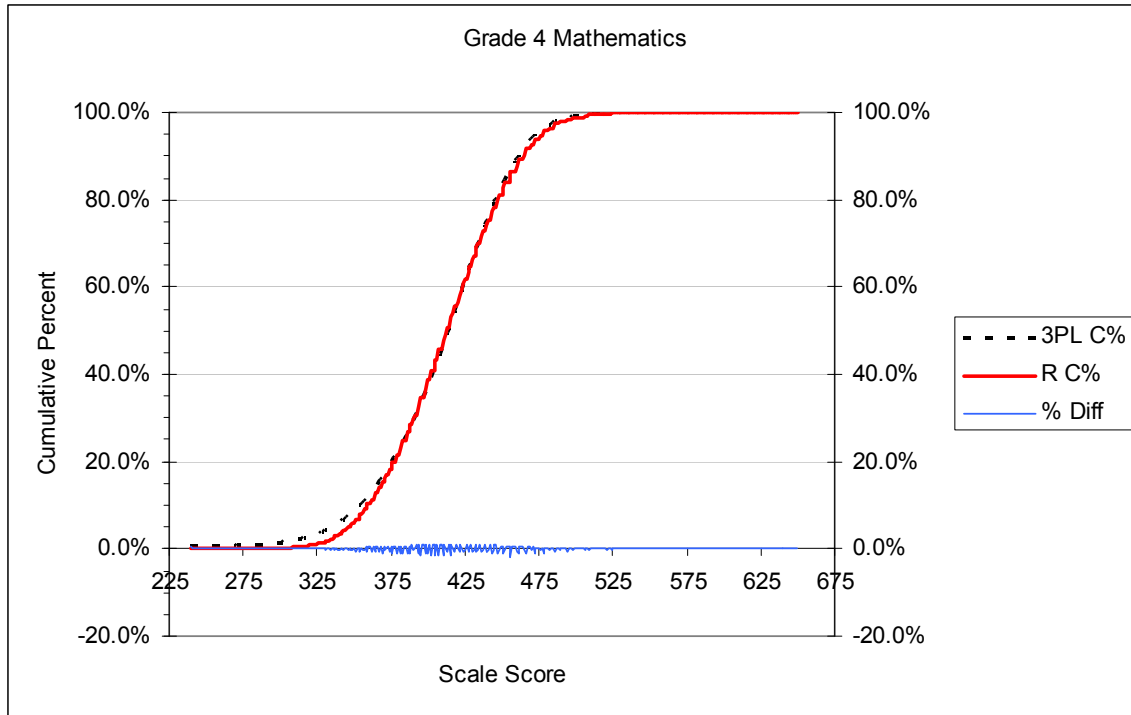


Figure C.3 Cumulative distribution functions (CDFs) for the 3PL and the Rasch scale scores with the percent differences between CDFs: Grade 4

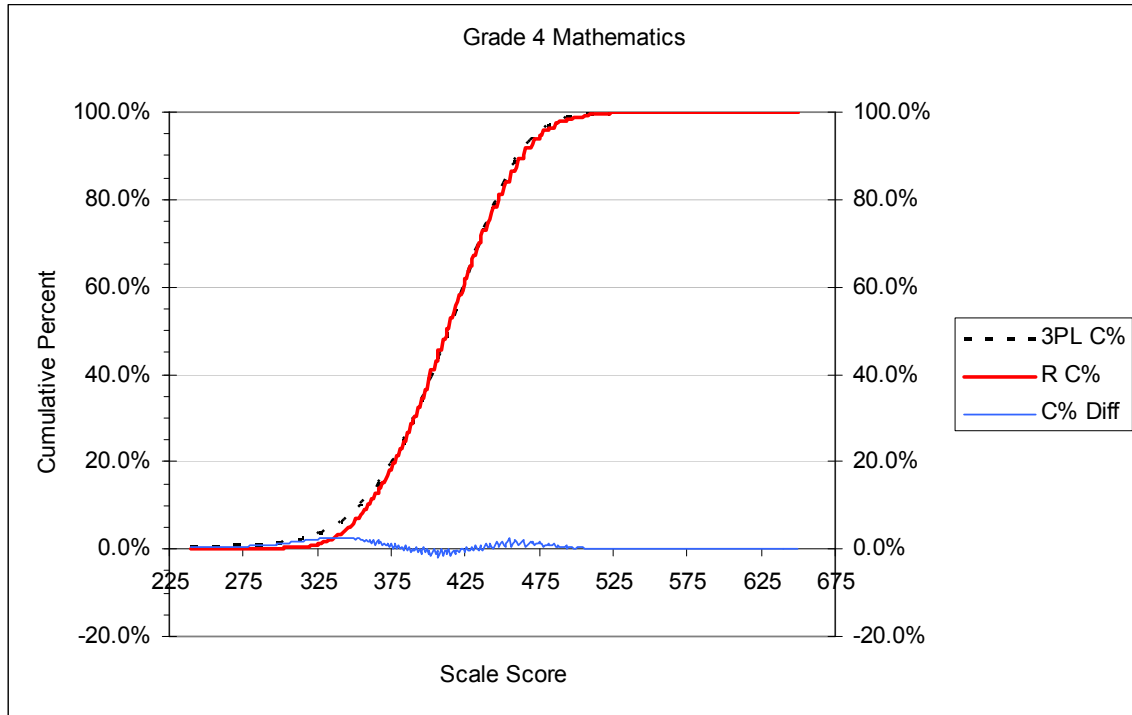


Figure C.4 Cumulative distribution functions (CDFs) for the 3PL and the Rasch scale scores with the cumulative percent differences between CDFs: Grade 4

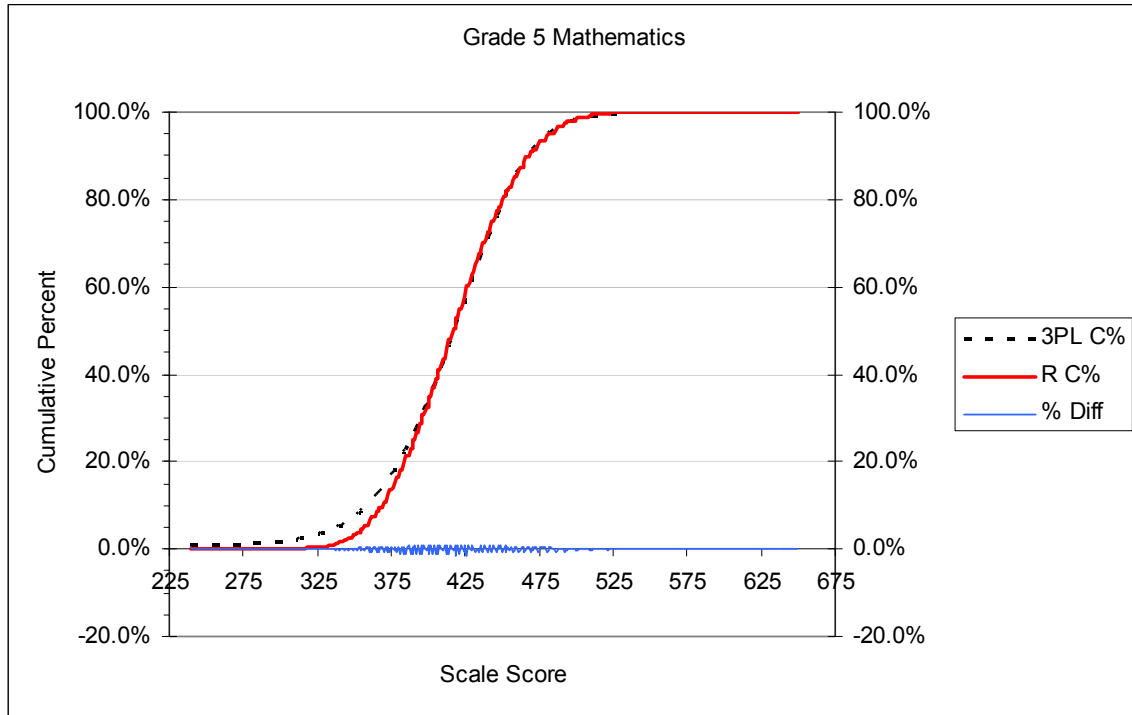


Figure C.5 Cumulative distribution functions (CDFs) for the 3PL and the Rasch scale scores with the percent differences between CDFs: Grade 5

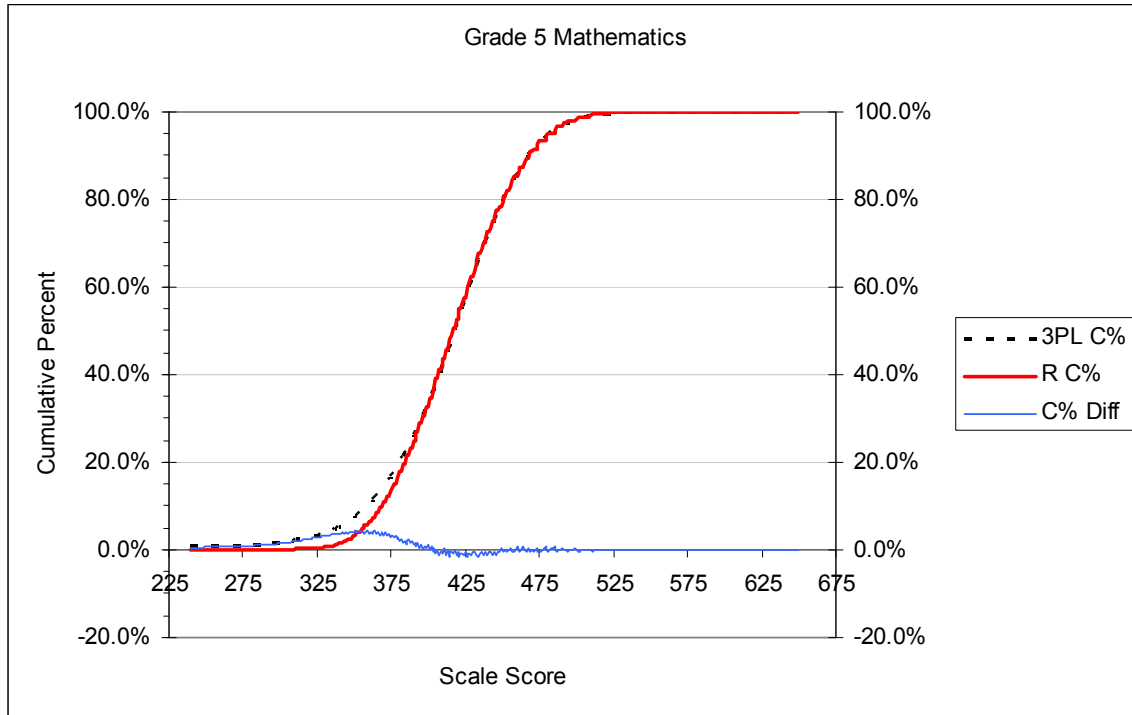


Figure C.6 Cumulative distribution functions (CDFs) for the 3PL and the Rasch scale scores with the cumulative percent differences between CDFs: Grade 5

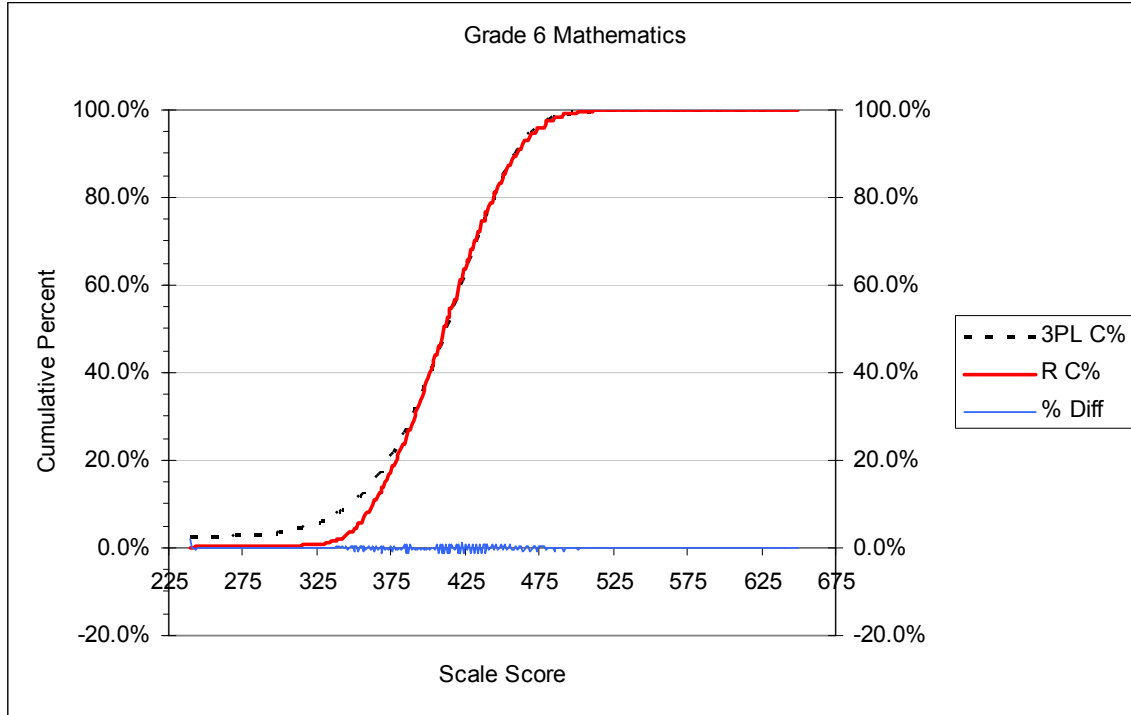


Figure C.7 Cumulative distribution functions (CDFs) for the 3PL and the Rasch scale scores with the percent differences between CDFs: Grade 6

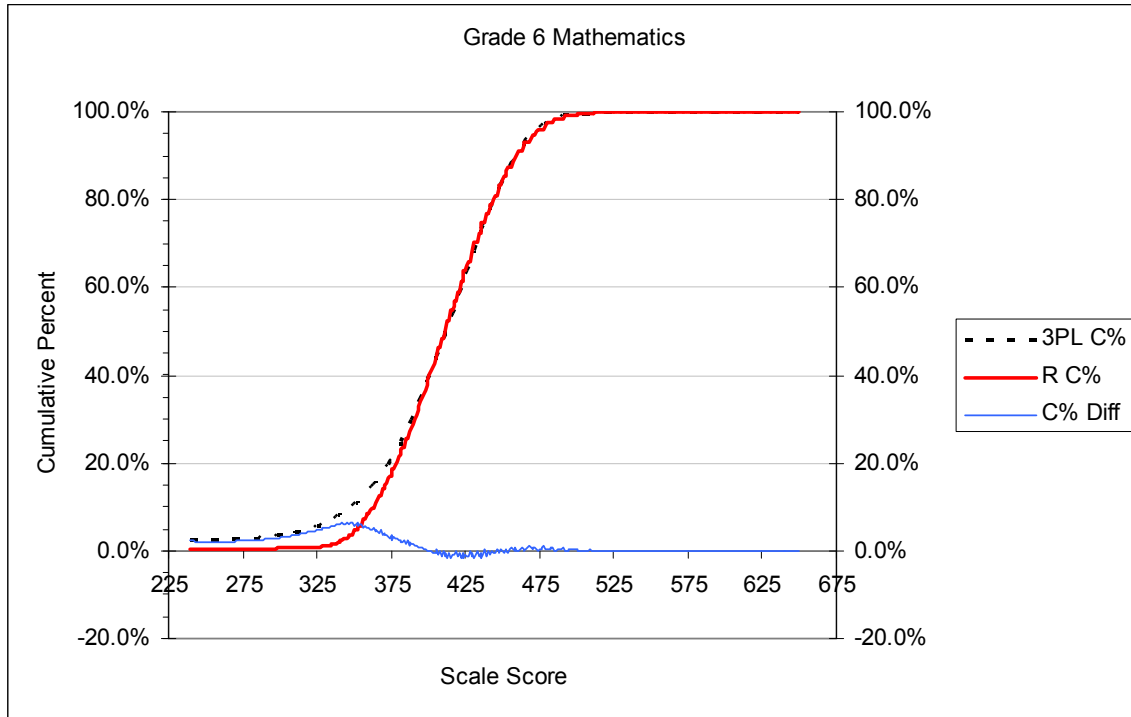


Figure C.8 Cumulative distribution functions (CDFs) for the 3PL and the Rasch scale scores with the cumulative percent differences between CDFs: Grade 6

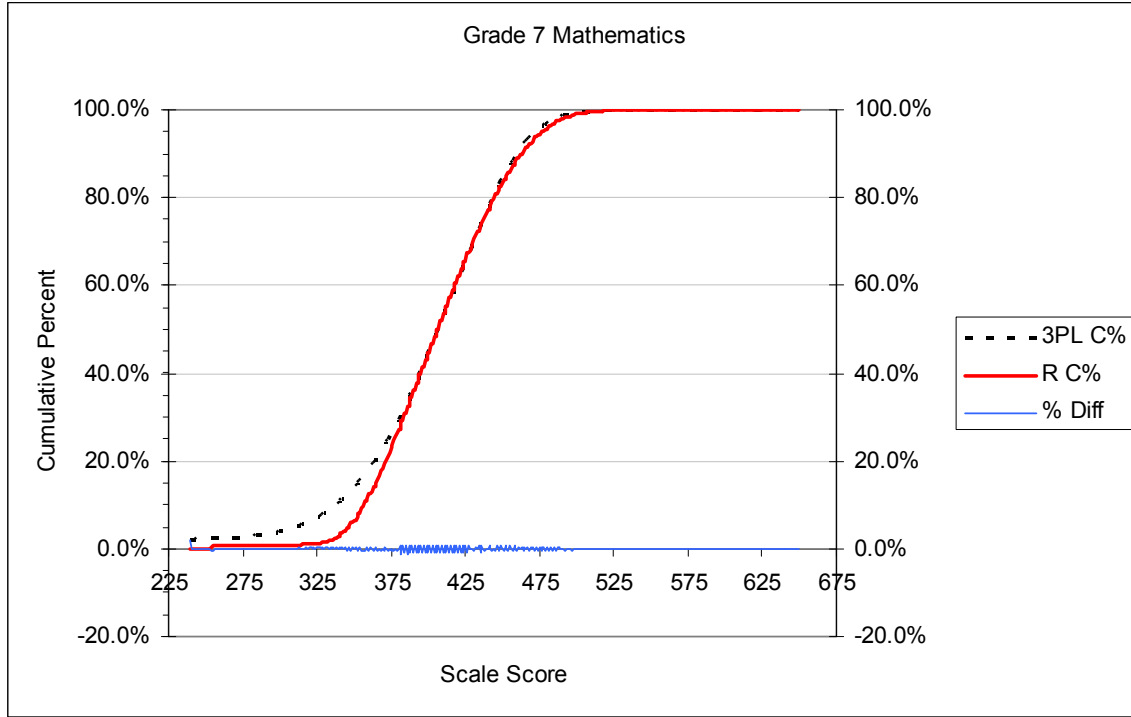


Figure C.9 Cumulative distribution functions (CDFs) for the 3PL and the Rasch scale scores with the percent differences between CDFs: Grade 7

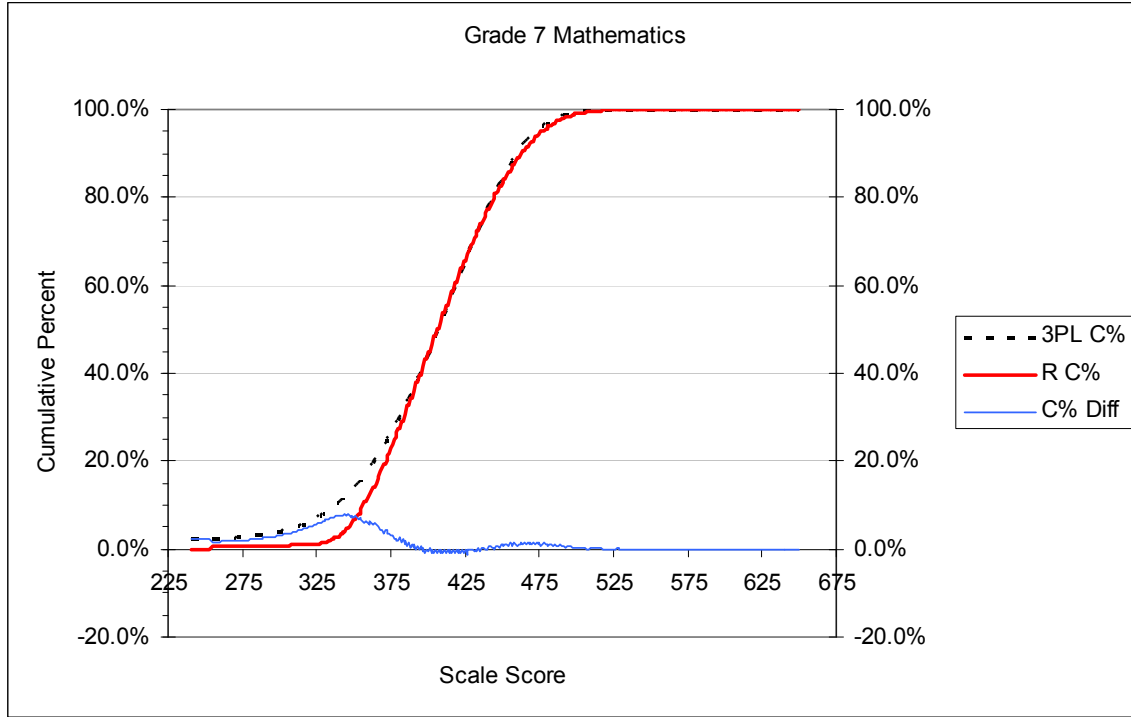


Figure C.10 Cumulative distribution functions (CDFs) for the 3PL and the Rasch scale scores with the cumulative percent differences between CDFs: Grade 7

