Missouri

Assessment Program

Grade-Level Assessments

Grades 3-8
English Language Arts
and Mathematics
Grades 5 and 8 Science

Technical Report 2017

Submitted to
Missouri Department of Elementary and Secondary Education
December 2017

DATA RECOGNITION
DRC
CORPORATION

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Table of Contents

Table of Contents i
Table of Tables iv
Table of Figures vii
Executive Summary 1
E.1 Background 1
E.2 Administration 2
E.3 Student Performance 2
E.4 Validity of Intended Interpretation of Test Scores 3
Chapter 1: Introduction 7
1.1 Background of the Missouri Assessment Program 7
1.2 Purpose of the Missouri Assessment Program 8
1.3 Design of the Missouri Assessment Program 8
1.4 Overview of This Report 8
Chapter 2: The Uses of Test Scores 12
2.1 Uses of Test Scores 12
2.2 Test-Level Scores 13
2.2.1 Scale Scores 13
2.2.2 Achievement Levels 13
2.2.3 Use of Test-Level Scores 13
Chapter 3: Test Content Development 14
3.1 Development of ELA and Mathematics Assessments 14
3.1.1 Development of Items for DRC's Item Bank 14
3.1.2 Content and Bias Review of Items Used in MAP 19
3.1.3 Test Specifications of MAP ELA and Mathematics 20
3.1.4 Standard and Content Specifications of MAP ELA and Mathematics 21
3.1.5 Alignment Study 22
3.1.6 Operational Test Selection 22
3.2 Development of Science Assessments 23
3.2.1 Test Specifications 23
3.2.2 Item Development 23
3.2.3 Item Review 24
3.2.4 Field Test Administration 25
3.2.5 Operational Test Selection 25
3.2.6 Alignment Study 26
3.3 Universal Design 28
3.4 Accommodations 28
3.5 Summary 29
Chapter 4: Test Administration 47
4.1 Training of Districts 47
4.2 Ancillary Materials 48
4.2.1 Return Material Forms and Guidelines 52

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4.2.2 Security Forms ... 52
4.2.3 Interpretive Guides ... 52
4.3 Test Security Measures ... 52
4.4 Test Administration ... 53
4.4.1 Test Time ... 53
4.4.2 Universal Tools and Accommodations ... 53
4.5 Summary ... 55
Chapter 5: Scoring of Constructed-Response, Writing Prompt, and Autoscored Items ... 76
5.1 Handscoring Scoring Process ... 76
5.1.1 Selection of Readers ... 76
5.1.2 PAS Training Process ... 77
5.1.3 Monitoring the Scoring Process ... 79
5.1.4 Security ... 80
5.2 Item Autoscoring Process ... 80
5.3 Multiple-Choice and Multi-Select Item Scoring Process ... 81
5.4 Inter-rater Reliability ... 81
5.5 Summary ... 82
Chapter 6: Operational Data Analyses ... 86
6.1 Classical Item Statistics ... 86
6.1.1 Test-Level Statistics ... 86
6.1.2 Item-Level Statistics ... 87
6.2 Item Response Theory ... 88
6.2.1 Scaling and Equating ... 89
6.3 Pre-equated Design ... 92
6.3.1 Post-equating Verification ... 92
6.4 Lowest and Highest Obtainable Scale Scores ... 93
6.5 Item-Pattern Scoring ... 93
6.6 Summary ... 93
Chapter 7: Test Results ... 125
7.1 Test Completion ... 125
7.2 Current Administration Data ... 126
7.3 Cross-Year, Cross-Sectional Comparisons ... 127
7.4 Reports ... 129
7.4.1 Description of Each Type of Report ... 130
7.5 Data Structures ... 131
7.5.1 General Research File ... 131
7.6 Interpreting Test Results ... 131
7.7 Summary ... 132
Chapter 8: Achievement Level Setting ... 147
8.1 ELA and Mathematics Achievement Levels ... 147
8.1.1 Standard Setting Process and Methodology ... 147
8.2 Science Achievement Levels ... 148
8.2.1 Cut Point Validation Process and Methodology ... 149
8.3 Achievement Level Descriptors ... 149
8.4 Cut Scores ... 149
8.5 Summary ... 149

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Chapter 9: Evidence of Construct-Related Validity 152
9.1 Minimization of Construct-Irrelevant Variance and Construct Underrepresentation 152
9.2 Reliability 152
9.2.1 Test Reliability 154
9.2.2 Standard Error of Measurement 154
9.2.3 Conditional Standard Error of Measurement 155
9.2.4 Classification Accuracy and Consistency 156
9.3 Validity Evidence Based on Internal Test Structure 158
9.3.1 Principal Components Analysis 159
9.4 Analyses by Content Strands 160
9.4.1 Correlations among Content Strand Subscores 160
9.4.2 Reliability and Standard Error of Measurement of Content Strands 161
9.5 Validity Evidence Based on Relationship with Other Variables 161
9.6 Summary 162
Chapter 10: Fairness 186
10.1 Minimizing Bias through Test Development 187
10.2 Evaluating Bias through Differential Item Functioning Statistics 188
10.3 Impact Analysis 191
10.3.1 Effect Size 191
10.3.2 Reliability 193
10.4 Summary 193
References 207
Appendix A: Test Coordinator's Manual 211
Appendix B: Examiner's Manual 246
Appendix C: English Language Arts, Mathematics, and Science Post-equating 314
Appendix D: Guide to Interpreting Results 335
Appendix E: GRF Layout 355

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Table of Tables

Table E.1: Test Completion Rates: All Students 5
Table E.2: Percentage of Students Classified as Proficient or Advanced from 2006 through 2017 Using Census Data: English Language Arts 5
Table E.3: Percentage of Students Classified as Proficient or Advanced from 2006 through 2017 Using Census Data: Mathematics 5
Table E.4: Percentage of Students Classified as Proficient or Advanced from 2008 through 2017 Using Census Data: Science 6

Table 1.1: Timeline of the Grade-Span MAP 11
Table 1.2: Timeline of the Grade-Level MAP 11

Table 3.1: College- and Career-Ready Item Bank Development Activities 31
Table 3.2: College- and Career-Ready Item Types 32
Table 3.3: 2017 MAP Test Blueprint: Target Score Points by Strand 33
Table 3.4: MAP 2017 Strand Item/Point Distributions: English Language Arts 34
Table 3.5: MAP 2017 Assessment Focus Point Distributions: English Language Arts 35
Table 3.6: MAP 2017 Strand Item/Point Distributions: Mathematics 37
Table 3.7: MAP 2017 Content Category Point Distributions: Mathematics 38
Table 3.8: Science MAP 2017 GLE Strand, Item Type, and Point Distributions 44
Table 3.9: Elements of Universal Design 45
Table 3.10: Item Omitted from the MAP Spring 2017 Braille Version 45

Table 4.1: MAP Administration Schedule Timing Guidelines by Session 56
Table 4.2: MAP Test Time Summary by Session: English Language Arts 57
Table 4.3: MAP Test Time Summary by Session: Mathematics 58
Table 4.4: MAP Test Time Summary by Session: Science 59
Table 4.5: MAP Universal Tools 60
Table 4.6: MAP Accommodations for Students with Disabilities 63
Table 4.7: Number and Percentage of Students Using Accommodations or Universal Tools 65

Table 5.1: Inter-rater Reliability: English Language Arts 83
Table 5.2: Inter-rater Reliability: Science 84

Table 6.1: MAP Means and Standard Deviations for Raw Scores, p-values, Item-Total Correlation (R_{it}): English Language Arts 95
Table 6.2: MAP Means and Standard Deviations for Raw Scores, p-values, Item-Total Correlation (R_{it}): Mathematics 95
Table 6.3: MAP Means and Standard Deviations for Raw Scores, p-values, Item-Total Correlation (R_{it}): Science 95
Table 6.4: Item Statistics: English Language Arts, Grade 3 96
Table 6.5: Item Statistics: English Language Arts, Grade 4 98
Table 6.6: Item Statistics: English Language Arts, Grade 5 100
Table 6.7: Item Statistics: English Language Arts, Grade 6 102

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Table 6.8: Item Statistics: English Language Arts, Grade 7 104
Table 6.9: Item Statistics: English Language Arts, Grade 8 106
Table 6.10: Item Statistics: Mathematics, Grade 3 108
Table 6.11: Item Statistics: Mathematics, Grade 4 110
Table 6.12: Item Statistics: Mathematics, Grade 5 112
Table 6.13: Item Statistics: Mathematics, Grade 6 114
Table 6.14: Item Statistics: Mathematics, Grade 7 116
Table 6.15: Item Statistics: Mathematics, Grade 8 118
Table 6.16: Item Statistics: Science, Grade 5 120
Table 6.17: Item Statistics: Science, Grade 8 122
Table 6.18: Lowest and Highest Obtainable Scores 124

Table 7.1: Test Completion Rates: All Students 134
Table 7.2: Test Completion Rates: Males 134
Table 7.3: Test Completion Rates: Females 134
Table 7.4: Test Completion Rates: White 135
Table 7.5: Test Completion Rates: Black 135
Table 7.6: Test Completion Rates: Hispanic 135
Table 7.7: Test Completion Rates: Asian/Pacific Islander 136
Table 7.8: Test Completion Rates: American Indian 136
Table 7.9: Test Completion Rates: Other Race/Ethnicity 136
Table 7.10: Test Completion Rates: Students Receiving Accommodations 137
Table 7.11: State-Level Scale Score Statistics: English Language Arts 137
Table 7.12: State-Level Scale Score Statistics: Mathematics 137
Table 7.13: State-Level Scale Score Statistics: Science 137
Table 7.14: State-Level Scale Score Means, 2016 through 2017 Census Data: English Language Arts 138
Table 7.15: State-Level Scale Score Means, 2016 through 2017 Census Data: Mathematics 138
Table 7.16: State-Level Scale Score Means, 2008 through 2017 Census Data: Science 139
Table 7.17: Percentage of Students in Achievement Levels, 2006 through 2017 Census Data: English Language Arts 140
Table 7.18: Percentage of Students in Achievement Levels, 2006 through 2017 Census Data: Mathematics 143
Table 7.19: Percentage of Students in Achievement Levels, 2008 through 2017 Census Data: Science 146

Table 8.1: Cut Scores: English Language Arts 151
Table 8.2: Cut Scores: Mathematics 151
Table 8.3: Cut Scores: Science 151

Table 9.1: Reliability: English Language Arts 164
Table 9.2: Reliability: Mathematics 164
Table 9.3: Reliability: Science 164

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Table 9.4: Conditional Standard Error of Measurement at the Basic, Proficient, and Advanced Cut Scores: English Language Arts 165
Table 9.5: Conditional Standard Error of Measurement at the Basic, Proficient, and Advanced Cut Scores: Mathematics 165
Table 9.6: Conditional Standard Error of Measurement at the Basic, Proficient, and Advanced Cut Scores: Science 165
Table 9.7: Classification Accuracy and Consistency Conditioned on Level of Achievement 166
Table 9.8: Classification Accuracy and Consistency at Achievement Cut Points..... 167
Table 9.9: Principal Component Analysis: English Language Arts 168
Table 9.10: Principal Component Analysis: Mathematics 169
Table 9.11: Principal Component Analysis: Science..... 169
Table 9.12: Uncorrected Correlation Coefficient (below Diagonal) and Corrected Correlation Coefficient (above Diagonal) among Content Strands: English Language Arts..... 170
Table 9.13: Uncorrected Correlation Coefficient (below Diagonal) and Corrected Correlation Coefficient (above Diagonal) among Content Strands: Mathematics . 171
Table 9.14: Uncorrected Correlation Coefficient (below Diagonal) and Corrected Correlation Coefficient (above Diagonal) among GLE Strands: Science 172
Table 9.15: Mean, Standard Deviation, and Standard Error of Measurement of Content Strands: English Language Arts..... 174
Table 9.16: Mean, Standard Deviation, and Standard Error of Measurement of Content Strands: Mathematics..... 175
Table 9.17: Mean, Standard Deviation, and Standard Error of Measurement of GLE Strands: Science 176
Table 9.18: Correlations between Content Area Scale Scores 177

Table 10.1: Number of Items Flagged for DIF: English Language Arts 195
Table 10.2: Number of Items Flagged for DIF: Mathematics 196
Table 10.3: Number of Items Flagged for DIF: Science 197
Table 10.4: Impact Analysis: Grade 3 198
Table 10.5: Impact Analysis: Grade 4 198
Table 10.6: Impact Analysis: Grade 5 199
Table 10.7: Impact Analysis: Grade 6 200
Table 10.8: Impact Analysis: Grade 7 200
Table 10.9: Impact Analysis: Grade 8 201
Table 10.10: Reliability and SEM by Subgroup: English Language Arts 202
Table 10.11: Reliability and SEM by Subgroup: Mathematics 204
Table 10.12: Reliability and SEM by Subgroup: Science 206

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Table of Figures

Figure 3.1: Operational Test Development 46

Figure 4.1: Sample Script from Examiner's Manual 71
Figure 4.2: Sample District Report Form 74
Figure 4.3: Sample Accountability Form via eDIRECT 75

Figure 9.1: CSEM Curve with Cut Scores: English Language Arts, Grade 3 178
Figure 9.2: CSEM Curve with Cut Scores: English Language Arts, Grade 4 178
Figure 9.3: CSEM Curve with Cut Scores: English Language Arts, Grade 5 179
Figure 9.4: CSEM Curve with Cut Scores: English Language Arts, Grade 6 179
Figure 9.5: CSEM Curve with Cut Scores: English Language Arts, Grade 7 180
Figure 9.6: CSEM Curve with Cut Scores: English Language Arts, Grade 8 180
Figure 9.7: CSEM Curve with Cut Scores: Mathematics, Grade 3 181
Figure 9.8: CSEM Curve with Cut Scores: Mathematics, Grade 4 181
Figure 9.9: CSEM Curve with Cut Scores: Mathematics, Grade 5 182
Figure 9.10: CSEM Curve with Cut Scores: Mathematics, Grade 6 182
Figure 9.11: CSEM Curve with Cut Scores: Mathematics, Grade 7 183
Figure 9.12: CSEM Curve with Cut Scores: Mathematics, Grade 8 183
Figure 9.13: CSEM Curve with Cut Scores: Science, Grade 5, Form A 184
Figure 9.14: CSEM Curve with Cut Scores: Science, Grade 5, Form B 184
Figure 9.15: CSEM Curve with Cut Scores: Science, Grade 8, Form A 185
Figure 9.16: CSEM Curve with Cut Scores: Science, Grade 8, Form B 185

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EXECUTIVE SUMMARY

This report is a technical summary of the 2017 administration of the Missouri Assessment Program (MAP) in English Language Arts (ELA) and Mathematics administered in Grades 3 through 8, and Science administered in Grades 5 and 8. The ELA and Mathematics tests are grade-level tests that are designed to measure students' knowledge of ELA and Mathematics and are aligned with Missouri Learning Standards. The 2017 ELA and Mathematics operational test forms were the same as the 2016 forms and were developed by Data Recognition Corporation (DRC) using DRC's college- and career-ready item bank.

The Science tests are grade-span assessments. These tests are designed to measure students' knowledge of Science, and they are aligned with Missouri Learning Standards. The Grade 5 Science test measures students' knowledge of Science concepts taught in Grades 3 through 5. The Grade 8 Science test measures students' knowledge of Science concepts taught in Grades 6 through 8. The 2017 Science test forms were the same as the 2015 and 2016 Science test forms, which were created by Iowa Testing Programs (ITP), a research, development, and outreach unit in the College of Education at the University of Iowa, and the Missouri Department of Elementary and Secondary Education (DESE). These assessments included Missouri-owned items and items supplied by ITP and licensed to DESE.

All assessments except for Braille, large-print, and accommodated paper-and-pencil forms were administered online. This section provides a summary of the Spring 2017 MAP ELA, Mathematics, and Science Technical Report.

E.1 Background

The MAP was originally designed as grade-span tests to measure Missouri's Show-Me Standards. These standards were adopted by the Missouri State Board of Education in 1996. Since their inception, Missouri's Show-Me Standards have been further refined to better delineate Content Standards, Process Standards, and Content Strands as Missouri changed its testing program to comply with the requirements of No Child Left Behind. Starting in 2006, grade-level tests were administered in Communication Arts and Mathematics. Starting in 2008, Science tests were administered. Science assessments are aligned with Science Grade-Level Expectations (GLEs) (for details refer to http://dese.mo.gov/college-career-readiness/curriculum/proposed-missouri-learning-standards-update/current-missouri). In 2009, the MAP was no longer administered at the high school level. It was replaced by the Missouri End-of-Course Assessments (the technical report for these assessments may be found at http://dese.mo.gov/college-career-readiness/assessment/assessment-technical-support-materials).

The MAP ELA and Mathematics tests have undergone multiple alignment analyses with the latest changes in the 2015–16 administration. While the 2015–16 ELA and Mathematics assessments are comparable content- and construct-wise to the assessments administered in the 2014–15 school year, there were no common items between the two assessments; therefore, they were not statistically linked to the previous scales. The new reporting scales for the ELA and Mathematics tests were established after the Spring 2016 test administration, and the new performance-level cut scores were set for these assessments in the Summer of 2016. The ELA and Mathematics Spring

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2016 results are considered a new baseline for year-to-year student performance comparisons. Spring 2017 is the second administration year of the same ELA and Mathematics test forms. Science assessments, on the other hand, have remained on the same scales since the first year of their administration, and the same test forms were administered to Missouri students in 2015, 2016, and 2017.

All 2016–17 assessments were administered online. ELA and Mathematics contained various item types, including multiple-choice (MC), technology-enhanced (TE), evidence-based selected response (EBSR), and short-answer (SA), as well as writing prompts (WPs) in ELA Grades 5 and 8. Science tests contained MC items and constructed-response (CR) items. Paper-and-pencil versions of the tests, including Braille and large print, were also available for all content areas.

E.2 Administration

In Spring 2017, Missouri administered summative assessments in English Language Arts and Mathematics to students in Grades 3 through 8 and in Science to students in Grades 5 and 8. The MAP was administered from April 3 to May 26, 2016. Test administration is discussed in Chapter 4 of this report.

Approximately 560 districts and charter schools administered ELA and Mathematics MAP tests in Grades 3 through 8 and Science tests in Grades 5 and 8. Table E.1 shows test completion rates based on Missouri student census data.[1] For the purposes of this report, "completion rate" is defined as the percentage of students who received a valid scale score given the total number of students eligible to take the online test or receive a test book. The Accountable columns show the total number of students eligible to take the online test or receive a test book. The Percentage Reportable columns show the percentage of students who received a scale score on the MAP. Further analysis of completion rates is provided in Chapter 7 of this report.

E.3 Student Performance

This is the twelfth year of the grade-level MAP testing programs in English Language Arts and Mathematics and the tenth year of the MAP testing program in Science. Tables E.2 and E.3 present the percentage of students classified as *Proficient* or *Advanced* in 2006 through 2017 in English Language Arts and Mathematics, respectively. Table E.4 presents the percentage of students classified as *Proficient* or *Advanced* in 2008 through 2017 in Science.

The percentage of students classified as *Proficient* or *Advanced* in ELA was similar for all grade levels and ranged from 59% for Grade 7 to 64% for Grade 4. A small increase in the percentage of students classified as *Proficient* or *Advanced* in ELA was observed between Spring 2016 and Spring 2017 test administrations across all grades. The increase ranged from 0.5% for Grade 5 to 1.5% for Grade 3 ELA.

The percentage of students classified as *Proficient* or *Advanced* in Mathematics was found to decrease as grade level increased and ranged from approximately 54% for Grades 3 and 4 to 30%

[1] The census data used in this report do not reflect additional cleaning steps that DESE staff implements once DRC/CTB releases data to DESE; therefore, the numbers in this report may differ from those in DESE reports using their cleaned data.

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for Grade 8. Similar to ELA, a small increase in the percentage of students classified as *Proficient* or *Advanced* was observed between Spring 2016 and Spring 2017 test administrations across all grades for Mathematics. The increase ranged from approximately 0.5% for Grade 6 to close to 2% for Grades 7 and 8.

The percentage of students classified as *Proficient* or *Advanced* in Science was approximately 46% for Grade 5 and approximately 49% for Grade 8, representing an increase of approximately 3% for Grade 5 and approximately 1% for Grade 8 between Spring 2016 and Spring 2017 test administrations.

More details on student performance are provided in Chapter 7.

New achievement cut scores for ELA and Mathematics were established after the 2015–16 test administration and remained unchanged for the 2016–17 administration. Therefore, student performance in ELA and Mathematics is directly comparable between the last two administrations. The student performance in ELA and Mathematics is not directly comparable between the 2015–16 and 2014–15 administrations. Similarly, because the 2014–15 assessments were different in content and format from the 2013–14 assessments, the performance of students in these two years is not directly comparable either. The achievement cut scores for Science remained unchanged during the nine years of the test administration.

E.4 Validity of Intended Interpretation of Test Scores

Most sections of this Technical Report are designed to provide validity evidence to support the use and intended interpretation of the MAP ELA, Mathematics, and Science test scores. MAP scores are used to identify students' strengths and weaknesses in Missouri's student performance; to inform stakeholders (teachers, school administrators, district administrators, DESE staff members, parents, and the public) about the status of the progress toward meeting academic achievement standards of the state; and to meet the requirements of the state's accountability program.

Evidence of validity based on test content was supported by the test specifications, including the test design and test blueprint. Missouri ELA and Mathematics assessments were developed in alignment with Missouri Learning Standards using ELA and Mathematics items from DRC's college- and career-ready item pool. Science assessments were built using the Missouri Science item pool and the Iowa Test of Basic Skills item pool developed by the University of Iowa. More details on test content and test development are provided in Chapter 3 of this report.

With the exceptions of Braille, large-print, and a limited number of paper-and-pencil test forms, MAP assessments were administered online in a standardized manner further supporting validity of the intended score interpretation. Universal tools were available for all students to use, and accommodations were available to students for whom such aids were deemed appropriate and were indicated in their Individualized Education Programs. More details on test administration and use or accommodations or universal tools are provided in Chapter 4 of this report.

Scoring of TE, SA, EBSR, and CR items (in Science), as well as WPs (in ELA Grades 5 and 8), followed predefined scoring criteria. The TE, SA, and EBSR items were autoscored. ELA WPs and

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Science CR items were scored by human readers. The inter-rater reliability statistics demonstrated that the items scored by human readers were scored reliably (refer to Chapter 5 for details).

The test scaling of all assessments was conducted using item response theory (IRT) methodology. The 2017 ELA, Mathematics, and Science assessments were pre-equated to MAP ELA, Mathematics, and Science scales, respectively, and students were scored using item parameters estimated after the 2016 test administration. The IRT models used for MAP test scaling were appropriate for the test data supporting the operational data analysis and ensuring that the test items, as well as the overall tests, were functioning appropriately. For details on test scaling, refer to Chapter 6. The ELA and Mathematics cut scores used for classification of students into different performance levels and associated achievement-level descriptors were established during the Summer 2016 standard setting in a collaborative and participatory process further supporting the validity and interpretation of the MAP scores. The Science cut scores were reviewed and validated in Spring 2015 (refer to Chapter 8 for details on cut score setting for ELA and Mathematics, and cut score validation for Science).