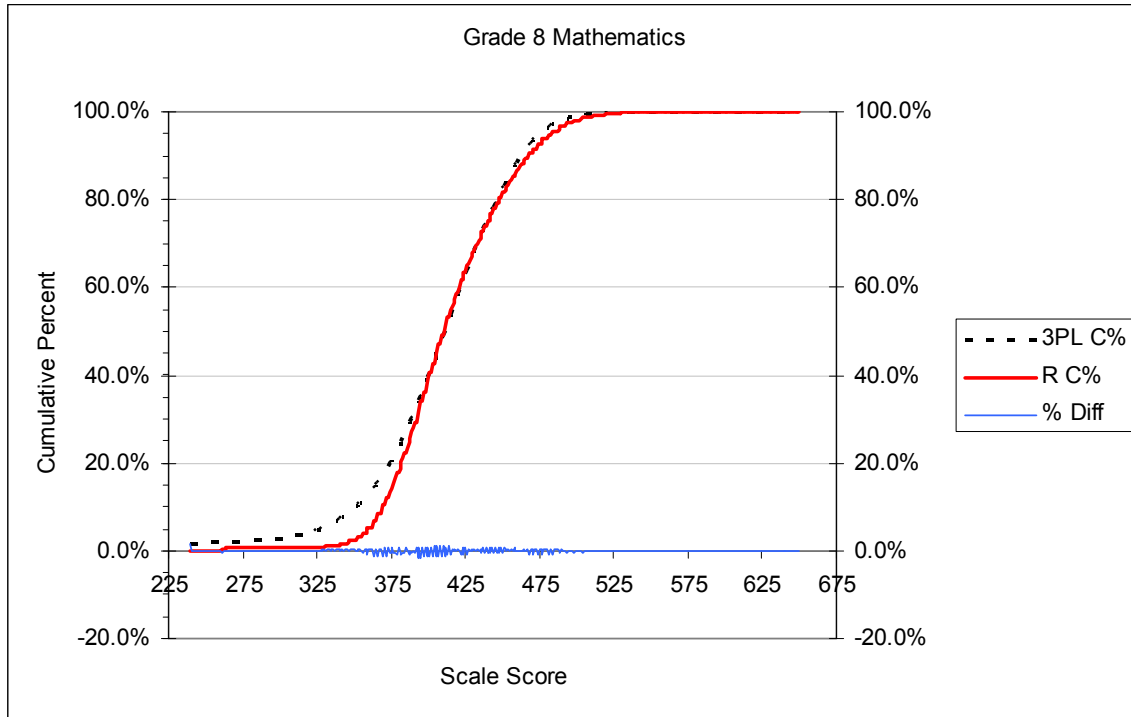


Figure C.11 Cumulative distribution functions (CDFs) for the 3PL and the Rasch scale scores with the percent differences between CDFs: Grade 8

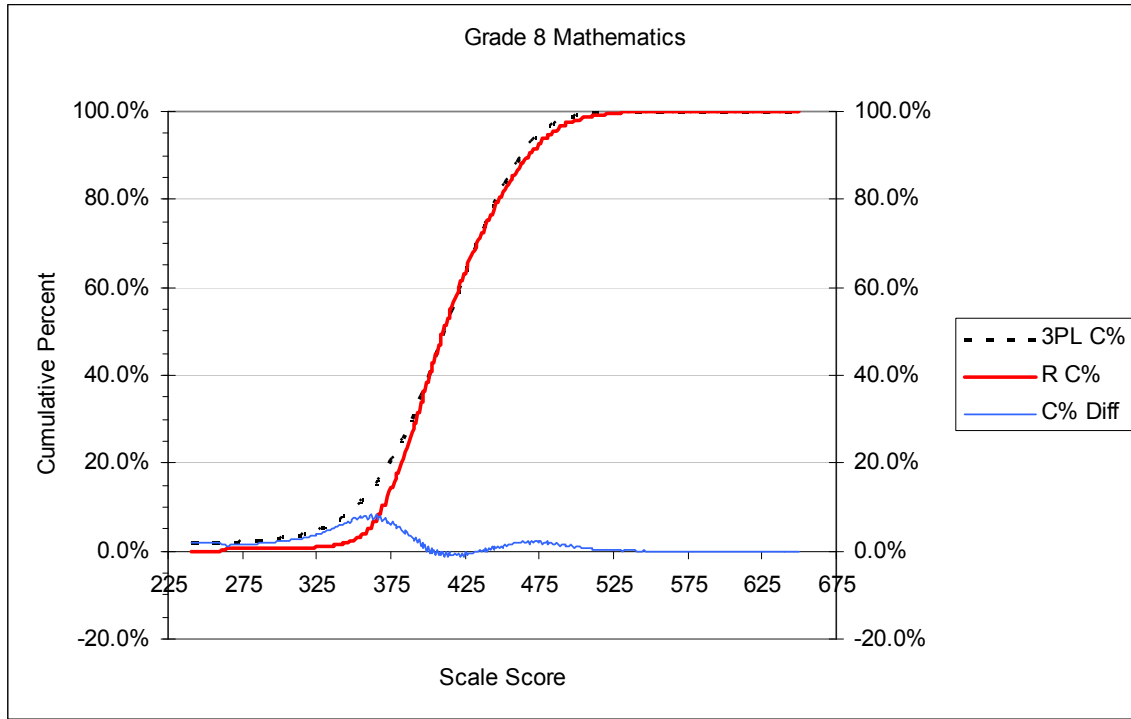


Figure C.12 Cumulative distribution functions (CDFs) for the 3PL and the Rasch scale scores with the cumulative percent differences between CDFs: Grade 8

Table C.17 Correlation between 3PL and Rasch Ability Estimates

Grade	Correlation Coefficient
3	0.99
4	0.98
5	0.98
6	0.95
7	0.96
8	0.95

Table C.18 Overall Performance Level Results of Each Grade

Grade	Model	3PL Vs. Rasch Performance Level			
		Below	Proficient	Advanced	Pass Rate
3	3PL	21.10%	54.17%	24.72%	78.89%
	Rasch	21.03%	52.84%	26.13%	78.97%
4	3PL	18.17%	49.79%	32.04%	81.83%
	Rasch	16.81%	50.46%	32.73%	83.19%
5	3PL	26.84%	54.00%	19.15%	73.15%
	Rasch	25.06%	55.59%	19.35%	74.94%
6	3PL	34.57%	46.77%	18.66%	65.43%
	Rasch	33.99%	47.10%	18.92%	66.02%
7	3PL	40.16%	44.01%	15.83%	59.84%
	Rasch	39.68%	43.60%	16.72%	60.32%
8	3PL	45.08%	32.46%	22.46%	54.92%
	Rasch	44.91%	31.73%	23.36%	55.09%

Table C.19 Kappa Indices for Classification Agreement between 3PL and 1PL: All Grades

Grade	Kappa
3	0.92
4	0.93
5	0.93
6	0.93
7	0.95
8	0.94

Table C.20 Overall Raw Agreement Index between 3PL and 1PL: All Grades

Grade	Consistent Classification	Inconsistent classification
3	95.17%	4.83%
4	95.73%	4.27%
5	95.99%	4.01%
6	95.85%	4.15%
7	96.67%	3.33%
8	96.34%	3.66%

Table C.21 Classification Consistency of Each Performance Level between 3PL and 1PL: Grade 3

	BL	PA	AD
B	20.12%	0.99%	0.00%
PA	0.91%	51.09%	2.17%
AD	0.00%	0.76%	23.96%

Note. B: Basic; PA: Proficient; AD: Advanced

Table C.22 Classification Consistency of Each Performance Level between 3PL and 1PL: Grade 4

	BL	PA	AD
B	16.51%	1.66%	0.00%
PA	0.30%	47.99%	1.50%
AD	0.00%	0.80%	31.23%

Table C.23 Classification Consistency of Each Performance Level between 3PL and 1PL: Grade 5

	BL	PA	AD
B	24.76%	2.09%	0.00%
PA	0.30%	52.79%	0.92%
AD	0.00%	0.71%	18.44%

Table C.24 Classification Consistency of Each Performance Level between 3PL and 1PL: Grade 6

	BL	PA	AD
B	33.07%	1.50%	0.00%
PA	0.91%	44.86%	1.00%
AD	0.00%	0.74%	17.92%

Note. B: Basic; PA: Proficient; AD: Advanced

Table C.25 Classification Consistency of Each Performance Level between 3PL and 1PL: Grade 7

	BL	PA	AD
B	38.99%	1.17%	0.00%
PA	0.69%	42.14%	1.18%
AD	0.00%	0.29%	15.54%

Table C.26 Classification Consistency of Each Performance Level between 3PL and 1PL: Grade 8

	BL	PA	AD
B	43.75%	1.33%	0.00%
PA	1.16%	30.26%	1.03%
AD	0.00%	0.13%	22.33%

APPENDIX D: THE 2007 MSA-MATH CLASSICAL AND IRT ITEM PARAMETERS

Table D.1 The 2007 MSA-Math Classical and IRT 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	Step 2-3
2109793	SR	0.33	0.34	2.7485	0.0444	1.02	1.17			
2109796	SR	0.59	0.46	1.2834	0.0437	0.99	0.96			
2109798	SR	0.49	0.42	1.7953	0.0430	1.01	1.05			
3509918	BCR	0.76	0.46	0.2848	0.0489	0.97	0.93			
3564076	BCR	0.50	0.50	1.8054	0.0342	1.06	1.05	-1.5584	1.5584	
3509931	SR	0.65	0.38	0.9627	0.0441	1.12	1.17			
3510022	SR	0.47	0.33	2.0077	0.0422	1.14	1.29			
3510009	SR	0.79	0.41	0.0690	0.0510	1.04	1.07			
3509953	SR	0.94	0.38	-1.6881	0.0865	0.89	0.54			
3548054	SR	0.93	0.29	-1.7100	0.0868	1.34	1.58			
3509955	SR	0.57	0.34	1.8411	0.0420	1.13	1.25			
3509964	SR	0.74	0.52	-0.0360	0.0522	1.14	1.01			
3509966	SR	0.90	0.24	-0.7332	0.0625	0.93	1.02			
3509974	SR	0.66	0.27	1.0359	0.0439	1.26	1.39			
3509979	SR	0.84	0.39	-0.0209	0.0520	0.89	0.80			
3509919	BCR	0.64	0.47	1.0279	0.0446	1.02	1.12			
3564077	BCR	0.57	0.53	1.3747	0.0317	1.04	1.04	-1.0227	1.0227	
3509987	SR	0.66	0.49	0.9682	0.0443	0.94	0.85			
3510017	SR	0.91	0.40	-1.1315	0.0710	0.92	0.82			
3510003	SR	0.84	0.44	-0.4214	0.0574	0.94	0.76			
3510006	SR	0.61	0.54	1.2257	0.0433	0.90	0.88			
3548055	SR	0.93	0.40	-2.4386	0.1171	1.85	0.92			
3510011	SR	0.63	0.47	0.9634	0.0444	1.01	1.00			
3510125	SR	0.52	0.47	1.6971	0.0425	0.96	0.97			
3510018	SR	0.77	0.50	0.2953	0.0487	0.90	0.84			
3510023	SR	0.50	0.43	1.8271	0.0421	1.02	1.05			
3510027	SR	0.87	0.40	-0.5906	0.0601	0.91	0.80			
3510029	SR	0.94	0.40	-1.3693	0.0766	0.62	0.33			
3510032	SR	0.88	0.30	-1.0976	0.0699	1.44	2.03			
3510035	SR	0.87	0.36	-0.6165	0.0604	1.00	1.25			
3510051	SR	0.54	0.46	1.4814	0.0425	0.97	0.97			
3510053	SR	0.84	0.35	-0.2691	0.0553	0.98	1.19			
3510055	SR	0.62	0.49	1.2952	0.0429	0.92	0.91			
3510058	SR	0.86	0.47	-0.6059	0.0603	0.91	0.84			
3510060	BCR	0.84	0.33	-0.4888	0.0593	1.07	1.12			
3564078	BCR	0.53	0.50	1.5699	0.0362	0.98	0.98	-1.8116	1.8116	
3510346	SR	0.85	0.43	-0.5185	0.0590	0.94	1.00			
3510033	SR	0.79	0.38	0.0473	0.0515	1.03	1.04			
3510012	SR	0.78	0.48	0.0993	0.0510	0.93	0.82			

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2	Step 2-3
3510062	SR	0.85	0.20	-0.3652	0.0563	1.15	1.45			
3510063	SR	0.78	0.43	0.4861	0.0471	0.87	0.80			
3509983	SR	0.91	0.44	-1.1470	0.0711	0.87	0.70			
3510065	SR	0.96	0.29	-2.1822	0.1047	1.20	0.99			
3510066	SR	0.80	0.52	0.0425	0.0513	0.85	0.72			
3509936	BCR	0.74	0.54	0.4441	0.0477	0.92	0.84			
3564079	BCR	0.48	0.55	1.9803	0.0346	0.96	0.95	-1.6081	1.6081	
3510071	SR	0.64	0.54	0.9317	0.0446	0.88	0.77			
3510072	BCR	0.85	0.42	-0.5702	0.0596	0.95	1.02			
3564080	BCR	0.58	0.56	1.3990	0.0302	1.04	1.06	-0.6985	0.6985	
3510126	SR	0.78	0.43	0.1797	0.0498	1.01	0.89			
3509945	SR	0.91	0.44	-1.1209	0.0705	0.88	0.75			
3509957	BCR	0.77	0.31	0.1695	0.0501	1.15	1.20			
3564081	BCR	0.43	0.46	2.3042	0.0361	1.10	1.11	-1.8051	1.8051	
3509958	SR	0.87	0.53	-0.3242	0.0558	0.69	0.53			
3509961	SR	0.92	0.34	-1.3667	0.0766	0.87	0.85			
3510068	SR	0.81	0.46	-0.3305	0.0559	1.01	1.06			
3510069	SR	0.35	0.20	2.8084	0.0447	1.29	1.82			
3510070	SR	0.97	0.26	-2.6459	0.1276	0.80	0.69			
3510034	BCR	0.30	0.42	2.8934	0.0449	0.93	0.90			
3564082	BCR	0.32	0.52	3.0491	0.0355	0.93	0.92	-1.5541	1.5541	
3510041	SR	0.92	0.35	-1.8190	0.0905	1.41	1.44			
3510043	SR	0.76	0.40	0.0444	0.0511	1.19	1.19			
3510044	SR	0.86	0.37	-0.5231	0.0590	0.98	0.96			
3510329	SR	0.55	0.34	1.5719	0.0424	1.17	1.33			

Table D.2 The 2007 MSA- Mathematics Classical and IRT 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	Step 2-3
2109793	SR	0.33	0.33	2.7485	0.0433	1.02	1.12			
2109796	SR	0.59	0.46	1.2834	0.0434	0.96	0.93			
2109798	SR	0.50	0.42	1.7953	0.0423	0.99	1.03			
3509918	BCR	0.76	0.46	0.2848	0.05	1	0.96			
3564076	BCR	0.51	0.49	1.8054	0.034	1.07	1.06	-1.5584	1.5584	
3509980	SR	0.45	0.33	2.2264	0.0416	1.08	1.19			
3510022	SR	0.49	0.31	2.0077	0.0416	1.1	1.2			
3548059	SR	0.71	0.55	0.6288	0.0468	0.82	0.69			
3510071	SR	0.64	0.55	0.9317	0.0446	0.9	0.8			
3548057	SR	0.73	0.37	0.5502	0.0474	1.05	1.1			
3509955	SR	0.56	0.32	1.8411	0.0415	1.09	1.16			
3509964	SR	0.75	0.53	-0.036	0.0539	1.07	0.87			
3509966	SR	0.90	0.24	-0.7332	0.0661	1.06	1.53			
3509923	SR	0.82	0.55	0.0147	0.0532	0.74	0.59			
3509959	SR	0.70	0.47	0.874	0.045	0.92	0.87			
3509919	BCR	0.65	0.47	1.0279	0.0444	0.99	1.01			
3564077	BCR	0.57	0.53	1.3747	0.0315	1.1	1.08	-1.0227	1.0227	
3509926	SR	0.36	0.42	2.4187	0.0421	0.92	0.91			
3509960	SR	0.76	0.35	0.3981	0.0491	1.1	1.21			
3509927	SR	0.78	0.35	0.4123	0.0488	0.98	1.18			
3509928	SR	0.88	0.50	-0.6271	0.0639	0.69	0.47			
3510009	SR	0.77	0.43	0.069	0.0528	1.09	1.03			
3510069	SR	0.33	0.18	2.8084	0.0436	1.22	1.62			
3509988	SR	0.73	0.43	0.5005	0.0481	1.01	1.05			
3509929	SR	0.54	0.47	1.8021	0.0416	0.93	0.97			
3509930	SR	0.95	0.39	-1.9318	0.1025	0.93	0.85			
3510018	SR	0.78	0.51	0.2953	0.0499	0.83	0.68			
3510027	SR	0.87	0.39	-0.5906	0.0634	0.88	0.85			
3510029	SR	0.95	0.40	-1.3693	0.0822	0.46	0.25			
3510035	SR	0.87	0.34	-0.6165	0.0633	1.16	1.39			
3510053	SR	0.85	0.36	-0.2691	0.0573	0.98	1.35			
3509933	SR	0.91	0.24	-1.2635	0.079	1.42	1.69			
3510051	SR	0.51	0.46	1.4814	0.0422	0.98	0.97			
3509962	SR	0.88	0.43	-0.6247	0.0639	0.86	0.68			
3510060	BCR	0.83	0.32	-0.4888	0.0615	1.23	1.25			
3564078	BCR	0.53	0.50	1.5699	0.0361	0.96	0.96	-1.8116	1.8116	
3510052	SR	0.75	0.28	0.5884	0.0472	1.19	1.34			

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2	Step 2-3
3510347	SR	0.68	0.46	0.9229	0.0448	0.99	1.06			
3510036	SR	0.85	0.42	-0.5397	0.0625	0.96	1.01			
3510062	SR	0.85	0.21	-0.3652	0.0589	1.1	1.3			
3510063	SR	0.79	0.43	0.4861	0.048	0.87	0.8			
3509945	SR	0.92	0.43	-1.1209	0.075	0.81	0.61			
3509935	SR	0.67	0.44	1.2515	0.043	0.95	0.92			
3510067	BCR	0.82	0.36	-0.1708	0.0559	1.02	0.97			
3564083	BCR	0.73	0.36	0.4429	0.035	1.26	1.3	-1.0657	1.0657	
3510006	SR	0.64	0.53	1.2257	0.043	0.85	0.8			
3509956	SR	0.64	0.31	1.1953	0.0433	1.16	1.22			
3509963	BCR	0.74	0.40	0.1298	0.052	1.12	1.3			
3564084	BCR	0.47	0.44	1.9318	0.0705	0.99	0.99	-3.8671	3.8671	
3548063	SR	0.93	0.43	-1.4037	0.0836	0.69	0.38			
3509965	SR	0.94	0.36	-1.6657	0.0927	0.91	0.54			
3509922	BCR	0.65	0.45	1.0354	0.0441	0.98	0.96			
3564085	BCR	0.34	0.50	3.3509	0.0391	0.93	0.92	-2.2387	2.2387	
3509958	SR	0.88	0.54	-0.3242	0.0581	0.64	0.43			
3509961	SR	0.92	0.35	-1.3667	0.0822	1.04	1.28			
3510066	SR	0.82	0.51	0.0425	0.0528	0.79	0.62			
3509938	SR	0.93	0.37	-1.6759	0.0927	1.07	0.84			
3510070	SR	0.98	0.26	-2.6459	0.1397	0.9	0.88			
3509932	BCR	0.98	0.28	-2.7619	0.1469	0.95	0.6			
3564086	BCR	0.39	0.54	2.643	0.0344	0.92	0.91	-1.5825	1.5825	
3510041	SR	0.93	0.32	-1.819	0.098	1.45	1.61			
3510043	SR	0.77	0.40	0.0444	0.0528	1.15	1.13			
3510044	SR	0.84	0.37	-0.5231	0.0617	1.17	1.1			
3510013	SR	0.50	0.31	1.8364	0.0415	1.16	1.31			