Evidence of construct-related validity—supporting the intended interpretation of test scores and their use—was provided through studies of test reliability, evaluation of internal test structure, and evaluation of the relationship of test scores with external variables. The reliability analysis results indicated that the MAP tests produce scores that would be relatively stable if the tests were administered repeatedly under similar conditions. The assumption that the content-area MAP tests were unidimensional (that is, the grade-level test measured one primary dimension) was confirmed through principal component analysis. The divergent evidence of the validity of the intended interpretation of the MAP test scores was evaluated through the correlations computed between the ELA, Mathematics, and Science scale scores (refer to Chapter 9 for details). The student scores were found to be highly but not perfectly related to each other, suggesting that while different constructs are being measured, the three assessments may also be tapping into a similar knowledge base or general underlying ability. In addition, test fairness was evaluated through differential item functioning analysis and analysis of differences in test performance among subgroups (refer to Chapter 10 for details).

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Table E.1: Test Completion Rates: All Students

Grade	Accountable in ELA	Percentage Reportable in ELA	Accountable in Mathematics	Percentage Reportable in Mathematics	Accountable in Science	Percentage Reportable in Science
3	69,473	99.69%	69,510	99.94%		
4	69,624	99.72%	69,685	99.92%		
5	68,082	99.73%	68,112	99.92%	68,095	99.90%
6	66,945	99.76%	66,959	99.89%		
7	66,507	99.71%	65,744	99.84%		
8	66,043	99.68%	53,217*	99.76%	66,050	99.79%

*Grade 8 students had the option of taking Algebra 1 instead of MAP Mathematics in Grade 8.

Table E.2: Percentage of Students Classified as *Proficient* or *Advanced* from 2006 through 2017 Using Census Data: English Language Arts

Grade	English Language Arts													
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**		**2015***		**2016****	**2017****
3	42.4	42.6	40.3	40.3	43.1	43.6	45.3	47.8	41.6		57.1		60.6	62.1
4	43.8	45.1	45.1	46.3	50.9	51.9	52.2	52.8	45.5		58.3		63.2	64.2
5	45.0	47.8	48.1	48.8	51.0	51.1	51.8	52.3	50.0		58.9		62.0	62.5
6	42.2	43.6	47.4	47.7	49.6	50.5	50.2	51.0	47.5		54.9		58.3	59.5
7	42.7	44.4	49.0	50.8	51.7	53.8	55.2	54.9	55.4		57.2		58.0	59.2
8	41.5	41.6	48.1	49.7	51.8	52.5	53.3	53.9	50.4		57.5		59.2	60.3

*Students were classified into achievement levels based on the Smarter Balanced Assessment Consortium's cut scores.
**Students were classified into achievement levels based on the new Missouri cut scores.

Table E.3: Percentage of Students Classified as *Proficient* or *Advanced* from 2006 through 2017 Using Census Data: Mathematics

Grade	Mathematics													
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**		**2015***		**2016****	**2017****
3	43.3	45.0	43.8	44.4	47.1	49.4	51.9	50.7	50.2		52.0		52.5	53.5
4	43.4	44.5	44.2	44.4	48.4	50.5	50.5	50.1	42.1		49.6		52.9	54.2
5	43.3	46.6	45.8	47.2	51.7	52.5	54.3	53.9	52.2		39.8		46.7	48.3
6	43.9	47.8	50.7	50.1	55.4	56.9	55.7	56.2	55.6		38.1		43.3	43.7
7	42.9	44.9	49.5	51.9	54.5	55.8	59.6	57.3	56.7		35.3		42.1	43.8
8	39.8	40.6	43.8	46.4	51.3	50.8	52.0	40.3	42.2		28.2		28.3	30.0

*Students were classified into achievement levels based on the Smarter Balanced Assessment Consortium's cut scores.
**Students were classified into achievement levels based on the new Missouri cut scores.

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Table E.4: Percentage of Students Classified as *Proficient* or *Advanced* from 2008 through 2017 Using Census Data: Science

Grade	Science									
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
5	44.5	45.1	48.9	50.5	51.4	51.3	47.3	47.0	42.9	46.1
8	43.2	44.8	48.0	50.0	49.6	50.1	51.9	48.9	48.0	49.3

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CHAPTER 1: INTRODUCTION

The 2017 Missouri Assessment Program (MAP) marked the twelfth administration of the grade-level English Language Arts (ELA) and Mathematics and the tenth administration of the grade-span Science MAP tests in Missouri. The MAP is designed to measure students' knowledge of ELA, Mathematics, and Science. This report provides a technical overview of the ELA, Mathematics, and Science assessments of the 2016–17 MAP. As such, it presents evidence for the validity of the intended interpretation of the 2016–17 MAP scores.

This chapter of the Technical Report serves to describe the background, history, purpose, and design of the MAP for ELA, Mathematics, and Science, followed by an overview of the major sections of the current report.

1.1 Background of the Missouri Assessment Program

The MAP traces its origin to the 1993 Outstanding Schools Act. This act required that Missouri create a statewide assessment system that measured challenging academic standards. From this act, grade-span assessments were created that measured Missouri's Show-Me Standards. Originally, the MAP was designed to be a grade-span test: Grades 3, 7, and 11 in Communication Arts; Grades 4, 8, and 10 in Mathematics; and Grades 3, 7, and 10 in Science. Table 1.1 provides a brief timeline of the events of the grade-span MAP.

In 2001, the federal No Child Left Behind (NCLB) legislation was enacted, which required states to develop grade-level tests in both Reading and Mathematics to be administered annually in Grades 3 through 8 and once in Grades 10 through 12. It also required that states have in place Science assessments to be administered at least once in Grades 3 through 5, Grades 6 through 9, and Grades 10 through 12 by the 2007–08 school year. In accordance with the NCLB legislation, student performance, reported in terms of proficiency categories, is used to determine the adequate yearly progress of students at the school, district, and state levels.

In response to NCLB, DESE contracted with CTB/McGraw-Hill (CTB) in 2003 to expand the testing program to grade-level testing for Communication Arts and Mathematics, and again in 2005 to construct Science assessments. In Spring 2006, Missouri administered a field test in Science, which was the basis for the construction of the 2008 and 2010 operational Science forms. Both contracts were renewed in 2007 and extended through 2013–14.

New ELA and Mathematics assessments for Grades 3–8 were developed for the 2014–15 administration. While the 2013–14 assessments were aligned to the Missouri Grade-Level Expectations (GLEs) with only partial alignment to the Common Core Standards, the 2014–15 assessments consisted of items fully aligned to the new Missouri Learning Standards, which are the same as Common Core State Standards. The ELA and Mathematics 2014–15 MAP assessments were built as fixed forms using Smarter Balanced Assessment Consortium's (SBAC) computer-adaptive item bank. The 2014–15 test scores were reported on new scales, and students were classified into achievement levels on the basis of the cut scores established by SBAC on their computer-adaptive item bank.

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The MAP tests have undergone yet another change in the 2015–16 administration for ELA and Mathematics Grades 3–8. These assessments were developed using DRC's college- and career-ready item pools. While the 2015–16 ELA and Mathematics assessments were comparable content- and construct-wise to the assessments administered in the 2014–15 year, there were no common items between the two assessments. Therefore, the 2015–16 assessments were not statistically linked to the previous scales. The new reporting scales for the ELA and Mathematics tests were established after the Spring 2016 test administration, and the new achievement-level cut scores were set for these assessments in Summer 2016. The ELA and Mathematics Spring 2016 results are considered a new baseline for year-to-year student performance comparisons. The test forms administered in Spring 2016 were reused in Spring 2017 and no changes were made to the test scales or achievement-level cut scores. Therefore, the student scores and performance-level data are directly comparable between the 2015–16 and 2016–17 administration years.

Science assessments were on a different trajectory. DESE contracted with the Iowa Testing Program (ITP) to develop the Science assessments for the 2014–15 test administration. Data Recognition Corporation (DRC) supported the Science test administration, scoring, data analysis, and reporting starting with the 2014–15 administration. The same test forms were administered in Spring 2015, 2016, and 2017.

The fixed forms of the 2016–17 assessments were administered online. ELA and Mathematics tests contained various item types, including MC, TE, EBSR, SA, and WPs (in ELA Grades 5 and 8). Science tests contained MC and CR items. Paper-and-pencil versions of the tests, including Braille and large print, were also available.

Table 1.2 shows a timeline of the development history of the NCLB-compliant testing program and the transition to the assessment aligned with the Missouri Learning Standards.

1.2 Purpose of the Missouri Assessment Program

The MAP ELA, Mathematics, and Science tests are designed to measure how well students acquire the skills and knowledge described in the Missouri Learning Standards. The assessments yield information on academic achievement at the student, class, school, district, and state levels. This information is used to diagnose individual student knowledge and skills in relation to the instruction and to gauge the overall quality of education throughout Missouri.

1.3 Design of the Missouri Assessment Program

The Spring 2017 MAP ELA and Mathematics administration consisted of one operational grade-level assessment per grade and content area. The Science administration consisted of two operational test forms in each grade. Braille and large-print test forms were constructed for each grade and content area to enable visually impaired students to participate in MAP testing.

1.4 Overview of This Report

This Technical Report documents in the subsequent chapters the major activities of the testing cycle. This report provides comprehensive details confirming that the processes and procedures applied in the MAP ELA, Mathematics, and Science adhere to appropriate professional standards

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and practices of educational assessment. Ultimately, this report serves to document evidence that valid inferences about Missouri student performance can be derived from the MAP. An overview of major activities documented within this report is provided below.

The Uses of Test Scores (Chapter 2)
Chapter 2 of the Technical Report discusses the concept of validity evidence. This Technical Report is composed of evidence that supports the use of the MAP ELA, Mathematics, and Science scores. In Chapter 2, some of the uses of the MAP scores are discussed.

Test Content Development (Chapter 3)
Chapter 3 of the Technical Report provides a summary of the test development activities that occurred to create the Spring 2017 operational test forms and the materials developed to inform the public about the testing program. As each major event is presented and discussed, the role of the event in contributing to evidence for validity of the interpretation and use of test results is discussed.

Test Administration (Chapter 4)
Chapter 4 of the Technical Report serves to describe the processes and activities implemented and information disseminated to help ensure standardized test-administration procedures and, thus, uniform test-administration conditions for students.

Scoring of Constructed-Response, Writing Prompt, and Autoscored Items (Chapter 5)
Chapter 5 of the Technical Report describes the processes and activities for autoscoring MC, MS, TE, SA, and EBSR items, and for handscoring CR items and WPs. This chapter also discusses the measures for training raters and for ensuring consistency among scorers. Finally, this chapter presents the results of the inter-rater reliability studies.

Operational Data Analyses (Chapter 6)
Chapter 6 of the Technical Report includes a detailed description of the operational analyses of the 2017 ELA, Mathematics, and Science MAP, which are composed of three major parts: the classical item analysis; calibration, scaling, and linking using item response theory (IRT) models; and student scoring. It also reports the results of the classical item analysis.

Test Results (Chapter 7)
Chapter 7 of the Technical Report contains information on the results of the Spring 2017 MAP administration. Detailed summary statistics based on scale scores and achievement-level information are also provided. Finally, this chapter presents information on the score reports sent to districts.

Achievement Level Setting (Chapter 8)
Chapter 8 of the Technical Report briefly discusses standard setting. It provides an overview of the standard-setting procedure and setting of cut scores used to classify students into achievement levels for ELA and Mathematics after the 2015–16 test administration. It also summarizes the process of cut score validation for Science, which occurred in Spring 2015.

Evidence of Construct-Related Validity (Chapter 9)
Chapter 9 of the Technical Report provides evidence of reliability and validity of the interpretation of the MAP ELA, Mathematics, and Science scores. This chapter provides detailed results of the

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reliability of the tests, as well as information on the decision consistency of the cut scores. It also provides evidence of construct-related validity for the intended interpretation of the MAP scores.

Fairness (Chapter 10)

Chapter 10 of the Technical Report discusses fairness and how the MAP ELA, Mathematics, and Science tests are constructed to be fair to all Missouri students. This chapter summarizes the results of the differential item functioning (DIF) analysis. It also discusses the results of an impact analysis to determine whether large differences exist between demographic groups in Missouri.

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Table 1.1: Timeline of the Grade-Span MAP

Year	Event
1996	Show-Me Standards approved
1996	Frameworks for Curriculum Development published
1997	Annotations to the Curriculum Frameworks published
1998	First operational administration of Mathematics MAP (Grades 4, 8, and 10)
1999	First operational administration of Communication Arts MAP (Grades 3, 7, and 11) and Science MAP (Grades 4, 8, and 11)
2000	First operational administration of Social Studies MAP (Grades 4, 8, and 10)
2001	Mathematics Curriculum Supplement published
2005	Last year of grade-span MAP

Table 1.2: Timeline of the Grade-Level MAP

Year	Event
2004	GLEs published
2005	Communication Arts and Mathematics field test
2005	Standard setting for Communication Arts and Mathematics
2006	First operational Communication Arts and Mathematics MAP
2007	Science field test
2008	First operational Science MAP
2008	Standard setting for Science
2008	Last operational administration of High School MAP
2008	Version 2.0 GLEs published
2009	Last operational administration of MAP based on V1.0 GLEs
2010	First operational administration of MAP based on V2.0 GLEs
2015	Cut score validation for Science
2015	First and last operational administration of MAP based on Common Core State Standards for ELA and Mathematics under SBAC patronage
2016	First operational administration of MAP based on Missouri Learning Standards for ELA and Mathematics using DRC's college- and career-ready item pool
2016	Standard setting for ELA and Mathematics
2017	Second operational administration of MAP based on Missouri Learning Standards for ELA and Mathematics using DRC's college- and career-ready item pool
2017	Tenth operational administration of MAP based on Missouri Learning Standards for Science

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CHAPTER 2: THE USES OF TEST SCORES

Validity is the overarching component of the MAP ELA, Mathematics, and Science testing program. The following excerpt is from the *Standards for Educational and Psychological Testing* (hereafter the *Standards*; American Educational Research Association [AERA], American Psychological Association [APA], & National Council on Measurement in Education [NCME], 2014):

> Ultimately, the validity of an intended interpretation of test scores relies on all the available evidence relevant to the technical quality of a testing system. Different components of validity evidence . . . include evidence of careful test construction; adequate score reliability; appropriate test administration and scoring; accurate score scaling, equating, and standard setting; and careful attention to fairness for all test takers, as appropriate to the test interpretation in question. (22)

As stated by the *Standards,* the validity of a testing program hinges on the interpretation of the test scores. Validity evidence that supports the uses of the MAP test scores is provided in this Technical Report. This section examines some possible uses of the MAP ELA, Mathematics, and Science test scores.

The following sections (Chapters 3 through 10) of this Technical Report provide additional evidence for these uses, as well as technical support for some of the interpretations and uses of test scores. The information in Chapters 3 through 10 also provides a firm foundation of evidence that the MAP tests measure what they are intended to measure. However, this Technical Report cannot anticipate all possible interpretations and uses of the MAP ELA, Mathematics, and Science scores. It is recommended that policy and program evaluation studies, in accordance with the *Standards*, be conducted to support some of the uses of the MAP ELA, Mathematics, and Science scores.

2.1 Uses of Test Scores

The validity of an interpretation of a test score ultimately rests on how that test score is used and the information that supports such uses. To understand whether a test score is being used properly, it is necessary to first understand the purpose of the test. The intended uses of the MAP ELA, Mathematics, and Science scores include the following:

- evaluating students' academic achievement
- communicating expectations for all students
- evaluating school-, district-, and state-level programs
- informing stakeholders (teachers, school administrators, district administrators, DESE staff members, parents, and the public) about the status of the progress toward meeting academic achievement standards of the state
- meeting the requirements of the state's accountability program, the Missouri School Improvement Program

This Technical Report refers to the use of the test-level scores: scale scores and achievement levels.

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2.2 Test-Level Scores

At the test level, an overall scale score that is based on student performance on the entire test is reported. In addition, an associated level of achievement is reported. These scores indicate, in varying ways, a student's achievement in ELA, Mathematics, and Science. Test-level scores are reported at four levels: the state, the school district, the school, and the student.

The following sections discuss two types of test-level scores that are reported to indicate a student's achievement on the ELA, Mathematics, and Science MAP: (1) the scale score and (2) its associated level of achievement.

2.2.1 Scale Scores

A scale score is determined for ELA, Mathematics, and Science, indicating a student's total performance on the MAP. The overall scale score for a content area quantifies the achievement being measured by the ELA, Mathematics, or Science test. In other words, the scale score represents the student's degree of achievement; higher scale scores indicate higher achievement levels on the test, and lower scale scores indicate lower achievement levels.

2.2.2 Achievement Levels

A student's performance on the ELA, Mathematics, or Science MAP is reported in one of four achievement levels: *Below Basic*, *Basic*, *Proficient*, or *Advanced*. The cut scores for the ELA and Mathematics levels of achievement were recommended by Missouri educators at the Bookmark Standard Setting workshop in July 2016, after the Spring 2016 test administration. The cut scores for Science were set by Missouri educators in July 2008 and upheld after the cut point validation workshop in June 2015. The cut scores reflect the expectations of Missouri educators and citizens of what Missouri students should know and be able to do in ELA, Mathematics, and Science (see Chapter 8 of this report for a discussion of the MAP standard setting for all content areas).

Therefore, the MAP achievement levels reflect the achievement standards and abilities intended by the Missouri legislature, Missouri teachers, Missouri citizens, and DESE. Descriptions of each level of achievement in terms of what a student should know and be able to do are provided with the *Guide to Interpreting Results* (see Chapters 4 and 7).

2.2.3 Use of Test-Level Scores

The MAP scale scores and achievement levels provide summary evidence of student achievement in ELA, Mathematics, and Science. Classroom teachers may use these scores as evidence of student achievement in these content areas. At the aggregate level, district and school administrators may use this information for activities such as curriculum planning. The results presented in this Technical Report provide evidence that the scale scores are a valid and reliable indicator of student performance in ELA, Mathematics, and Science.

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CHAPTER 3: TEST CONTENT DEVELOPMENT

Content-related evidence of the validity of the intended test score interpretation in achievement testing is supported by a correspondence between test content and a specification of the content domain. Evidence of content-related validity can be demonstrated through consistent adherence to test blueprints, through a high-quality test development process that includes review of items for accessibility to English Language Learners (ELL) and students with disabilities, and through alignment studies performed by independent groups. In this chapter, we will provide a detailed discussion of the test development cycle. In particular, this section will show how the MAP followed rigorous procedures to construct ELA, Mathematics, and Science tests that reflect the full range of content that the MAP is expected to cover.

This chapter is particularly relevant to AERA, APA, & NCME (2014) Standards 4.0, 4.1, and 4.7. It also addresses Standards 3.1, 3.2, 3.9, 4.12, and 7.4, which will be discussed in pertinent sections of this chapter. Standards 4.0, 4.1, and 4.7 are from Chapter 4 of the AERA, APA, & NCME (2014) *Standards*, "Test Design and Development." Each of these Standards and the way each Standard is addressed will be presented in this chapter. AERA, APA, & NCME (2014) Standard 4.0 states the following:

> Tests and testing programs should be designed and developed in a way that supports the validity of interpretations of the test scores for their intended uses. Test developers and publishers should document steps taken during the design and development process to provide evidence of fairness, reliability, and validity for intended uses for individuals in the intended examinee population. (85)

The purpose of this chapter is to document the test development process used for the MAP ELA, Mathematics, and Science tests. In this chapter, we describe steps taken to create the MAP tests, from the development of test specifications to the selection of operational forms. Section 3.1 of this chapter describes development of ELA and Mathematics tests, and Section 3.2 describes the process for Science test development.

3.1 Development of ELA and Mathematics Assessments

The first subsection of Section 3.1 describes DRC's item bank, from which MAP ELA and Mathematics items were selected. The remaining subsections describe the test development process for Missouri ELA and Mathematics tests.

3.1.1 Development of Items for DRC's Item Bank

In 2015, it was determined that Missouri DESE would license ELA and Mathematics items from DRC's college- and career-ready (CCR) item bank. These items would be used on the Spring 2016 and 2017 summative assessments. This section of the document provides a high-level overview of the development of the CCR item bank, from which MAP ELA and Mathematics items were selected.

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The CCR item bank contains nationally field tested items that support the next generation of standards and assessments. It is aligned to the CCR standards in Mathematics and English Language Arts in Grades 3 through 8.

Alignment to the CCR standards, grade-level appropriateness, depth of knowledge (DOK), item/task level of complexity, estimated difficulty level, relevancy of context, rationale for distractors, style, accuracy, and correct terminology were major considerations in the item development process. DRC's item development processes for the CCR item bank followed the *Standards for Educational and Psychological Testing* (AERA, APA, & NCME, 2014). DRC's item development work was and continues to be designed to produce reliable and instructionally valid tests that adhere to the guidelines articulated in the AERA, APA, & NCME (2014) *Standards*. In particular, the item development process discussed in this section is in compliance with the AERA, APA, & NCME (2014) Standard 4.7 stating the following:

> The procedures used to develop, review, and try out items and to select items from the item pool should be documented. (87)

Considerations of Test Fairness in Item Development

AERA, APA, & NCME (2014) Standard 3.2 is particularly relevant to fairness in item development:

> Test developers are responsible for developing tests that measure the intended construct and for minimizing the potential for tests' being affected by construct-irrelevant characteristics, such as linguistic, communicative, cognitive, cultural, physical, or other characteristics. (64)

DRC developed bias and sensitivity guidelines to help ensure that the items are fair for all groups of test takers, despite differences in characteristics, including, but not limited to, disability status, ethnic group, gender, regional background, native language, race, religion, sexual orientation, and socioeconomic status. DRC strongly relied on the bias and sensitivity guidelines in the development of the items and assessments, particularly in item writing and review. Items had to comply with the guidelines in order to be included in the assessments. DRC also commissioned an external item bias and fairness review. The external bias, fairness, and sensitivity reviewers included experts who had a vast array of experience in education that provided them with diverse perspectives. All reviewers were experienced in the review of passage sets and items in ELA and Mathematics for bias, fairness, and sensitivity issues.

Item Writing

DRC's CCR item development occurred from 2013 to 2015. DRC worked with qualified item writers throughout the test development cycle to develop items. The item writers were trained on DRC's CCR content specifications and item and stimulus specifications. In addition, DRC test development experts held regular meetings to provide direction and feedback to the item writers. Using an item development plan, the number and distribution of items to be written were specified for item writing teams. Pools of items were written to support a variety of item types and standards covered for future operational use.

To ensure that the items produced were sufficient in number and adequately distributed across subcategories and levels of difficulty, item writers were informed of the required quantities of

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items. An item authoring card was completed for each item. It contained information about the item, such as grade level, content category, and subcategories. Based on the item writer's classroom teaching experience, knowledge of the content area curriculum, and cognitive demands required by the item, estimates were recorded for level of cognitive complexity and difficulty level. Items were written to provide for a range of difficulty.