Table D.3 The 2007 MSA- Mathematics Classical and IRT 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	Step 2-3
3515405	BCR	0.80	0.32	-0.6315	0.0529	1.06	1.28			
3564160	BCR	0.57	0.37	0.2677	0.047	1.07	1.1	-2.9522	2.9522	
3515406	SR	0.60	0.42	0.6241	0.0432	1.02	1			
3515407	SR	0.85	0.44	-0.799	0.0552	0.8	0.69			
3515408	SR	0.68	0.55	0.1763	0.0455	0.87	0.74			
3515410	SR	0.81	0.40	-1.055	0.0591	1.2	1.19			
3515411	SR	0.84	0.31	-0.6969	0.0538	0.99	1.02			
3515421	SR	0.82	0.41	-0.6701	0.0536	0.9	0.87			
3515425	SR	0.64	0.51	0.4405	0.0436	0.9	0.84			
3515426	SR	0.44	0.36	1.6228	0.0424	1.09	1.14			
3515428	SR	0.94	0.29	-1.7288	0.0733	0.6	0.42			
3515447	SR	0.45	0.45	1.4979	0.0422	0.95	1.01			
3515451	BCR	0.70	0.60	0.0472	0.0465	0.85	0.79			
3564161	BCR	0.67	0.59	0.3581	0.0308	1.01	1.04	-0.4204	0.4204	
3515604	SR	0.64	0.52	0.394	0.0443	0.91	0.87			
3515456	SR	0.81	0.36	-0.7475	0.0546	1.17	1.52			
3515467	SR	0.95	0.27	-2.6054	0.1031	0.98	1.19			
3515840	SR	0.65	0.35	0.4436	0.0441	1.16	1.33			
3515470	SR	0.69	0.40	0.0797	0.0463	1.04	1			
3515705	SR	0.75	0.38	-0.2051	0.0487	1.08	1.15			
3515471	SR	0.86	0.39	-0.9767	0.0579	0.94	0.77			
3515479	SR	0.73	0.38	0.0054	0.0466	1.06	1.15			
3515484	SR	0.92	0.30	-1.7626	0.0742	0.95	1.28			
3515486	SR	0.57	0.39	0.7468	0.043	1.1	1.12			
3515630	SR	0.50	0.47	0.9291	0.0424	1.01	1.01			
3515631	SR	0.77	0.38	-0.4674	0.0511	1.06	1.14			
3515490	SR	0.92	0.35	-1.2672	0.063	0.64	0.46			
3515514	SR	0.89	0.43	-1.4725	0.0673	0.88	0.69			
3515519	SR	0.82	0.41	-0.6898	0.0538	0.97	1.17			
3515533	SR	0.85	0.49	-0.7839	0.055	0.78	0.64			
3515543	SR	0.79	0.52	-0.2743	0.0491	0.75	0.67			
3515545	SR	0.86	0.44	-0.8464	0.056	0.77	0.64			
3515886	BCR	0.45	0.47	1.4586	0.0424	0.95	0.93			
3564162	BCR	0.52	0.48	0.8111	0.0382	1.04	1.05	-1.9929	1.9929	
3515909	SR	0.49	0.48	1.2871	0.0422	0.95	0.95			
3548085	SR	0.55	0.50	0.9256	0.0427	0.89	0.86			
3548086	SR	0.76	0.43	-0.2943	0.0496	0.99	1.01			

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2	Step 2-3
3515787	SR	0.51	0.27	1.1443	0.0424	1.16	1.24			
3515557	SR	0.69	0.29	-0.0497	0.0471	1.3	1.76			
3515558	SR	0.36	0.19	2.1761	0.0441	1.34	1.69			
3515648	BCR	0.50	0.55	1.2409	0.0421	0.87	0.82			
3564163	BCR	0.56	0.65	0.847	0.0313	0.82	0.81	-0.9809	0.9809	
3515559	SR	0.72	0.40	0.1734	0.0455	0.99	1.06			
3515570	SR	0.52	0.43	0.8666	0.0426	1.05	1.09			
3515571	SR	0.85	0.42	-0.9395	0.0573	0.9	0.96			
3515573	SR	0.50	0.47	1.3716	0.042	0.97	0.96			
3515574	SR	0.85	0.48	-0.9677	0.0578	0.87	0.74			
3515577	BCR	0.73	0.42	-0.157	0.0487	1.06	1.25			
3564164	BCR	0.50	0.47	1.2002	0.0386	1.05	1.05	-2.0544	2.0544	
3548081	SR	0.58	0.35	0.8669	0.0425	1.12	1.18			
3515807	BCR	0.79	0.36	-0.7079	0.0544	1.09	1.12			
3564165	BCR	0.37	0.47	2.1566	0.0359	1.07	1.07	-1.7285	1.7285	
3515423	SR	0.90	0.44	-1.6156	0.0706	0.89	0.77			
3515424	SR	0.57	0.49	0.7782	0.0429	0.94	0.91			
3515575	SR	0.77	0.39	-0.1077	0.0477	0.93	0.92			
3515576	SR	0.61	0.41	0.5508	0.0437	1.04	1.04			
3515585	BCR	0.19	0.42	3.2248	0.0529	0.87	0.66			
3564166	BCR	0.43	0.63	1.6067	0.0322	0.86	0.85	-1.1609	1.1609	
3515500	SR	0.71	0.38	-0.3554	0.0499	1.26	1.4			
3515506	SR	0.89	0.42	-1.2169	0.0622	0.76	0.6			
3548083	SR	0.88	0.26	-1.6445	0.0713	1.42	2.19			
3515832	SR	0.66	0.48	0.3339	0.0447	0.93	0.87			
3548088	SR	0.74	0.46	-0.1831	0.0484	0.95	0.93			
3515853	SR	0.71	0.48	-0.106	0.0484	0.95	0.84			

Table D.4 The 2007 MSA- Mathematics Classical and IRT 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	Step 2-3
3515595	BCR	0.77	0.47	-0.4303	0.0497	0.91	0.77			
3564167	BCR	0.47	0.56	1.4549	0.0359	0.95	0.94	-1.7990	1.7990	
3515407	SR	0.85	0.44	-0.799	0.0537	0.84	0.7			
3515596	SR	0.78	0.31	-0.5201	0.0504	1.15	1.39			
3515447	SR	0.46	0.47	1.4979	0.0423	0.96	0.98			
3515408	SR	0.69	0.55	0.1763	0.0449	0.84	0.74			
3515599	SR	0.71	0.39	0.223	0.0446	1	1.08			
3515410	SR	0.82	0.40	-1.055	0.0573	1.11	1.08			
3515600	SR	0.75	0.28	-0.3709	0.049	1.24	1.56			
3515601	SR	0.68	0.40	-0.0452	0.0464	1.08	1.12			
3515602	SR	0.53	0.39	1.0231	0.0423	1.07	1.08			
3515428	SR	0.94	0.26	-1.7288	0.0709	0.66	0.58			
3515603	BCR	0.55	0.53	0.8277	0.0429	0.9	0.87			
3564168	BCR	0.38	0.60	1.8996	0.0324	0.89	0.85	-1.0960	1.0960	
3515604	SR	0.64	0.53	0.394	0.044	0.88	0.79			
3515605	SR	0.53	0.50	0.9009	0.0425	0.95	0.93			
3515456	SR	0.80	0.37	-0.7475	0.0533	1.03	1.17			
3515467	SR	0.94	0.26	-2.6054	0.0994	0.9	1.36			
3515606	SR	0.91	0.34	-1.7067	0.0705	0.93	0.86			
3515652	SR	0.68	0.31	0.1694	0.0452	1.19	1.43			
3515471	SR	0.86	0.37	-0.9767	0.0561	0.88	0.72			
3515936	SR	0.86	0.29	-1.1494	0.0589	1.07	1.36			
3515486	SR	0.57	0.39	0.7468	0.0427	1.08	1.11			
3548078	SR	0.50	0.43	0.6281	0.043	1.13	1.23			
3515630	SR	0.50	0.48	0.9291	0.0423	0.99	0.97			
3515631	SR	0.77	0.37	-0.4674	0.05	1.04	1.24			
3515632	SR	0.71	0.53	-0.0118	0.046	0.9	0.77			
3515634	SR	0.75	0.49	-0.2435	0.0478	0.9	0.91			
3515635	SR	0.60	0.49	0.6901	0.0428	0.96	0.95			
3548079	SR	0.94	0.36	-2.3	0.0871	0.91	0.62			
3515636	SR	0.54	0.45	0.8456	0.0427	1.04	1.06			
3515545	SR	0.86	0.41	-0.8464	0.0543	0.85	0.85			
3515638	BCR	0.62	0.55	0.3998	0.044	0.89	0.83			
3564169	BCR	0.46	0.53	1.3844	0.0339	1.04	1.06	-1.5044	1.5044	
3515791	SR	0.75	0.37	-0.2628	0.0481	1.04	1.2			
3515795	SR	0.60	0.46	0.5626	0.0435	0.98	0.96			
3515869	SR	0.56	0.48	0.808	0.0428	0.94	0.91			

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2	Step 2-3
3515836	SR	0.58	0.46	0.6346	0.0434	0.96	0.93			
3515557	SR	0.71	0.34	-0.0497	0.0462	1.12	1.26			
3515640	SR	0.42	0.33	1.772	0.0429	1.13	1.35			
3515648	BCR	0.50	0.57	1.2409	0.0421	0.86	0.8			
3564163	BCR	0.55	0.65	0.847	0.0312	0.92	0.88	-0.9809	0.9809	
3515641	SR	0.83	0.51	-0.8522	0.0544	0.83	0.71			
3515570	SR	0.50	0.44	0.8666	0.0424	1.04	1.11			
3515571	SR	0.85	0.39	-0.9395	0.0556	0.89	0.97			
3515643	SR	0.38	0.45	1.757	0.0428	0.97	0.97			
3515645	SR	0.71	0.38	-0.1355	0.0469	1.15	1.22			
3515862	BCR	0.49	0.47	1.1734	0.0423	1	0.98			
3564170	BCR	0.59	0.59	0.6541	0.0304	1	0.96	-0.6701	0.6701	
3548081	SR	0.57	0.34	0.8669	0.0424	1.13	1.14			
3515807	BCR	0.78	0.36	-0.7079	0.0527	1.23	1.3			
3564165	BCR	0.37	0.49	2.1566	0.0357	1.03	1.02	-1.7285	1.7285	
3515424	SR	0.59	0.50	0.7782	0.0426	0.94	0.94			
3515425	SR	0.71	0.54	-0.1565	0.0471	0.88	0.74			
3515575	SR	0.79	0.44	-0.1077	0.0467	0.86	0.8			
3515576	SR	0.60	0.42	0.5508	0.0432	0.99	0.92			
3515830	BCR	0.95	0.29	-2.4304	0.0916	0.97	2.12			
3564171	BCR	0.71	0.33	-0.5629	0.0373	1.28	1.4	-1.5858	1.5858	
3515933	SR	0.76	0.26	-0.3619	0.0488	1.19	1.38			
3515506	SR	0.89	0.39	-1.2169	0.06	0.79	0.65			
3515592	SR	0.82	0.45	-0.8156	0.054	0.93	0.83			
3515931	SR	0.67	0.48	0.1924	0.0448	0.92	0.84			
3515880	SR	0.69	0.40	0.0211	0.0458	1.04	1.02			
3515887	SR	0.89	0.33	-1.4589	0.0646	0.99	1.1			

Table D.5 The 2007 MSA- Mathematics Classical and IRT 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
2105953	SR	0.70	0.57	-0.0727	0.045	0.83	0.7			
2105954	SR	0.78	0.30	-0.6503	0.0496	1.09	1.17			
2105975	SR	0.51	0.55	0.9019	0.0429	0.89	0.87			
2105978	SR	0.38	0.43	1.3673	0.0447	0.99	1.05			
3511531	BCR	0.68	0.52	0.0868	0.0442	0.9	0.83			
3563986	BCR	0.55	0.53	0.6862	0.0347	0.97	0.98	-1.6106	1.6106	
3511196	SR	0.55	0.52	0.6094	0.0423	0.91	0.88			
3511203	SR	0.87	0.46	-1.3086	0.0582	0.83	0.62			
3511216	SR	0.67	0.25	0.203	0.0436	1.19	1.24			
3512606	SR	0.63	0.32	0.3045	0.043	1.14	1.27			
3511246	SR	0.78	0.46	-0.331	0.0466	0.86	0.78			
3512632	SR	0.39	0.38	1.6552	0.0432	1.07	1.21			
3512702	SR	0.54	0.35	0.8431	0.0419	1.14	1.23			
3511307	SR	0.41	0.34	1.5483	0.0427	1.13	1.26			
3511312	SR	0.39	0.36	1.5795	0.0428	1.1	1.27			
3511336	BCR	0.33	0.47	1.8944	0.0448	0.92	0.87			
3563987	BCR	0.34	0.61	1.9609	0.033	0.84	0.8	-1.0144	1.0144	
3511339	SR	0.62	0.50	0.4633	0.0428	0.88	0.9			
3511345	SR	0.92	0.31	-1.6886	0.0657	0.73	0.73			
3511348	SR	0.57	0.40	0.8118	0.0422	1.06	1.11			
3511626	SR	0.81	0.32	-0.926	0.053	1.06	1.14			
3511371	SR	0.53	0.23	0.8516	0.0422	1.3	1.44			
3511376	SR	0.81	0.40	-0.9892	0.0535	1.11	1.34			
3512638	SR	0.64	0.45	0.2606	0.0433	1	0.99			
3511396	SR	0.84	0.40	-1.1516	0.0556	0.99	0.99			
3511410	SR	0.67	0.44	-0.0507	0.0447	1.08	1.12			
3512618	BCR	0.45	0.55	1.2891	0.0424	0.85	0.81			
3563988	BCR	0.52	0.47	0.6654	0.0428	0.94	0.93	-2.4487	2.4487	
3511429	SR	0.75	0.44	-0.5025	0.0482	1.05	1.09			
3511433	SR	0.97	0.21	-3.4208	0.1298	0.98	1.07			
3511439	SR	0.79	0.47	-0.5779	0.0488	0.87	0.72			
3512616	SR	0.44	0.35	1.2809	0.0422	1.14	1.22			
3512625	SR	0.88	0.34	-1.6381	0.0646	0.97	1.04			
3512714	SR	0.91	0.24	-1.9727	0.0726	1.05	1.22			
3512649	BCR	0.27	0.49	2.3175	0.0476	0.86	0.78			
3563989	BCR	0.34	0.48	1.6549	0.0285	1.29	1.56	0.7655	-0.7655	
3511458	SR	0.92	0.33	-1.7042	0.0656	0.84	0.75			

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2	Step 2-3
3511467	SR	0.85	0.41	-0.9093	0.0524	0.8	0.65			
3512627	SR	0.88	0.36	-1.3981	0.0598	0.94	0.85			
3511470	SR	0.81	0.42	-0.6898	0.0499	0.9	0.82			
3511479	SR	0.51	0.43	0.6218	0.0422	1.09	1.13			
3511504	SR	0.90	0.26	-1.255	0.0574	0.75	0.83			
3511513	SR	0.85	0.37	-1.1293	0.0554	0.97	0.9			
3511521	SR	0.67	0.46	0.2895	0.0433	0.94	0.87			
3556476	BCR	0.49	0.53	1.0216	0.0421	0.92	0.91			
3563990	BCR	0.46	0.64	1.2214	0.0272	0.95	0.91	0.5363	-0.5363	
3511563	SR	0.62	0.39	0.376	0.0431	1.04	1.01			
3511258	ECR	0.81	0.41	-1.0768	0.0552	0.97	0.87			
3563991	ECR	0.49	0.56	0.6008	0.0331	0.95	0.94	-3.6557	0.5929	3.0628
3511266	SR	0.71	0.44	0.0148	0.0444	0.95	0.86			
3511320	SR	0.91	0.34	-1.4191	0.06	0.71	0.64			
3512595	SR	0.79	0.39	-0.6828	0.0498	0.99	0.94			
3511483	BCR	0.38	0.54	1.7333	0.0434	0.84	0.77			
3563992	BCR	0.34	0.58	1.9616	0.0336	0.93	0.92	-1.2852	1.2852	
3511499	SR	0.63	0.52	0.1746	0.0436	0.95	0.93			
3511330	SR	0.63	0.33	0.6342	0.0422	1.16	1.18			
3511269	SR	0.81	0.39	-1.0845	0.0548	1.1	1.09			
3511566	SR	0.66	0.41	0.1548	0.0437	1.01	1.03			
3511455	BCR	0.79	0.58	-0.7457	0.0509	0.78	0.61			
3563993	BCR	0.67	0.55	0.1392	0.0297	1.03	1.2	-0.1147	0.1147	
3511442	SR	0.61	0.49	0.5383	0.0423	0.94	0.93			
3512710	SR	0.59	0.41	0.5954	0.0423	1.05	1.09			
3512687	SR	0.52	0.40	0.9241	0.0419	1.07	1.1			
3512628	SR	0.77	0.36	-0.5862	0.049	1.02	1.15			
3511448	SR	0.76	0.40	-0.6839	0.0499	1.09	1.14			

Table D.6 The 2007 MSA- Mathematics Classical and IRT 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
2105953	SR	0.71	0.56	-0.0727	0.0465	0.83	0.78			
2105954	SR	0.78	0.31	-0.6503	0.0513	1.08	1.27			
2105975	SR	0.51	0.56	0.9019	0.0443	0.86	0.82			
2105978	SR	0.39	0.46	1.3673	0.0462	0.93	0.91			
3512527	SR	0.63	0.58	-0.05	0.0463	0.96	0.88			
3512528	SR	0.87	0.39	-1.1721	0.0582	0.89	0.69			
3512606	SR	0.65	0.32	0.3045	0.0445	1.14	1.24			
3511216	SR	0.68	0.25	0.203	0.0449	1.18	1.3			
3511246	SR	0.79	0.44	-0.331	0.0483	0.83	0.72			
3512529	SR	0.56	0.24	0.4459	0.0442	1.31	1.45			
3512702	SR	0.53	0.35	0.8431	0.0433	1.13	1.24			
3511307	SR	0.41	0.34	1.5483	0.044	1.13	1.22			
3511312	SR	0.40	0.37	1.5795	0.0442	1.1	1.21			
3511336	BCR	0.33	0.47	1.8944	0.0462	0.93	0.89			
3563987	BCR	0.34	0.60	1.9609	0.0341	0.89	0.85	-1.0144	1.0144	
3512534	SR	0.69	0.38	0.0331	0.046	1.04	1.05			
3511345	SR	0.92	0.30	-1.6886	0.0686	0.7	0.59			
3511348	SR	0.56	0.40	0.8118	0.0437	1.05	1.09			
3512540	SR	0.57	0.44	0.4738	0.0444	1.08	1.14			
3511371	SR	0.54	0.24	0.8516	0.0437	1.27	1.39			
3512543	SR	0.72	0.30	-0.342	0.0483	1.2	1.53			
3512546	SR	0.84	0.36	-1.0402	0.0561	0.97	0.93			
3512638	SR	0.63	0.43	0.2606	0.0447	1.05	1.11			
3512553	SR	0.59	0.48	0.4855	0.0441	0.97	0.95			
3512618	BCR	0.45	0.55	1.2891	0.0439	0.84	0.8			
3563988	BCR	0.53	0.46	0.6654	0.0441	1.1	1.09	-2.4487	2.4487	
3511439	SR	0.78	0.47	-0.5779	0.0506	0.94	0.79			
3511410	SR	0.70	0.43	-0.0507	0.0464	1.01	1.01			
3511396	SR	0.85	0.38	-1.1516	0.0579	1.02	0.91			
3512612	SR	0.38	0.24	1.6747	0.0448	1.28	1.49			
3512696	SR	0.87	0.31	-1.4768	0.0645	0.97	0.92			
3512691	SR	0.52	0.34	1.0014	0.044	1.16	1.25			
3512649	BCR	0.29	0.51	2.3175	0.0497	0.88	0.8			
3563989	BCR	0.36	0.49	1.6549	0.0299	1.25	1.45	0.7655	-0.7655	
3512578	SR	0.88	0.37	-1.362	0.0614	0.84	0.79			
3511467	SR	0.86	0.39	-0.9093	0.0543	0.84	0.75			
3512605	SR	0.94	0.32	-2.076	0.078	0.91	0.61			

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2	Step 2-3
3511470	SR	0.82	0.39	-0.6898	0.0517	0.88	0.84			
3511479	SR	0.58	0.44	0.6218	0.0436	1	0.99			
3511504	SR	0.89	0.22	-1.255	0.0596	0.97	1.29			
3511513	SR	0.86	0.38	-1.1293	0.0577	0.9	0.9			
3511521	SR	0.69	0.46	0.2895	0.0447	0.88	0.78			
3556476	BCR	0.51	0.53	1.0216	0.0435	0.85	0.81			
3563990	BCR	0.47	0.65	1.2214	0.0281	0.93	0.84	0.5363	-0.5363	
3511563	SR	0.64	0.41	0.376	0.0446	1.04	0.99			
3512530	ECR	0.64	0.38	0.3293	0.045	1.06	1.07			
3563999	ECR	0.45	0.66	1.1973	0.028	0.87	0.88	-2.0598	0.5889	1.4709
3511266	SR	0.70	0.42	0.0148	0.0459	1	0.96			
3511320	SR	0.93	0.30	-1.4191	0.0626	0.63	0.58			
3512595	SR	0.77	0.36	-0.6828	0.0516	1.12	1.17			
3511483	BCR	0.38	0.54	1.7333	0.0448	0.89	0.82			
3563992	BCR	0.35	0.57	1.9616	0.0346	0.96	0.93	-1.2852	1.2852	
3511499	SR	0.64	0.52	0.1746	0.0451	0.92	0.86			
3511330	SR	0.63	0.34	0.6342	0.0436	1.07	1.06			
3511269	SR	0.81	0.39	-1.0845	0.057	1.18	1.2			
3512637	SR	0.80	0.28	-0.6947	0.0519	1.1	1.29			
3512559	BCR	0.84	0.31	-1.0868	0.0576	1.02	1.03			
3564001	BCR	0.59	0.38	-0.2633	0.047	1.07	1.08	-2.9179	2.9179	
3511442	SR	0.61	0.47	0.5383	0.0438	0.92	0.93			
3512648	SR	0.48	0.46	1.2138	0.0434	0.98	0.99			
3512688	SR	0.42	0.27	1.42	0.0438	1.24	1.4			
3511631	SR	0.76	0.40	-0.3862	0.0489	0.97	1.01			
3511448	SR	0.80	0.37	-0.6839	0.0517	1.01	1.1			

Table D.7 The 2007 MSA- Mathematics Classical and IRT 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
2111062	SR	0.68	0.52	-0.2183	0.0444	0.89	0.79			
2111067	SR	0.80	0.39	-1.1522	0.0519	0.99	0.85			
2111069	SR	0.60	0.27	0.1761	0.043	1.2	1.32			
3516240	SR	0.56	0.53	0.2409	0.0426	0.91	0.91			
3516241	SR	0.84	0.39	-1.4702	0.0558	1.03	0.9			
3516243	SR	0.69	0.38	-0.2844	0.0446	1.06	0.98			
3516242	SR	0.38	0.36	1.2969	0.0432	1.1	1.2			
3516912	SR	0.54	0.46	0.5174	0.0423	0.99	0.98			
3516248	SR	0.75	0.44	-0.7278	0.0476	1	0.91			
3516247	SR	0.55	0.60	0.3674	0.0424	0.83	0.76			
3516249	SR	0.67	0.41	-0.4091	0.0452	1.04	1.14			
3516452	ECR	0.64	0.56	-0.1166	0.0444	0.88	0.88			
3564002	ECR	0.47	0.66	0.8847	0.027	0.94	0.94	-1.8229	0.1381	1.6849
3516255	SR	0.70	0.37	-0.4703	0.0459	1.08	1.16			
3516256	SR	0.60	0.38	0.135	0.0429	1.08	1.13			
3516257	SR	0.83	0.36	-1.2053	0.0522	1.01	1.12			
3516258	SR	0.54	0.36	0.3254	0.0425	1.12	1.17			
3516279	SR	0.73	0.54	-0.6642	0.0471	0.88	0.75			
3516280	SR	0.50	0.30	0.6666	0.0424	1.18	1.25			
3516281	SR	0.44	0.46	0.8563	0.0425	1	1.03			
3516283	SR	0.43	0.47	0.9203	0.0426	0.97	1.02			
3516285	SR	0.54	0.43	0.3104	0.043	1.05	1.04			
3516290	SR	0.64	0.44	-0.1396	0.0448	0.99	0.99			
3516291	SR	0.47	0.32	0.6406	0.0426	1.19	1.27			
3516298	SR	0.29	0.49	1.7544	0.0459	0.87	0.96			
3516573	SR	0.67	0.43	-0.3209	0.0456	0.96	0.97			
3516301	SR	0.67	0.51	-0.2182	0.0451	0.9	0.83			
3516302	SR	0.69	0.43	-0.4092	0.0452	1.05	1.1			
3516303	SR	0.53	0.46	0.658	0.0422	0.99	1.01			
3516305	SR	0.68	0.39	-0.2581	0.0444	1.06	1.03			
3516307	SR	0.61	0.54	0.2577	0.0427	0.88	0.81			
3516310	SR	0.69	0.38	-0.3503	0.045	1.02	1.05			
3517013	BCR	0.35	0.56	1.4674	0.0442	0.83	0.79			
3564004	BCR	0.57	0.64	0.0865	0.0366	0.79	0.78	-1.7954	1.7954	
3516313	SR	0.83	0.34	-1.3362	0.0538	1.01	1.3			
3516318	SR	0.88	0.44	-1.8302	0.0617	0.95	0.7			

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2	Step 2-3
3516327	BCR	0.44	0.32	0.963	0.0428	1.22	1.29			
3564005	BCR	0.59	0.61	0.0487	0.0322	0.91	0.9	-0.9977	0.9977	
3517000	SR	0.51	0.42	0.6588	0.0426	1.05	1.06			
3517010	SR	0.48	0.33	0.8496	0.0422	1.15	1.23			
3516328	SR	0.75	0.45	-0.7001	0.0472	0.96	1.04			
3516293	SR	0.45	0.39	1.0083	0.0424	1.1	1.18			
3516330	SR	0.79	0.49	-0.3114	0.0447	0.77	0.69			
3516331	SR	0.41	0.36	1.1378	0.0427	1.14	1.22			
3516352	SR	0.77	0.46	-0.8335	0.0483	0.95	0.85			
3516353	SR	0.58	0.34	0.0893	0.0431	1.16	1.24			
3516354	SR	0.72	0.52	-0.7843	0.048	0.97	0.86			
3516355	SR	0.66	0.52	-0.1849	0.044	0.94	0.88			
3516627	BCR	0.52	0.54	0.4728	0.0434	0.93	0.9			
3564006	BCR	0.42	0.61	1.265	0.0375	0.9	0.89	-1.8927	1.8927	
3516284	BCR	0.52	0.56	0.4969	0.0438	0.89	0.81			
3564007	BCR	0.42	0.60	0.9985	0.0311	0.99	0.97	-0.6994	0.6994	
3516351	SR	0.51	0.51	0.4777	0.0422	0.94	0.93			
3516332	SR	0.51	0.28	0.5885	0.0421	1.19	1.29			
3516329	SR	0.62	0.47	0.5144	0.0421	0.96	0.94			
3516295	SR	0.65	0.34	0.1004	0.043	1.08	1.19			
3516333	BCR	0.60	0.66	0.1031	0.0431	0.75	0.66			
3564008	BCR	0.61	0.71	0.1124	0.0298	0.77	0.74	-0.4274	0.4274	
3516326	BCR	0.77	0.51	-0.8501	0.049	0.89	1.01			
3564009	BCR	0.58	0.35	-0.0229	0.0362	1.32	1.37	-1.7436	1.7436	
3516320	SR	0.90	0.35	-1.6189	0.0579	0.74	0.7			
3516323	SR	0.67	0.44	-0.0894	0.044	1.01	0.96			

Table D.8 The 2007 MSA- Mathematics Classical and IRT 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
2111062	SR	0.68	0.52	-0.2183	0.0441	0.88	0.77			
2111067	SR	0.81	0.39	-1.1522	0.0521	0.94	0.83			
2111069	SR	0.60	0.28	0.1761	0.0426	1.18	1.22			
3516240	SR	0.55	0.53	0.2409	0.0422	0.91	0.87			
3516429	SR	0.92	0.24	-2.1599	0.0697	0.93	1.12			
3516242	SR	0.39	0.36	1.2969	0.0426	1.08	1.18			
3516912	SR	0.54	0.46	0.5174	0.0419	0.97	0.96			
3516243	SR	0.69	0.38	-0.2844	0.0443	1.03	0.95			
3516247	SR	0.56	0.60	0.3674	0.0419	0.83	0.77			
3516248	SR	0.75	0.44	-0.7278	0.0474	1	0.94			
3516451	SR	0.74	0.45	-0.7288	0.0474	0.94	0.88			
3517004	ECR	0.87	0.43	-1.7238	0.061	0.87	0.7			
3564010	ECR	0.58	0.61	0.2493	0.0258	1.01	1.04	-1.6097	0.1701	1.4396
3516255	SR	0.72	0.37	-0.4703	0.0456	0.99	1			
3516256	SR	0.61	0.38	0.135	0.0425	1.08	1.12			
3516280	SR	0.51	0.31	0.6666	0.0417	1.13	1.17			
3516453	SR	0.76	0.51	-0.816	0.0482	0.87	0.74			
3516454	SR	0.80	0.44	-1.1295	0.0515	0.92	0.89			
3516455	SR	0.49	0.49	0.5348	0.0418	0.98	0.95			
3517002	SR	0.74	0.41	-0.7729	0.048	0.99	1.01			
3516517	SR	0.32	0.38	1.4277	0.0433	0.98	1.01			
3516559	SR	0.84	0.39	-1.4432	0.056	0.98	1.03			
3516565	SR	0.44	0.47	0.8786	0.0418	0.96	1.01			
3516571	SR	0.35	0.30	1.3093	0.0429	1.07	1.22			
3516291	SR	0.46	0.33	0.6406	0.0419	1.14	1.2			
3516573	SR	0.69	0.42	-0.3209	0.0448	0.94	0.95			
3516301	SR	0.69	0.52	-0.2182	0.0443	0.8	0.71			
3516302	SR	0.69	0.42	-0.4092	0.045	1.01	1.07			
3516303	SR	0.53	0.47	0.658	0.0417	0.96	0.96			
3516594	SR	0.80	0.48	-1.0547	0.0506	0.87	0.73			
3516313	SR	0.83	0.33	-1.3362	0.0542	1	1.19			
3516613	SR	0.55	0.31	0.4071	0.042	1.18	1.24			
3517013	BCR	0.36	0.56	1.4674	0.0436	0.83	0.79			
3564004	BCR	0.56	0.64	0.0865	0.0364	0.81	0.8	-1.7954	1.7954	
3516305	SR	0.68	0.39	-0.2581	0.0442	0.98	0.92			
3516320	SR	0.92	0.33	-1.6189	0.0586	0.61	0.49			

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2	Step 2-3
3516327	BCR	0.42	0.31	0.963	0.0422	1.18	1.25			
3564005	BCR	0.59	0.60	0.0487	0.0319	0.96	0.95	-0.9977	0.9977	
3517000	SR	0.49	0.43	0.6588	0.0421	1.02	1.02			
3516907	SR	0.61	0.28	0.1598	0.0424	1.21	1.25			
3516328	SR	0.74	0.41	-0.7001	0.0472	0.99	1.02			
3516293	SR	0.46	0.37	1.0083	0.042	1.1	1.16			
3516618	SR	0.34	0.08	1.3357	0.0427	1.36	1.61			
3516621	SR	0.71	0.25	-1.2026	0.0524	1.67	2.75			
3516623	SR	0.74	0.32	-0.7259	0.0474	1.17	1.44			
3516624	SR	0.23	0.20	1.9065	0.0457	1.11	1.51			
3516625	SR	0.84	0.46	-1.2475	0.053	0.8	0.56			
3516354	SR	0.72	0.51	-0.7843	0.0479	0.9	0.76			
3516627	BCR	0.52	0.52	0.4728	0.0424	0.96	0.93			
3564006	BCR	0.41	0.60	1.265	0.0372	0.82	0.82	-1.8927	1.8927	
3516284	BCR	0.53	0.55	0.4969	0.0429	0.86	0.79			
3564007	BCR	0.43	0.60	0.9985	0.0305	0.94	0.92	-0.6994	0.6994	
3516332	SR	0.55	0.29	0.5885	0.0418	1.22	1.3			
3516351	SR	0.51	0.51	0.4777	0.0419	0.92	0.89			
3516329	SR	0.65	0.46	0.5144	0.0417	0.94	0.92			
3516295	SR	0.65	0.32	0.1004	0.0425	1.1	1.18			
3516622	BCR	0.42	0.64	1.0504	0.0423	0.73	0.66			
3564011	BCR	0.49	0.70	0.6015	0.0278	0.81	0.74	-0.0073	0.0073	
3516616	BCR	0.40	0.58	1.1174	0.0426	0.85	0.79			
3564012	BCR	0.49	0.50	0.5414	0.037	1.04	1.04	-1.8777	1.8777	
3516318	SR	0.84	0.47	-1.8302	0.0625	1.07	0.84			
3516323	SR	0.64	0.41	-0.0894	0.044	0.98	0.94			

Table D.9 The 2007 MSA- Mathematics Classical and IRT 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
2111486	SR	0.37	0.43	0.9205	0.0455	1.09	1.23			
3517744	BCR	0.35	0.47	0.9733	0.0466	1.11	1.11			
3564018	BCR	0.24	0.53	1.8283	0.0369	1.18	1.18	-0.8810	0.8810	
3517604	SR	0.32	0.48	1.0539	0.0458	1.05	1.04			
3517601	SR	0.45	0.52	0.4455	0.0439	1.01	1.02			
3517609	SR	0.50	0.50	0.1508	0.0435	1.03	1.03			
3517613	SR	0.62	0.59	-0.642	0.0445	0.87	0.78			
3517616	SR	0.55	0.52	-0.1398	0.0435	0.97	0.98			
3517634	SR	0.63	0.59	-0.4706	0.0439	0.82	0.75			
3517642	SR	0.42	0.61	0.3982	0.0437	0.83	0.78			
3517638	SR	0.69	0.51	-1.1551	0.0467	0.95	0.9			
3517647	SR	0.65	0.43	-0.6621	0.0445	1.05	1.03			
3517643	SR	0.66	0.32	-0.6035	0.0443	1.17	1.41			
3517650	SR	0.60	0.52	-0.4683	0.0439	0.93	0.88			
3517652	SR	0.66	0.48	-0.6359	0.0445	0.98	0.92			
3547473	SR	0.77	0.44	-1.1243	0.0466	0.86	0.73			
3517663	SR	0.27	0.40	1.5825	0.0488	1.14	1.39			
3517665	SR	0.35	0.40	0.9745	0.0456	1.11	1.34			
3517667	SR	0.57	0.48	-0.5147	0.0441	1.04	1.27			
3517670	ECR	0.30	0.57	1.3231	0.0489	0.97	0.89			
3564019	ECR	0.15	0.60	2.8181	0.0362	1	0.94	-1.6936	-0.1462	1.8398
3517675	SPR	0.68	0.52	-1.1204	0.0477	0.88	0.92			
3555857	SPR	0.36	0.62	0.9196	0.0466	0.8	0.73			
3517681	SPR	0.56	0.64	-0.2862	0.0446	0.78	0.7			
3517683	SPR	0.46	0.65	0.2733	0.0447	0.8	0.73			
3517678	SR	0.88	0.36	-2.682	0.0674	0.92	0.65			
3517710	SR	0.61	0.55	-0.6119	0.0451	0.91	0.86			
3517742	SR	0.50	0.51	0.0227	0.0442	1.03	1.12			
3517687	SR	0.56	0.51	-0.0583	0.0434	1.01	1.01			
3517692	SR	0.79	0.31	-1.4991	0.0494	1.05	1.38			
3517694	SR	0.73	0.56	-1.2172	0.0472	0.8	0.61			
3517673	ECR	0.65	0.39	-0.8144	0.046	1.12	1.47			
3564020	ECR	0.40	0.48	0.8436	0.0406	1.13	1.13	-4.4403	0.7733	3.6670
3517757	SPR	0.35	0.48	1.088	0.0464	1.07	1.2			
3517704	SPR	0.43	0.51	0.4293	0.045	1.04	1.05			
3517759	SPR	0.43	0.63	0.5501	0.0449	0.84	0.78			

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2	Step 2-3
3517719	BCR	0.26	0.50	1.5471	0.0503	0.99	0.93			
3564021	BCR	0.41	0.52	0.7817	0.0451	0.97	0.97	-2.6186	2.6186	
3517709	SR	0.64	0.53	-0.7302	0.0453	0.94	1			
3517712	SR	0.45	0.41	0.5663	0.0448	1.19	1.38			
3517714	SR	0.54	0.62	0.0092	0.0442	0.83	0.75			
3517716	SR	0.61	0.37	-0.4333	0.045	1.22	1.18			
3517718	SR	0.61	0.39	-0.2963	0.0444	1.12	1.19			
3517721	SR	0.42	0.49	0.5231	0.0449	1	1.02			
3517723	SR	0.39	0.16	0.6126	0.0453	1.56	1.88			
3555858	SR	0.39	0.43	0.6673	0.0457	1.19	1.36			
3547477	SR	0.49	0.57	0.068	0.0449	0.92	0.87			
3517725	BCR	0.26	0.59	1.6208	0.0495	0.81	0.69			
3564022	BCR	0.40	0.68	0.6682	0.0319	0.92	0.87	-0.6977	0.6977	
3517730	SPR	0.58	0.50	-0.3199	0.044	0.99	1.04			
3517732	SPR	0.31	0.56	1.3822	0.0477	0.91	0.77			
3517656	SR	0.63	0.40	-0.4094	0.0438	1.13	1.1			
3517736	SR	0.51	0.50	0.079	0.0434	1.03	1.05			
3517818	BCR	0.33	0.63	1.1456	0.0469	0.82	0.7			
3564023	BCR	0.38	0.62	1.1416	0.0404	0.85	0.84	-2.2500	2.2500	
3517876	SPR	0.14	0.43	2.7529	0.0615	0.92	0.97			
3547482	ECR	0.17	0.55	2.3028	0.0556	0.79	0.51			
3564024	ECR	0.35	0.72	1.1035	0.0281	0.87	0.85	-1.5185	-0.4265	1.9449
3517779	SPR	0.64	0.45	-0.7021	0.045	1.03	1.14			
3517697	SR	0.37	0.32	1.2314	0.0467	1.3	1.75			
3517733	SPR	0.53	0.61	-0.037	0.0445	0.85	0.78			
3555859	SR	0.74	0.43	-1.4603	0.0492	1.04	1.23			

Table D.10 The 2007 MSA- Mathematics Classical and IRT 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
2111486	SR	0.37	0.41	0.9205	0.0445	1.08	1.3			
3517706	BCR	0.47	0.48	0.2566	0.0443	1.06	1.12			
3564025	BCR	0.28	0.58	1.4706	0.0343	1.14	1.09	-0.8554	0.8554	
3517613	SR	0.62	0.58	-0.642	0.0447	0.91	0.83			
3555861	SR	0.72	0.49	-1.1968	0.0478	0.95	0.88			
3517604	SR	0.32	0.45	1.0539	0.0448	1.04	1.14			
3517602	SR	0.45	0.46	0.7735	0.044	1.08	1.26			
3517638	SR	0.69	0.53	-1.1551	0.0475	1	0.98			
3517679	SR	0.49	0.22	0.2781	0.0432	1.4	1.61			
3517609	SR	0.49	0.47	0.1508	0.0433	1.05	1.09			
3517643	SR	0.66	0.33	-0.6035	0.0445	1.15	1.43			
3517740	SR	0.53	0.58	-0.0121	0.0431	0.87	0.81			
3517631	SR	0.71	0.42	-1.1518	0.0474	1.07	1.3			
3517634	SR	0.62	0.58	-0.4706	0.0441	0.87	0.78			
3517665	SR	0.34	0.41	0.9745	0.0446	1.04	1.25			
3517635	SR	0.67	0.55	-0.9569	0.0462	0.86	0.8			
3517615	SR	0.68	0.44	-0.7793	0.0454	1	0.91			
3517637	SR	0.74	0.43	-1.1275	0.0473	1.01	1.07			
3517639	SR	0.28	0.40	1.4497	0.0469	1.04	1.3			
3517670	ECR	0.29	0.55	1.3231	0.0476	0.92	0.82			
3564019	ECR	0.16	0.59	2.8181	0.0354	1.11	1.03	-1.6936	-0.1462	1.8398
3517675	SPR	0.69	0.53	-1.1204	0.0482	0.94	0.94			
3555864	SPR	0.22	0.52	1.8439	0.0514	0.91	0.83			
3517683	SPR	0.45	0.62	0.2733	0.044	0.88	0.86			
3517645	SPR	0.69	0.53	-1.1974	0.0493	0.93	0.89			
3517741	SR	0.91	0.31	-3.1184	0.0804	0.93	1.03			
3517812	SR	0.54	0.47	-0.115	0.044	1.01	1.02			
3547535	SR	0.76	0.44	-1.6395	0.0528	0.99	0.84			
3517687	SR	0.57	0.50	-0.0583	0.0431	1	0.97			
3517692	SR	0.79	0.33	-1.4991	0.0504	1.04	1.28			
3517694	SR	0.75	0.57	-1.2172	0.0479	0.75	0.57			
3517648	ECR	0.63	0.43	-0.6275	0.0453	1.09	1.28			
3564027	ECR	0.58	0.62	-0.3188	0.0295	1	1.05	-0.9499	-1.4821	2.4320
3517695	SPR	0.35	0.57	0.9921	0.0454	0.92	0.9			
3517729	SPR	0.68	0.59	-1.0032	0.047	0.8	0.89			
3517757	SPR	0.33	0.48	1.088	0.0454	0.95	1.04			