Item Writer Training

Item writers were selected and trained for the content areas of ELA and Mathematics. All DRC item writers were experienced writers, teachers, or former teachers who had broad specialized knowledge in the subject area of their expertise. Only qualified individuals, possessing both content expertise and good technical writing skills, were selected to write items for ELA and Mathematics. The qualifications DRC used to select item writers include the following:

- A bachelor's degree or higher in Reading, ELA, Mathematics, Curriculum and Instruction, and/or related fields.
- In-depth understanding and knowledge of the special considerations involving the following: the writing of standards-based multiple-choice items, including writing distractor rationales for each answer option; an understanding of DOK levels, estimated difficulty levels, grade-level appropriateness, readability, and bias considerations; the development of technology-enhanced and open-ended items, including developing item-specific scoring guidelines for each item; and the writing of unique, independent items for passages that do not clue each other
- Participation in the assessment-specific training workshop.

The writers were trained individually and had previous experience in writing selected-response, technology-enhanced, and constructed-response items. Prior to developing items for the CCR item bank, the item writers were trained with regard to the following:

- CCR standards (Mathematics and ELA)
- Webb's Four Levels of Cognitive Complexity: Recall, Basic Application of Skill/Concept, Strategic Thinking, and Extended Thinking
- General scoring guidelines for each content area
- Specific and general guidelines for item writing
- Bias, fairness, and sensitivity guidelines
- Principles of universal design
- Item quality technical style guidelines
- Reference information
- Sample items

Reading Passage Development

The task of writing passages was conducted by DRC content experts with classroom experience in Reading/Language Arts as well as experience in writing informational and literary passages. These content experts also underwent specialized training (provided by DRC) in the characteristics of acceptable passages. Guidelines for passage writing included appropriate length, text structure, density, and vocabulary for the grade level. A judgment was also made about whether the reading level required by a particular passage was at the independent level, that is, where the average student should be able to read 90% of words in the text independently. Passage writers were

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required to write a specified number of passages for each genre. In some cases, public domain passages were acquired to address authentic works. Approval to reprint was secured from the publishers as necessary. Passages underwent an internal review by several test development content editors who evaluated their merit with regard to the following criteria:

- Passages have interest value for students.
- Passages are grade appropriate in terms of text complexity, vocabulary, and language characteristics.
- Passages are free of bias, fairness, and sensitivity issues.
- Passages represent different cultures.
- Passages are from a variety of sources.
- Passages are able to stand the test of time.
- Passages are sufficiently rich to generate a variety of item types.
- Passages are complete with all necessary permissions documentation.
- Passages avoid dated subject matter unless a relevant historical context is provided.
- Passages should not require students to have extensive background knowledge in a certain discipline or area to understand a text.

After completion of the internal review process, the passages deemed potentially acceptable were reviewed by the external reviewers for content and bias, fairness, and sensitivity. The approved passages were then used on the field test.

Pilot Tests

The online pilot test administrations in Spring and Fall 2014 were designed to collect preliminary data to determine the quality of the item pool's content and format. The pilot tests were conducted on relatively small volunteer student samples. The Spring pilot included Mathematics items only and was conducted in Alaska. The Fall pilot included both ELA and Mathematics items and was conducted in the following states: Texas, Oregon, Montana, Nebraska, Arkansas, Wisconsin, Alabama, Vermont, Oklahoma, California, Ohio, New Hampshire, Minnesota, and South Dakota. The items were administered using a fully randomized design for each subject and grade. One of the main goals was to try out a variety of new technology-enhanced item types to determine the best use when assessing the ELA and Mathematics standards. The content and item specifications were adjusted after the pilot tests, prior to development of new items for the field tests.

Item Reviews

As part of the item construction process, each item was reviewed by content specialists and editors at DRC. Content specialists and editors evaluated each item to make sure that it measured the intended CCR standards. They also assessed each item for grade-level appropriateness and verified that the items had only one correct answer (multiple-choice and some technology-enhanced items). In addition, the difficulty level, DOK, graphics, language demand, and distractors were also evaluated. Other elements considered in this process included, but were not limited to, universal design, bias, grammar/punctuation, and CCR item bank style.

Upon completion of the internal reviews, DRC commissioned an external review for both content and bias. DRC utilized qualified professionals to provide a review of the CCR items. The external reviewers had a broad range of experience in the educational field. All of the reviewers had either bachelor-level, master-level, or doctoral-level degrees and teaching experience in their specific area

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of expertise. Their professional backgrounds included classroom teachers (i.e., regular education, special education, and gifted/talented education), curriculum specialists, content area instructional specialists, test development editors, university professors, state department of education ELA and Mathematics specialists, members of the Smarter Balanced Consortium Item Development Team, and disability rights advocates. The reviewers resided in various parts of the United States and were able to provide the national as well as regional perspective and understanding of the items.

The twelve ELA reviewers had backgrounds in at least one of the following fields: English; Reading; Writing; Curriculum; English as a Second Language (ESL), Teachers of English to Speakers of Other Languages; Talented and Gifted; Elementary, Middle, and Secondary Education; Collegiate Education; and Applied Linguistics. They represented all levels in the field of teaching from kindergarten through collegiate as well as teaching of talented and gifted, ESL, Title I, Chapter I, and special education students.

The ten Mathematics reviewers were current or former teachers that had a range of experiences in the field of education. All reviewers had experience teaching in K–12 classrooms, and more than half of them taught at the undergraduate and/or graduate level preparing future teachers, as well as providing professional development for current teachers. All reviewers had extensive experience with CCR standards.

The ten bias, fairness, and sensitivity reviewers were experienced in the review of passage sets and items in ELA and Mathematics for bias, fairness, and sensitivity issues. Their perspectives and experiences included knowledge of populations such as ELL, special education students, students with disabilities, highly capable students, and ethnically and culturally diverse populations.

Overall, the knowledge and educational experience of the item and passage writers as well as the item reviewers met the requirements of the following AERA, APA, & NCME (2014) standards:

Standard 3.1 Those responsible for test development, revision, and administration should design all steps of the testing process to promote valid score interpretations for intended score uses for the widest possible range of individuals and relevant subgroups in the intended population. (63)

Standard 3.2 Test developers are responsible for developing tests that measure the intended construct and for minimizing the potential for tests' being affected by construct-irrelevant characteristics, such as linguistic, communicative, cognitive, cultural, physical, or other characteristics. (64)

Field Test Selection and Administration

Based on the recommendations made by the external reviewers, DRC's test development content editors determined which items were to be included in DRC's final online field test administration, held from October 2015 to December 2015. The field test was conducted in the following states: Nebraska, Louisiana, Ohio, Texas, California, Michigan, Minnesota, Kentucky, Alabama, and Oregon. Between approximately 15 and 200 students responded to each item, depending on the grade level, content area, and item type. The major purposes of the field test were to administer a sufficiently large number of items that could be used in future summative assessments; to obtain initial item classical statistics and conduct differential item functioning (DIF) analyses to inform item data reviews; to evaluate the protocols for the test administration and computer delivery

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system (technology infrastructure); and to implement targeted test accommodations and elements of universal design. In total, over 5,000 items were field-tested for ELA and Mathematics across all grade levels.

Summary of Item Development

DRC's CCR item development occurred from 2013 to 2015. DRC worked with qualified item writers throughout the test development cycle to develop items and passages for ELA and items for Mathematics. In addition, DRC sought the expertise of external reviewers to ensure item quality. External reviewers, under DRC patronage, reviewed all CCR items and item stimuli for accessibility, bias, sensitivity, and content. (Item stimuli include the reading passages used on the ELA assessments and the figures and graphics used on the Mathematics assessments.) Prior to the Fall 2015 field test, twelve ELA experts, ten Mathematics experts, and ten bias, fairness, and sensitivity experts reviewed items for accessibility and bias and sensitivity. During the accessibility reviews, experts identified issues that could potentially negatively affect a student's ability to access stimuli and items. During the bias and sensitivity review, experts identified content in stimuli and items that could potentially unfairly affect a student's response because of his or her background. The content review focused on developmental appropriateness and alignment of stimuli and items to the CCR content specifications. The content review experts also checked the accuracy of the content, answer keys, and scoring materials. Items flagged for accessibility, bias and sensitivity, and/or other content concerns were either revised to address the issues identified by the experts or removed from the item pool. Items approved by external panels and DRC's internal content specialists became DRC's item bank and, after field testing, were used to select items for inclusion in the 2015–16 MAP ELA and Mathematics test forms. Table 3.1 shows the high-level sequence of the activities that occurred in the development of the CCR item bank.

Various item types were developed for inclusion in the CCR item pool. Descriptions of each item type (in alphabetical order) used in the CCR item bank are included in Table 3.2.

3.1.2 Content and Bias Review of Items Used in MAP

It was determined that the CCR item bank would be utilized to develop the operational MAP ELA and Mathematics assessments for Grades 3 through 8. Therefore, prior to the Spring 2016 operational testing, all CCR items that could potentially be used on the Missouri tests were submitted to Missouri content and bias committees for review. The committees consisted of Missouri educators from school districts throughout the state. The primary responsibility of the committee was to evaluate items with regard to quality and content classification, including grade-level appropriateness, estimated difficulty, and bias, fairness, and sensitivity issues. Due to the leasing agreement of the CCR items, the committee members were asked to note items as accepted without edits or rejected. The committee also reviewed the items for adherence to the principles of universal design, including language demand.

The content and bias reviews were held in Missouri from October 31 to November 2, 2016, for ELA and Mathematics. Committee members were recruited by DESE. The meetings commenced with a welcome by DESE and DRC, followed by an overview of the test development process by DESE. DESE, along with DRC, also provided training on the procedures and forms to be used for item content and bias review.

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The review facilitators were recruited by DESE and were assisted by representatives from DRC and DESE. Committee members, grouped by grade level and content area, worked through and reviewed the items for quality and content, as well as for the following properties:

- Missouri Learning Standard alignment
- Grade-level appropriateness
- DOK
- Correct answer
- Quality of distractors
- Appropriate language demand
- Freedom from bias and sensitivity
- Recommendation for use on the large-print accommodation form
- Recommendation for use on the Braille accommodation form

The members of the review groups were asked to reach a consensus to either accept or reject each item. Committee facilitators recorded the committee decision on the item review rating forms provided by DRC.

Security of materials included in the item review process was addressed by adhering to a strict set of procedures. Items in binders were distributed for committee review and signed for by each member on a daily basis. All attendees, with the exception of DESE staff, were required to sign a confidentiality agreement. All materials not in use at any time were stored in a locked room. Secure materials that did not need to be retained after the meetings were deposited in secure containers and shredded.

3.1.3 Test Specifications of MAP ELA and Mathematics

As stated in the previous section, the test content for the 2016 MAP operational test was provided through DRC's CCR item bank. Items administered for the 2016 MAP operational test were aligned with Missouri Learning Standards. Operational forms were selected based on MAP test blueprint specifications. The operational test forms developed for the Spring 2016 administrations were also administered with no changes in Spring 2017.

AERA, APA, & NCME (2014) Standard 4.1 states the following:

> Test specifications should describe the purpose(s) of the test, the definition of the construct or domain measured, the intended examinee population, and interpretations for intended uses. The specifications should include a rationale supporting the interpretations and uses of test results for the intended purpose(s). (85)

The purpose of the test is discussed in Chapter 2. The MAP ELA and Mathematics domains are generally defined as the knowledge and skills that are identified within the Missouri Learning Standards for ELA and Mathematics. The framework of Missouri Learning Standards, in turn, is based on prior consensus among DESE, Missouri educators, and experienced subject-matter experts that the framework represents what is important for teachers to teach and students to learn.

Evidence of validity based on test content includes information about the test specifications, including the test design and test blueprint. Test development involves creating a design framework

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from the statement of the construct to be measured. The primary consideration in the development of the MAP ELA and Mathematics test specifications was the assessment alignment with the Missouri Learning Standards. Constraints of the assessment program and the state policy decisions were also taken into consideration in development of the test specifications.

The MAP ELA and Mathematics test specifications consist of a test blueprint and a test design for each grade level and content area. In partnership with DRC, DESE created test blueprints and test designs that were parallel to the Smarter Balanced Assessment Consortium (SBAC) 2014–15 operational form blueprints and test designs. DRC's CCR item bank, which is aligned to the Common Core State Standards, was used to create the new test forms for the 2015–16 administration. For ELA and Mathematics, the test blueprints were finalized in December 2015. DRC and DESE content experts scrutinized each blueprint to ensure optimal content coverage and efficient use of time and resources. In general, the blueprints represent content sampling proportions that reflect intended emphasis in instruction and mastery at each grade level. The test specifications provide the number of items by strand, assessment focus, and item type in the desired proportions within test delivery constraints. The test designs for ELA and Mathematics were finalized in February 2016 by DESE and DRC. The same test designs were used for the operational test forms administered in Spring 2017 since it was determined the Spring 2016 forms would be reused with no changes in Spring 2017.

The key structural aspect of the MAP ELA and Mathematics tests is the test blueprint, which specifies the target score points for each content category or strand, as shown in Table 3.3. The blueprint represents the target weights for each strand decided upon by DESE in collaboration with DRC. Test design elements include number and types of items for each of the scores reported. The degree to which the 2017 MAP operational forms matched the test blueprint can be assessed by comparing the targeted score point distributions defined in the test blueprint in Table 3.3 with the actual point distributions displayed in Tables 3.4 and 3.5 for ELA and Tables 3.6 and 3.7 for Mathematics. Actual point distributions on the 2017 MAP operational forms matched blueprint targets within 10%, which was the tolerance for variation approved by DESE.

3.1.4 Standard and Content Specifications of MAP ELA and Mathematics

AERA, APA, & NCME (2014) Standard 4.12 states the following:

> Test developers should document the extent to which the content domain of a test represents the domain defined in the test specifications. (89)

The MAP item specifications are designed to ensure that the assessment items measure the assessment's domains. Indeed, the purpose of the item specifications is to define the characteristics of the items that will provide the evidence to support one or more domains. To do this, the item specifications delineate the types of evidence that should be elicited for each strand within a grade level. Then, they provide explicit guidance on how to write items in order to elicit the desired evidence.

In doing this, the item specifications provide guidance on how to measure the standards. The item specifications provide guidelines on how to create the items that are specific to each assessment domain, or strand. In ELA and Mathematics, item specifications describe the knowledge, skills, and

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processes being measured by each of the item types aligned to particular standards. These item specifications were developed for each grade level and standard in order to delineate the expectations of knowledge and skill measured by the items on the MAP tests at each grade.

Table 3.4 provides the distribution of items and points on the 2017 MAP ELA tests by strand, and Table 3.5 shows the distribution of points by assessment focus for ELA.

Table 3.6 provides the distribution of items and points on the 2017 MAP Mathematics tests by strand, and Table 3.7 shows the distribution of points by content category for Mathematics.

3.1.5 Alignment Study

The alignment study, conducted for DESE by the Wisconsin Center for Education and Research at the University of Wisconsin–Madison and reported in the *Missouri Department of Elementary & Secondary Education 2016 Alignment Study Report* (WCER, 2016), demonstrated the degree to which (a) the MAP test specifications captured the Missouri Learning Standards and (b) the items adequately represent the reporting categories/strands delineated in the test specifications. The study utilized the Survey of Enacted Curriculum methodology for conducting content and alignment analyses.

The alignment study discussed the three dimensions of alignment among elements of content: topic coverage, cognitive demand, and balance of representation. The results of the alignment study for ELA showed good alignment results for all measures and grades, except for balance of representation. Results for topic coverage and cognitive demand indicated strong alignment across measures and grades. The balance of representation measures was somewhat lower than the measures of topic coverage and cognitive demand. The alignment results for the Mathematics assessments revealed strong alignment results across all grades and especially high alignment results for topic coverage, indicating a large degree of alignment across all Mathematics topics.

The overall results of the study indicated that the MAP ELA and Mathematics summative tests met or exceeded the average degree of alignment the WCER has found across the many assessments they have analyzed. The analysis was completed with test blueprints and operational assessments that were administered in Spring 2016 and again in Spring 2017.

3.1.6 Operational Test Selection

The Missouri educator-approved portion of the DRC CCR item bank was used to select the ELA and Mathematics forms. MAP operational test item selections for the Spring 2016 summative assessment were performed October 19–23, 2015, by DESE and DRC. The DRC test development experts made initial selections, which were either approved or revised by DESE content specialists. The selection process followed criteria specified by DRC staff and approved by DESE. Since the items had not been field-tested with Missouri students, the selection criteria were based mainly on content requirements and included the following:

- Test length and item types adhered to the DESE-approved test design.
- Content coverage adhered to the DESE-approved test blueprint.
- Only items approved by Missouri educators during content and bias reviews were used in form selection.

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Figure 3.1 outlines the steps that were used to develop MAP ELA and Mathematics summative assessments.

3.2 Development of Science Assessments

In this section, we document the test development process used for the Science MAP, from the development of test specifications to the selection of operational forms.

3.2.1 Test Specifications

The purpose of the test is discussed in Chapter 2. The Science MAP domains are generally defined as the knowledge and skills identified within the Missouri Learning Standards and Grade-Level Expectations (GLEs) for Science. This framework, in turn, is based on prior consensus among DESE, Missouri educators, and experienced subject-matter experts that the framework represents what is important for teachers to teach and students to learn.

As stated in the previous section, evidence of validity based on test content includes information about the test specifications, including the test design and test blueprint. Test development involves creating a design framework from the statement of the construct to be measured. The Science MAP test specifications evolve from the tension between the constraints of the assessment program and the benefits sought from the examination of students. Many of the benefits sought are not scientific in nature, nor are many of the constraints; rather, they are policy considerations. The development of test specifications for Science adhered to the AERA, APA, & NCME (2014) Standard 4.1, cited in a previous section of this chapter.

The Science MAP test specifications consist of a test blueprint and a test design for Grades 5 and 8. DESE provided the test specifications for the 2015 MAP grade-level Science assessment for Grades 5 and 8 to Iowa Testing Programs (ITP). ITP used the test specifications to develop two forms at each grade level for administration in Spring 2015; these forms were also administered in Spring 2016 and in Spring 2017. All assessments were fixed forms.

The test blueprint specifies the target score points for each GLE Strand, as shown in Table 3.3. The blueprint represents a compromise among many constraints, including the target weights for each GLE recommended by DESE, availability of items from field testing, and results of multiple reviews by content specialists. Test design elements include such elements as number and types of items/tasks for each of the scores reported. The degree to which the 2017 Science MAP operational forms matched the test blueprint can be assessed by comparing the targeted score point distributions defined in the test blueprint with the actual point distributions displayed in Table 3.8. Actual point distributions on the 2017 Science MAP operational forms matched blueprint targets within 10%, which was the tolerance for variation approved by DESE.

3.2.2 Item Development

There was no new item development for the 2016–17 Science MAP, and, as stated in the previous section, the Spring 2017 forms were the same as the Spring 2016 forms. It is worth noting, however, that historically the MAP item development was conducted using well-established content development workflow processes and methodologies. These processes include editing items for

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both content and style, which includes multiple reviews of each question to ensure proper grammar, punctuation, and compliance with the established style. Clarity and fair access for all examinees also fall within the purview of the style reviews, which occurred at scheduled milestones within the overall test development process. The last field test of MAP Science items occurred during the 2008–09 test administration.

Past item development, reviews, and field testing processes were in compliance with the following AERA, APA, & NCME (2014) standards.

Standard 3.1 Those responsible for test development, revision, and administration should design all steps of the testing process to promote valid score interpretations for intended score uses for the widest possible range of individuals and relevant subgroups in the intended population. (63)

Standard 3.2 Test developers are responsible for developing tests that measure the intended construct and for minimizing the potential for tests' being affected by construct-irrelevant characteristics, such as linguistic, communicative, cognitive, cultural, physical, or other characteristics. (64)

Standard 4.7 The procedures used to develop, review, and try out items and to select items from the item pool should be documented. (87)

Detailed information on Science MAP item development, reviews, and field testing can be found in the *Missouri Assessment Program: Grade-Level Assessment Technical Report 2009* (https://dese.mo.gov/sites/default/files/2009-MAP-Technical-Report.pdf).

Selected-response (SR) items that were included in the 2017 Science tests were developed by ITP between years 2000 and 2005. At that time, the standard item development process employed by ITP involved both ITP content specialists and school teachers. ITP test development staff convened item-writing workshops and trained educators on sound item-writing practices. Using the content standards and test blueprint as a guide, educators drew upon their experiences in the classroom to write items that would be engaging to students and representative of current curriculum. ITP content experts, copyeditors, and test development experts then reviewed those items for content accuracy, adherence to item development guidelines, fairness, and universal design. The items were also copyedited for clarity of expression as well as grammar and spelling. Once the items were reviewed internally, ITP convened a panel of educators to evaluate the items. The educators reviewed the items for grade-level appropriateness, content relevance, and accuracy. The goal of the educator panels was to confirm that the items were appropriate for the intended students and content area. Items were then edited and refined by ITP test developers as necessary.

3.2.3 Item Review

The most recent content and bias review (CBR) of MAP Science items was conducted by McGraw-Hill Education CTB and American Institute for Research (AIR) in December 2013, during which items were evaluated for content, bias, and suitability for online administration. The participants verified each item's alignment to the Missouri Learning Standards by reviewing the GLE assignment. The accepted items became candidates for the next step in the process, the Science

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MAP online field test. The process of item review adhered to AERA, APA, & NCME (2014) Standard 3.2:

> Test developers are responsible for developing tests that measure the intended construct and for minimizing the potential for tests' being affected by construct-irrelevant characteristics, such as linguistic, communicative, cognitive, cultural, physical, or other characteristics. (64)

Items developed by ITP were reviewed by a panel of educators after item development and before field testing. The standard process of item review includes review for grade-level appropriateness, content relevance, and accuracy. The goal of the educator panels is to confirm that the items are appropriate for the intended students and content area. Items are then edited and refined by ITP test developers as necessary before field test administration.

3.2.4 Field Test Administration

This section of the report describes field testing and data analysis of items included in the 2016–17 Science assessments.

Online Field Test Administration and Data Analysis of MAP Items

The items approved by Missouri CBR committees became the basis for the formation of the first online field test forms administered in Spring 2014. Approximately 150 Science items, previously administered to Missouri students in paper-and-pencil administrations, were administered online to samples of Grade 5 and Grade 8 students.

The data analysis for the administered online Science items was conducted by CTB in Summer 2014. Classical item analysis included computation of *p*-values, computation of item-total test correlations, a distractor analysis for multiple-choice items, and evaluation of item omit rates. Items were calibrated using item response theory (IRT) methodology. The three-parameter logistic model for multiple-choice items and the two-parameter partial-credit model for constructed-response items were used to estimate item parameters (Bock & Aitkin, 1981; Thissen, 1982). The Stocking & Lord (1983) procedure was used to equate the administered online items to the operational test scales using a set of common items administered in the online field test and the paper-and-pencil operational assessments. In addition, to evaluate whether the items function differently for equally able members of different groups, DIF analysis was conducted for all items (Camilli & Shepard, 1994). The results of these data analyses were delivered to DESE for subsequent operational test form selection.