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2	Step 2-3
3517693	BCR	0.16	0.46	2.4839	0.0573	0.89	0.71			
3564028	BCR	0.45	0.55	0.4116	0.0353	1.11	1.11	-1.5038	1.5038	
3517709	SR	0.66	0.54	-0.7302	0.0455	0.89	0.86			
3517712	SR	0.45	0.40	0.5663	0.0441	1.11	1.27			
3517714	SR	0.56	0.62	0.0092	0.0437	0.83	0.78			
3517716	SR	0.63	0.38	-0.4333	0.0448	1.14	1.09			
3517662	SR	0.47	0.33	0.3081	0.0438	1.35	1.51			
3517721	SR	0.44	0.49	0.5231	0.0441	1.01	1.02			
3517664	SR	0.80	0.44	-1.621	0.0527	0.8	0.64			
3517752	SR	0.62	0.50	-0.5723	0.0453	0.99	0.99			
3517885	SR	0.35	0.45	1.0861	0.0458	1.05	1.23			
3517666	BCR	0.27	0.58	1.6118	0.0482	0.81	0.67			
3564029	BCR	0.40	0.67	0.7029	0.0307	0.95	0.89	-0.5095	0.5095	
3517668	SPR	0.34	0.54	1.1331	0.0456	0.91	0.81			
3517671	SPR	0.34	0.65	1.0884	0.0456	0.75	0.62			
3517650	SR	0.60	0.52	-0.4683	0.0441	0.95	0.93			
3517652	SR	0.67	0.47	-0.6359	0.0447	0.97	0.87			
3517715	BCR	0.81	0.50	-1.8006	0.0541	0.85	0.79			
3564030	BCR	0.50	0.46	0.1441	0.0483	0.99	0.97	-2.9105	2.9105	
3517758	SPR	0.24	0.49	1.7915	0.0495	0.96	0.85			
3547487	ECR	0.77	0.54	-1.5658	0.0518	0.82	0.7			
3564031	ECR	0.31	0.61	2.1233	0.038	0.9	0.89	-3.8495	0.2592	3.5903
3555865	SPR	0.34	0.57	1.0579	0.0457	0.9	0.89			
3517718	SR	0.64	0.35	-0.2963	0.0435	1.21	1.3			
3517756	SPR	0.44	0.39	0.4675	0.0435	1.18	1.24			
3555859	SR	0.76	0.44	-1.4603	0.0499	0.97	0.98			

Table D.11 The 2007 MSA- Mathematics Classical and IRT 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
2107347	SR	0.34	0.42	0.8135	0.0451	1.1	1.29			
2107359	SR	0.59	0.20	-0.9648	0.0461	1.27	1.77			
2107361	SR	0.47	0.31	-0.2102	0.0446	1.17	1.3			
3514015	SR	0.23	0.30	1.4965	0.0495	1.14	1.28			
3514014	SR	0.56	0.40	-0.2177	0.0424	1.1	1.1			
3514016	SR	0.75	0.37	-1.3613	0.0462	0.99	0.97			
3514046	SR	0.52	0.48	-0.1452	0.0425	0.99	0.96			
3514013	BCR	0.44	0.67	0.3616	0.0438	0.76	0.69			
3564107	BCR	0.64	0.64	-1.107	0.0357	0.83	0.83	-1.4410	1.4410	
3547550	SR	0.57	0.27	-0.4694	0.0426	1.23	1.42			
3514056	SR	0.79	0.33	-1.9767	0.052	1.02	1.33			
3514053	SR	0.71	0.41	-1.2003	0.0452	1.01	1.1			
3514058	SR	0.30	0.47	1.0306	0.0461	0.97	1.07			
3514059	SR	0.63	0.45	-0.5815	0.0428	1	0.96			
3514062	SR	0.41	0.58	0.5139	0.0438	0.86	0.85			
3514702	ECR	0.28	0.53	1.2761	0.0486	0.94	0.89			
3564108	ECR	0.34	0.63	0.6901	0.0257	1.34	1.3	-0.7491	0.5272	0.2219
3514064	SPR	0.14	0.46	2.7466	0.0666	0.97	0.76			
3514276	SPR	0.45	0.68	0.2809	0.0437	0.72	0.64			
3514127	SPR	0.22	0.57	1.6861	0.0518	0.86	0.65			
3514125	SPR	0.60	0.50	-0.6461	0.044	0.93	0.98			
3514121	SR	0.69	0.41	-1.0563	0.0448	1	1.08			
3514139	SR	0.73	0.37	-1.3743	0.0462	1	1.11			
3514073	SR	0.55	0.45	-0.4061	0.0425	1.06	1.07			
3514074	SR	0.42	0.30	0.3257	0.0435	1.24	1.33			
3514075	SR	0.63	0.39	-0.6275	0.0428	1.11	1.11			
3514078	ECR	0.22	0.59	1.6578	0.052	0.78	0.61			
3564109	ECR	0.31	0.71	0.9387	0.0276	0.92	0.89	-1.3082	0.3860	0.9222
3514611	SPR	0.65	0.44	-0.9362	0.0444	1	1.04			
3514083	SPR	0.24	0.56	1.4236	0.0522	0.86	0.79			
3514092	SR	0.42	0.34	0.2379	0.0432	1.19	1.28			
3514102	SR	0.62	0.48	-0.4851	0.0432	0.93	1			
3514095	SR	0.31	0.49	1.2102	0.0475	1.03	1.19			
3514093	SR	0.33	0.36	0.8718	0.0457	1.2	1.43			
3514107	SR	0.12	0.28	2.3547	0.0598	1.02	1.35			
3514103	SR	0.60	0.39	-0.533	0.0433	1.13	1.2			

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2	Step 2-3
3514608	SR	0.41	0.56	0.3422	0.044	0.89	0.88			
3514287	SR	0.62	0.42	-0.8039	0.0441	1.01	1.12			
3514267	BCR	0.35	0.55	0.8169	0.0454	0.92	0.83			
3564110	BCR	0.62	0.64	-0.9309	0.0354	0.82	0.81	-1.4936	1.4936	
3514113	SPR	0.65	0.45	-0.8134	0.0436	0.95	1.13			
3514275	SPR	0.72	0.40	-1.375	0.0468	0.97	1.31			
3514117	BCR	0.32	0.67	0.9736	0.0475	0.73	0.61			
3564111	BCR	0.39	0.68	0.4284	0.0328	0.86	0.86	-0.8203	0.8203	
3514279	SPR	0.21	0.59	1.6979	0.0517	0.78	0.59			
3514131	SPR	0.39	0.55	0.5831	0.0443	0.91	0.85			
3514057	SR	0.65	0.56	-0.938	0.0439	0.87	0.75			
3514607	ECR	0.26	0.69	1.2953	0.0492	0.68	0.53			
3564112	ECR	0.24	0.73	1.2629	0.0275	0.84	0.68	0.1082	-0.8532	0.7450
3514055	SR	0.57	0.42	-0.2581	0.0424	1.06	1.12			
3514052	SR	0.50	0.31	-0.1085	0.0425	1.28	1.32			
3514118	BCR	0.09	0.32	2.8471	0.0676	1.01	1.04			
3564113	BCR	0.40	0.51	1.0451	0.0438	0.91	0.89	-2.7281	2.7281	
3514291	SR	0.73	0.39	-1.4001	0.0465	0.97	1.28			
3514606	SR	0.69	0.27	-1.106	0.0448	1.2	1.57			
3514076	SR	0.46	0.49	0.1649	0.0429	1.03	1.05			
3514100	SR	0.75	0.37	-1.0918	0.0447	0.96	0.94			
3514080	SPR	0.52	0.62	-0.1513	0.0431	0.81	0.77			
3514079	SPR	0.31	0.58	1.2068	0.048	0.86	0.83			
3514669	BCR	0.51	0.60	-0.1522	0.0438	0.85	0.83			
3564114	BCR	0.63	0.61	-0.8897	0.0315	0.93	0.99	-0.4608	0.4608	
3514710	SR	0.53	0.39	-0.1424	0.0428	1.15	1.22			

Table D.12 The 2007 MSA- Mathematics Classical and IRT 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
2107347	SR	0.34	0.42	0.8135	0.0447	1.04	1.11			
2107359	SR	0.59	0.21	-0.9648	0.0466	1.23	1.6			
2107361	SR	0.47	0.30	-0.2102	0.045	1.15	1.29			
3514015	SR	0.22	0.29	1.4965	0.0488	1.15	1.33			
3514014	SR	0.56	0.39	-0.2177	0.0422	1.09	1.09			
3514016	SR	0.77	0.37	-1.3613	0.0465	0.95	0.98			
3514055	SR	0.58	0.39	-0.2581	0.0422	1.07	1.14			
3514147	BCR	0.38	0.59	0.673	0.0447	0.85	0.77			
3564115	BCR	0.33	0.62	0.7108	0.03	1.07	1.02	0.4113	-0.4113	
3514052	SR	0.51	0.28	-0.1085	0.0422	1.24	1.28			
3514058	SR	0.30	0.46	1.0306	0.0455	0.99	1.08			
3514062	SR	0.42	0.57	0.5139	0.0433	0.88	0.86			
3514059	SR	0.63	0.43	-0.5815	0.0429	1.02	1.04			
3514156	SR	0.73	0.45	-1.4579	0.0474	0.99	0.95			
3514056	SR	0.75	0.36	-1.9767	0.0529	1.42	1.83			
3514283	ECR	0.34	0.62	0.8146	0.0452	0.85	0.74			
3564116	ECR	0.49	0.68	-0.2444	0.0279	0.99	0.97	-2.2962	1.2817	1.0145
3514159	SPR	0.62	0.45	-0.6287	0.0433	0.98	1.11			
3514161	SPR	0.19	0.54	1.9454	0.0536	0.85	0.68			
3514162	SPR	0.37	0.60	0.6672	0.0446	0.82	0.75			
3514163	SPR	0.52	0.60	-0.1901	0.043	0.85	0.82			
3514122	SR	0.60	0.49	-0.5576	0.0432	0.96	0.89			
3514092	SR	0.42	0.33	0.2379	0.0427	1.16	1.21			
3514075	SR	0.64	0.39	-0.6275	0.043	1.09	1.06			
3514073	SR	0.54	0.45	-0.4061	0.0424	1.02	1			
3514076	SR	0.48	0.46	0.1649	0.0425	1.02	1.01			
3514164	ECR	0.55	0.56	-0.4257	0.0435	0.89	0.96			
3564117	ECR	0.45	0.60	0.1001	0.0295	1.19	1.19	-2.4484	0.5623	1.8861
3514090	SPR	0.63	0.37	-0.7807	0.0438	1.07	1.24			
3514281	SPR	0.21	0.44	1.7603	0.0524	0.95	0.92			
3514173	SR	0.49	0.34	0.0215	0.0428	1.16	1.2			
3514095	SR	0.29	0.48	1.2102	0.0473	0.96	1.05			
3514174	SR	0.58	0.48	0.1391	0.043	1.06	1.05			
3514100	SR	0.69	0.35	-1.0918	0.0459	1.03	1.11			
3514138	SR	0.58	0.49	-0.4768	0.0437	0.96	0.88			
3514213	SR	0.63	0.47	-0.6097	0.0439	0.9	0.9			

Item CID	Item Type	P-Value	Point-Biserial	Rasch Difficulty	SE	MS. Infit	MS. Outfit	Step 0-1	Step 1-2	Step 2-3
3514103	SR	0.58	0.36	-0.533	0.0438	1.1	1.15			
3547555	SR	0.51	0.51	-0.5164	0.044	0.94	0.9			
3514108	BCR	0.13	0.36	2.4365	0.0604	1	1.01			
3564118	BCR	0.23	0.51	2.5497	0.0419	1	0.99	-2.3938	2.3938	
3514263	SPR	0.51	0.44	-0.1362	0.0424	1.04	1.1			
3514111	SPR	0.42	0.62	0.3986	0.0433	0.81	0.75			
3514117	BCR	0.32	0.66	0.9736	0.047	0.75	0.65			
3564111	BCR	0.40	0.67	0.4284	0.0326	0.88	0.88	-0.8203	0.8203	
3514708	SPR	0.57	0.30	-0.3665	0.0431	1.22	1.31			
3514114	SPR	0.41	0.50	0.4361	0.0433	0.99	1			
3514046	SR	0.52	0.48	-0.1452	0.0423	0.99	0.94			
3514152	ECR	0.33	0.55	0.8591	0.0461	0.9	0.88			
3564119	ECR	0.34	0.70	0.5971	0.0254	1	0.99	-0.6076	0.3356	0.2720
3547550	SR	0.64	0.19	-0.4694	0.0425	1.27	1.56			
3547551	SR	0.85	0.33	-2.2204	0.0566	0.95	1.03			
3514266	BCR	0.29	0.62	1.2135	0.0474	0.8	0.68			
3564120	BCR	0.49	0.66	-0.0476	0.034	0.87	0.87	-1.3415	1.3415	
3547547	SR	0.54	0.55	-0.2056	0.0425	0.87	0.8			
3514288	SR	0.58	0.59	-0.4203	0.0425	0.82	0.73			
3514074	SR	0.41	0.32	0.3257	0.043	1.23	1.35			
3514102	SR	0.64	0.49	-0.4851	0.0426	0.91	0.91			
3514083	SPR	0.26	0.58	1.4236	0.0514	0.85	0.75			
3514611	SPR	0.62	0.45	-0.9362	0.0447	1.05	1.12			
3514133	BCR	0.37	0.57	0.6858	0.0454	0.92	0.89			
3564121	BCR	0.49	0.62	-0.165	0.0385	0.89	0.89	-1.8706	1.8706	
3547536	SR	0.49	0.44	-0.0487	0.0427	1.05	1.06			

APPENDIX E: THE 2007 MSA-MATH BLUEPRINTS

Table E.1 The 2007 MSA-Math Blueprint: Grade 3

Code	Standard / Objective statement	No. of SAT10 Items	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	SR BCR	SR BCR	SR BCR	SR BCR	SR BCR
1	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
			(6)	(4) (1)	(2)	(4) (1)	(2)
1.A	1.A. Patterns or Functions						
1.A.1	1.A.1. Identify, describe, extend, or create numeric patterns to:						
1.A.1.a	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	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	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	1.A.2. Identify, describe, extend or create non-numeric patterns to:						
1.A.2.a	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	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	1.B. Expressions, Equations, or Inequalities						
1.B.1	1.B.1. Write or identify expressions to:						
1.B.1.a	1.B.1.a. Represent numeric quantities with one operational symbol (+, -) using whole numbers (0-50)						
1.B.2	1.B.2. Identify, write, or solve equations or inequalities to:						
1.B.2.a	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. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective statement	No. of SAT10 Items	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	SR BCR	SR BCR	SR BCR	SR BCR	SR BCR
1	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 (4)	13 (3)	13 (4) (1)	13 (1)	13 (4) (1)
1.A	1.A. Patterns or Functions						
1.A.1	1.A.1. Identify, describe, extend, or create numeric patterns to:						
1.A.1.a	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	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	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	1.A.2. Identify, describe, extend or create non-numeric patterns to:						
1.A.2.a	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	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	1.B. Expressions, Equations, or Inequalities						
1.B.1	1.B.1. Write or identify expressions to:						
1.B.1.a	1.B.1.a. Represent numeric quantities with one operational symbol (+, -) using whole numbers (0-50)						
1.B.2	1.B.2. Identify, write, or solve equations or inequalities to:						
1.B.2.a	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. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items		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		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
1.B.2.b	1.B.2.b. Find the missing number (unknown) in a number sentence (equation) with one operation (+, -) using whole numbers (0-100)												
1.C	1.C. Numeric or Graphic Representations of Relationships												
1.C.1	1.C.1. Locate points on a number line to:												
1.C.1.a	1.C.1.a. Represent whole numbers on a number line (0-500)												
1.C.1.b	1.C.1.b. Represent proper fractions with denominators of 2, 3, or 4 on a number line												
2	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	1		6	1	6	1	6	1	6	1	6	1
						(2)		(1)	(1)	(1)		(3)	
2.A	2.A. Plane Geometric Figures												
2.A.1	2.A.1. Analyze the properties of plane geometric figures to:												
2.A.1.a	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	2.A.1.b. Identify or describe quadrilaterals (squares, rectangles, rhombi, parallelograms, trapezoids) by the length of sides												
2.A.1.c	2.A.1.c. Identify triangles, rectangles, or squares as part of a composite figure comprised of 2 of the stated polygons												
2.B	2.B. Solid Geometric Figures												
2.B.1	2.B.1. Analyze the properties of solid geometric figures to:												
2.B.1.a	2.B.1.a. Identify or describe a cube by the number of edges, faces, vertices, or shape of each face												
2.D	2.D. Congruence or Similarity												
2.D.1	2.D.1 Analyze congruent figures to:												
2.D.1.a	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 SAT10 Items		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	SR	BCR
1.B.2.b	1.B.2.b. Find the missing number (unknown) in a number sentence (equation) with one operation (+, -) using whole numbers (0-100)												
1.C	1.C. Numeric or Graphic Representations of Relationships												
1.C.1	1.C.1. Locate points on a number line to:												
1.C.1.a	1.C.1.a. Represent whole numbers on a number line (0-500)												
1.C.1.b	1.C.1.b. Represent proper fractions with denominators of 2, 3, or 4 on a number line												
2	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	1	6	1	6	1	6	1	6	1	6	1	6
				(1)	(1)		(2)		(3)		(1)		
2.A	2.A. Plane Geometric Figures												
2.A.1	2.A.1. Analyze the properties of plane geometric figures to:												
2.A.1.a	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	2.A.1.b. Identify or describe quadrilaterals (squares, rectangles, rhombi, parallelograms, trapezoids) by the length of sides												
2.A.1.c	2.A.1.c. Identify triangles, rectangles, or squares as part of a composite figure comprised of 2 of the stated polygons												
2.B	2.B. Solid Geometric Figures												
2.B.1	2.B.1. Analyze the properties of solid geometric figures to:												
2.B.1.a	2.B.1.a. Identify or describe a cube by the number of edges, faces, vertices, or shape of each face												
2.D	2.D. Congruence or Similarity												
2.D.1	2.D.1 Analyze congruent figures to:												
2.D.1.a	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 SAT10 Items		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		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
2.E	2.E. Transformations												
2.E.1	2.E.1. Analyze a transformation to:												
2.E.1.a	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	2.E.2. Analyze geometric figures or pictures to:												
2.E.2.a	2.E.2.a. Identify or describe not more than 4 lines of symmetry												
3	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
				(3)		(2)		(3)	(1)	(2)	(1)	(1)	
3.A	3.A. Measurement Scales												
3.A.1	3.A.1. Read scales to:												
3.A.1.a	3.A.1.a. Estimate or determine length to the nearest centimeter or 1/2 inch												
3.A.1.b	3.A.1.b. Identify time to the nearest minute using an analog clock												
3.A.1.c	3.A.1.c. Estimate or determine temperature to the nearest degree (oF or oC)												
3.A.1.d	3.A.1.d. Estimate or determine weight to the nearest pound or ounce												
3.B	3.B. Measurement Tools												
3.B.1	3.B.1. Use standard or metric units to:												
3.B.1.a	3.B.1.a. Measure length to the nearest centimeter or 1/2 inch using a ruler												
3.C	3.C. Applications in Measurement												
3.C.1	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 SAT10 Items		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	SR	BCR
2.E	2.E. Transformations												
2.E.1	2.E.1. Analyze a transformation to:												
2.E.1.a	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	2.E.2. Analyze geometric figures or pictures to:												
2.E.2.a	2.E.2.a. Identify or describe not more than 4 lines of symmetry												
3	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	6
			(2)		(2)		(3)		(1)		(1)		(1)
3.A	3.A. Measurement Scales												
3.A.1	3.A.1. Read scales to:												
3.A.1.a	3.A.1.a. Estimate or determine length to the nearest centimeter or 1/2 inch												
3.A.1.b	3.A.1.b. Identify time to the nearest minute using an analog clock												
3.A.1.c	3.A.1.c. Estimate or determine temperature to the nearest degree (oF or oC)												
3.A.1.d	3.A.1.d. Estimate or determine weight to the nearest pound or ounce												
3.B	3.B. Measurement Tools												
3.B.1	3.B.1. Use standard or metric units to:												
3.B.1.a	3.B.1.a. Measure length to the nearest centimeter or 1/2 inch using a ruler												
3.C	3.C. Applications in Measurement												
3.C.1	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 SAT10 Items		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	SR	BCR
3.C.1.a	3.C.1.a. Find the perimeter of geometric figure or pictures on a grid (0-50)												
3.C.1.b	3.C.1.b. Find the area of geometric figures or pictures on a grid using whole units (0-50)												
3.C.2	3.C.2. Calculate to:												
3.C.2.a	3.C.2.a. Determine equivalent units of 12 inches = 1 foot or 3 feet = 1 yard (0-30)												
4	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
				(1)	(1)	(2)	(1)	(1)		(2)		(3)	
4.A	4.A. Data Displays												
4.A.1	4.A.1. Organize or display data to:												
4.A.1.a	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	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	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	4.B. Data Analysis												
4.B.1	4.B.1. Analyze data to:												
4.B.1.a	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	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	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. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
3.C.1.a	3.C.1.a. Find the perimeter of geometric figure or pictures on a grid (0-50)											
3.C.1.b	3.C.1.b. Find the area of geometric figures or pictures on a grid using whole units (0-50)											
3.C.2	3.C.2. Calculate to:											
3.C.2.a	3.C.2.a. Determine equivalent units of 12 inches = 1 foot or 3 feet = 1 yard (0-30)											
4	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
			(3)	(1)	(2)	(1)	(2)		(5)	(1)	(5)	
4.A	4.A. Data Displays											
4.A.1	4.A.1. Organize or display data to:											
4.A.1.a	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	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	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	4.B. Data Analysis											
4.B.1	4.B.1. Analyze data to:											
4.B.1.a	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	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	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. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
5	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		2		2	
					(1)		(1)				(1)	(1)
5.B	5.B. Theoretical Probability											
5.B.1	5.B.1. Determine the relative probability of one simple event to:											
5.B.1.a	5.B.1.a Describe the probability using the terms more (or most) likely, less (or least) likely, or equally likely											
6	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.	2	10	3	10	3	10	3	10	3	10	3
			(2)	(1)	(2)	(1)	(5)		(5)		(2)	
36.A	6.A. Knowledge of Number or Place Value											
6.A.1.	6.A.1. Apply knowledge of rational numbers or place value to:											
6.A.1.a	6.A.1.a. Read, write, or represent whole numbers using symbols, words, or models (0-10,000)											
6.A.1.b	6.A.1.b. Express whole numbers in expanded form (0-10,000)											
6.A.1.c	6.A.1.c. Identify the place value of a digit in a number (0-9,999)											
6.A.1.d	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	6.A.2. Apply knowledge of fractions to:											
6.A.2.a	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	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. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR		
5	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	(1)	2	(1)	2		2	(1)	(1)	
5.B	5.B. Theoretical Probability													
5.B.1	5.B.1. Determine the relative probability of one simple event to:													
5.B.1.a	5.B.1.a Describe the probability using the terms more (or most) likely, less (or least) likely, or equally likely													
6	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.	2	10	3	10	3	10	3	10	3	10	3	10	3
			(2)	(1)	(2)	(1)	(5)		(5)		(2)			
6.A	6.A. Knowledge of Number or Place Value													
6.A.1.	6.A.1. Apply knowledge of rational numbers or place value to:													
6.A.1.a	6.A.1.a. Read, write, or represent whole numbers using symbols, words, or models (0-10,000)													
6.A.1.b	6.A.1.b. Express whole numbers in expanded form (0-10,000)													
6.A.1.c	6.A.1.c. Identify the place value of a digit in a number (0-9,999)													
6.A.1.d	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	6.A.2. Apply knowledge of fractions to:													
6.A.2.a	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	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. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR BCR	SR BCR	SR BCR	SR BCR	SR BCR
6.A.3	6.A.3. Apply knowledge of money to:						
6.A.3.a	6.A.3.a. Represent money amounts (\$0-\$100)						
6.A.3.b	6.A.3.b. Determine the value of a given set of mixed currency up (\$0-\$100)						
6.B	6.B. Number Theory						
6.B.1	6.B.1. Apply number relationships to:						
6.B.1.a	6.B.1.a. Identify or describe whole numbers as even or odd (0-100)						
6.C	6.C. Number Computation						
6.C.1	6.C.1. Analyze number relationships or compute to:						
6.C.1.a	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	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	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	6.C.1.d. Identify or use the commutative, identity or zero properties for multiplication using whole numbers (0-20)						