Field Test Administration of ITP Items

Items that were selected from the ITP item pool for inclusion in MAP Science assessments were not field-tested in Missouri prior to their operational use due to insufficient time between item selection and form development. These items were field-tested nationally between 2001 and 2005. A sample of Missouri students participated in the ITP national research studies conducted by ITP at that time.

3.2.5 Operational Test Selection

The MAP grade-level Science assessments for Grades 5 and 8 consist of three sessions. The first session contains constructed-response (CR) items, the second session contains SR items, and the third session contains a performance event. ITP assembled the operational forms for the 2014–15

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administration using the CR items and performance events provided by DESE. These items were field-tested online in Missouri in Spring 2014. ITP supplied the SR items that were field-tested nationally to ensure that they were grade-level appropriate.

Test forms were built from the pool of eligible items according to the test specifications. ITP development staff reviewed each test form to make certain that individual items on the forms were appropriate and error free. Educators and other content experts were convened to conduct another review of the test forms for content accuracy, fairness, and universal design. At this stage in the process, reviews focused not only on individual items but also on the content representativeness and statistical characteristics of the test as a whole. Note that SR items were worth one point each, CR items were worth two points each, and the value of items related to the performance event ranged from one to four points each.

The selection criteria were based on both content requirements and statistical criteria, including the following:

- Test length and item types match the DESE-approved test design.
- Content coverage matches the DESE-approved test blueprint.
- The following items are avoided, whenever possible:
    - p-value ≤ 0.10 or ≥ 0.90
    - Omit rates $\geq 5\%$
    - Poor Fit statistics (Q1)
    - Significant DIF statistics: If an item with DIF must be included for blueprint coverage, examine the item to determine whether any content reason exists for the DIF flag (sometimes items will demonstrate statistical bias but no content reason can be determined for the bias).

Once the test forms were constructed, the materials were submitted for another round of external reviews. Educators were recruited by ITP to evaluate the materials from a variety of perspectives, including appropriateness for the intended audience. In addition, experts were recruited to evaluate materials for perceived fairness and sensitivity concerns. Educators/reviewers were selected to represent various ethnic and racial groups, genders, and student subgroups such as English language learners, students with special needs, and students who are visually impaired.

Missouri educators reviewed the Science test forms after the form development was completed as part of the Science assessment alignment study conducted by a third party and described in the next section.

The test forms developed for the 2014–15 test administration were re-administered in Spring 2017 in the same online, Braille, and paper-pencil formats.

3.2.6 Alignment Study

AERA, APA, & NCME (2014) Standard 4.12 states the following:

> Test developers should document the extent to which the content domain of a test represents the domain defined in the test specifications. (89)

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The Science MAP assessed version 2.0 of the Missouri GLEs. Prior to selecting the operational tests, in compliance with Standard 4.12, CTB and DESE performed an in-depth comparison of the version 2.0 GLEs against the former version in place since 2006. This comparison was conducted beginning in early 2008 through the approval of the 2010–2013 MAP test specifications. The analysis included an alignment of the entire MAP item pool to the version 2.0 GLEs, which were reviewed and approved by DESE. The alignment study conducted by HumRRO indicated that there were some alignment deficiencies in the 2013 MAP test forms for Science, which was mainly attributed to a large number of GLEs at each grade level. Recommendations were made to broaden the scope of item development so more GLEs could be tested, to increase the cognitive complexity of new test items, and to reduce the number of Science GLEs so a greater proportion can be tested each year.

DESE followed these recommendations in development of the 2015 test forms. HumRRO was contracted again to review and analyze the alignment of the 2015 Science assessments for Grades 5 and 8 to the 2009 revision of the Missouri Learning Standards for Science. HumRRO convened two panels of Missouri educators to review the extent of the item alignment and to evaluate items on universal design characteristics, namely written content and figures/graphics as well as overall item quality. A total of sixteen Missouri educators (eight per grade) participated in the alignment study.

Following the reviews and examination of the item alignment, HumRRO analyzed the results using the Webb (2005) alignment method. Dr. Norman Webb developed a procedure to evaluate alignment of the assessment to the content standards using four statistics. These statistics indicate how well an assessment covers the content standards in terms of content breadth and depth. The alignment indicators include the following:

- Categorical concurrence—determines the degree of overall content coverage by the assessment for each content strand.
- Range-of-knowledge correspondence—indicates the specific content expectations (e.g., standard, benchmark) assessed within each strand.
- Balance-of-knowledge representation—provides a statistical index reflecting the distribution of assessed content within each strand (i.e., how evenly the content is assessed.)
- Depth-of-knowledge consistency—compares the cognitive complexity ratings of the items with the complexity ratings of each content standard.

The alignment evaluation involved a comparison of the 2015 MAP grade-level Science assessment to the Missouri Learning Standards. The content alignment evaluation involved a review by current and recently retired Missouri educators highly familiar with the content standards and the assessment.

The results of the independent alignment review provided generally positive support for the content-related validity of the MAP grade-level Science assessment based on several outcomes. First, panelists found that the included items assessed a level of cognitive complexity that was at or above the cognitive complexity level of the GLE associated with each item for both forms. Second, items were distributed evenly over content expectations. Additional analyses found that the Science items do measure the intended content and that panelists' levels indicate that almost all the items in each strand assess students at the appropriate cognitive complexity (using Webb's DOK levels). These results demonstrate that the forms are properly aligned with the Missouri Learning Standards and

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that the items on the forms reflect a balanced representation of the standards at a level of complexity appropriate for the grade.

However, it should be noted that due to the Science MAP assessments being grade-span assessments (i.e., the GLEs from three grade levels and not just one were included in the assessment), the range-of-knowledge results imply a restricted range of content assessed by the assessments. These findings stem from more GLEs than items being available for the assessment. This is a direct result of the Science assessments being grade-span assessments and the way in which the Webb indicators do not account for the state's intentions/emphasis of content, particularly for a grade-span assessment (HumRRO, 2014).

3.3 Universal Design

Grade-level assessments that are universally designed allow participation of the widest possible range of students, resulting in more valid inferences about students' performance. Universally designed grade-level assessments may reduce the need for accommodations by reducing or eliminating access barriers associated with the tests themselves. Table 3.9 presents the elements of universal design (Thompson & Thurlow, 2002). The elements of universal design are relevant to both item development and form construction. This section addresses how the elements of universal design were addressed in the construction of the ELA, Mathematics, and Science test forms in compliance with AERA, APA, & NCME (2014) Standard 3.1, which states the following:

> Those responsible for test development, revision, and administration should design all steps of the testing process to promote valid score interpretations for intended score uses for the widest possible range of individuals and relevant subgroups in the intended population. (63)

A goal of universal design is to measure the performance of students with a wide range of abilities and skill, ensuring that students with diverse learning needs receive opportunities to demonstrate competence on the same content. To accommodate the greatest number of students for the MAP tests, the assessments include simple, clear, and intuitive instructions and procedures; maximum readability and comprehensibility; and maximum legibility. These design components are addressed primarily through the physical layout and formatting of the print test books and through the web formatting of the online test forms. The page specifications define how directions and test items are placed on the pages, the location and appearance of headers and footers, spacing between an item stem and answer choices, and other page elements to ensure a consistent, legible appearance of printed test books and online test forms. Written instructions at the beginning of each test session are clearly and simply stated, and the wording of such instructions is standardized as much as possible across content areas and grade levels to ensure clarity and consistency.

3.4 Accommodations

AERA, APA, & NCME (2014) Standard 3.9 states the following:

> Test developers and/or test users are responsible for developing and providing test accommodations, when appropriate and feasible, to remove construct-irrelevant barriers that otherwise would interfere with examinees' ability to demonstrate their standing on the target constructs. (67)

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Students with disabilities or ELL students may be provided with test administration accommodation(s) based on their Individualized Education Plan (IEP). More information on accommodations can be found in Section 4.4.2 of Chapter 4. Accommodation code definitions can be found in the *Test Coordinator's Manual* and in the *Examiner's Manual* presented in Appendices A and B, respectively.

Braille and large-print test versions were constructed for each grade/content area to enable students who are blind or visually impaired to participate in the MAP testing. Braille and large-print forms for ELA and Mathematics content areas contained the same items as regular operational online test forms. For Science, Braille and large-print forms contained the same items as one of the regular operational online test forms (Form A). Specific recommendations on how to transcribe items into Braille were provided by an independent Braille expert who collaborated with the Braille publisher to produce the Braille version of the MAP and teacher's notes that accompany the Braille forms. DESE conducted a review meeting with a committee of Missouri teachers in February 2015 to ensure that both the Braille and large-print versions of the 2017 Science MAP assessment would be accessible to Missouri's blind or visually impaired students. A similar review was conducted for ELA and Mathematics Braille and large-print test forms in February 2016. DESE and the teacher committee made recommendations, as needed, for how to further revise the transcription to best serve the needs of blind or visually impaired students.

While the goal is to maximize the number of items on the Braille form, it is not always possible to transcribe all items into Braille because some items represent concepts that are simply not appropriate for students who take the Braille form. In Science, it was necessary to omit one item from the Grade 5 Braille version due to excessive difficulty associated with the Braille transcription. Table 3.10 provides information on the item that was omitted from the 2017 Braille form. No items were omitted from the Braille or large-print version of ELA and Mathematics tests.

3.5 Summary

In summary, the overall purpose of this chapter is to explicate the procedures used in the development of the MAP assessments. The efforts in developing the MAP are in alignment with multiple best practices of the test industry and support the following AERA, APA, & NCME (2014) standards:

- Standard 3.1—Those responsible for test development, revision, and administration should design all steps of the testing process to promote valid score interpretations for intended score uses for the widest possible range of individuals and relevant subgroups in the intended population.
- Standard 3.2—Test developers are responsible for developing tests that measure the intended construct and for minimizing the potential for tests' being affected by construct-irrelevant characteristics, such as linguistic, communicative, cognitive, cultural, physical, or other characteristics.
- Standard 3.9—Test developers and/or test users are responsible for developing and providing test accommodations, when appropriate and feasible, to remove construct-irrelevant barriers that otherwise would interfere with examinees' ability to demonstrate their standing on the target constructs.

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- Standard 4.0—Tests and testing programs should be designed and developed in a way that supports the validity of interpretations of the test scores for their intended uses. Test developers and publishers should document steps taken during the design and development process to provide evidence of fairness, reliability, and validity for intended uses for individuals in the intended examinee population.
- Standard 4.1—Test specifications should describe the purpose(s) of the test, the definition of the construct or domain measured, the intended examinee population, and interpretations for intended uses. The specifications should include a rationale supporting the interpretations and uses of test results for the intended purpose(s).
- Standard 4.7—The procedures used to develop, review, and try out items and to select items from the item pool should be documented.
- Standard 4.12—Test developers should document the extent to which the content domain of test represents the domain defined in the test specifications.

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Table 3.1: College- and Career-Ready Item Bank Development Activities

College- and Career-Ready Item Bank Development Activities
Establish item/passage development specifications and style guides, and prepare item writing training manuals.
Determine item development plans.
Train item writers and/or passage developers in the project requirements and specifications.
Develop passages and write items.
Review, edit, code, and track items and produce graphics.
Produce review forms for content and bias/fairness/sensitivity reviews by external reviewers.
Modify items based on external reviewers' recommendations.
Review and approve field test ready items and passages.
Develop field test forms and administer field test.
Review field test item data.
Approve items to be included in the item bank.

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Table 3.2: College- and Career-Ready Item Types

Item Type	Name	Description
EBSR	Evidence-Based Selected Response	Each evidence-based selected-response item has two parts, and each two-part item is designed to elicit an evidence-based response from a student who has read a literature text passage, an informational text passage, or a writing concept. In part one, which is similar to a multiple-choice item, the student analyzes a passage or writing concept and chooses the best answer from four response options. In part two, the student elicits evidence from the passage or writing concept to select one or more answers based on the response to part one. Each of these items is worth one point.
MC	Multiple Choice	Each multiple-choice item has four response options, only one of which is correct. Multiple-choice items are used to assess a variety of skill levels, from short-term recall of information to inference and problem solving. Each of these items is worth one point.
MS	Multiple Select	Each multiple-select item requires a student to evaluate information presented and respond by choosing two or more correct responses. Multiple-select items can be used to assess multiple skills and concepts in both mathematics and English language arts. Each of these items is worth one point.
SA	Short Answer	Each short-answer item requires a student to enter a short numeric or algebraic response. These items are designed to assess a student's ability to formulate a solution to a pure or applied mathematics problem without the assistance of response options. The short-answer items are scored on a 0–1-point scale using item-specific autoscoring rules.
SCR	Short Constructed Response	Each short-constructed-response item is designed to address writing through a short response as opposed to an essay. It assesses writing skills in ways a multiple-choice item cannot. The short-constructed-response items are scored on a 0–2-point scale using item-specific scoring rubric.
TE	Technology Enhanced	Each technology-enhanced item is designed to elicit evidence of a broad range of student understanding. A student interacts with the enhanced features of these computer-delivered, autoscoreable test items to show understanding of skills and concepts. Item types such as drag-and-drop, hot-spot, number line and coordinate graphing, data displays, matching interaction, and drop-down menus are just some of the technology-enhanced items presented to a student. The technology-enhanced items are scored on a 0–1-point scale using item-specific scoring rules.
WP	Writing Prompt	Each writing-prompt is designed to assess the student's ability to write an on-demand essay response to a mode-specific task. A student demonstrates his/her writing skills by producing a narrative, informative/expository, or opinion/argumentative essay. The writing prompts are scored using a three-trait holistic rubric for a total of 10 points. The rubric traits include: purpose/organization (1–4 points), development/elaboration (1–4 points), and conventions (1–2 points).

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Table 3.3: 2017 MAP Test Blueprint: Target Score Points by Strand

Content Area	Grade					
Strand	**3**	**4**	**5**	**6**	**7**	**8**
English Language Arts						
Reading Literary and Informational	20	20	20	20	20	20
Writing	16	16	22	16	16	22
Research	8	8	8	8	8	8
Listening	8	8	8	8	8	8
Mathematics						
Operations and Algebraic Thinking	15	10	6			
Numbers and Operations in Base Ten	6	8	8			
Numbers and Operations - Fractions	7	12	16			
Measurement and Data	10	8	7			
Geometry	4	4	5	6	7	11
Ratios and Proportional Relationships				6	10	
The Number System				13	8	4
Expressions and Equations				15	13	15
Statistics and Probability				6	8	6
Functions						10
Science						
Matter and Energy			8			8
Force and Motion			6			5
Characteristics of Living Organisms			6			6
Interactions of Organisms			7			5
Earth Systems			7			8
The Universe			6			6
Scientific Inquiry			15			17
Science, Technology, and Human Activity			5			5

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Table 3.4: MAP 2017 Strand Item/Point Distributions: English Language Arts

Grade	Strand	SR/TE Items	WP Items	Total Items	SR/TE Points	WP Points	Total Points	% of Total Points
3	Reading Literary and Informational	20		20	20		20	38%
	Writing	16		16	16		16	31%
	Research	8		8	8		8	15%
	Listening	8		8	8		8	15%
	Total	52	0	52	52	0	52	100%
4	Reading Literary and Informational	20		20	20		20	38%
	Writing	16		16	16		16	31%
	Research	8		8	8		8	15%
	Listening	8		8	8		8	15%
	Total	52	0	52	52	0	52	100%
5	Reading Literary and Informational	20		20	20		20	34%
	Writing	12	1	13	12	10	22	38%
	Research	8		8	8		8	14%
	Listening	8		8	8		8	14%
	Total	48	1	49	48	10	58	100%
6	Reading Literary and Informational	20		20	20		20	38%
	Writing	16		16	16		16	31%
	Research	8		8	8		8	15%
	Listening	8		8	8		8	15%
	Total	52	0	52	52	0	52	100%
7	Reading Literary and Informational	20		20	20		20	38%
	Writing	16		16	16		16	31%
	Research	8		8	8		8	15%
	Listening	8		8	8		8	15%
	Total	52	0	52	52	0	52	100%
8	Reading Literary and Informational	20		20	20		20	34%
	Writing	12	1	13	12	10	22	38%
	Research	8		8	8		8	14%
	Listening	8		8	8		8	14%
	Total	48	1	49	48	10	58	100%

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Table 3.5: MAP 2017 Assessment Focus Point Distributions: English Language Arts

English Language Arts Grades 3–5					
Strand	**Content Category**	**Assessment Focus**	**Total Points**		
			Grade 3	**Grade 4**	**Grade 5**
Reading	Apply reading skills to literary texts	Key Ideas and Details	5	7	4
		Craft and Structure	5	3	4
		Integration of Knowledge and Ideas	0	0	2
	Apply reading skills to informational texts	Key Ideas and Details	5	5	5
		Craft and Structure	3	3	1
		Integration of Knowledge and Ideas	2	2	4
Writing	Demonstrate the ability to produce and examine writing	Text Types and Purposes	8	8	10
		Production and Distribution	8	8	12
Research	Demonstrate the ability to conduct research	Research to Build and Present Knowledge	8	8	8
Speaking and Listening	Demonstrate the ability to evaluate spoken material	Comprehension and Collaboration	8	8	8

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Table 3.5: MAP 2017 Assessment Focus Point Distributions: English Language Arts (cont.)

English Language Arts Grades 6–8					
Strand	**Content Category**	**Assessment Focus**	**Total Points**		
			Grade 6	**Grade 7**	**Grade 8**
Reading	Apply reading skills to literary texts	Key Ideas and Details	5	3	4
		Craft and Structure	3	3	3
		Integration of Knowledge and Ideas	0	2	1
	Apply reading skills to informational texts	Key Ideas and Details	3	5	5
		Craft and Structure	5	6	3
		Integration of Knowledge and Ideas	4	1	4
Writing	Demonstrate the ability to produce and examine writing	Text Types and Purposes	8	8	10
		Production and Distribution	8	8	12
Research	Demonstrate the ability to conduct research	Research to Build and Present Knowledge	8	8	8
Speaking and Listening	Demonstrate the ability to evaluate spoken material	Comprehension and Collaboration	8	8	8

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Table 3.6: MAP 2017 Strand Item/Point Distributions: Mathematics

Grade	Strand	MC/MS Items & Points*	Auto-scored CR Items & Points*	Total Items & Points*	% of Total Points
3	Operations and Algebraic Thinking	13	2	15	36%
	Numbers and Operations in Base Ten	4	2	6	14%
	Numbers and Operations - Fractions	6	1	7	17%
	Measurement and Data	8	2	10	24%
	Geometry	3	1	4	10%
	Total	34	8	42	100%
4	Operations and Algebraic Thinking	9	1	10	24%
	Numbers and Operations in Base Ten	4	4	8	19%
	Numbers and Operations - Fractions	11	1	12	29%
	Measurement and Data	6	2	8	19%
	Geometry	3	1	4	10%
	Total	33	9	42	100%
5	Operations and Algebraic Thinking	5	1	6	14%
	Numbers and Operations in Base Ten	6	2	8	19%
	Numbers and Operations - Fractions	10	6	16	38%
	Measurement and Data	5	2	7	17%
	Geometry	5	0	5	12%
	Total	31	11	42	100%
6	Ratios and Proportional Relationships	4	2	6	13%
	The Number System	9	4	13	28%
	Expressions and Equations	13	2	15	33%
	Geometry	4	2	6	13%
	Statistics and Probability	6	0	6	13%
	Total	36	10	46	100%
7	Ratios and Proportional Relationships	8	2	10	22%
	The Number System	6	2	8	17%
	Expressions and Equations	12	1	13	28%
	Geometry	4	3	7	15%
	Statistics and Probability	7	1	8	17%
	Total	37	9	46	100%
8	The Number System	2	2	4	9%
	Expressions and Equations	11	4	15	33%
	Functions	8	2	10	22%
	Geometry	10	1	11	24%
	Statistics and Probability	6	0	6	13%
	Total	37	9	46	100%

*Note: All Mathematics items were worth 1 point in the MAP 2016 assessment.

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Table 3.7: MAP 2017 Content Category Point Distributions: Mathematics

Mathematics Grade 3		
Strand	**Content Category**	**Total Points**
Operations and Algebraic Thinking	Represent and solve problems involving multiplication and division	5
	Understand properties of multiplication and the relationship between multiplication and division	4
	Multiply and divide within 100	2
	Solve problems involving the four operations, and identify and explain patterns in arithmetic	4
Numbers and Operations in Base Ten	Use place value understanding and properties of operations to perform multi-digit arithmetic	6
Numbers and Operations - Fractions	Develop understanding of fractions as numbers	7
Measurement and Data	Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects	3
	Represent and interpret data	2
	Geometric measurement: understand concepts of area and relate area to multiplication and to addition	3
	Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures	2
Geometry	Reason with shapes and their attributes	4

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Table 3.7: MAP 2017 Content Category Point Distributions: Mathematics (cont.)

Mathematics Grade 4		
Strand	**Content Category**	**Total Points**
Operations and Algebraic Thinking	Use the four operations with whole numbers to solve problems	5
	Gain familiarity with factors and multiples	2
	Generate and analyze patterns	3
Numbers and Operations in Base Ten	Generalize place value understanding for multi-digit whole numbers	3
	Use place value understanding and properties of operations to perform multi-digit arithmetic	5
Numbers and Operations - Fractions	Extend understanding of fraction equivalents and ordering	3
	Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers	4
	Understand decimal notation for fractions, and compare decimal fractions	5
Measurement and Data	Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit	3
	Represent and interpret data	2
	Geometric measurement: understand concepts of angle and measure angles	3
Geometry	Draw and identify lines and angles, and classify shapes by properties of their lines and angles	4

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Table 3.7: MAP 2017 Content Category Point Distributions: Mathematics (cont.)

Mathematics Grade 5		
Strand	**Content Category**	**Total Points**
Operations and Algebraic Thinking	Write and interpret numerical expressions	4
	Analyze patterns and relationships	2
Numbers and Operations in Base Ten	Understand the place value system	4
	Perform operations with multi-digit whole numbers and with decimals to hundredths	4
Numbers and Operations - Fractions	Use equivalent fractions as a strategy to add and subtract fractions	6
	Apply and extend previous understandings of multiplication and division to multiply and divide fractions	10
Measurement and Data	Convert like measurement units within a given measurement system	2
	Represent and interpret data	2
	Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition	3
Geometry	Graph points on the coordinate plane to solve real-world and mathematical problems	3
	Classify two-dimensional figures into categories based on their properties	2

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Table 3.7: MAP 2017 Content Category Point Distributions: Mathematics (cont.)