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR BCR	SR BCR	SR BCR	SR BCR	SR BCR
6.A.3	6.A.3. Apply knowledge of money to:						
6.A.3.a	6.A.3.a. Represent money amounts (\$0-\$100)						
6.A.3.b	6.A.3.b. Determine the value of a given set of mixed currency up to (\$0-\$100)						
6.B	6.B. Number Theory						
6.B.1	6.B.1. Apply number relationships to:						
6.B.1.a	6.B.1.a. Identify or describe whole numbers as even or odd (0-100)						
6.C	6.C. Number Computation						
6.C.1	6.C.1. Analyze number relationships or compute to:						
6.C.1.a	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	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	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	6.C.1.d. Identify or use the commutative, identity or zero properties for multiplication using whole numbers (0-20)						

Note. The number in the parenthesis indicates the total number of field test items.

Table E.2 The 2007 MSA-Math Blueprint: Grade 4

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR BCR	SR BCR	SR BCR	SR BCR	SR BCR
1	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
			(5) (1)	(7) (1)	(6)	(5)	(2) (1)
1.A	1.A. Patterns or Functions						
1.A.1	1.A.1. Identify, describe, extend, or create numeric patterns or functions to:						
1.A.1.a	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	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	1.A.2. Identify, describe, extend, analyze, or create a non-numeric growing or repeating pattern to:						
1.A.2.a	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	1.A.2.b. Generalize a rule for a repeating pattern with no more than 4 objects in the core pattern						
1.B	1.B. Expressions, Equations, or Inequalities						
1.B.1	1.B.1. Write or identify expressions to:						
1.B.1.a	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	1.B.2. Identify, write, or solve equations or inequalities to:						
1.B.2.a	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 SAT10 Items		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	SR	BCR
1	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
				(2)	(1)	(4)		(5)		(3)		(5)	
1.A	1.A. Patterns or Functions												
1.A.1	1.A.1. Identify, describe, extend, or create numeric patterns or functions to:												
1.A.1.a	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	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	1.A.2. Identify, describe, extend, analyze, or create a non-numeric growing or repeating pattern to:												
1.A.2.a	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	1.A.2.b. Generalize a rule for a repeating pattern with no more than 4 objects in the core pattern												
1.B	1.B. Expressions, Equations, or Inequalities												
1.B.1	1.B.1. Write or identify expressions to:												
1.B.1.a	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	1.B.2. Identify, write, or solve equations or inequalities to:												
1.B.2.a	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 SAT10 Items		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		SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
1.B.2.b	1.B.2.b. Find the unknown in an equation with one operation (x) using whole numbers (0-100)												
1.C	1.C. Numeric or Graphic Representations of Relationships												
1.C.1	1.C.1. Locate points on a number line or in a coordinate grid to:												
1.C.1.a	1.C.1.a. Represent proper fractions with denominators of 6, 8, or 10 on a number line												
1.C.1.b	1.C.1.b. Identify positions on a coordinate plane in the first quadrant using ordered pairs of whole numbers (0-20)												
2	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)				(1)		(3)	
2.A	2.A. Plane Geometric Figures												
2.A.1	2.A.1. Analyze the properties of plane geometric figures to:												
2.A.1.a	2.A.1.a. Identify or describe an angle as acute, right, or obtuse angle in relationship to another angle												
2.A.2	2.A.2. Analyze geometric relationships to:												
2.A.2.a	2.A.2.a. Compare or classify an angle as acute, right, or obtuse in relationship to another angle												
2.B	2.B. Solid Geometric Figures												
2.B.1	2.B.1. Analyze the properties of solid geometric figures to:												
2.B.1.a	2.B.1.a. Identify cones or cylinders												
2.B.1.b	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	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 SAT10 Items	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	SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
1.B.2.b	1.B.2.b. Find the unknown in an equation with one operation (x) using whole numbers (0-100)											
1.C	1.C. Numeric or Graphic Representations of Relationships											
1.C.1	1.C.1. Locate points on a number line or in a coordinate grid to:											
1.C.1.a	1.C.1.a. Represent proper fractions with denominators of 6, 8, or 10 on a number line											
1.C.1.b	1.C.1.b. Identify positions on a coordinate plane in the first quadrant using ordered pairs of whole numbers (0-20)											
2	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)				(1)		(1)		(1)	(1)
2.A	2.A. Plane Geometric Figures											
2.A.1	2.A.1. Analyze the properties of plane geometric figures to:											
2.A.1.a	2.A.1.a. Identify or describe an angle as acute, right, or obtuse angle in relationship to another angle											
2.A.2	2.A.2. Analyze geometric relationships to:											
2.A.2.a	2.A.2.a. Compare or classify an angle as acute, right, or obtuse in relationship to another angle											
2.B	2.B. Solid Geometric Figures											
2.B.1	2.B.1. Analyze the properties of solid geometric figures to:											
2.B.1.a	2.B.1.a. Identify cones or cylinders											
2.B.1.b	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	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 SAT10 Items		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	SR	BCR
2.B.2.a	2.B.2.a. Analyze or identify the number or arrangement of squares needed to make a cube												
2.B.2.b	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	2.D.1 Apply congruence in transformation to :												
2.D.1.a	2.D.1.a Identify the result in a transformation as being congruent to the original figure												
2.E	2.E. Transformations												
2.E.1	2.E.1. Analyze a transformation to:												
2.E.1.a	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	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)	(1)	(1)		(1)	
3.A	3.A. Measurement Scales												
3.A.1	3.A.1. Read scales to:												
3.A.1.a	3.A.1.a. Estimate or determine length to the nearest millimeter or ¼ inch												
3.B	3.B. Measurement Tools												
3.B.1	3.B.1. Use standard or metric units to:												
3.B.1.a	3.B.1.a. Measure length to the nearest millimeter or 1/4 inch using a ruler												
3.C	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 SAT10 Items		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	SR	BCR
2.B.2.a	2.B.2.a. Analyze or identify the number or arrangement of squares needed to make a cube												
2.B.2.b	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	2.D.1 Apply congruence in transformation to :												
2.D.1.a	2.D.1.a Identify the result in a transformation as being congruent to the original figure												
2.E	2.E. Transformations												
2.E.1	2.E.1. Analyze a transformation to:												
2.E.1.a	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	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
				(3)		(2)		(1)	(1)	(1)			
3.A	3.A. Measurement Scales												
3.A.1	3.A.1. Read scales to:												
3.A.1.a	3.A.1.a. Estimate or determine length to the nearest millimeter or ¼ inch												
3.B	3.B. Measurement Tools												
3.B.1	3.B.1. Use standard or metric units to:												
3.B.1.a	3.B.1.a. Measure length to the nearest millimeter or 1/4 inch using a ruler												
3.C	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 SAT10 Items	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	SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
3.C.1	3.C.1. Count or calculate to:											
3.C.1.a	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	3.C.1.b. Find the area of rectangles given the length of the sides in whole numbers (0-100)											
3.C.1.c	3.C.1.c. Find elapsed or end time using hour and half hour intervals											
3.C.2	3.C.2. Calculate to:											
3.C.2.a	3.C.2.a. Determine equivalent units of 36 inches = 1 yard (0-100)											
4	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
			(2)		(1)		(2)		(2)	(1)	(4)	
4.A	4.A. Data Displays											
4.A.1	4.A.1. Organize or display data to:											
4.A.1.a	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	4.B. Data Analysis											
4.B.1	4.B.1. Analyze data to:											
4.B.1.a	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	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	4.B.2. Analyze a data set to:											
4.B.2.a	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 SAT10 Items		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	SR	BCR
3.C.1	3.C.1. Count or calculate to:												
3.C.1.a	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	3.C.1.b. Find the area of rectangles given the length of the sides in whole numbers (0-100)												
3.C.1.c	3.C.1.c. Find elapsed or end time using hour and half hour intervals												
3.C.2	3.C.2. Calculate to:												
3.C.2.a	3.C.2.a. Determine equivalent units of 36 inches = 1 yard (0-100)												
4	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
				(2)	(1)	(2)		(2)		(3)		(2)	
4.A	4.A. Data Displays												
4.A.1	4.A.1. Organize or display data to:												
4.A.1.a	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	4.B. Data Analysis												
4.B.1	4.B.1. Analyze data to:												
4.B.1.a	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	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	4.B.2. Analyze a data set to:												
4.B.2.a	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 SAT10 Items	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	SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
5	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
					(2)		(1)		(1)		(2)	
5.B	5.B. Theoretical Probability											
5.B.1	5.B.1. Determine the relative probability of one simple event comprised of equally likely outcomes to:											
5.B.1.a	5.B.1.a Describe the probability as a fraction with a sample space of no more than 6 outcomes											
6	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
			(5)	(1)	(3)		(2)	(1)	(3)	(1)	(1)	(1)
6.A	6.A. Knowledge of Number or Place Value											
6.A.1.	6.A.1. Apply knowledge of whole numbers or place value to:											
6.A.1.a	6.A.1.a. Read, write, or represent whole numbers using symbols, words, or models (0-1,000,000)											
6.A.1.b	6.A.1.b. Express whole numbers in expanded form (0-1,000,000)											
6.A.1.c	6.A.1.c. Identify the place value of a digit in a number (0-1,000,000)											
6.A.1.d	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	6.A.2. Apply knowledge of fractions or decimals to:											
6.A.2.a	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	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 SAT10 Items	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	SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
5	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
			(2)		(1)	(1)	(1)		(1)		(2)	
5.B	5.B. Theoretical Probability											
5.B.1	5.B.1. Determine the relative probability of one simple event comprised of equally likely outcomes to:											
5.B.1.a	5.B.1.a Describe the probability as a fraction with a sample space of no more than 6 outcomes											
6	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
			(3)		(4)	(1)	(3)	(1)	(4)	(2)	(3)	(1)
6.A	6.A. Knowledge of Number or Place Value											
6.A.1.	6.A.1. Apply knowledge of whole numbers or place value to:											
6.A.1.a	6.A.1.a. Read, write, or represent whole numbers using symbols, words, or models (0-1,000,000)											
6.A.1.b	6.A.1.b. Express whole numbers in expanded form (0-1,000,000)											
6.A.1.c	6.A.1.c. Identify the place value of a digit in a number (0-1,000,000)											
6.A.1.d	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	6.A.2. Apply knowledge of fractions or decimals to:											
6.A.2.a	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	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 SAT10 Items	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	SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
6.A.2.c	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	6.A.2.d. Express decimals with no more than 2 decimal places in expanded form (0-100)											
6.A.2.e	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	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	6.A.3. Apply knowledge of money to:											
6.A.3.a	6.A.3.a. Compare the value of 2 sets of mixed currency (\$0-\$100)											
6.B	6.B. Number Theory											
6.B.1	6.B.1. Apply number relationships to:											
6.B.1.a	6.B.1.a. Identify or use divisibility rules of 2, 5, or 10 with whole numbers (0-1,000)											
6.B.1.b	6.B.1.b. Identify the factors of whole numbers (0-24)											
6.B.1.c	6.B.1.c. Identify no more than the first 5 multiples of any single digit whole number											
6.C	6.C. Number Computation											
6.C.1	6.C.1. Analyze number relationships or compute to:											
6.C.1.a	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	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	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 SAT10 Items	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	SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
6.A.2.c	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	6.A.2.d. Express decimals with no more than 2 decimal places in expanded form (0-100)											
6.A.2.e	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	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	6.A.3. Apply knowledge of money to:											
6.A.3.a	6.A.3.a. Compare the value of 2 sets of mixed currency (\$0-\$100)											
6.B	6.B. Number Theory											
6.B.1	6.B.1. Apply number relationships to:											
6.B.1.a	6.B.1.a. Identify or use divisibility rules of 2, 5, or 10 with whole numbers (0-1,000)											
6.B.1.b	6.B.1.b. Identify the factors of whole numbers (0-24)											
6.B.1.c	6.B.1.c. Identify no more than the first 5 multiples of any single digit whole number											
6.C	6.C. Number Computation											
6.C.1	6.C.1. Analyze number relationships or compute to:											
6.C.1.a	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	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	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 SAT10 Items	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	SR	BCR	SR	BCR	SR	BCR	SR	BCR	SR	BCR
6.C.1.d	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	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	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	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	6.C.2. Estimate to:											
6.C.2.a	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	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. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR BCR	SR BCR	SR BCR	SR BCR	SR BCR
6.C.1.d	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	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	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	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	6.C.2. Estimate to:						
6.C.2.a	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	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. The number in the parenthesis indicates the total number of field test items.

Table E.3 The 2007 MSA-Math Blueprint: Grade 5

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR	BC	RECR	SR	BC	RECR	SR	BC	RECR	SR	BC	RECR	SR	BC	RECR
1.	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.	1	12	1	1	12	1	1	12	1	1	12	1	1	12	1	1
			(2)	(1)	(1)	(1)	(1)	(1)	(2)	(1)	(1)	(1)	(1)	(1)	(2)	(1)	(1)
1.A	1.A. Patterns or Functions																
1.A.1	1.A.1. Identify, describe, extend, or create numeric patterns or functions to:																
1.A.1.a	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	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	1.A.1.c. Apply a given two-operation rule (+, -, x) for a pattern using whole numbers (0-100)																
1.B	1.B. Expressions, Equations, or Inequalities																
1.B.1	1.B.1. Write or evaluate expressions to:																
1.B.1.a	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	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	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. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR	BCR	ECR	SR	BCR	ECR	SR	BCR	ECR	SR	BCR	ECR	SR	BCR	ECR
1.0	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.	1	12	1	1	12	1	1	12	1	1	12	1	1	12	1	1
			(3)	(1)	(2)	(1)	(1)	(2)	(1)	(2)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
1.A	1.A. Patterns or Functions																
1.A.1	1.A.1. Identify, describe, extend, or create numeric patterns or functions to:																
1.A.1.a	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	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	1.A.1.c. Apply a given two-operation rule (+, -, x) for a pattern using whole numbers (0-100)																
1.B	1.B. Expressions, Equations, or Inequalities																
1.B.1	1.B.1. Write or evaluate expressions to:																
1.B.1.a	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	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	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. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
1.B.2	1.B.2. Identify, write, or solve equations or inequalities to:						
1.B.2.a	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	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	1.C. Numeric or Graphic Representations of Relationships						
1.C.1	1.C.1. Locate points on a number line or in a coordinate grid to:						
1.C.1.a	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	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	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	1	4 1	4 1	4 1	4 1	4 1
			(2) (1)	(2)	(1)	(2)	(2) (1)
2.A	2.A. Plane Geometric Figures						
2.A.1	2.A.1. Analyze the properties of plane geometric figures to:						
2.A.1.a	2.A.1.a. Identify or describe parallel or perpendicular lines or line segments in geometric figures or pictures						
2.A.1.b	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	2.A.2. Analyze geometric relationships to:						

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
1.B.2	1.B.2. Identify, write, or solve equations or inequalities to:						
1.B.2.a	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	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	1.C. Numeric or Graphic Representations of Relationships						
1.C.1	1.C.1. Locate points on a number line or in a coordinate grid to:						
1.C.1.a	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	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	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	1	4 1	4 1	4 1	4 1	4 1
			(2)	(2)	(1)	(1)	(2) (1)
2.A	2.A. Plane Geometric Figures						
2.A.1	2.A.1. Analyze the properties of plane geometric figures to:						
2.A.1.a	2.A.1.a. Identify or describe parallel or perpendicular lines or line segments in geometric figures or pictures						
2.A.1.b	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	2.A.2. Analyze geometric relationships to:						

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
2.A.2.a	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	2.B Solid Geometric Figures						
2.B.1	2.B.1 Analyze the properties of solid geometric figures to:						
2.B.1.a	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	2.B.1.b. Classify prisms or pyramids as triangular or rectangular by the base						
2.B.2	2.B.2. Analyze the relationship between plane geometric figures and surfaces of solid geometric figures to:						
2.B.2.a	2.B.2.a Analyze or identify the number or arrangement of rectangles needed to make a rectangle prism						
2.B.2.b	2.B.2.b. Analyze or identify the number or arrangement of triangles/rectangles needed to make a triangular prism						
2.B.2.c	2.B.2.c. Analyze or identify the number or arrangement of circles/rectangles needed to make a cylinder						
2.C	2.C. Representation of Geometric Figures						
2.C.1	2.C.1. Represent plane geometric figures to:						
2.C.1.a	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	2.D Congruence of Similarity						
2.D.1	2.D.1 Analyze similar figures to:						
2.D.1.a	2.D.1.a. Identify or describe geometric figures with the same shape and different size						

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
2.A.2.a	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 \sphericalangle ABC)						
2.B	2.B Solid Geometric Figures						
2.B.1	2.B.1 Analyze the properties of solid geometric figures to:						
2.B.1.a	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	2.B.1.b. Classify prisms or pyramids as triangular or rectangular by the base						
2.B.2	2.B.2. Analyze the relationship between plane geometric figures and surfaces of solid geometric figures to:						
2.B.2.a	2.B.2.a Analyze or identify the number or arrangement of rectangles needed to make a rectangle prism						
2.B.2.b	2.B.2.b. Analyze or identify the number or arrangement of triangles/rectangles needed to make a triangular prism						
2.B.2.c	2.B.2.c. Analyze or identify the number or arrangement of circles/rectangles needed to make a cylinder						
2.C	2.C. Representation of Geometric Figures						
2.C.1	2.C.1. Represent plane geometric figures to:						
2.C.1.a	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	2.D Congruence of Similarity						
2.D.1	2.D.1 Analyze similar figures to:						
2.D.1.a	2.D.1.a. Identify or describe geometric figures with the same shape and different size						

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
2.E	2.E. Transformations						
2.E.1	2.E.1. Analyze a transformation to:						
2.E.1.a	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	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.	1	6 1	6 1	6 1	6 1	6 1
			(1)	(2)	(2)	(2)	(1) (1)
3.A	3.A. Measurement Scales						
3.A.1	3.A.1. Read scales to:						
3.A.1.a	3.A.1.a. Estimate or determine weight to the nearest ounce or gram						
3.A.1.b	3.A.1.b. Estimate or determine capacity to the nearest ounce						
3.B	3.B. Measurement Tools						
3.B.1	3.B.1. Use standard units to:						
3.B.1.a	3.B.1.a. Measure length to the nearest 1/8 inch using a ruler						
3.B.2	3.B.2. Use standard units to:						
3.B.2.a	3.B.2.a. Measure angles (acute, right, obtuse) to the nearest degree using protractors						
3.C	3.C. Applications in Measurement						
3.C.1	3.C.1. Estimate or apply formulas to:						
3.C.1.a	3.C.1.a. Determine the perimeter of polygons with no more than 8 sides using whole numbers (0-500)						

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
2.E	2.E. Transformations						
2.E.1	2.E.1. Analyze a transformation to:						
2.E.1.a	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	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.	1	6 1	6 1	6 1	6 1	6 1
			(1)		(2) (1)	(1)	(2) (1)
3.A	3.A. Measurement Scales						
3.A.1	3.A.1. Read scales to:						
3.A.1.a	3.A.1.a. Estimate or determine weight to the nearest ounce or gram						
3.A.1.b	3.A.1.b. Estimate or determine capacity to the nearest ounce						
3.B	3.B. Measurement Tools						
3.B.1	3.B.1. Use standard units to:						
3.B.1.a	3.B.1.a. Measure length to the nearest 1/8 inch using a ruler						
3.B.2	3.B.2. Use standard units to:						
3.B.2.a	3.B.2.a. Measure angles (acute, right, obtuse) to the nearest degree using protractors						
3.C	3.C. Applications in Measurement						
3.C.1	3.C.1. Estimate or apply formulas to:						
3.C.1.a	3.C.1.a. Determine the perimeter of polygons with no more than 8 sides using whole numbers (0-500)						

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
3.C.1.b	3.C.1.b. Determine the area of rectangles with whole numbers (0-200)						
3.C.1.c	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	3.C.2. Calculate to:						
3.C.2.a	3.C.2.a. Find start, elapsed or end time to the nearest minute						
3.C.2.b	3.C.2.b Determine equivalent units of seconds, minutes, or hours						
3.C.2.c	3.C.2.c. Determine equivalent units of pints, quarts, or gallons						
4.0	4. 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
			(1) (1)		(1)	(1)	(1)
4.A	4.A. Data Displays						
4.A.1	4.A.1. Organize or display data to:						
4.A.1.a	4.A.1.a. Make stem & leaf plots with no more than 20 data points using whole numbers (0-100)						
4.A.1.b	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	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	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	4.B. Data Analysis						
4.B.1	4.B.1. Analyze data to:						
4.B.1.a	4.B.1.a. Interpret stem & leaf plots with no more than 20 pieces of data points 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 SAT10 Items	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	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
3.C.1.b	3.C.1.b. Determine the area of rectangles with whole numbers (0-200)						
3.C.1.c	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	3.C.2. Calculate to:						
3.C.2.a	3.C.2.a. Find start, elapsed or end time to the nearest minute						
3.C.2.b	3.C.2.b Determine equivalent units of seconds, minutes, or hours						
3.C.2.c	3.C.2.c. Determine equivalent units of pints, quarts, or gallons						
4.0	4. 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
			(1) (1)	(2) (1)	(1)	(2)	(2)
4.A	4.A. Data Displays						
4.A.1	4.A.1. Organize or display data to:						
4.A.1.a	4.A.1.a. Make stem & leaf plots with no more than 20 data points using whole numbers (0-100)						
4.A.1.b	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	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	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	4.B. Data Analysis						
4.B.1	4.B.1. Analyze data to:						
4.B.1.a	4.B.1.a. Interpret stem & leaf plots with no more than 20 pieces of data points 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 SAT10 Items	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	SR BCRECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCRECR
4.B.1.b	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	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	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	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	4.B.2 Determine measures of central tendency of a data set to:						
4.B.2.a	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	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.		3 1	3 1	3 1	3 1	3 1
			(1)	(1)	(1) (1)	(1)	
5.A	5.A. Sample Space						
5.A.1	5.A.1. Identify members of a sample space to:						
5.A.1.a	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	5.B. Theoretical Probability						
5.B.1	5.B.1. Determine the probability of one simple event comprised of equally likely outcomes to:						
5.B.1.a	5.B.1.a Express the probability as a fraction with a sample space of no more than 20 outcomes						
6.0	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.	1	12 2	12 2	12 2	12 2	12 2
			(3)	(4) (1)	(3) (1)	(3)	(4)

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
4.B.1.b	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	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	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	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	4.B.2 Determine measures of central tendency of a data set to:						
4.B.2.a	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	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.		3 1	3 1 (1)	3 1	3 1 (1) (1)	3 1
5.A	5.A. Sample Space						
5.A.1	5.A.1. Identify members of a sample space to:						
5.A.1.a	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	5.B. Theoretical Probability						
5.B.1	5.B.1. Determine the probability of one simple event comprised of equally likely outcomes to:						
5.B.1.a	5.B.1.a Express the probability as a fraction with a sample space of no more than 20 outcomes						
6.0	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.	1	12 2 (3) (1)	12 2 (3)	12 2 (4) (1)	12 2 (3)	12 2 (3)

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
6.A	6.A. Knowledge of Number or Place Value						
6.A.1.	6.A.1. Apply Knowledge of fractions, decimals, or place value to:						
6.A.1.a	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	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	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	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	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	6.B. Number Theory						
6.B.1	6.B.1. Apply number relationships to:						
6.B.1.a	6.B.1.a. Identify or describe whole numbers as prime or composite (0-100)						
6.B.1.b	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	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	6.B.1.d. Identify a common multiple or the least common multiple of no more than 4 single digit whole numbers						
6.C	6.C. Number Computation						

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
6.A	6.A. Knowledge of Number or Place Value						
6.A.1.	6.A.1. Apply Knowledge of fractions, decimals, or place value to:						
6.A.1.a	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	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	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	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	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	6.B. Number Theory						
6.B.1	6.B.1. Apply number relationships to:						
6.B.1.a	6.B.1.a. Identify or describe whole numbers as prime or composite (0-100)						
6.B.1.b	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	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	6.B.1.d. Identify a common multiple or the least common multiple of no more than 4 single digit whole numbers						
6.C	6.C. Number Computation						

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
6.C.1	6.C.1. Analyze number relationships or compute to:						
6.C.1.a	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	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	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	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	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	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	6.C.1.g. Multiply a decimal in monetary notation by a single digit whole number (0-100)						
6.C.2	6.C.2. Estimate to:						
6.C.2.a	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	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	6.C.2.c. Determine the product of a decimal in monetary notation by a single digit whole number (0-100)						

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
6.C.1	6.C.1. Analyze number relationships or compute to:						
6.C.1.a	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	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	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	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	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	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	6.C.1.g. Multiply a decimal in monetary notation by a single digit whole number (0-100)						
6.C.2	6.C.2. Estimate to:						
6.C.2.a	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	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	6.C.2.c. Determine the product of a decimal in monetary notation by a single digit whole number (0-100)						

Note. The number in the parenthesis indicates the total number of field test items.

Table E.4 The 2007 MSA-Math Blueprint: Grade 6

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR	BC	RECR	SR	BC	RECR	SR	BC	RECR	SR	BC	RECR	SR	BC	RECR
1.0	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.	1	11	1	1	11	1	1	11	1	1	11	1	1	11	1	1
			(6)	(1)	(5)				(5)	(1)		(4)			(6)		(1)
1.A	1.A. Patterns or Functions																
1.A.1	1.A.1. Identify, describe, extend, or create numeric patterns or functions to:																
1.A.1.a	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	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	1.B. Expressions, Equations, or Inequalities																
1.B.1	1.B.1. Write or evaluate expressions to:																
1.B.1.a	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	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	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. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR	BCR	ECR	SR	BCR	ECR	SR	BCR	ECR	SR	BCR	ECR	SR	BCR	ECR
1.0	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.	1	11	1	1	11	1	1	11	1	1	11	1	1	11	1	1
			(5)	(1)	(1)	(6)	(1)		(3)	(1)	(1)	(3)	(1)		(3)	(1)	(1)
1.A	1.A. Patterns or Functions																
1.A.1	1.A.1. Identify, describe, extend, or create numeric patterns or functions to:																
1.A.1.a	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	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	1.B. Expressions, Equations, or Inequalities																
1.B.1	1.B.1. Write or evaluate expressions to:																
1.B.1.a	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	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	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. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
1.B.2	1.B.2. Identify, write, or solve equations or inequalities to:						
1.B.2.a	1.B.2.a. Represent relationships using a variable with the appropriate relational symbols ($>$, $<$, $=$) and one operational symbol ($+$, $-$, \times , \div) 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	1.B.2.b. Find the unknown in an equation with one operation ($+$, $-$, \times , \div , with no remainder) and positive coefficients using decimals with no more than two decimal places (0-100)						
1.C	1.C. Numeric or Graphic Representations of Relationships						
1.C.1	1.C.1. Locate points on a number line or in a coordinate plane to:						
1.C.1.a	1.C.1.a. Represent integers (-20 to 20) on a number line						
1.C.1.b	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	1.C.2. Analyze linear relationships to:						
1.C.2.a	1.C.2.a. Identify given graph of a line that shows increase, decrease, or no change						
2.0	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)	(2)	(1)	(2) (1)
2.A	2.A. Plane Geometric Figures						
2.A.1	2.A.1. Analyze the properties of plane geometric figures to:						
2.A.1.a	2.A.1.a. Identify or describe diagonal line segments						

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
1.B.2	1.B.2. Identify, write, or solve equations or inequalities to:						
1.B.2.a	1.B.2.a. Represent relationships using a variable with the appropriate relational symbols ($>$, $<$, $=$) and one operational symbol ($+$, $-$, \times , \div) 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	1.B.2.b. Find the unknown in an equation with one operation ($+$, $-$, \times , \div , with no remainder) and positive coefficients using decimals with no more than two decimal places (0-100)						
1.C	1.C. Numeric or Graphic Representations of Relationships						
1.C.1	1.C.1. Locate points on a number line or in a coordinate plane to:						
1.C.1.a	1.C.1.a. Represent integers (-20 to 20) on a number line						
1.C.1.b	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	1.C.2. Analyze linear relationships to:						
1.C.2.a	1.C.2.a. Identify given graph of a line that shows increase, decrease, or no change						
2.0	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
			(1)	(2)	(2)	(1)	(2) (1)
2.A	2.A. Plane Geometric Figures						
2.A.1	2.A.1. Analyze the properties of plane geometric figures to:						
2.A.1.a	2.A.1.a. Identify or describe diagonal line segments						

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
2.A.1.b	2.A.1.b. Identify or describe the radius, diameter, or circumference of a circle						
2.A.2	2.A.2. Analyze geometric relationships to:						
2.A.2.a	2.A.2.a. Compare or classify triangles as scalene, equilateral, or isosceles						
2.A.2.b	2.A.2.b. Compare or classify triangles as equiangular, obtuse, acute, or right						
2.A.2.c	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	2.A.2.d. Identify or compare circumference, radii, or diameter of a circle ($\pi = 3.14$)						
2.C	2.C. Representation of Geometric Figures						
2.C.1	2.C.1. Represent plane geometric figures to:						
2.C.1.a	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 ($0^\circ - 179^\circ$)						
2.C.1.b	2.C.1.b. Identify, describe or draw a polygon in the first quadrant given no more than six coordinates						
2.C.1.c	2.C.1.c. Identify or describe perpendicular bisectors or angle bisectors						
3.0	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.		5 1	5 1	5 1	5 1	5 1
			(1)	(1) (1)	(1)	(2)	(2)
3.B	3.B. Measurement Tools						
3.B.1	3.B.1. Use standard units to:						
3.B.1.a	3.B.1.a. Measure length to the nearest $\frac{1}{16}$ inch using a ruler						
3.C	3.C. Applications in Measurement						
3.C.1	3.C.1. Estimate or apply formulas to:						
3.C.1.a	3.C.1.a. Determine the area of a triangle with whole number dimensions (0-200)						
3.C.1.b	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 SAT10 Items	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	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
2.A.1.b	2.A.1.b. Identify or describe the radius, diameter, or circumference of a circle						
2.A.2	2.A.2. Analyze geometric relationships to:						
2.A.2.a	2.A.2.a. Compare or classify triangles as scalene, equilateral, or isosceles						
2.A.2.b	2.A.2.b. Compare or classify triangles as equiangular, obtuse, acute, or right						
2.A.2.c	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	2.A.2.d. Identify or compare circumference, radii, or diameter of a circle ($\pi = 3.14$)						
2.C	2.C. Representation of Geometric Figures						
2.C.1	2.C.1. Represent plane geometric figures to:						
2.C.1.a	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	2.C.1.b. Identify, describe or draw a polygon in the first quadrant given no more than six coordinates						
2.C.1.c	2.C.1.c. Identify or describe perpendicular bisectors or angle bisectors						
3.0	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.		5 1	5 1	5 1	5 1	5 1
			(1)		(1) (1)		(1) (1)
3.B	3.B. Measurement Tools						
3.B.1	3.B.1. Use standard units to:						
3.B.1.a	3.B.1.a. Measure length to the nearest 1/16 inch using a ruler						
3.C	3.C. Applications in Measurement						
3.C.1	3.C.1. Estimate or apply formulas to:						
3.C.1.a	3.C.1.a. Determine the area of a triangle with whole number dimensions (0-200)						
3.C.1.b	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 SAT10 Items	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	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
3.C.1.c	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	3.C.1.d. Determine the missing dimension of a quadrilateral given the perimeter using whole number dimensions (0-200)						
3.C.1.e	3.C.1.e. Determine the missing dimension of a square or rectangle given the area using whole number dimensions (0-200)						
4.0	4. 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
			(1) (1)	(1)	(1)	(2) (1)	(1)
4.A	4.A. Data Displays						
4.A.1	4.A.1. Organize or display data to:						
4.A.1.a	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	4.A.1.b. Make stem-and-leaf plots with no more than 20 data points using whole numbers (0-1,000)						
4.B	4.B. Data Analysis						
4.B.1	4.B.1. Analyze data to:						
4.B.1.a	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	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	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.		4	4	4	4	4
				(1)			
5.B	5.B. Theoretical Probability						
5.B.1	5.B.1. Determine the probability of one simple event comprised of equality likely outcomes to:						

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
3.C.1.c	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	3.C.1.d. Determine the missing dimension of a quadrilateral given the perimeter using whole number dimensions (0-200)						
3.C.1.e	3.C.1.e. Determine the missing dimension of a square or rectangle given the area using whole number dimensions (0-200)						
4.0	4. Knowledge of Statistics - Students will collect, organize, display, analyze, or interpret data to make decisions or predictions	8	1	8	1	8	1
		(2)	(1)	(2)	(4)	(1)	(2)
4.A	4.A. Data Displays						
4.A.1	4.A.1. Organize or display data to:						
4.A.1.a	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	4.A.1.b. Make stem-and-leaf plots with no more than 20 data points using whole numbers (0-1,000)						
4.B	4.B. Data Analysis						
4.B.1	4.B.1. Analyze data to:						
4.B.1.a	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	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	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.	4	4	4	4	4	4
		(1)				(1)	
5.B	5.B. Theoretical Probability						
5.B.1	5.B.1. Determine the probability of one simple event comprised of equality likely outcomes to:						

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
5.B.1.a	5.B.1.a Express the probability as a decimal with a sample space of 10, 20, 25, or 50 outcomes						
5.C	5.C. Experimental Probability						
5.C.1	5.C.1. Analyze the results of a probability experiment to:						
5.C.1.a	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	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.	2	10 2	10 2	10 2	10 2	10 2
				(1)	(1) (1)	(1) (1)	
6.A	6.A. Knowledge of Number or Place Value						
6.A.1.	6.A.1. Apply Knowledge of rational numbers or place value to:						
6.A.1.a	6.A.1.a. Read, write, or represent whole numbers using exponential form using powers of 10 (0-10,000)						
6.A.1.b	6.A.1.b. Read, write, or represent integers (-100 to 100)						
6.A.1.c	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	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	6.C. Number Computation						
6.C.1	6.C.1. Analyze number relationships or compute to:						
6.C.1.a	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. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR BCRECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCRECR
5.B.1.a	5.B.1.a Express the probability as a decimal with a sample space of 10, 20, 25, or 50 outcomes						
5.C	5.C. Experimental Probability						
5.C.1	5.C.1. Analyze the results of a probability experiment to:						
5.C.1.a	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	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.	2	10 2 (1)	10 2 (1) (1)	10 2 (2)	10 2 (1) (1)	10 2 (2)
6.A	6.A. Knowledge of Number or Place Value						
6.A.1.	6.A.1. Apply Knowledge of rational numbers or place value to:						
6.A.1.a	6.A.1.a. Read, write, or represent whole numbers using exponential form using powers of 10 (0-10,000)						
6.A.1.b	6.A.1.b. Read, write, or represent integers (-100 to 100)						
6.A.1.c	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	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	6.C. Number Computation						
6.C.1	6.C.1. Analyze number relationships or compute to:						
6.C.1.a	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. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR BCRECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCRECR
6.C.1.b	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	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	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	6.C.1.e. Determine 10%, 20%, 25%, or 50% of a whole number (0-1,000)						
6.C.1.f	6.C.1.f. Use the distributive property to simplify numeric expressions using whole numbers (0-1,000)						
6.C.2	6.C.2. Estimate to:						
6.C.2.a	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. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT10 Items	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	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR	SR BCR ECR
6.C.1.b	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	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	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	6.C.1.e. Determine 10%, 20%, 25%, or 50% of a whole number (0-1,000)						
6.C.1.f	6.C.1.f. Use the distributive property to simplify numeric expressions using whole numbers (0-1,000)						
6.C.2	6.C.2. Estimate to:						
6.C.2.a	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. The number in the parenthesis indicates the total number of field test items.