Mathematics Grade 6		
Strand	**Content Category**	**Total Points**
Ratios and Proportional Relationships	Understand ratio concepts and use ratio reasoning to solve problems	6
The Number System	Apply and extend previous understandings of multiplication and division to divide fractions by fractions	2
	Compute fluently with multi-digit numbers and find common factors and multiples	5
	Apply and extend previous understandings of numbers to the system of rational numbers	6
Expressions and Equations	Apply and extend previous understandings of arithmetic to algebraic expressions	6
	Reason about and solve one-variable equations and inequalities	7
	Represent and analyze quantitative relationships between dependent and independent variables	2
Geometry	Solve real-world and mathematical problems involving area, surface area, and volume	6
Statistics and Probability	Develop understanding of statistical variability	3
	Summarize and describe distributions	3

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Table 3.7: MAP 2017 Content Category Point Distributions: Mathematics (cont.)

Mathematics Grade 7		
Strand	**Content Category**	**Total Points**
Ratios and Proportional Relationships	Analyze proportional relationships and use them to solve real-world and mathematical problems	10
The Number System	Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers	8
Expressions and Equations	Use properties of operations to generate equivalent expressions	5
	Solve real-life and mathematical problems using numerical and algebraic expressions and equations	8
Geometry	Draw, construct and describe geometrical figures and describe the relationships between them	2
	Solve real-life and mathematical problems involving angle measure, area, surface area, and volume	5
Statistics and Probability	Use random sampling to draw inferences about a population	2
	Draw informal comparative inferences about two populations	2
	Investigate chance processes and develop, use, and evaluate probability models	4

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Table 3.7: MAP 2017 Content Category Point Distributions: Mathematics (cont.)

Mathematics Grade 8		
Strand	**Content Category**	**Total Points**
The Number System	Know that there are numbers that are not rational, and approximate them by rational numbers	4
Expressions and Equations	Work with radicals and integer exponents	6
	Understand the connections between proportional relationships, lines, and linear equations	5
	Analyze and solve linear equations and pairs of simultaneous linear equations	4
Functions	Define, evaluate, and compare functions	5
	Use functions to model relationships between quantities	5
Geometry	Understand congruence and similarity using physical models, transparencies, or geometry software	6
	Understand and apply the Pythagorean Theorem	2
	Solve real-world and mathematical problems involving volume of cylinders, cones and spheres	3
Statistics and Probability	Investigate patterns of association in bivariate data	6

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Table 3.8: Science MAP 2017 GLE Strand, Item Type, and Point Distributions

Grade	GLE Strand	SR Items	CR Items	Total Items	SR Points	CR Points	Total Points	% of Total Points
5	Matter and Energy	3	2	5	3	4	7	12%
	Force and Motion	1	2	3	1	4	5	8%
	Characteristics of Living Organisms	3	2	5	3	4	7	12%
	Interactions of Organisms	5	2	7	5	4	9	15%
	Earth Systems	4	2	6	4	4	8	13%
	The Universe	2	2	4	2	4	6	10%
	Scientific Inquiry		9	9		14	14	23%
	Science, Technology, and Human Activity		2	2		4	4	7%
	Total	18	23	41	18	42	60	100%
8	Matter and Energy	4	2	6	4	4	8	13%
	Force and Motion		2	2		4	4	7%
	Characteristics of Living Organisms	2	2	4	2	4	6	10%
	Interactions of Organisms	2	2	4	2	4	6	10%
	Earth Systems	5	2	7	5	4	9	15%
	The Universe	2	2	4	2	4	6	10%
	Scientific Inquiry		9	9		17	17	28%
	Science, Technology, and Human Activity	1	2	3	1	4	5	8%
	Total	16	23	39	16	45	61	100%

Note: Data in this table reflect item and point distribution for one test form in each grade. Item number or point distribution per GLE strand may vary slightly across test forms in a given grade, but all forms are aligned with the test blueprint.

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Table 3.9: Elements of Universal Design

Element	Explanation
Inclusive Assessment Population	Tests designed for state, district, or school accountability must include every student except those in the alternate assessment, and this is reflected in assessment design and field testing procedures.
Precisely Defined Constructs	The specific constructs tested must be clearly defined so that all construct-irrelevant cognitive, sensory, emotional, and physical barriers can be removed.
Accessible, Non-Biased Items	Accessibility is built into items from the beginning, and bias review procedures ensure that quality is retained in all items.
Amenable to Accommodations	The test design facilitates the use of needed accommodations.
Simple, Clear, and Intuitive Instructions and Procedures	All instructions and procedures are simple, clear, and presented in understandable language.
Maximum Readability and Comprehensibility	Readability and plain language guidelines are followed (e.g., sentence length and number of difficult words are kept to a minimum) to produce readable and comprehensible text.
Maximum Legibility	Characteristics that ensure easy decipherability are applied to text, tables, figures, illustrations, and response formats.

Table 3.10: Item Omitted from the MAP Spring 2017 Braille Version

Grade	Content Area	Type	Session	Item
5	Science	CR	3	2

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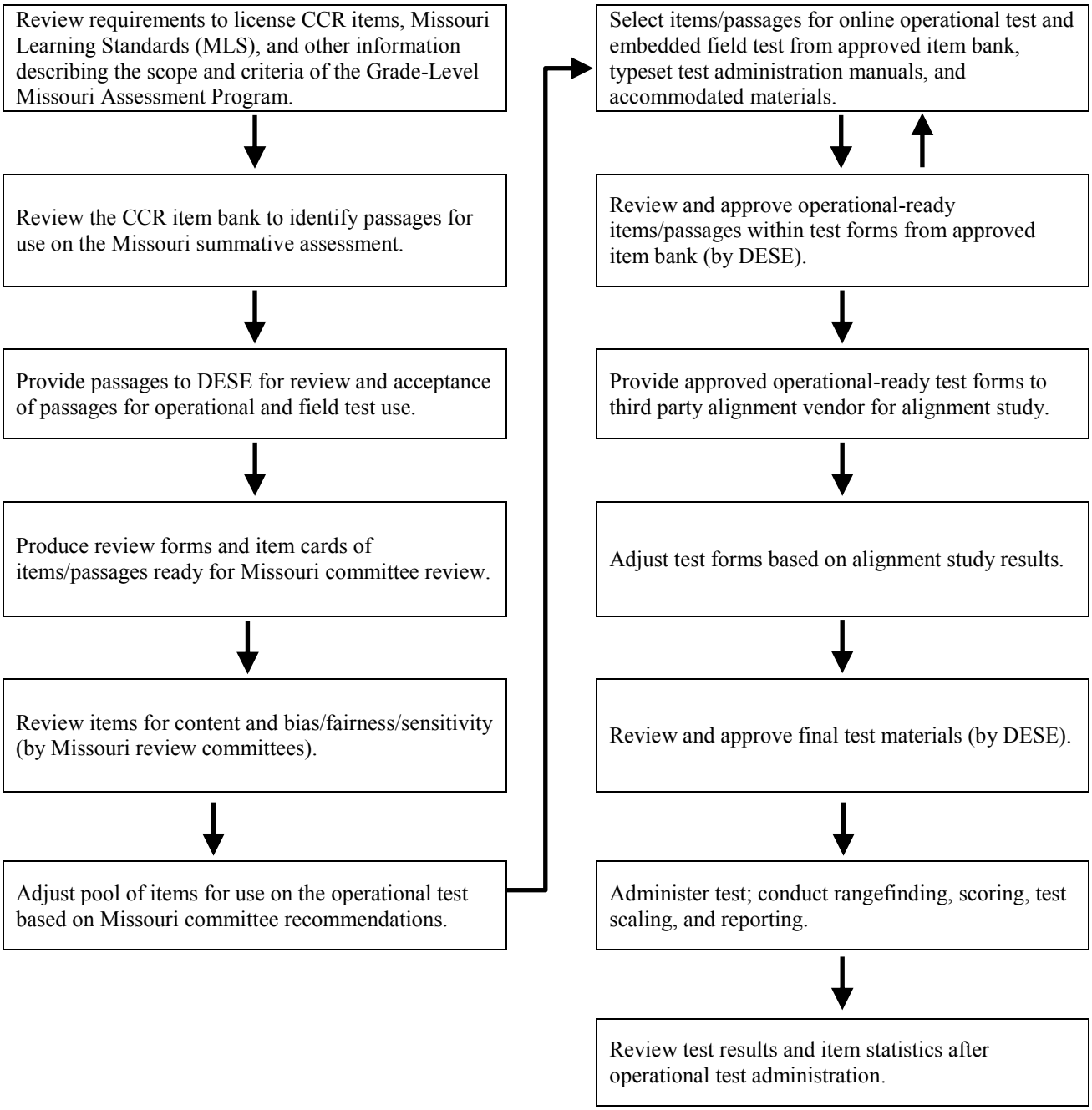
Figure 3.1: Operational Test Development



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CHAPTER 4: TEST ADMINISTRATION

Chapter 4 of the Technical Report describes the processes and activities implemented and information disseminated to help ensure standardized test administration procedures and, thus, uniform test administration conditions for students. According to the AERA, APA, & NCME *Standards* (2014), "The usefulness and interpretability of test scores require that a test be administered and scored according to the developer's instructions" (111). Chapter 4 examines how test administration procedures implemented for the MAP strengthen and support the intended score interpretations and reduce construct-irrelevant variance that could threaten the validity of score interpretations.

Chapter 4 demonstrates adherence to AERA, APA, & NCME (2014) Standards 4.15, 4.16, 6.1, 6.2, 6.4, 6.6, and 6.7 in the ELA and Mathematics MAP. Each standard will be explicated within the relevant section of this chapter.

4.1 Training of Districts

To ensure that the MAP's Grade-Level Assessments are administered and scored in accordance with DESE's mandates, DESE takes a primary role in communicating with and training district personnel. The development of the Grade-Level Assessments is a collaborative effort between DESE and DRC. DESE conveys to districts the purpose of the Grade-Level Assessments and the importance of test administration being consistent with test industry standards. The tests and the consistent standards of administration must also meet the State Board of Education policies and the mandates of both state and federal legislation.

To accomplish these goals, DESE provides train-the-trainer opportunities for the District Test Coordinators, who, in turn, convey test administration training to schools within their districts. DESE conducts quality assurance visits during testing to ensure district adherence to the standardized administration of the tests.

The District Test Coordinators are responsible for the schools within their districts. They disseminate information to each school, offer assistance with test administration, and serve as the liaisons between DESE and their districts. DESE also provides assistance with and interpretation of Grade-Level Assessment data and test results.

DESE's Assistant Director of Assessment trained the District Test Coordinators in the following components of Grade-Level Assessment administration: the *Test Coordinator's Manual*, the *Examiner's Manual*, the dates for testing, appropriate protocols for test administration and security, guidance on the timing and administration of tests, and changes made to the test since the last administration in Spring 2016.

During the recorded webinar for the Test Coordinator training, the Assistant Director of Assessment walked the District Test Coordinators and other DESE staff through an annotated version of the *Test Coordinator's Manual.* The District Test Coordinators, in turn, used this information to train staff within their districts.

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4.2 Ancillary Materials

Test administration ancillary materials for the MAP contribute to the body of evidence of the validity of score interpretation. This section examines how the test materials address the AERA, APA, & NCME (2014) *Standards* related to test administration procedures.

For the Spring 2017 test administration, DRC produced two types of administration manuals: the *Test Coordinator's Manual* and the *Examiner's Manual* (presented in Appendix A and Appendix B, respectively). DESE Curriculum and Assessment staff review, provide feedback on, and give final approval for each manual.

The *Test Coordinator's Manual* is common to all grades and content areas. It provides an overview of the MAP and any changes made to the MAP for 2017. It gives guidelines for testing, such as the inclusion of special populations, the use of translators, and the invalidation procedures. It also details the Test Coordinator's role in the testing process by outlining nine steps the Test Coordinator should follow. Information included in the *Test Coordinator's Manual* is listed below.

- 1.0 Overview of Important Information for the MAP Grade-Level Assessments
  - 1.1 This Test Coordinator's Manual
  - 1.2 Glossary of Terms
  - 1.3 About the Tests
  - 1.4 Schedule of Important Dates for Spring 2017
  - 1.5 Special Populations, Optional Populations, and Special Circumstances
- 2.0 Before Online Testing
  - 2.1 Advance Announcements and Preparation
  - 2.2 User Roles
  - 2.3 Test Security
  - 2.4 eDIRECT and INSIGHT
  - 2.5 Assessment Materials for Students/Administrators
- 3.0 After Online Testing
  - 3.1 Submitting All Tests/Close of Testing Window
  - 3.2 Reporting Test Invalidations
  - 3.3 How to Handle Student Absence
  - 3.4 Securely Destroy Materials
  - 3.5 Individual Student Reports
- 4.0 Large-Print, Braille, and Paper-and-Pencil Editions
  - 4.1 Before Testing
  - 4.2 After Testing

Appendix A: Handling Student Transfers and Changes in Testing Status
Appendix B: Test Timing Guidelines

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The *Examiner's Manual* is specific to each grade. The MAP *Examiner's Manual* also outlines steps that should be followed when administering the MAP. Information included in each *Examiner's Manual* is listed below:

- 1.0 Overview of Important Information for the MAP Grade-Level Assessments
  - 1.1 This Test Examiner's Manual
  - 1.2 Glossary of Terms
  - 1.3 About the Tests
  - 1.4 Test Administration Policies
  - 1.5 Scheduling the Tests
  - 1.6 Accommodations and Special Populations
  - 1.7 Online Tools Training and Tutorials
- 2.0 Before Online Testing
  - 2.1 Advance Announcements and Preparation
  - 2.2 User Roles
  - 2.3 Test Security
  - 2.4 Assessment Materials for Students/Administrators
- 3.0 During Online Testing
  - 3.1 Specific Administration Information
  - 3.2 Moving a Student During an Assessment
- 4.0 After Online Testing
  - 4.1 Reporting Test Invalidations
  - 4.2 How to Handle Student Absences
- 5.0 Large-Print, Braille, and Paper-and-Pencil Editions
  - 5.1 Before Testing
  - 5.2 During Testing
  - 5.3 After Testing

Appendix A: Item Types
Appendix B: INSIGHT Keyboard Shortcuts and Icons

This section presents the AERA, APA, & NCME (2014) standards relevant to test administration and how information in the MAP *Examiner's Manual* addresses these standards.

Standard 4.15 The directions for test administration should be presented with sufficient clarity so that it is possible for others to replicate the administration conditions under which the data on reliability, validity, and (where appropriate) norms were obtained. Allowable variations in administration procedures should be clearly described. The process for reviewing requests for additional testing variations should also be documented. (90)

The MAP *Examiner's Manual* provides instructions for before-, during-, and after-testing activities with sufficient detail and clarity to support reliable test administrations by qualified test administrators. To ensure uniform administration conditions throughout the state, instructions in the *Examiner's Manual* describe the following: general rules of online testing; pause rules; scheduling the tests; recommended order of test administration; classroom activity information; assessment duration, timing, and sequencing information; and the materials that the examiner and students need for testing.

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Standard 4.16 The instructions presented to test takers should contain sufficient detail so that test takers can respond to a task in the manner that the test developer intended. When appropriate, sample materials, practice or sample questions, criteria for scoring, and a representative item identified with each item format or major area in the test's specification or domain should be provided to the test takers prior to the administration of the test, or should be included in the testing material as part of the standard administration instructions. (90)

To ensure clarity of instructions to students, the manuals include scripts that the examiner is instructed to read verbatim to students. Examiners are instructed to follow the script and to repeat any part of the directions as many times as needed but to not modify the words used. Examiners may use professional judgment to respond to student questions, but they may not reword test items, suggest answers, or evaluate student work during the testing session. A sample of a script is presented in Figure 4.1.

Online Tools Training tutorials and practice tests are provided in each content area to familiarize students/users with the navigation of the online systems, functionality of the testing environment, and different item types. Districts have the following options for training students on interacting with the INSIGHT testing platform and using the tools contained within INSIGHT:

- Online Tools Training (OTT)—OTT gives students/users the ability to use the tools available in the INSIGHT testing platform on a variety of item types that will be used in the operational assessments. Using the OTT allows students/users to become comfortable with using the built-in system tools prior to the summative assessment. There is no limit to the amount of times a student/user can access the OTT.

- Online Tutorials—Online Tutorials give students/users the ability to watch recorded videos that demonstrate the features of INSIGHT and the tools that will be used for the operational assessments.

These options are made available several months in advance of the summative assessments.

Standard 6.1 Test administrators should follow carefully the standardized procedures for administration and scoring specified by the test developer and any instructions from the test user. (114)

To ensure the usefulness and interpretability of test scores and to minimize sources of construct-irrelevant variance, it is essential that the MAP is administered according to the prescribed test schedule. The *Test Coordinator's Manual* includes instructions for scheduling the test within the state testing window of April 3–May 26, 2017. The *Examiner's Manual*s contain the schedule for timing each test session and indicate whether timing is to be strictly enforced. The test timing schedule is presented in Table 4.1.

Standard 6.4 The testing environment should furnish reasonable comfort with minimal distractions to avoid construct-irrelevant variance. (116)

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Section 2.0 in the *Examiner's Manual* overviews the steps that teachers should take to prepare for computer-based testing for administering the MAP online test. These include the following:

- Determine the layout of the physical computer lab.
- Plan seating arrangements. Allow enough space between students to prevent the sharing of answers.
- Eliminate distractions such as bells or telephones.
- Use a Do Not Disturb sign on the door of the testing room.
- Make sure classroom maps, charts, and any other materials that relate to the content and processes of the test are covered, removed, or placed out of the students' view.

Standard 6.6 Reasonable efforts should be made to ensure the integrity of test scores by eliminating opportunities for test takers to attain scores by fraudulent or deceptive means. (116)

The *Examiner's Manual* and the *Test Coordinator's Manual* present instructions for post-test activities to ensure that online tests are submitted and printed test materials are handled properly, ensuring the integrity of student information and test scores. Detailed instructions guide test examiners in submitting all online test records. For students who are administered a large-print or Braille version of the MAP, examiners are instructed to transcribe students' responses from the large-print test or Braille test book into the online testing system (INSIGHT) exactly as they responded in the large-print or Braille test book.

Test administrators are expected to report testing concerns involving a wide range of improper activities that may occur during testing, including the following: copying and reviewing Grade-Level Assessment questions with students; cueing students during testing either verbally or with written materials on the classroom walls; cueing students nonverbally, such as tapping fingers or nodding the head; using a calculator on parts of the test where it is not allowed; allowing students to correct or complete answers after tests have been submitted; splitting sessions into two parts; ignoring the standardized directions in the online assessment; reading the ELA assessment to students; paraphrasing parts of the test to students; changing or completing (or allowing other school personnel to change or complete) student answers; allowing accommodations that are not written in the Individualized Education Program (IEP); allowing accommodations for students who do not have an IEP; allowing students to use dictionaries on parts of the Grade-Level Assessment other than the writing prompt; or defining terms on the test.

Testing concerns are gathered from school officials, students, parents, and other interested parties who call DESE to state their issues. A narrative of the conversation is written and read back to them. The superintendent of the district in which the allegation is made is then contacted and read the narrative. A letter is sent to confirm the conversation and to ask the superintendent to investigate the claim. A Quality Assurance—Grade-Level Assessment—Self-Monitoring Report is sent for the superintendent to use for replying to the allegation. A sample district report is shown in Figure 4.2.

Standard 6.7 Test users have the responsibility of protecting the security of test materials at all times. (117)

Throughout the manuals, Test Coordinators and examiners are reminded of test security requirements and procedures to maintain test security. Specific actions that are direct violations of

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test security are so noted. Detailed information about test security procedures are presented in Section 4.3.

4.2.1 Return Material Forms and Guidelines

The *Test Coordinator's Manual* instructs Test Coordinators in procedures for organizing and packing materials and returning them to DRC for secure inventory purposes. DESE Curriculum and Assessment staff have opportunities to review, provide feedback, and give final approval. The purpose of the instructions is to ensure that secure test materials are properly accounted for and organized properly for return shipment. Since the test is administered online except for special cases, only the large-print, Braille, and paper-and-pencil printed test books are packed and returned to DRC.

4.2.2 Security Forms

As soon as large-print and Braille test books are received by a district, the District Test Coordinator ensures that the first and last security barcodes on the tests match the packing list they received. The District Test Coordinator then packages the tests to be sent to schools. Upon returning test books to DRC, School and District Test Coordinators are required to complete and submit an electronic *Accountability Form* via DRC's eDIRECT portal. This form is pre-populated with the number of each material originally sent to each school. The Test Coordinators then enter the number of materials returned and provides space to districts/schools to document nonstandard situations, including lost, damaged, destroyed, extra, or missing test books. A sample *Accountability Form* is shown in Figure 4.3.

4.2.3 Interpretive Guides

Essential to making valid interpretations of test scores is an understanding of what the test scores mean and how to interpret score reports. The *Guide to Interpreting Results* is written for Missouri teachers and administrators who receive the MAP score reports from the 2017 administration. More detail about the guide can be found in Chapter 7.

4.3 Test Security Measures

Maintaining the security of all test materials is crucial to preventing the possibility of random or systematic errors, such as unauthorized exposure of test items that would affect the valid interpretation of test scores. Several test security measures are implemented for the MAP. Test security procedures are discussed throughout the *Examiner's Manual* and the *Test Coordinator's Manual*.

Test Coordinators and examiners are instructed to keep all test materials in locked storage, except during actual test administration, and access to secure materials must be restricted to authorized individuals only (e.g., test examiners and the School Test Coordinator). During the testing sessions, test examiners are directly responsible for the security of the MAP and must account for all test materials at all times. The test examiners must supervise the test administrations at all times.

With computer-based testing, test security is maintained by providing individual test tickets for student testing. Test tickets provide the secure login credentials (i.e., username and password) required for a student to use the testing software. Once students have started their tests, the test

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examiner is responsible for circulating through the room to ensure that all conditions of test security are maintained.

4.4 Test Administration

The 2017 test was administered to students within the state testing window of April 3–May 26, 2017. Schools and districts chose when and how to administer the MAP within this window. Each session within each content area of the MAP was required to be administered in one block of time.

4.4.1 Test Time

The MAP tests are not timed and sufficient time for students to attempt all items is provided. Nevertheless, the *Examiner's Manual*s provided examiners with timing guidelines for the assessments. For the MAP's sessions, examiners were instructed to allow students to complete the assessment if they were making adequate progress. The timing guidelines of the MAP are presented in Table 4.1. To verify the appropriateness of the timing guidelines, actual test time summaries were computed for MAP tests by test session, grade, and content. These summaries are presented in Tables 4.2 to 4.4 for ELA, Mathematics, and Science, respectively. The summaries include the number of students, mean and standard deviation of the session test time, and the session test times at selected percentiles. The number of students included in this analysis is lower than the total population of Missouri students who took the MAP tests. The records excluded from this analysis were the ones in which 1) the test time was not captured properly, and 2) the number of test log-ins was not equal to the number of test log-outs. Between 12% and 19% of the records were excluded for ELA, between 7% and 10% of the records were excluded for Mathematics, and between 7% and 9% of the records were excluded for Science. When the test time guidelines are compared to actual test times, it was observed that, for ELA and Science, at least 75% or more students completed all test sessions well within the suggested times. The exception was Science, Grade 5, Session 1, which was completed by at least 50% of students within the suggested time. ELA Sessions 3 and 4 and Science Sessions 2 and 3 were completed by at least 90% of students within the suggested times. For Mathematics, at least 50% of students completed Session 1 within the suggested times in all grades. Except for Grade 5, at least 75% of students completed Session 2 of the test within the suggested times. Mathematics Session 3 was completed by at least 90% of students in all grades within the suggested times. In addition, in each case, the mean session time was higher than the median (the 50th percentile) session time indicating a somewhat positively skewed distribution. The session time means are affected by extreme cases of students with very long times. The median is the midpoint of the frequency distribution of session time with an equal proportion of students (50%) falling above or below it. The median is not affected by the extreme values and accurately reflects the middle of the data set.

4.4.2 Universal Tools and Accommodations

Universal tools and accommodations are allowed on the MAP. These types of student aids are described below.

- Universal tools are available to all students based on student preference and selection. Some tools, such as a ruler and a digital notepad, are embedded in the online system, while others, such as a physical thesaurus and scratch paper, are external to the system. The availability of universal tools varies by item.

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- Accommodations are changes in procedures or materials that increase equitable access during the MAP Grade-Level Assessments. Assessment accommodations allow students to access assessment content to show what they know and can do. Accommodations are available for students with documented IEPs or 504 Plans and for students with limited English proficiency.

Accommodations may be used with students who qualify under the Individuals with Disabilities Education Act (IDEA) and have an IEP, who qualify under Section 504 of the Americans with Disabilities Act and have a Section 504 plan, or who are identified as English Language Learner (ELL) students. Accommodations must be specified in the qualifying student's individual plan and must be consistent with accommodations used during daily classroom instruction and testing. The use of any accommodation must be indicated on the student information sheet at the time of test administration. AERA, APA, & NCME (2014) Standard 6.2 states the following:

> When formal procedures have been established for requesting and receiving accommodations, test takers should be informed of these procedures in advance of testing. (115)

In compliance with this standard, the grade-specific MAP *Examiner's Manual* contains the list of universal tools and accommodations permissible for the MAP assessments. The table of tools and accommodations presented in the *Examiner's Manual* is shown in Tables 4.5 and 4.6. If a specific accommodation is not on the list of accommodations in the *Examiner's Manual,* the accommodation may still be permitted. However, for accountability purposes, there are some accommodations that will invalidate a student's test results, such as an oral administration of the ELA test or paraphrasing of any of the tests. Detailed information regarding testing accommodations can be found at the DESE website: http://dese.mo.gov/college-career-readiness/assessment.

Braille and large-print forms are provided for blind or visually impaired students.

Table 4.7 summarizes the numbers of reportable students for whom accommodations or universal tools were indicated by a teacher for the 2017 MAP. The analyses in Table 4.7 are based on reportable data and include only students who used universal tools or accommodations and received a scale score on the ELA, Mathematics, or Science MAP. It should be noted that additional ELA accommodations are available to students in Grades 6 through 8 only, resulting in an increased total number of students using ELA accommodations in these grades compared to the total number of students using ELA accommodations in Grades 3 through 5. For Mathematics, additional accommodations are available for Grades 4 through 8, resulting in an increased total number of students using Mathematics accommodations in these grades compared to the total number of students using Mathematics accommodations in Grade 3.

In 2017, the most commonly used accommodations were read aloud (text-to-speech or human reader) for ELA reading passages in Grades 6–8, calculator use for non-calculator allowed items in Grades 4–8 Mathematics, and multiplication table use in Grades 4–8 Mathematics. The separate setting and having the test read aloud (text-to-speech or human reader) were the most frequently used universal tools for all three assessments.

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4.5 Summary

In summary, the overall purpose of each of the test administration workshops and the ancillary materials is to keep districts informed about policies and procedures related to testing in general and the MAP in particular. The information imparted is clearly related to standardizing the administration of the MAP, maintaining the security of the assessment, allowing access to the assessments for special populations by clearly delineating appropriate universal tools or accommodations, and providing guidance on appropriate interpretations of the test results. These communication and training efforts by DESE and the ancillary information developed by DRC are in alignment with multiple best practices of the testing industry and support the following AERA, APA, & NCME (2014) standards:

- Standard 4.15—The directions for test administration should be presented with sufficient clarity so that it is possible for others to replicate the administration conditions under which the data on reliability, validity, and (where appropriate) norms were obtained. Allowable variations in administration procedures should be clearly described. The process for reviewing requests for additional testing variations should also be documented.
- Standard 4.16—The instructions presented to test takers should contain sufficient detail so that test takers can respond to a task in the manner that the test developer intended. When appropriate, sample materials, practice or sample questions, criteria for scoring, and a representative item identified with each item format or major area in the test's specification or domain should be provided to the test takers prior to the administration of the test, or should be included in the testing material as part of the standard administration instructions.
- Standard 6.1—Test administrators should follow carefully the standardized procedures for administration and scoring specified by the test developer and any instructions from the test user.
- Standard 6.2—When formal procedures have been established for requesting and receiving accommodations, test takers should be informed of these procedures in advance of testing.
- Standard 6.4—The testing environment should furnish reasonable comfort with minimal distractions to avoid construct-irrelevant variance.
- Standard 6.6—Reasonable efforts should be made to ensure the integrity of test scores by eliminating opportunities for test takers to attain scores by fraudulent or deceptive means.
- Standard 6.7—Test users have the responsibility of protecting the security of test materials at all times.

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Table 4.1: MAP Administration Schedule Timing Guidelines by Session

Grade	Session	English Language Arts	Mathematics	Science
3	1	45–80	35–50	
	2	30–50	35–50	
	3	20–40	15–30	
4	1	45–80	35–50	
	2	30–50	35–50	
	3	20–40	15–30	
5	1	45–80	35–50	45–55
	2	25–45	35–50	20–25
	3	20–40	15–30	45–65
	4	90–120		
6	1	45–80	35–45	
	2	30–50	45–60	
	3	20–40	25–30	
7	1	45–80	20–25	
	2	30–50	60–80	
	3	20–40	25–30	
8	1	45–80	15–20	45–55
	2	25–45	65–85	20–25
	3	20–40	25–30	45–65
	4	90–120		

Note: All times are in minutes. All times are estimates and all sessions are untimed.

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Table 4.2: MAP Test Time Summary by Session: English Language Arts

Grade	Session	N Students	Average Test Time in Minutes		Test Time in Minutes at Selected Percentiles							
			Mean	SD	5	10	25	50	75	90	95	99
3	1	55,058	62	36	29	34	44	57	75	95	111	160
	2	55,044	41	18	21	24	30	38	48	62	73	106
	3	55,037	23	11	11	13	16	20	27	36	43	65
4	1	56,521	60	25	29	34	43	55	71	90	105	143
	2	56,513	37	19	20	22	27	34	43	55	65	90
	3	56,509	23	10	12	13	16	20	26	34	41	62
5	1	52,892	57	26	28	32	41	52	67	85	100	141
	2	52,875	34	19	18	20	25	31	39	50	59	83
	3	52,872	20	11	11	12	15	18	23	31	37	55
	4	52,854	57	34	16	22	34	51	73	98	116	165
6	1	56,252	54	22	27	32	40	51	63	79	92	132
	2	56,245	40	16	21	25	30	37	46	57	66	94
	3	56,232	19	8	10	11	14	17	21	27	32	51
7	1	56,552	54	21	28	33	41	52	64	78	90	122
	2	56,528	39	14	21	25	31	38	46	56	63	85
	3	56,526	18	10	10	12	14	17	20	25	29	40
8	1	53,499	48	17	25	29	36	45	56	68	78	103
	2	53,479	31	11	17	20	25	30	36	44	49	64
	3	53,461	17	6	9	11	13	16	19	23	27	37
	4	53,458	55	31	16	22	33	50	71	94	112	156

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Table 4.3: MAP Test Time Summary by Session: Mathematics

Grade	Session	N Students	Average Test Time in Minutes		Test Time in Minutes at Selected Percentiles							
			Mean	SD	5	10	25	50	75	90	95	99
3	1	60,250	42	23	19	22	28	37	51	68	83	120
	2	60,240	38	21	15	18	24	33	46	62	76	111
	3	60,226	14	9	5	6	8	12	17	25	31	47
4	1	60,354	42	22	19	22	28	37	51	68	82	120
	2	60,341	40	40	18	21	27	36	48	65	78	112
	3	60,323	15	10	5	6	9	12	18	27	33	51
5	1	58,925	57	27	26	31	39	51	68	89	105	149
	2	58,922	46	23	20	24	32	42	56	74	88	126
	3	58,918	15	9	5	7	9	12	18	25	31	49
6	1	60,016	41	17	21	24	30	38	48	61	70	98
	2	59,999	43	18	21	25	32	40	51	64	74	105
	3	59,975	13	8	5	6	8	11	16	22	27	42
7	1	58,953	27	13	13	15	19	25	32	41	47	63
	2	58,939	57	23	28	33	42	54	68	84	98	132
	3	58,930	14	7	5	6	9	12	17	22	26	39
8	1	48,008	21	10	9	11	14	19	26	33	38	54
	2	47,981	54	22	25	31	40	52	65	80	92	127
	3	47,959	12	7	4	6	8	11	15	20	25	37

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Table 4.4: MAP Test Time Summary by Session: Science

Grade	Session	N Students	Average Test Time in Minutes		Test Time in Minutes at Selected Percentiles							
			Mean	SD	5	10	25	50	75	90	95	99
5	1	59,461	54	26	26	30	38	49	65	83	98	141
	2	59,446	15	10	7	8	10	13	18	25	32	51
	3	59,437	32	14	15	18	22	29	38	49	57	81
8	1	59,804	45	18	23	26	33	41	53	67	77	106
	2	59,784	11	5	6	7	8	10	13	17	21	30
	3	59,777	28	11	14	17	21	26	32	41	47	63

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Table 4.5: MAP Universal Tools

Tool	Description	Code
Bilingual Dictionary	**ELL students** may have access to a physical Bilingual Dictionary for use **ONLY** on the Writing Prompt in grades 5 and 8. If the Bilingual Dictionary is electronic, it may not connect to the internet.	S431
Break (Pause)	All students may take breaks of up to 20 minutes as needed. There is no limit to how many times a student may use this during an assessment.	N/A
Calculator (For Calculator Allowed Items Only) Grades 6-8	All students may have access to a physical calculator, on items where calculator use is allowed (Session 2, Grades 6-8). The memory of the physical calculator must be cleared before and after testing by the test examiner.	N/A
Color Contrast – Online	The INSIGHT platform allows all students to adjust background or font color based on student needs or preferences.	N/A
Color Contrast – Paper	All students taking the paper/pencil assessment may have the test printed in different colors based on student needs or preferences.	S102
Color Overlay	All students taking the paper/pencil assessment may have a color transparency placed over the test presented to them based on student needs or preferences.	S103
English Dictionary	All students may have access to a physical English Dictionary for use **ONLY** on the Writing Prompt in grades 5 and 8. If the English Dictionary is electronic, it may not connect to the internet.	N/A
Grammar Handbook	All students may have access to a physical Grammar Handbook for use **ONLY** on the Writing Prompt in grades 5 and 8. If the Grammar Handbook is electronic, it may not connect to the internet.	N/A
Graphing Tool	The INSIGHT platform allows all students to use an embedded tool to graph functions.	N/A
Highlighter	The INSIGHT platform allows all students access to a highlighter for marking desired text.	N/A
Keyboard Navigation	The INSIGHT platform allows all students to navigate through the text by using the keyboard.	N/A
Line Guide	The INSIGHT platform allows all students to use an embedded horizontal line that brings focus to a single line of text.	N/A
Magnifier (Zoom)	The INSIGHT platform allows all students to magnify the screen by 1.5 or 2 times the original size.	N/A
Magnification – Assistive Technology	**Students with visual impairments** may use assistive technology software that magnifies the screen beyond the built-in capabilities of the magnifier (zoom) tool. The software can be used in conjunction with the INSIGHT platform. The software must be provided by the district.	S105
Mark for Review	The INSIGHT platform allows all students to mark an item for review.	N/A
Masking – Online	The INSIGHT platform allows all students to block off content that is not of immediate need or that may be distracting by using an embedded masking tool.	N/A
Masking – Paper	All students taking the paper/pencil or Large Print assessments may use a masking tool to block off content that is not of immediate need or that may be distracting.	S107

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Table 4.5: MAP Universal Tools (cont.)

Tool	Description	Code
Non-Accommodation Paper Based Assessment	This tool is available for the following scenarios: • For students that need to test off-site in a non-district building (e.g. hospital, juvenile facility, etc.), the student may use the Paper/Pencil Based Assessment. • For **ELL students** who are using the Translation tool (S109) or Read Aloud – Native Language (S111), where the translator needs access to the assessment prior to administration to conduct translation services, choose this tool for just ONE student in the group. That student should still take the assessment online. • For students using Read Aloud – Human Reader (S043) where the examiner needs a paper copy to read from, choose this tool for just ONE student in the group. That student should still take the assessment online.	S112
Protractor	The INSIGHT platform allows all students to use an embedded protractor on specific items where appropriate.	N/A
Read Aloud (Not Including ELA Reading Passages) – Text-To-Speech	The INSIGHT platform allows **all students** to have the test directions and items in English Language Arts, Mathematics and Science read aloud via embedded text-to-speech technology. The student can control the speed and volume of the voice. The system also includes a follow along feature, where the word being read is highlighted for the student.	S041
Read Aloud (Not Including ELA Reading Passages) – Human Reader	Any student taking either the online, paper/pencil, Large Print or Braille assessments may have the test directions and items in English Language Arts, Mathematics and Science read aloud by a human reader.	S043
Read Aloud (Not Including ELA Reading Passages) – Assistive Technology	**Students with Disabilities** that use specific text-to-speech assistive technology software in the everyday classroom may use that technology in conjunction with the INSIGHT testing platform. The software must be provided by the district.	S042
Read Aloud (Not Including ELA Reading Passages) – Native Language	**ELL students** taking either the online, paper/pencil, Large Print or Braille assessments may have the test directions and items in English Language Arts, Mathematics and Science read aloud in the students' native language by a human reader.	S111
Ruler	The INSIGHT platform allows all students to use an embedded ruler on specific items where appropriate.	N/A
Scratch Paper (Sticky Notes)	The INSIGHT platform allows all students to use an embedded notepad (called Sticky Notes) to make notes about an item. Electronic notes **DO NOT** carry over from previous sessions. If a student logs off prior to finishing a session, any electronic notes **WILL NOT** carry over when the student logs back in. As long as you do not log out or finish the session, they remain.	N/A
Scribe	Students may dictate their responses to a scribe, who must follow the scribing guidelines (http://dese.mo.gov/sites/default/files/asmt-scribing-guidelines.pdf).	S351
Separate Setting	Students may be allowed to test in a separate setting from other students. This includes testing individually or testing as part of a smaller group.	S501
Strikethrough (Cross Off)	The INSIGHT platform allows all students to cross out answer options.	N/A

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Table 4.5: MAP Universal Tools (cont.)

Tool	Description	Code
Thesaurus	All students may have access to a physical Thesaurus for use **ONLY** on the ELA Writing Prompt in grades 5 and 8. If the Thesaurus is electronic, it may not connect to the internet.	N/A
Translation	**ELL students** may respond to any assessment in their native language. The responses must be translated and transcribed.	S109
Writing Tools	The INSIGHT platform allows all students to use writing tools on specific items where appropriate. The tools include the ability to bold, italicize and underline text, create bullet points, undo/redo typing, and copy/paste text the student has typed.	N/A

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Table 4.6: MAP Accommodations for Students with Disabilities

Accommodation	Description	Code
Abacus	Students with this accommodation in their IEP/504 plan may have access to an abacus.	A391
Alternate Response Options	Students with this accommodation in their IEP/504 plan may respond to items using an alternate option, including but not limited to: Adapted Keyboards, StickyKeys, MouseKeys, FilterKeys, Adapted Mouse, Touch Screen, Head Wand and Switches.	A441
Braille	**Students with visual impairments** with this accommodation in their IEP/504 plan may access the assessment via a Braille version. Tactile overlays and graphics tools may be used to assist the student in accessing the content.	A012
Calculator (For Non-Calculator Allowed Items Only) GRADE 3 ONLY (Invalidation)	Students in 3rd grade with this accommodation in their IEP/504 plan may have access to a physical calculator, on items where calculator use is not allowed. The memory of the physical calculator must be cleared before and after testing by the test examiner.	A392
Calculator (For Non-Calculator Allowed Items Only) GRADES 4-8	Students in grades 4-8 with this accommodation in their IEP/504 plan may have access to a physical calculator, on items where calculator use is not allowed. The memory of the physical calculator must be cleared before and after testing by the test examiner.	A393
Large Print	Students with visual impairments with this accommodation in their IEP/504 plan may access the assessment via a Large Print version.	A021
Multiplication Table GRADE 3 ONLY (Invalidation)	Students in 3rd grade with this accommodation in their IEP/504 plan may have access to a single digit multiplication table.	A394
Multiplication Table GRADES 4-8	Students in grades 4-8 with this accommodation in their IEP/504 plan may have access to a single digit multiplication table.	A395
Paper Based Assessment	Students with this accommodation in their IEP/504 plan may take the assessment using the paper/pencil format.	A102
Read Aloud (ELA Reading Passages) – Blind Students	Blind students at any grade level who do not yet possess adequate Braille skills with this accommodation in their IEP/504 plan, may have the ELA Reading Passages read aloud by a human reader.	A046
Read Aloud (ELA Reading Passages) – Text-To-Speech GRADES 3-5 (Invalidation)	Students in grades 3-5 with this accommodation in their IEP/504 plan can have the INSIGHT platform read the ELA Reading Passages via embedded text-to-speech technology. The student can control the speed and volume of the voice. The system also includes a follow along feature, where the word being read is highlighted for the student.	A040
Read Aloud (ELA Reading Passages) – Human Reader GRADES 3-5 (Invalidation)	Students in grades 3-5 with this accommodation in their IEP/504 plan, taking the online, paper/pencil, Large Print or Braille assessments may have the ELA Reading Passages read aloud by a human reader.	A041

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Table 4.6: MAP Accommodations for Students with Disabilities (cont.)

Tool	Description	Code
Read Aloud (ELA Reading Passages) – Assistive Technology GRADES 3-5 (Invalidation)	Students in grades 3-5 with this accommodation in their IEP/504 plan, that use specific text-to-speech assistive technology software in the everyday classroom, may use that technology in conjunction with the INSIGHT testing platform to have the ELA Reading Passages read aloud by the software. The software must be provided by the district.	A042
Read Aloud (ELA Reading Passages) – Native Language GRADES 3-5 (Invalidation)	ELL students in grades 3-5 with this accommodation in their IEP/504 plan, taking the online, paper/pencil, Large Print or Braille assessments may have the ELA Reading Passages read aloud to them in their native language by a human reader.	A111
Read Aloud (ELA Reading Passages) – Text-To-Speech GRADES 6-8	Students in grades 6-8 with this accommodation in their IEP/504 plan, can have the INSIGHT platform read the ELA Reading Passages via embedded text-to-speech technology. The student can control the speed and volume of the voice. The system also includes a follow along feature, where the word being read is highlighted for the student.	A043
Read Aloud (ELA Reading Passages) – Human Reader GRADES 6-8	Students in grades 6-8 with this accommodation in their IEP/504 plan, taking the online, paper/pencil, Large Print or Braille assessments may have the ELA Reading Passages read aloud by a human reader.	A045
Read Aloud (ELA Reading Passages) – Assistive Technology GRADES 6-8	Students in grades 6-8 with this accommodation in their IEP/504 plan, that use specific text-to-speech assistive technology software in the everyday classroom, may use that technology in conjunction with the INSIGHT testing platform to have the ELA Reading Passages read aloud by the software. The software must be provided by the district.	A044
Read Aloud (ELA Reading Passages) – Native Language GRADES 6-8	ELL students in grades 6-8 with this accommodation in their IEP/504 plan, taking the online, paper/pencil, Large Print or Braille assessments may have the ELA Reading Passages read aloud to them in their native language by a human reader.	A112
Sign Language	Hearing Impaired students with this accommodation in their IEP/504 plan may have ELA listening items translated into American Sign Language (ASL), Signing Exact English (SEE) or any other form of sign language.	A052
Specialized Calculator (For Calculator Allowed Items Only)	Students with this accommodation in their IEP/504 plan may have access to a specialized calculator, on items where calculator use is allowed (Session 2). The specialized calculator can include a talking calculator or Braille calculator among others. The memory of the physical calculator must be cleared before and after testing by the test examiner.	A396
Speech-To-Text – Assistive Technology	Students with this accommodation in their IEP/504 plan, that use specific speech-to-text assistive technology software in the everyday classroom, may use that technology in conjunction with the INSIGHT testing platform. The software must be provided by the district.	A352

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Table 4.7: Number and Percentage of Students Using Accommodations or Universal Tools

Grade	Accommodations	English Language Arts		Mathematics	
		Freq.	Pct.	Freq.	Pct.
3	Large Print	29	0.04%	27	0.04%
3	Read Aloud - ELA Reading Passages - Text-To-Speech -GRADES 3-5 ONLY-INVALIDATION ELA	49	0.07%		
3	Read-Aloud - ELA Reading Passages - Human Reader -GRADES 3-5 ONLY-INVALIDATION ELA	43	0.06%		
3	Read-Aloud - ELA Reading Passages - Assistive Technology - GRADES 3-5 ONLY-INVALIDATION ELA	1	0%		
3	Read-Aloud - ELA Reading Passages -Blind Students	3	0%		
3	Sign Language	18	0.03%	10	0.01%
3	Paper Based Assessment	71	0.1%	71	0.1%
3	Speech-To-Text - Assistive Technology	19	0.03%	20	0.03%
3	Abacus			21	0.03%
3	Calculator - For Non-Calculator Allowed Items Only-GRADE 3 ONLY-INVALIDATION MATHEMATICS			97	0.14%
3	Multiplication Table -GRADE 3 ONLY-INVALIDATION MATHEMATICS			110	0.16%
3	Specialized Calculator			12	0.02%
3	Alternate Response Options	8	0.01%	8	0.01%
	Universal Tools	**Freq.**	**Pct.**	**Freq.**	**Pct.**
3	Read-Aloud - Text-To-Speech	25,070	36.09%	26,588	38.25%
3	Read-Aloud - Assistive Technology	16	0.02%	10	0.01%
3	Read-Aloud - Human Reader	3,273	4.71%	3,640	5.24%
3	Color Contrast - Paper	11	0.02%	12	0.02%
3	Color Overlay	25	0.04%	24	0.03%
3	Magnification - Assistive Technology	341	0.49%	341	0.49%
3	Masking - Paper	20	0.03%	23	0.03%
3	Translation	41	0.06%	87	0.13%
3	Read-Aloud - Native Language	57	0.08%	116	0.17%
3	Scribe	1,376	1.98%	1,305	1.88%
3	Bilingual Dictionary	69	0.1%	72	0.1%
3	Separate Setting	10,944	15.75%	10,991	15.81%
3	Non-Accommodation Paper Based Assessment	44	0.06%	58	0.08%

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Table 4.7: Number and Percentage of Students Using Accommodations or Universal Tools (cont.)