Table E.5 The 2007 MSA- Mathematics Blueprint: Grade 7

Code	Standard / Objective Statement	No. of SAT 10 Items	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	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E
		R	P	C	C	P	C	C	P	C	C	P	C	C	P	C	C	P	C	C		
		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R		
1.0	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.		9	3	1	1	9	3	1	1	9	3	1	1	9	3	1	1	9	3	1	1
			(2)	(2)	(1)	(4)	(2)	(1)	(1)	(3)	(1)	(1)	(2)	(1)	(1)	(1)	(2)	(1)	(2)	(1)	(1)	
1.A	1.A. Patterns or Functions																					
1.A.1	1.A.1. Identify, describe, extend, or create linear patterns or functions to:																					
1.A.1.a	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	1.B. Expressions, Equations, or Inequalities																					
1.B.1	1.B.1. Write or evaluate expressions to:																					
1.B.1.a	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	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	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. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT 10 Items	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	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
1.0	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.		9	3	1	1	9	3	1	1	9	3	1	1	9	3	1	1	9	3	1	1
			(2)	(1)	(1)		(1)	(2)			(1)	(1)	(1)		(1)	(2)	(1)		(1)	(1)		(1)
1.A	1.A. Patterns or Functions																					
1.A.1	1.A.1. Identify, describe, extend, or create linear patterns or functions to:																					
1.A.1.a	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	1.B. Expressions, Equations, or Inequalities																					
1.B.1	1.B.1. Write or evaluate expressions to:																					
1.B.1.a	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	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	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. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT 10 Items	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	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	
1.B.2	1.B.2. Identify, write, or solve equations or inequalities to:																						
1.B.2.a	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	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	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	1.B.2.d. Identify or graph solutions or inequalities on a number line using whole numbers (0-50)																						
1.B.2.e	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	1.C. Numeric or Graphic Representations of Relationships																						
1.C.1	1.C.1. Locate points on a number line or in a coordinate plane to:																						
1.C.1.a	1.C.1.a. Represent rational numbers on a number line (-100 to 100)																						

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT 10 Items	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	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	
		R	P	P	C	C	P	P	C	C	P	P	C	C	P	P	C	C	P	P	C	C	
1.B.2	1.B.2. Identify, write, or solve equations or inequalities to:																						
1.B.2.a	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	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	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	1.B.2.d. Identify or graph solutions or inequalities on a number line using whole numbers (0-50)																						
1.B.2.e	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	1.C. Numeric or Graphic Representations of Relationships																						
1.C.1	1.C.1. Locate points on a number line or in a coordinate plane to:																						
1.C.1.a	1.C.1.a. Represent rational numbers on a number line (-100 to 100)																						

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT 10 Items	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	S	B	E	S	S	S	B	E	S	S	S	B	E	S	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	
1.C.1.b	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	1.C.2. Analyze linear relationships to:																						
1.C.2.a	1.C.2.a. Identify a table of values that shows increase, decrease, or no change																						
2.0	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	4	2	1	4	2	1	4	2	1	4	2	1	4	2	1	4	2	1	4	2	1	1
																							(1)
2.A	2.A. Plane Geometric Figures																						
2.A.1	2.A.1. Analyze the properties of plane geometric figures to:																						
2.A.1.a	2.A.1.a. Identify or describe vertical, adjacent, complementary, or supplementary angles (Use the angle notation m)																						
2.A.2	2.A.2. Analyze geometric relationships to:																						
2.A.2.a	2.A.2.a. Determine missing measurements of an angle in a quadrilateral																						
2.A.2.b	2.A.2.b Determine missing measurements of vertical, adjacent, complementary, or supplementary angles.																						
2.C	2.C. Representation of Geometric Figures																						
2.C.1	2.C.1. Represent plane geometric figures to:																						
2.C.1.a	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	2.C.1.b. Construct a line segment congruent to a given line segment																						
2.C.1.c	2.C.1.c. Construct a perpendicular bisector to given line segment or a bisector to a given angle																						

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT 10 Items	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	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	
		R	P	R	C	C	P	C	C	P	C	C	P	C	C	P	C	C	P	C	C		
1.C.1.b	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	1.C.2. Analyze linear relationships to:																						
1.C.2.a	1.C.2.a. Identify a table of values that shows increase, decrease, or no change																						
2.0	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	4	2	1	4	2	1	4	2	1	4	2	1	4	2	1	4	2	1	4	2	1	
		(1)		(1)	(1)		(1)	(2)		(1)	(1)		(1)	(2)									
2.A	2.A. Plane Geometric Figures																						
2.A.1	2.A.1. Analyze the properties of plane geometric figures to:																						
2.A.1.a	2.A.1.a. Identify or describe vertical, adjacent, complementary, or supplementary angles (Use the angle notation m)																						
2.A.2	2.A.2. Analyze geometric relationships to:																						
2.A.2.a	2.A.2.a. Determine missing measurements of an angle in a quadrilateral																						
2.A.2.b	2.A.2.b Determine missing measurements of vertical, adjacent, complementary, or supplementary angles.																						
2.C	2.C. Representation of Geometric Figures																						
2.C.1	2.C.1. Represent plane geometric figures to:																						
2.C.1.a	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	2.C.1.b. Construct a line segment congruent to a given line segment																						
2.C.1.c	2.C.1.c. Construct a perpendicular bisector to given line segment or a bisector to a given angle																						

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT 10 Items	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 R	S R	B R	E R	S R	S R	B R	E R	S R	S R	B R	E R	S R	S R	B R	E R
2.D	2.D. Congruence or Similarity																	
2.D.1	2.D.1 Apply the properties of congruent polygons to:																	
2.D.1.a	2.D.1.a. Find the length of corresponding sides or the measure of corresponding angles using whole numbers (0-1,000)																	
2.E	2.E. Transformations																	
2.E.1	2.E.1. Analyze a transformation on a coordinate plane to:																	
2.E.1.a	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	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.		4	1	1	4	1	1	4	1	1	4	1	1	4	1	1	
			(1)	(1)		(1)	(1)		(1)	(1)		(1)	(1)		(1)	(1)		
3.C	3.C. Applications in Measurement																	
3.C.1	3.C.1. Estimate or apply formulas to:																	
3.C.1.a	3.C.1.a. Determine area of parallelograms or trapezoids using whole number dimensions (0-1,000)																	
3.C.1.b	3.C.1.b. Determine surface area of rectangular prisms using whole number dimensions (0-1,000)																	
3.C.2	3.C.2. Analyze scale drawings to:																	
3.C.2.a	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	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. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT 10 Items	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 R	S R	B R	E R	S R	S R	B R	E R	S R	S R	B R	E R	S R	S R	B R	E R
2.D	2.D. Congruence or Similarity																	
2.D.1	2.D.1 Apply the properties of congruent polygons to:																	
2.D.1.a	2.D.1.a. Find the length of corresponding sides or the measure of corresponding angles using whole numbers (0-1,000)																	
2.E	2.E. Transformations																	
2.E.1	2.E.1. Analyze a transformation on a coordinate plane to:																	
2.E.1.a	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	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.		4	1	1	4	1	1	4	1	1	4	1	1	4	1	1	
			(2)			(1)	(1)		(2)			(1)	(1)		(2)		(1)	
3.C	3.C. Applications in Measurement																	
3.C.1	3.C.1. Estimate or apply formulas to:																	
3.C.1.a	3.C.1.a. Determine area of parallelograms or trapezoids using whole number dimensions (0-1,000)																	
3.C.1.b	3.C.1.b. Determine surface area of rectangular prisms using whole number dimensions (0-1,000)																	
3.C.2	3.C.2. Analyze scale drawings to:																	
3.C.2.a	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	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. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT 10 Items	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	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
4.0	4. 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)	(2)	(1)	(3)	(1)	(2)	(1)									
4.A	4.A. Data Displays																					
4.A.1	4.A.1. Organize or display data to:																					
4.A.1.a	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	4.B. Data Analysis																					
4.B.1	4.B.1. Analyze data to:																					
4.B.1.a	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	4.B.1.b. Determine the best choice of a data display for a given data set																					
4.B.2	4.B.2 Analyze measures of central tendency to:																					
4.B.2.a	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	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.		3	1	1	3	1	1	3	1	1	3	1	1	3	1	1	3	1	1		
			(1)						(1)	(1)				(1)				(1)				
5.A	5.A. Sample Space																					

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT 10 Items	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 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	4. Knowledge of Statistics - Students will collect, organize, display, analyze, or interpret data to make decisions or predictions		5 (1)	2	1	1	5 (1)	2	1	1	5	2	1	1	5 (2)	2 (1)	1	1	5 (1)	2	1	1	1
4.A	4.A. Data Displays																						
4.A.1	4.A.1. Organize or display data to:																						
4.A.1.a	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	4.B. Data Analysis																						
4.B.1	4.B.1. Analyze data to:																						
4.B.1.a	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	4.B.1.b. Determine the best choice of a data display for a given data set																						
4.B.2	4.B.2 Analyze measures of central tendency to:																						
4.B.2.a	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	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.		3 (1)	1	1	3 (1)	1 (1)	1 (1)	3 (1)	1 (1)	3	1	1	3	1	1	3	1	1	3	1	1	
5.A	5.A. Sample Space																						

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT 10 Items	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	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
5.A.1	5.A.1. Identify numbers of members of a sample space to:																							
5.A.1.a	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	5.B. Theoretical Probability																							
5.B.1	5.B.1. Determine the probability of an event comprised of no more than 2 independent events to:																							
5.B.1.a	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	5.C. Experimental Probability																							
5.C.1	5.C.1. Analyze the results of a survey or simulation to:																							
5.C.1.a	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	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.	1	10	3		10	3		10	3		10	3		10	3		10	3		10	3		10
			(1)	(1)		(1)	(2)		(1)	(1)		(1)	(1)		(1)	(1)		(1)	(1)		(1)	(1)		(1)
6.A	6.A. Knowledge of Number or Place Value																							
6.A.1	6.A.1. Apply knowledge of rational numbers or place value to:																							
6.A.1.a	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	6.A.1.b. Express decimals with no more than 4 decimal places using expanded form (0-100)																							
6.A.1.c	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 SAT 10 Items	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	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E
		R	P	P	C	C	P	P	C	C	P	P	C	C	P	P	C	C	P	P	C	C
5.A.1	5.A.1. Identify numbers of members of a sample space to:																					
5.A.1.a	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	5.B. Theoretical Probability																					
5.B.1	5.B.1. Determine the probability of an event comprised of no more than 2 independent events to:																					
5.B.1.a	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	5.C. Experimental Probability																					
5.C.1	5.C.1. Analyze the results of a survey or simulation to:																					
5.C.1.a	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	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.	1	10	3			10	3			10	3			10	3			10	3		
			(1)	(2)			(1)	(2)			(1)	(2)			(2)				(2)	(2)		
6.A	6.A. Knowledge of Number or Place Value																					
6.A.1	6.A.1. Apply knowledge of rational numbers or place value to:																					
6.A.1.a	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	6.A.1.b. Express decimals with no more than 4 decimal places using expanded form (0-100)																					
6.A.1.c	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 SAT 10 Items	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 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	
6.A.1.d	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	6.C. Number Computation																		
6.C.1	6.C.1. Analyze number relationships or compute to:																		
6.C.1.a	6.C.1.a. Add, subtract, multiply, or divide integers (Use one operation and -100 to 100)																		
6.C.1.b	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	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	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	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	6.C.2. Estimate to:																		
6.C.2.a	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	6.C.3. Analyze ratios or percents to:																		

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT 10 Items	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	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
6.A.1.d	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	6.C. Number Computation																					
6.C.1	6.C.1. Analyze number relationships or compute to:																					
6.C.1.a	6.C.1.a. Add, subtract, multiply, or divide integers (Use one operation and -100 to 100)																					
6.C.1.b	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	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	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	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	6.C.2. Estimate to:																					
6.C.2.a	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	6.C.3. Analyze ratios or percents to:																					

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT 10 Items	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	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	P	C	C	P	C	C	P	C	C	P	C	C	P	C	C	P	C	C	P	C	C	P	C	C
6.C.3.a	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	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. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT 10 Items	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	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	P	C	C	P	C	C	P	C	C	P	C	C	P	C	C	P	C	C	P	C	C	P	C	C
6.C.3.a	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	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. The number in the parenthesis indicates the total number of field test items.

Table D.6 The 2007 MSA-Math Blueprint: Grade 8

Code	Standard / Objective Statement	No. of SAT 10 Items	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	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E
		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
1.0	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.		8	4	2	1	8	4	2	1	8	4	2	1	8	4	2	1	8	4	2	1
			(1)	(2)	(1)	(2)	(1)	(1)	(1)	(2)	(1)	(2)	(1)	(1)	(1)	(2)						
1.A	1.A. Patterns or Functions																					
1.A.1	1.A.1. Identify, describe, extend, or create patterns, functions, or sequences to:																					
1.A.1.a	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	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	1.A.1.c. Determine whether a relationship is linear or non-linear given the graph of the function																					
1.B	1.B. Expressions, Equations, or Inequalities																					
1.B.1	1.B.1. Write, simplify or evaluate expressions to:																					
1.B.1.a	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	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. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT 10 Items	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	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
1.0	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.		8	4	2	1	8	4	2	1	8	4	2	1	8	4	2	1	8	4	2	1
			(3)	(3)	(1)	(2)	(2)	(1)	(3)	(1)	(1)	(4)	(2)	(1)	(3)	(2)	(1)	(1)				
1.A	1.A. Patterns or Functions																					
1.A.1	1.A.1. Identify, describe, extend, or create patterns, functions, or sequences to:																					
1.A.1.a	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	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	1.A.1.c. Determine whether a relationship is linear or non-linear given the graph of the function																					
1.B	1.B. Expressions, Equations, or Inequalities																					
1.B.1	1.B.1. Write, simplify or evaluate expressions to:																					
1.B.1.a	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	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. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT 10 Items	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	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	R	
1.B.1.c	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	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	1.B.2. Identify, write, or solve equations or inequalities to:																										
1.B.2.a	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	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	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	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	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	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 SAT 10 Items	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	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	R	
1.B.1.c	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	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	1.B.2. Identify, write, or solve equations or inequalities to:																										
1.B.2.a	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	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	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	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	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	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 SAT 10 Items	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	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E		
		R	R	P	C	C	R	R	P	C	C	R	R	P	C	C	R	R	P	C	C	R	R	P
1.C	1.C. Numeric or Graphic Representations of Relationships																							
1.C.1	1.C.1. Locate points on a coordinate plane to:																							
1.C.1.a	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	1.C.2. Analyze linear relationships to:																							
1.C.2.a	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	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	1	4	2	1	4	2	1	4	2	1	4	2	1	4	2	1	4	2	1	4	2	1	1
			(1)	(1)		(2)			(1)	(1)		(1)	(1)	(1)			(1)			(1)		(1)	(1)	
2.A	2.A. Plane Geometric Figures																							
2.A.1	2.A.1. Analyze the properties of plane geometric figures to:																							
2.A.1.a	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	2.A.1.b. Identify or describe the hypotenuse or legs of right triangles																							
2.A.2	2.A.2. Analyze geometric relationships to:																							
2.A.2.a	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	2.A.2.b. Apply the Pythagorean Theorem																							

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT 10 Items	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	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
1.C	1.C. Numeric or Graphic Representations of Relationships																								
1.C.1	1.C.1. Locate points on a coordinate plane to:																								
1.C.1.a	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	1.C.2. Analyze linear relationships to:																								
1.C.2.a	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	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	1	4	2	1	4	2	1	4	2	1	4	2	1	4	2	1	4	2	1	4	2	1	4	2
					(1)	(1)	(1)	(1)	(2)	(1)	(1)			(1)			(1)			(1)			(1)	(1)	
2.A	2.A. Plane Geometric Figures																								
2.A.1	2.A.1. Analyze the properties of plane geometric figures to:																								
2.A.1.a	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	2.A.1.b. Identify or describe the hypotenuse or legs of right triangles																								
2.A.2	2.A.2. Analyze geometric relationships to:																								
2.A.2.a	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	2.A.2.b. Apply the Pythagorean Theorem																								

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT 10 Items	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	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E		
		R	R	P	C	C	R	R	P	C	C	R	R	P	C	C	R	R	P	C	C	R	R	P
2.C	2.C. Representation of Geometric Figures																							
2.C.1	2.C.1. Represent plane geometric figures to:																							
2.C.1.a	2.C.1.a. Draw quadrilaterals given their whole number dimensions in inches or centimeters or angle measurements																							
2.C.1.b	2.C.1.b. Construct a perpendicular through a given point on a given line segment																							
2.C.1.c	2.C.1.c. Construct a triangle congruent to a given triangle																							
2.D	2.D. Congruence or Similarity																							
2.D.1	2.D.1 Analyze the properties of congruent polygons to:																							
2.D.1.a	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	2.E. Transformations																							
2.E.1	2.E.1. Analyze a transformation on a coordinate plane to:																							
2.E.1.a	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	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.	1	2	1	1	2	1	1	2	1	1	2	1	1	2	1	1	2	1	1				
			(1)			(2)			(1)	(1)		(1)	(1)	(1)	(1)	(1)		(1)	(1)					
3.C	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 SAT 10 Items	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 R	S R	B R	E R	S R	S R	B R	E R	S R	S R	B R	E R	S R	S R	B R	E R
2.C	2.C. Representation of Geometric Figures																	
2.C.1	2.C.1. Represent plane geometric figures to:																	
2.C.1.a	2.C.1.a. Draw quadrilaterals given their whole number dimensions in inches or centimeters or angle measurements																	
2.C.1.b	2.C.1.b. Construct a perpendicular through a given point on a given line segment																	
2.C.1.c	2.C.1.c. Construct a triangle congruent to a given triangle																	
2.D	2.D. Congruence or Similarity																	
2.D.1	2.D.1 Analyze the properties of congruent polygons to:																	
2.D.1.a	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	2.E. Transformations																	
2.E.1	2.E.1. Analyze a transformation on a coordinate plane to:																	
2.E.1.a	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	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.	1	2	1	1	2	1	1	2	1	1	2	1	1	2	1	1	
			(1)	(1)	(1)		(1)		(1)	(1)		(1)		(1)				
3.C	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 SAT 10 Items	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	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
3.C.1	3.C.1. Estimate or apply formulas to:																					
3.C.1.a	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	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	3.C.1.c. Find the volume of a cylinder with whole number dimensions, given the formula (0-10,000)																					
3.C.2	3.C.2. Analyze measurement relationships to:																					
3.C.2.a	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	4. 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)				(2)				(2)				(1)				(1)				
4.A	4.A. Data Displays																					
4.A.1	4.A.1. Organize and display data to:																					
4.A.1.a	4.A.1.a. Make circle graphs with no more than 5 categories using data in whole number percents																					
4.A.1.b	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	4.A.1.c. Make scatter plots with no more than 10 points using whole numbers (0-1,000)																					
4.B	4.B. Data Analysis																					

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT 10 Items	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	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			
3.C.1	3.C.1. Estimate or apply formulas to:																								
3.C.1.a	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	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	3.C.1.c. Find the volume of a cylinder with whole number dimensions, given the formula (0-10,000)																								
3.C.2	3.C.2. Analyze measurement relationships to:																								
3.C.2.a	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	4. 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	(2)	(1)	(1)(1)
4.A	4.A. Data Displays																								
4.A.1	4.A.1. Organize and display data to:																								
4.A.1.a	4.A.1.a. Make circle graphs with no more than 5 categories using data in whole number percents																								
4.A.1.b	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	4.A.1.c. Make scatter plots with no more than 10 points using whole numbers (0-1,000)																								
4.B	4.B. Data Analysis																								

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT 10 Items	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	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
4.B.1	4.B.1. Analyze data to:																					
4.B.1.a	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	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	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	4.B.1.d. Interpret circle graph with no more than 8 categories (0-1,000)																					
5.0	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	1	2	2	1	2	2	1	2	2	1	2	2	1	2	2	1	(1)	(1)
5.A	5.A. Sample Space																					
5.A.1	5.A.1. Identify number of members of a sample space to:																					
5.A.1.a	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	5.B. Theoretical Probability																					
5.B.1	5.B.1. Determine the probability of an event comprised of no more than 2 independent events to:																					
5.B.1.a	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. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT 10 Items	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			
		R	P	C	C	P	C	C	P	C	C	P	C	C	P	C	C	P	C	C
4.B.1	4.B.1. Analyze data to:																			
4.B.1.a	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	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	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	4.B.1.d. Interpret circle graph with no more than 8 categories (0-1,000)																			
5.0	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	1	2	2	1	2	2	1	2	2	1	2	2	1	2	2	1
			(1)					(1)	(1)	(1)		(1)	(1)	(1)				(1)		
5.A	5.A. Sample Space																			
5.A.1	5.A.1. Identify number of members of a sample space to:																			
5.A.1.a	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	5.B. Theoretical Probability																			
5.B.1	5.B.1. Determine the probability of an event comprised of no more than 2 independent events to:																			
5.B.1.a	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. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT 10 Items	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 R	S R	B R	E R	S R	S R	B R	E R	S R	S R	B R	E R	S R	S R	B R	E R
5.B.2	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	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	5.C. Experimental Probability																	
5.C.1	5.C.1. Analyze the results of a survey or simulation to:																	
5.C.1.a	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	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.	1	9	2	9	2	9	2	9	2	9	2	9	2	9	2	9	2
			(3)	(1)	(1)	(1)	(2)	(2)	(2)	(2)	(2)	(1)	(2)	(1)	(3)	(3)	(3)	(3)
6.A	6.A. Knowledge of Number or Place Value																	
6.A.1.	6.A.1. Apply knowledge of rational numbers or place value to:																	
6.A.1.a	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	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. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT 10 Items	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 R	S R	B R	E R	S R	S R	B R	E R	S R	S R	B R	E R	S R	S R	B R	E R
5.B.2	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	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	5.C. Experimental Probability																	
5.C.1	5.C.1. Analyze the results of a survey or simulation to:																	
5.C.1.a	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	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.	1	9	2	9	2	9	2	9	2	9	2	9	2	9	2	9	2
			(1)		(2)		(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
6.A	6.A. Knowledge of Number or Place Value																	
6.A.1.	6.A.1. Apply knowledge of rational numbers or place value to:																	
6.A.1.a	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	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. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT 10 Items	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 R	S P R	B C R	E C R	S P R	S P R	B C R	E C R	S P R	S P R	B C R	E C R	S P R	S P R	B C R	E C R	
6.C	6.C. Number Computation																		
6.C.1	6.C.1. Analyze number relationships or compute to:																		
6.C.1.a	6.C.1.a. Add, subtract, multiply, or divide integers using one operation (-1,000 to 1,000)																		
6.C.1.b	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	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	6.C.2. Estimate to:																		
6.C.2.a	6.C.2.a. Determine square roots of whole numbers (0-100)																		
6.C.3	6.C.3. Analyze ratios, proportions, or percents to:																		
6.C.3.a	6.C.3.a. Determine unit rates using positive rational numbers (0-100)																		
6.C.3.b	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	6.C.3.c. Use proportional reasoning to solve problems using positive rational numbers (0-1,000)																		

Note. The number in the parenthesis indicates the total number of field test items.

Code	Standard / Objective Statement	No. of SAT 10 Items	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	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	S	S	B	E	
		R	P	C	C	P	C	C	P	C	C	P	C	C	P	C	C	P	C	C	P	C	C
6.C	6.C. Number Computation																						
6.C.1	6.C.1. Analyze number relationships or compute to:																						
6.C.1.a	6.C.1.a. Add, subtract, multiply, or divide integers using one operation (-1,000 to 1,000)																						
6.C.1.b	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	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	6.C.2. Estimate to:																						
6.C.2.a	6.C.2.a. Determine square roots of whole numbers (0-100)																						
6.C.3	6.C.3. Analyze ratios, proportions, or percents to:																						
6.C.3.a	6.C.3.a. Determine unit rates using positive rational numbers (0-100)																						
6.C.3.b	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	6.C.3.c. Use proportional reasoning to solve problems using positive rational numbers (0-1,000)																						

Note. The number in the parenthesis indicates the total number of field test items.