Grade	Accommodations	English Language Arts		Mathematics	
		Freq.	Pct.	Freq.	Pct.
4	Braille	5	0.01%	4	0.01%
4	Large Print	26	0.04%	26	0.04%
4	Read Aloud - ELA Reading Passages - Text-To-Speech -GRADES 3-5 ONLY-INVALIDATION ELA	49	0.07%		
4	Read-Aloud - ELA Reading Passages - Human Reader -GRADES 3-5 ONLY-INVALIDATION ELA	38	0.05%		
4	Read-Aloud - ELA Reading Passages - Assistive Technology - GRADES 3-5 ONLY-INVALIDATION ELA	6	0.01%		
4	Read-Aloud - ELA Reading Passages - Blind Students	7	0.01%		
4	Sign Language	15	0.02%	9	0.01%
4	Paper Based Assessment	76	0.11%	76	0.11%
4	Speech-To-Text - Assistive Technology	34	0.05%	44	0.06%
4	Abacus			5	0.01%
4	Calculator - For Non-Calculator Allowed Items Only-GRADES 4-8			1,846	2.65%
4	Multiplication Table-GRADES 4-8			2,499	3.59%
4	Specialized Calculator			38	0.05%
4	Alternate Response Options	18	0.03%	16	0.02%
	Universal Tools	**Freq.**	**Pct.**	**Freq.**	**Pct.**
4	Read-Aloud - Text-To-Speech	23,987	34.45%	25,514	36.61%
4	Read-Aloud - Assistive Technology	13	0.02%	13	0.02%
4	Read-Aloud - Human Reader	2,987	4.29%	3,331	4.78%
4	Color Contrast - Paper	21	0.03%	21	0.03%
4	Color Overlay	24	0.03%	24	0.03%
4	Magnification - Assistive Technology	302	0.43%	305	0.44%
4	Masking - Paper	31	0.04%	34	0.05%
4	Translation	26	0.04%	68	0.1%
4	Read-Aloud - Native Language	35	0.05%	120	0.17%
4	Scribe	1,334	1.92%	1,264	1.81%
4	Bilingual Dictionary	72	0.1%	75	0.11%
4	Separate Setting	10,978	15.77%	11,053	15.86%
4	Non-Accommodation Paper Based Assessment	46	0.07%	56	0.08%

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Table 4.7: Number and Percentage of Students Using Accommodations or Universal Tools (cont.)

Grade	Accommodations	English Language Arts		Mathematics		Science	
		Freq.	Pct.	Freq.	Pct.	Freq.	Pct.
5	Braille	8	0.01%	8	0.01%	8	0.01%
5	Large Print	28	0.04%	28	0.04%	28	0.04%
5	Read Aloud - ELA Reading Passages - Text-To-Speech -GRADES 3-5 ONLY-INVALIDATION ELA	36	0.05%				
5	Read-Aloud - ELA Reading Passages - Human Reader -GRADES 3-5 ONLY-INVALIDATION ELA	34	0.05%				
5	Read-Aloud - ELA Reading Passages - Assistive Technology - GRADES 3-5 ONLY-INVALIDATION ELA	2	0%				
5	Read-Aloud - ELA Reading Passages - Blind Students	4	0.01%				
5	Sign Language	18	0.03%	8	0.01%	8	0.01%
5	Paper Based Assessment	81	0.12%	84	0.12%	84	0.12%
5	Speech-To-Text - Assistive Technology	42	0.06%	45	0.07%	49	0.07%
5	Abacus			6	0.01%	2	0%
5	Calculator - For Non-Calculator Allowed Items Only-GRADES 4-8			2,620	3.85%		
5	Multiplication Table-GRADES 4-8			3,162	4.64%	1,566	2.3%
5	Specialized Calculator			45	0.07%		
5	Alternate Response Options	17	0.02%	17	0.02%	16	0.02%
	Universal Tools	**Freq.**	**Pct.**	**Freq.**	**Pct.**	**Freq.**	**Pct.**
5	Read-Aloud - Text-To-Speech	23,147	34.00%	24,695	36.26%	24,465	35.93%
5	Read-Aloud - Assistive Technology	13	0.02%	15	0.02%	16	0.02%
5	Read-Aloud - Human Reader	2,457	3.61%	2,695	3.96%	2,782	4.09%
5	Color Contrast - Paper	10	0.01%	10	0.01%	10	0.01%
5	Color Overlay	43	0.06%	42	0.06%	42	0.06%
5	Magnification - Assistive Technology	307	0.45%	308	0.45%	303	0.44%
5	Masking - Paper	38	0.06%	38	0.06%	34	0.05%
5	Translation	44	0.06%	98	0.14%	99	0.15%
5	Read-Aloud - Native Language	58	0.09%	119	0.17%	116	0.17%
5	Scribe	1,394	2.05%	1,317	1.93%	1,341	1.97%
5	Bilingual Dictionary	129	0.19%	101	0.15%	99	0.15%
5	Separate Setting	10,456	15.36%	10,552	15.49%	10,263	15.07%
5	Non-Accommodation Paper Based Assessment	47	0.07%	68	0.1%	64	0.09%

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Table 4.7: Number and Percentage of Students Using Accommodations or Universal Tools (cont.)

Grade	Accommodations	English Language Arts		Mathematics	
		Freq.	Pct.	Freq.	Pct.
6	Braille	8	0.01%	8	0.01%
6	Large Print	33	0.05%	33	0.05%
6	Read Aloud - ELA Reading Passages - Text-To-Speech -GRADES 6-8	2,740	4.09%		
6	Read-Aloud - ELA Reading Passages - Assistive Technology-GRADES 6-8	16	0.02%		
6	Read-Aloud - ELA Reading Passages - Human Reader-GRADES 6-8	1,486	2.22%		
6	Read-Aloud - ELA Reading Passages - Blind Students	7	0.01%		
6	Sign Language	19	0.03%	17	0.03%
6	Paper Based Assessment	88	0.13%	92	0.14%
6	Read-Aloud - ELA Reading Passages - Native Language-GRADES 6-8	3	0%		
6	Speech-To-Text - Assistive Technology	37	0.06%	38	0.06%
6	Abacus			10	0.01%
6	Calculator - For Non-Calculator Allowed Items Only-GRADES 4-8			3,624	5.41%
6	Multiplication Table-GRADES 4-8			2,814	4.2%
6	Specialized Calculator			44	0.07%
6	Alternate Response Options	6	0.01%	4	0.01%
	Universal Tools	**Freq.**	**Pct.**	**Freq.**	**Pct.**
6	Read-Aloud - Text-To-Speech	15,567	23.25%	19,146	28.59%
6	Read-Aloud - Assistive Technology	10	0.01%	25	0.04%
6	Read-Aloud - Human Reader	1,105	1.65%	2,067	3.09%
6	Color Contrast - Paper	19	0.03%	19	0.03%
6	Color Overlay	23	0.03%	23	0.03%
6	Magnification - Assistive Technology	241	0.36%	241	0.36%
6	Masking - Paper	12	0.02%	12	0.02%
6	Translation	31	0.05%	81	0.12%
6	Read-Aloud - Native Language	44	0.07%	111	0.17%
6	Scribe	623	0.93%	599	0.89%
6	Bilingual Dictionary	107	0.16%	96	0.14%
6	Separate Setting	7,995	11.94%	8,070	12.05%
6	Non-Accommodation Paper Based Assessment	81	0.12%	87	0.13%

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Table 4.7: Number and Percentage of Students Using Accommodations or Universal Tools (cont.)

Grade	Accommodations	English Language Arts		Mathematics	
		Freq.	Freq.	Pct.	Pct.
7	Braille	3	0%	3	0%
7	Large Print	40	0.06%	39	0.06%
7	Read Aloud - ELA Reading Passages - Text-To-Speech -GRADES 6-8	3,286	4.94%		
7	Read-Aloud - ELA Reading Passages - Assistive Technology-GRADES 6-8	23	0.03%		
7	Read-Aloud - ELA Reading Passages - Human Reader-GRADES 6-8	1,325	1.99%		
7	Read-Aloud - ELA Reading Passages - Blind Students	7	0.01%		
7	Sign Language	18	0.03%	19	0.03%
7	Paper Based Assessment	88	0.13%	88	0.13%
7	Read-Aloud - ELA Reading Passages - Native Language-GRADES 6-8	3	0%		
7	Speech-To-Text - Assistive Technology	40	0.06%	35	0.05%
7	Abacus			8	0.01%
7	Calculator - For Non-Calculator Allowed Items Only-GRADES 4-8			4,062	6.18%
7	Multiplication Table-GRADES 4-8			1,908	2.9%
7	Specialized Calculator			54	0.08%
7	Alternate Response Options	6	0.01%	6	0.01%
	Universal Tools	**Freq.**	**Pct.**	**Freq.**	**Pct.**
7	Read-Aloud - Text-To-Speech	14,188	21.33%	17,645	26.84%
7	Read-Aloud - Assistive Technology	15	0.02%	29	0.04%
7	Read-Aloud - Human Reader	584	0.88%	1,515	2.3%
7	Color Contrast - Paper	34	0.05%	34	0.05%
7	Color Overlay	24	0.04%	24	0.04%
7	Magnification - Assistive Technology	244	0.37%	244	0.37%
7	Masking - Paper	12	0.02%	12	0.02%
7	Translation	75	0.11%	115	0.17%
7	Read-Aloud - Native Language	79	0.12%	107	0.16%
7	Scribe	435	0.65%	408	0.62%
7	Bilingual Dictionary	102	0.15%	97	0.15%
7	Separate Setting	7,103	10.68%	7,114	10.82%
7	Non-Accommodation Paper Based Assessment	69	0.1%	75	0.11%

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Table 4.7: Number and Percentage of Students Using Accommodations or Universal Tools (cont.)

Grade	Accommodations	English Language Arts		Mathematics		Science	
		Freq.	Pct.	Freq.	Pct.	Freq.	Pct.
8	Braille	3	0%	3	0.01%	3	0%
8	Large Print	35	0.05%	31	0.06%	35	0.05%
8	Read Aloud - ELA Reading Passages - Text-To-Speech -GRADES 6-8	2,928	4.43%				
8	Read-Aloud - ELA Reading Passages - Assistive Technology-GRADES 6-8	71	0.11%				
8	Read-Aloud - ELA Reading Passages - Human Reader-GRADES 6-8	1,232	1.87%				
8	Read-Aloud - ELA Reading Passages - Blind Students	7	0.01%				
8	Sign Language	19	0.03%	12	0.02%	17	0.03%
8	Paper Based Assessment	99	0.15%	93	0.17%	100	0.15%
8	Read-Aloud - ELA Reading Passages - Native Language-GRADES 6-8	4	0.01%				
8	Speech-To-Text - Assistive Technology	24	0.04%	21	0.04%	23	0.03%
8	Abacus			4	0.01%	4	0.01%
8	Calculator - For Non-Calculator Allowed Items Only-GRADES 4-8			4,016	7.55%		
8	Multiplication Table-GRADES 4-8			1,366	2.57%	535	0.81%
8	Specialized Calculator			70	0.13%		
8	Alternate Response Options	5	0.01%	5	0.01%	6	0.01%
	Universal Tools	**Freq.**	**Pct.**	**Freq.**	**Pct.**	**Freq.**	**Pct.**
8	Read-Aloud - Text-To-Speech	13,673	20.7%	14,268	26.81%	16,819	25.46%
8	Read-Aloud - Assistive Technology	15	0.02%	35	0.07%	42	0.06%
8	Read-Aloud - Human Reader	606	0.92%	1,383	2.6%	1,486	2.25%
8	Color Contrast - Paper	11	0.02%	10	0.02%	10	0.02%
8	Color Overlay	18	0.03%	15	0.03%	16	0.02%
8	Magnification - Assistive Technology	214	0.32%	217	0.41%	214	0.32%
8	Masking - Paper	7	0.01%	6	0.01%	5	0.01%
8	Translation	94	0.14%	124	0.23%	128	0.19%
8	Read-Aloud - Native Language	97	0.15%	126	0.24%	129	0.2%
8	Scribe	448	0.68%	415	0.78%	433	0.66%
8	Bilingual Dictionary	304	0.46%	122	0.23%	124	0.19%
8	Separate Setting	6,456	9.78%	6,286	11.81%	6,320	9.57%
8	Non-Accommodation Paper Based Assessment	89	0.13%	83	0.16%	93	0.14%

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Figure 4.1: Sample Script from *Examiner's Manual*

3.1 Specific Administration Information

1. The TE distributes the Student Test Tickets.

You should have received Student Test Tickets for this testing session from your DTC or STC. Before beginning, ensure that you have all of the correct test tickets for the students who will be testing. Note the Test Name and read it aloud where the script states [Test Name].

If students are starting a new session:

SAY **You are about to take (the) [Test Name].**

If students are resuming a session:

SAY **You are about to continue (the) [Test Name].**

I will now hand out a Test Ticket to each of you. When you receive your Test Ticket, check that your name appears on the ticket. If your name does not appear, raise your hand.

Distribute test tickets to each student, ensuring that each student is given the correct ticket with his or her name printed on it. Contact your STC or DTC if a needed ticket is missing.

2. The TE directs students to the test sign-in page.

SAY **Now select the "MO Online Assessments" icon that appears on your screen.**

Students using a laptop or desktop workstation should double click on the icon. Students using a Chromebook or iPad should tap on the icon. Help students if they have trouble activating the icon.

3. The TE instructs students to log in.

SAY **At the top of your screen you should see "Missouri Department of Elementary & Secondary Education." Below that, you will see links for the Online Tools Training and Test Sign in for the MAP Grade-Level Assessment Summative test. Please select "Test Sign In."**

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Figure 4.1: Sample Script from *Examiner's Manual* (cont.)

SAY **This is the Login screen. Type your username and password from your Test Ticket into the correct boxes on the screen. Then select "Sign In."**

Test Ticket information is unique to each student and each session. Assist students as needed; TEs may have to help students type in this information. After the login, make sure all students are on the correct screen. Wait for all students to reach this page.

SAY **This is the Welcome screen. Please check that your name appears at the top of the screen. Check that the test name is [Test Name]. Then check that your school, MOSIS ID, and other information are correct. If everything is correct, select "Continue." If your information is not correct, please raise your hand.**

If a student's information is incorrect, the TE should contact the STC and/or the DTC.

SAY **You are now on the screen that shows the name of the test you are scheduled to take. If you do not see this, please raise your hand. Please select the test link that is shown.**

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Figure 4.1: Sample Script from *Examiner's Manual* (cont.)

SAY Select the NEXT arrow to continue.

SAY The following screens contain the test directions for the test you are taking today. Please read the directions carefully. If you have any questions about the directions, raise your hand. You can find the directions during your test by clicking the HELP button in the top right corner.

SAY During the test, you may see a page with no test questions. Follow the directions on the page to continue taking the test.

If you are unsure of an answer, provide what you think is the best answer; there is no penalty for guessing. If you would like to review that answer at a later time, mark the item for review by clicking the FLAG at the bottom of the screen before going on to the next question. Flagging the item will remind you to go back and decide whether or not you want to change the answer.

You may PAUSE at any point in the test by clicking PAUSE after answering an item. The PAUSE button is used to stop the test. Please raise your hand if you need a break and ask me before you click PAUSE. After pausing, a timer will appear on your screen. After your break, click on the RESUME button to continue. If you pause for more than 20 minutes, you will need to log back in.

Your answers need to be your own work. Please keep your eyes on your own test and remember that there should be no talking.

Read aloud the following paragraph if students are taking Part 1 (Session 1) of an ELA performance task.

SAY Use your scratch paper to take notes you want to keep for Part 2, the essay portion, of this performance task. Any notes you take online using Sticky Notes will not be saved for Part 2.

SAY When you are ready to begin your test, click BEGIN THE TEST.

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Figure 4.2: Sample District Report Form

MISSOURI DEPARTMENT OF ELEMENTARY AND SECONDARY EDUCATION
OFFICE OF COLLEGE AND CAREER READINESS – ASSESSMENT SECTION

QUALITY ASSURANCE – GRADE-LEVEL AND END-OF-COURSE ASSESSMENTS

SPRING 2017

DIRECTIONS

This form is used both for district self-monitoring purposes and by Department of Elementary and Secondary Education (Department) employees or designees during an on-site Quality Assurance (QA) visit.

IF DISTRICT SELF-MONITORING: The District Test Coordinator (DTC) completes this form during the Spring of 2017. All questions on the form should be completed. Additionally, the DTC should participate in **two** classroom observations - one for MAP Grade-Level and one for End-of-Course (or two MAP Grade-Level if your district does not give End-of-Course assessments). Note: If the visit is for End-of-Course, the visit **MUST** be for Algebra I, Biology or English II.

IF DESE ON-SITE VISIT: A Department employee or designee completes this form at an onsite QA visit during the Spring 2017 assessment window. All questions on the form should be completed. Additionally, the employee/designee should participate in **one** classroom observation for the assigned assessment. Note: If the visit is for End-of-Course, the visit **MUST** be for Algebra I, Biology or English II.

Each question asked as part of the QA process has a set of possible follow-up questions. These follow-ups are designed to help generate answers to the main question. It is not required to address every possible follow-up.

After the QA process is complete, the District Test Coordinator (Self-Monitoring) **OR** the Department employee/designee (On-Site Visit) will submit their answers electronically at http://tiny.cc/deseqa. Forms must be entered electronically by **June 16, 2017**.

Important: If you have questions, or need to report testing irregularities or concerns, please contact the Assessment Section at 573-751-3545 or assessment@dese.mo.gov.

ABOUT THE VISIT

As part of the No Child Left Behind (NCLB) Act and Every Student Succeeds Act (ESSA) required monitoring process, the Department uses this document as a tool to monitor and strengthen statewide administration of the Missouri Assessment Program's Statewide Assessments. The questions are designed to focus attention and help districts examine important areas of assessment training, administration, and test security.

DISTRICT INFORMATION

NAME OF PERSON FILLING OUT THIS FORM:	
DISTRICT SELF-MONITORING OR DESE ON-SITE VISIT:	
SCHOOL DISTRICT NAME:	
COUNTY-DISTRICT CODE:	
DISTRICT TEST COORDINATOR NAME:	

The Department of Elementary and Secondary Education does not discriminate on the basis of race, color, religion, gender, national origin, age, or disability in its programs and activities. Inquiries related to Department programs and to the location of services, activities, and facilities that are accessible by persons with disabilities may be directed to the Jefferson State Office Building, Office of the General Counsel, Coordinator – Civil Rights Compliance (Title VI/Title IX/504/ADA/Age Act), 6th Floor, 205 Jefferson Street, P.O. Box 480, Jefferson City, MO 65102-0480; telephone number 573-526-4757 or TTY 800-735-2966; email civilrights@dese.mo.gov.

MO 500-3068 (Rev 12/16) Page **1** of **10**

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Figure 4.3: Sample Accountability Form via eDIRECT

Accountability Form

Accountability Form System is currently locked for selected Administration.

* Indicates required fields

Administration: Spring 2017 Summative Grade-Lev *

District: COLUMBIA 93 - 01009

School: (All)

Show

Enter Counts | Summary | Status Report

Instructions

Summary for District 010093 (Spring 2017 Summative Grade-Level Assessments)

	Secure Test Materials	Shipped to School	Returned to DRC
Grade 3 ELA	Braille Test Books		
	Braille Test Administrator's Notes		
	Large Print Test Books		
	Paper-Based PDF (from LP/Braille Kits)		
	Paper-Based PDF (printed from eDIRECT)		1
	Test Administration Scripts		
Grade 3 MA	Braille Test Books		
	Braille Test Administrator's Notes		
	Large Print Test Books		
	Paper-Based PDF (from LP/Braille Kits)		
	Paper-Based PDF (printed from eDIRECT)		1
	Test Administration Scripts		
Grade 4 ELA	Braille Test Books		
	Braille Test Administrator's Notes		
	Large Print Test Books	1	1
	Paper-Based PDF (from LP/Braille Kits)	1	1
	Paper-Based PDF (printed from eDIRECT)		1
	Test Administration Scripts	1	1
Grade 4 MA	Braille Test Books		
	Braille Test Administrator's Notes		
	Large Print Test Books	1	1
	Paper-Based PDF (from LP/Braille Kits)	1	1
	Paper-Based PDF (printed from eDIRECT)		1

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CHAPTER 5: SCORING OF CONSTRUCTED-RESPONSE, WRITING PROMPT, AND AUTOSCORED ITEMS

In this chapter, we first describe the scoring process used for the MAP. In particular, we focus on the PAS (Performance Assessment Services) process of handscoring writing prompts (WPs) and constructed-response (CR) items and the automated scoring of technology-enhanced (TE), evidence-based selected response (EBSR), and short-answer (SA) items. At the end of this section, we describe and report the results of the inter-rater reliability study conducted on the handscoring of the MAP WPs.

Chapter 5 adheres to AERA, APA, & NCME Standards 4.18, 4.20, 6.8, and 6.9. Each of these standards will be presented in the pertinent section of this chapter. Standard 4.18 provides some general guidance for Chapter 5:

> Procedures for scoring and, if relevant, scoring criteria, should be presented by the test developer with sufficient detail and clarity to maximize the accuracy of scoring. Instructions for using rating scales or for deriving scores obtained by coding, scaling, or classifying constructed responses should be clear. This is especially critical for extended-response items such as performance tasks, portfolios, and essays. (91)

Chapter 5 explains the process used for scoring the WPs and CR items and the process used for scoring the TE, EBSR, and SA items. The scoring criteria used for each item are not presented in this chapter to preserve the integrity of the items for future use.

5.1 Handscoring Scoring Process

WPs in ELA Grades 5 and 8 and CR items in Science were scored by human readers who were trained by DRC.

5.1.1 Selection of Readers

AERA, APA, & NCME (2014) Standard 4.20 specifies the following:

> The process for selecting, training, qualifying, and monitoring scorers should be specified by the test developer. The training materials, such as the scoring rubrics and examples of test takers' responses that illustrate the levels on the rubric score scale, and the procedures for training scorers should result in a degree of accuracy and agreement among scorers that allows the scores to be interpreted as originally intended by the test developer. Specifications should also describe processes for assessing scorer consistency and potential drift over time in raters' scoring. (92)

Sections 5.1.1 and 5.1.2 explain how readers are selected and trained for the MAP handscoring process. Section 5.1.3 describes how the scorers are monitored throughout the MAP handscoring process.

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DRC strives to develop a highly qualified, experienced core of readers so that the integrity of all projects is appropriately maintained.

Recruitment

The MAP 2017 project was staffed with a large number of readers and team leaders who had previous experience with DRC PAS projects. In addition, DRC worked with Stafforward (a company specializing in staffing practice areas such as clerical and administrative, call center, accounting, healthcare, scientific, and light-industrial) to recruit new team leaders and readers for employment. Recruitment sources included advertisements online and in newspapers in Indianapolis, Indiana, and nearby areas.

DRC requires that all readers and team leaders possess a bachelor's degree or higher. Stafforward screened all new applicants and required them to produce either a transcript or a copy of the degree. Stafforward also required a one-to-two-hour interview/screening process. Individuals who did not present proper documentation or had less than desirable work records were eliminated during this process. Stafforward verified that 100% of all potential readers met the degree requirement. All experienced readers and team leaders had already successfully completed the screening process.

The Interview Process

All potential readers completed a pre-interview activity. Applicants were required to write an essay and solve science items.

Stafforward interviewed each applicant and determined the applicant's suitability for scoring ELA WPs in Grades 5 and 8. Applicants with strong leadership skills were questioned further to determine whether they were qualified to be team leaders.

When Stafforward determined that applicants were qualified, the applicants were recommended for employment. Before being hired, all employees were required to read, agree to, and sign a nondisclosure agreement outlining DRC's business ethics and security procedures.

5.1.2 PAS Training Process

AERA, APA, & NCME (2014) Standard 6.9 specifies the following:

> Those responsible for test scoring should establish and document quality control processes and criteria. Adequate training should be provided. The quality of scoring should be monitored and documented. Any systematic source of scoring errors should be documented and corrected. (118)

Training Material Development

All materials necessary for scoring were developed by DRC. These materials included the scoring guides and training papers used to complete the handscoring of WPs.

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Missouri WPs were administered for the second time to Missouri students during the Spring 2017 operational test administration (the first administration was in Spring 2016). One WP was administered in Grade 5, and one WP was administered in Grade 8. Scoring Directors assembled scoring materials based on rubrics developed in 2016 (for more details on ELA WP rangefinding activities, refer to the *Missouri Assessment Program, Grade-Level Assessments Grades 3 through 8 English Language Arts and Mathematics Technical Report 2016* (https://dese.mo.gov/sites/default/files/asmt-gl-2016-tech-report-ela-and-math.pdf).

Missouri Science operational items have been previously field-tested, and the training materials used during the field test were used for training readers to score the operational items. During the previous field testing, PAS Scoring Directors assembled materials based on the rubrics. Student answer documents were randomly sampled to ensure that a representative sample of possible responses was used. Scoring Directors selected anchor papers and training papers and recommended clarifications to rubrics. All field test materials were previously presented during a Rangefinding review, and scores and annotations were approved by DESE participants. From that point, training and qualifying materials were developed based on the rubric and scoring philosophies discussed during the Rangefinding review.

Training and Qualifying Procedures

Handscoring involves training and qualifying team leaders and readers, monitoring scoring accuracy, and ensuring security of both the test materials and the scoring facilities. An explanation of the training and qualifying procedures follows.

All readers were trained and qualified on a specific Science CR item or an ELA WP to be scored. Readers were trained using the following steps:

- Reviewing WPs
- Reviewing rubrics
- Reviewing anchor papers
- Explaining scoring strategies, followed by a question-and-answer period
- Scoring a practice set, followed by sharing established scores
- Qualifying Round 1
- Qualifying Round 2 (if necessary)
- Explaining condition codes and sensitive paper procedures

All readers were trained and qualified using the same procedures and criteria. Qualification standards for every WP were predetermined by DESE. To score a CR item or a WP, readers must have met the specific standards for that item or prompt. Missouri WPs were scored using a 4-point rubric for the Evidence/Elaboration and Organization/Purpose components and a 2-point rubric for the Conventions component. Science items were scored using 1-, 2-, 3-, or 4-point scoring rubrics. The qualification standards were the following:

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- 4-point item: 80% exact agreement qualification
- 3-point item: 85% exact agreement qualification
- 2-point item: 90% exact agreement qualification
- 1-point item: 100% exact agreement qualification

Qualification rounds consisted of approximately 10 papers. Readers were given two attempts to qualify on an item. If a reader did not achieve the targeted exact percentage on the first qualification attempt (or had a non-adjacent score), he or she re-trained and was allowed to attempt a second qualification round. Readers failing both qualification attempts were not allowed to score that particular item but may have been allowed to train and qualify for scoring a different item.

5.1.3 Monitoring the Scoring Process

AERA, APA, & NCME (2014) Standard 6.8 states the following:

> Those responsible for test scoring should establish scoring protocols. Test scoring that involves human judgment should include rubrics, procedures, and criteria for scoring. When scoring of complex responses is done by computer, the accuracy of the algorithm and processes should be documented. (118)

This section explains the monitoring procedures DRC uses to ensure that readers follow established scoring criteria while items are being scored. Detailed scoring rubrics are available for all CR items, which specify the criteria for scoring those CR items.

Daily Accuracy Checks

Throughout the course of handscoring, calibration sets of pre-scored papers (validity papers) were administered daily to each reader to monitor scoring accuracy and to maintain a consistent focus on the established rubrics and guidelines. Validity papers were selected from live student responses in the Spring 2017 administration. Scoring Directors determined the true scores based on papers previously approved by DESE. Readers received 10 validity papers per day. The predetermined validity paper score was compared to the score the reader assigned. Readers whose daily validity agreement fell below qualification thresholds were counselled and retrained as needed. The scoring platform was designed to allow for routing of these selected responses without readers being able to identify which papers were the validity papers. In other words, validity responses were “blind” to the readers; they were not able to distinguish validity responses from live responses.

In addition to the validity process, DRC’s protocol included the use of read-behinds. Team leaders reviewed readers’ scored responses daily to identify a possible reader effect. If team leaders did not agree with any of the scores, they changed the student score to the correct one. Feedback was provided to the readers to rectify any scoring inconsistencies found during the read-behind process. Read-behind monitoring rates were higher during the initial weeks of scoring and were adjusted according to an

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individual reader's performance throughout the project. Read-behind monitoring rates typically ranged from 1:5 to 1:10.

Approximately 10% of all responses were scored by a second reader to establish inter-rater reliability statistics for all WPs. This procedure is called a "double-blind read" because the second reader does not know the first reader's score. Individual reader data, including number of responses scored and exact, adjacent, and nonadjacent agreement rates, were reviewed by the Scoring Directors. Any issues were investigated and resolved by Scoring Directors in consultation with the scoring project manager.

5.1.4 Security

Security guards were onsite whenever employees were present in the building. All employees were issued photo identification badges and were required to wear them in plain view at all times. Visitors and employees who forgot their badges were issued visitors' badges and were required to wear them in plain view. All employees and visitors were subject to inspection of their personal effects.

5.2 Item Autoscoring Process

All TE, EBSR, and SA items were processed through DRC's autoscoring engine and scored according to the assigned scoring rules. DRC ensured that all rubrics and scoring rules were verified for accuracy before scoring any of these items. DRC established an adjudication process for TE, EBSR, and SA items to verify that correct answers were identified. DRC's autoscoring quality assurance process included the following:

- A scoring rubric was created for each autoscored item. It was as simple as describing the one and only correct answer for dichotomously scored items (i.e., scored as either right or wrong).
- The information from the scoring rubric was entered into the scoring system within the item-banking system so that the information resided in one place, along with the item image and other metadata. This scoring information designated specific information that varied by item type. For example, for a drag-and-drop item, the information included which objects are to be placed in which drop region to receive credit.
- The information was then verified by another autoscoring expert.
- After testing started, reports were generated that showed every response, how many students gave that response, and the score the scoring system provided.
- The scoring was then checked against the scoring rubric using two levels of verification.
- If any discrepancies were found, the scoring information was modified and verified again. Scoring was then rerun. This checking and modification process continued until no other issues were found.

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- As a final check, a report was run that showed all student responses, along with their frequencies and received scores.

For Braille, large-print, and paper-and-pencil administrations, student responses were transcribed into the online system by a test examiner.

5.3 Multiple-Choice and Multi-Select Item Scoring Process

Responses to multiple-choice and multi-select items were captured during the online test administration. For Braille, large-print, and paper-and-pencil administrations, student responses were transcribed into the online system by a test examiner.

5.4 Inter-rater Reliability

Approximately 10% of the WP responses in ELA Grades 5 and 8 and CR items in Science were scored independently by a second reader. The statistics for the inter-rater reliability were calculated for all items at all grades. To determine the reliability of scoring, the percentage of exact and adjacent agreement between the two readers was examined. These statistics are presented in Table 5.1 for ELA and 5.2 for Science.

For each item, a quadratic weighted kappa statistic was calculated to reflect the level of improvement beyond the chance level in the consistency of scoring. To aid in the interpretation of the kappa statistic, the following cutoffs have been suggested (Landis & Koch, 1977; Altman, 1991):

Kappa Value	Strength of Agreement
0	None
<0.20	Poor
0.21–0.40	Fair
0.41–0.60	Moderate
0.61–0.80	Good
0.81–1.00	Very Good

One WP in Grade 5 and one WP in Grade 8 were scored by human readers. Each WP was scored on three components: Conventions, Evidence/Elaboration, and Organization/Purpose. As shown in Table 5.1, raters demonstrated at least 99% exact and adjacent agreement for the WP component scoring. The quadratic weighted kappa values indicate that there was either good agreement for all components in Grade 5 and good or very good inter-rater agreement for all components in Grade 8.

A total of 69 items were scored by human readers across all test forms for both Science grade levels. As shown in Table 5.2, raters demonstrated above 98% exact and adjacent agreement for all Science items. The quadratic weighted kappa ranged from 0.77 to 0.99, indicating that there was good or very good inter-rater agreement for all Science items.

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5.5 Summary

The information presented in this chapter summarizes the scoring procedures for different types of items and steps taken by DRC to ensure accuracy in automated scoring and handscoring processes. The inter-rater reliability statistics presented in Section 5.4 demonstrate that the handscored items are scored reliably. These efforts by DRC follow multiple best practices of the testing industry and support AERA, APA, & NCME (2014) Standards 4.18, 4.20, 6.8, and 6.9:

- Standard 4.18—Procedures for scoring and, if relevant, scoring criteria, should be presented by the test developer with sufficient detail and clarity to maximize the accuracy of scoring. Instructions for using rating scales or for deriving scores obtained by coding, scaling, or classifying constructed responses should be clear. This is especially critical for extended-response items such as performance tasks, portfolios, and essays.
- Standard 4.20—The process for selecting, training, qualifying, and monitoring scorers should be specified by the test developer. The training materials, such as the scoring rubrics and examples of test takers' responses that illustrate the levels on the rubric score scale, and the procedures for training scorers should result in a degree of accuracy and agreement among scorers that allows the scores to be interpreted as originally intended by the test developer. Specifications should also describe processes for assessing scorer consistency and potential drift over time in raters' scoring.
- Standard 6.8—Those responsible for test scoring should establish scoring protocols. Test scoring that involves human judgment should include rubrics, procedures, and criteria for scoring. When scoring of complex responses is done by computer, the accuracy of the algorithm and processes should be documented.
- Standard 6.9—Those responsible for test scoring should establish and document quality control processes and criteria. Adequate training should be provided. The quality of scoring should be monitored and documented. Any systematic source of scoring errors should be documented and corrected.

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Table 5.1: Inter-rater Reliability: English Language Arts

Grade	Form/ Component	Component Name	Item #	Score Range	% Exact	% Adjacent	% Exact & Adjacent*	Quadratic Weighted Kappa
5	1/A	Organization/Purpose	55	0–4	85.2%	14.8%	100.0%	0.77
	1/B	Evidence/Elaboration		0–4	84.3%	15.7%	100.0%	0.77
	1/C	Conventions		0–2	86.5%	13.4%	100.0%	0.66
8	1/A	Organization/Purpose	55	0–4	79.9%	19.9%	99.8%	0.83
	1/B	Evidence/Elaboration		0–4	80.0%	19.9%	99.9%	0.83
	1/C	Conventions		0–2	92.1%	7.9%	100.0%	0.67

*The percent exact & adjacent may not add up to 100 due to the percent discrepant (the cases where the assigned score varied by more than 1 point).

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Table 5.2: Inter-rater Reliability: Science

Grade	Session	Form	Item #	Score Range	% Exact	% Adjacent	% Exact & Adjacent*	Quadratic Weighted Kappa
	1	A	1	0–2	93.8%	6.1%	99.9%	0.94
	1	A	3	0–2	85.6%	14.0%	99.5%	0.85
	1	A	4	0–2	93.0%	6.9%	99.9%	0.94
	1	A	7	0–2	91.6%	8.2%	99.8%	0.91
	1	A	8	0–2	76.7%	22.0%	98.6%	0.78
	1	A	10	0–2	94.9%	5.0%	99.9%	0.95
	1	A	11	0–2	92.5%	7.3%	99.8%	0.94
	1	A	12	0–2	89.1%	10.8%	99.9%	0.88
	1	A	13	0–2	97.0%	3.0%	100.0%	0.96
	1	A	14	0–2	95.8%	4.1%	100.0%	0.95
	1	A, B	2	0–2	95.4%	4.6%	99.9%	0.95
	1	A, B	5	0–2	95.7%	4.1%	99.8%	0.96
	1	A, B	6	0–2	92.2%	7.7%	99.9%	0.92
	1	A, B	9	0–2	86.4%	13.3%	99.7%	0.84
	1	B	1	0–2	96.7%	3.3%	100.0%	0.97
	1	B	3	0–2	96.0%	3.9%	99.9%	0.94
5	1	B	4	0–2	98.7%	1.2%	99.9%	0.99
	1	B	7	0–2	99.2%	0.8%	100.0%	0.99
	1	B	8	0–2	94.8%	5.2%	100.0%	0.94
	1	B	10	0–2	89.5%	10.2%	99.7%	0.85
	1	B	11	0–2	97.3%	2.7%	100.0%	0.97
	1	B	12	0–2	98.1%	1.9%	100.0%	0.98
	1	B	13	0–2	90.0%	9.8%	99.8%	0.89
	1	B	14	0–2	97.8%	2.2%	100.0%	0.98
	3	A, B	33	0–2	99.5%	0.3%	99.7%	0.98
	3	A, B	34	0–4	95.2%	3.8%	99.0%	0.98
	3	A, B	35	0–1	94.0%	6.0%	100.0%	0.88
	3	A, B	36	0–1	98.5%	1.5%	100.0%	0.97
	3	A, B	37	0–2	88.8%	11.0%	99.7%	0.90
	3	A, B	38	0–1	93.9%	6.1%	100.0%	0.85
	3	A, B	39	0–1	92.5%	7.5%	100.0%	0.81
	3	A, B	40	0–1	90.5%	9.5%	100.0%	0.77
	3	A, B	41	0–1	99.0%	1.0%	100.0%	0.98

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Table 5.2: Inter-rater Reliability: Science (cont.)

Grade	Session	Form	Item #	Score Range	% Exact	% Adjacent	% Exact & Adjacent*	Quadratic Weighted Kappa
	1	A, B	5	0–2	94.0%	5.9%	99.9%	0.95
	1	A, B	10	0–2	98.2%	1.7%	100.0%	0.98
	1	A	1	0–2	90.5%	8.7%	99.2%	0.89
	1	A	2	0–2	88.9%	10.7%	99.6%	0.91
	1	A	3	0–2	97.5%	2.5%	100.0%	0.98
	1	A	4	0–2	97.7%	2.2%	99.9%	0.97
	1	A	6	0–2	94.8%	5.0%	99.7%	0.95
	1	A	7	0–2	90.1%	9.2%	99.3%	0.93
	1	A	8	0–2	90.8%	9.0%	99.8%	0.91
	1	A	9	0–2	92.5%	7.4%	99.9%	0.94
	1	A	11	0–2	97.5%	2.5%	100.0%	0.98
	1	A	12	0–2	92.9%	6.9%	99.9%	0.92
	1	A	13	0–2	96.4%	3.6%	99.9%	0.96
	1	A	14	0–2	93.7%	6.2%	99.9%	0.92
	1	B	1	0–2	96.1%	3.9%	100.0%	0.96
	1	B	2	0–2	90.2%	9.5%	99.7%	0.90
	1	B	3	0–2	95.5%	4.5%	100.0%	0.95
	1	B	4	0–2	97.8%	2.2%	100.0%	0.98
	1	B	5	0–2	96.9%	3.1%	100.0%	0.98
	1	B	6	0–2	89.6%	10.0%	99.6%	0.92
8	1	B	7	0–2	95.8%	4.1%	99.9%	0.96
	1	B	8	0–2	94.3%	5.6%	100.0%	0.83
	1	B	9	0–2	95.8%	4.2%	100.0%	0.97
	1	B	11	0–2	88.9%	10.4%	99.4%	0.89
	1	B	12	0–2	91.2%	8.5%	99.7%	0.91
	1	B	13	0–2	88.5%	11.2%	99.7%	0.86
	1	B	14	0–2	92.4%	7.6%	100.0%	0.92
	3	A, B	31, 30	0–2	97.3%	2.6%	99.9%	0.98
	3	A, B	32, 31	0–2	99.0%	1.0%	100.0%	0.99
	3	A, B	33, 32	0–1	92.7%	7.3%	100.0%	0.79
	3	A, B	34, 33	0–1	99.8%	0.2%	100.0%	0.99
	3	A, B	35, 34	0–4	90.1%	9.5%	99.6%	0.97
	3	A, B	36, 35	0–1	96.9%	3.1%	100.0%	0.94
	3	A, B	37, 36	0–2	93.2%	6.3%	99.5%	0.94
	3	A, B	38, 37	0–3	90.2%	9.1%	99.3%	0.95
	3	A, B	39, 38	0–1	95.5%	4.5%	100.0%	0.89

*The percent exact & adjacent may not add up to 100 for 1-point items due to the percent discrepant. The percent discrepant includes the cases where one reader assigned a score and the other reader assigned a condition code. With items worth 2 or more points, percent discrepant also refers to the cases where the assigned score varied by more than 1 point.

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CHAPTER 6: OPERATIONAL DATA ANALYSES

This chapter of the MAP Technical Report describes the analyses that occurred on the ELA, Mathematics, and Science operational data. These analyses include a classical item analysis and examination of the raw scores and an item response theory (IRT) analysis involving calibration, scaling, and equating. These analyses were conducted using the calibration samples, which contained close to 100% of the population data.

In this chapter, we first present the classical item statistics, including aggregate raw score statistics and individual item-level statistics. Next, we present the IRT models used for calibrating the data, address the purpose of data calibration and scaling, and discuss the pre-equated design for ELA, Mathematics, and Science. The lowest obtainable scale score (LOSS) and highest obtainable scale score (HOSS) for the tests are also presented.

Chapter 6 demonstrates adherence in the MAP to AERA, APA, & NCME (2014) Standards 1.8, 4.14, 5.2, 7.2, 5.13, and 5.15. Each standard will be explicated within the appropriate section of this chapter. Standard 7.2 provides general guidance that is relevant to this chapter:

> The population for whom a test is intended and specifications for the test should be documented. (126)

In Sections 6.1 and 6.2, we will discuss the calibration sample. Chapter 3 presents the test specifications. Information regarding reported data is discussed in detail in Chapter 7.

6.1 Classical Item Statistics

In this section, we present summary test statistics for ELA, Mathematics, and Science. This is followed by item-level statistics for each grade/content area of the MAP. These statistics were produced using the calibration sample data. The calibration samples for all three content areas were close to 100% of the Missouri student population. Detailed comparison of the Missouri calibration samples to the Missouri student population is provided in Appendix C of this report.

6.1.1 Test-Level Statistics

Tables 6.1, 6.2, and 6.3 present the number of items and score points on each test, the mean and standard deviation of the raw scores and *p*-values, and the mean and standard deviation of the item-total test correlations for each test form at each grade level of ELA, Mathematics, and Science, respectively. The mean *p*-value is the average of all item *p*-values of a specific grade/content area, and it is explained in the next section. The mean item-total test correlation is the average of item-total test correlations for all items of a specific grade/content area.

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6.1.2 Item-Level Statistics

Tables 6.4 through 6.9 present the item statistics for each operational item by grade for ELA. The data for Grades 5 and 8 ELA writing prompts (WPs) are shown for the three components that were scored separately. Tables 6.10 through 6.15 show the operational item statistics for each item by grade for Mathematics. Tables 6.16 and 6.17 show the item statistics for Science items. The tables include form number, session number, item number on the test, *p*-value, item-total test correlation (R_{it}), percent omit, and adjusted student count for each item by grade and content area. Note that the item numbers in ELA and Mathematics tables are not always consecutive because statistics for the field test items that were embedded in the ELA and Mathematics tests are not included in the tables. Items presented in Science tables can appear on one or both forms.

p-value: The *p*-value is a measure of item difficulty. For a dichotomous item, the *p*-value is calculated from the number of students who correctly responded to an item divided by the total number of students who attempted the item. The value is reported as a proportion. For a constructed-response item, the *p*-value is calculated from the average score for the item divided by the maximum points possible and is also reported as a proportion.

In terms of *p*-values, test scores tend to be more precise when their average *p*-values are in the mid-0.50s to low 0.70s. However, in building a criterion-referenced test, it is important to select items on the basis of content rather than on purely statistical criteria. As shown in Table 6.1, the average *p*-values associated with the ELA forms range from 0.53 (Grade 3) to 0.62 (Grade 4). As presented in Table 6.2, the average *p*-values associated with the Mathematics forms range from 0.37 (Grade 8) to 0.57 (Grade 3). A trend of higher mean *p*-values for lower grade levels and lower mean *p*-values for higher grade levels was observed for Mathematics. For Science Grade 5 (see Table 6.3), the mean *p*-values were 0.61 and 0.68 for Forms A and B, respectively. In Grade 8, the mean *p*-values were 0.55 and 0.54 for Forms A and B, respectively.

It is important to examine the range of *p*-values and not just the average *p*-value to determine whether a test measures well. It is desirable for the test to measure well throughout the range of skills present at a given grade. That is, it is important that the items measure the performance of both low-scoring and high-scoring students as well as the performance of students in the center of the distribution. Having a range of *p*-values also helps to prevent floor and ceiling effects so that the test does not have large numbers of students at the minimum or maximum possible scores. The ELA forms have items with *p*-values ranging from 0.06 to 0.93 (see Tables 6.4 through 6.9) across all grade levels. The *p*-values on the Mathematics forms range from 0.03 to 0.93 (see Tables 6.10 through 6.15). For Science forms, the item *p*-values range from 0.24 to 0.94 (see Tables 6.16 and 6.17). Items with low *p*-values were reviewed by test development experts after the test administration to confirm that the items function as intended. Overall, this broad range of *p*-values indicates that the items measure well throughout the range of skills and abilities at a given grade.

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Item-Total Correlations: An item-total correlation is the correlation between an item and the total test score, where the item score is excluded from the total score. It indicates how well an item differentiates between low- and high-achieving students. In general, items with correlations below 0.20 are said to be poorly discriminating. Over 95% of ELA and Science items, and over 90% of Mathematics items in the MAP had item-test correlations above this threshold. Any item with an item-total correlation below the 0.20 threshold was further analyzed to ensure that the item was correctly keyed.

Omit Rates: The omit rate for each item indicates the percentage of students who did not answer the item. Omit rates can be used to examine possible speededness issues on tests. A test may be speeded if students do not have adequate time to answer all questions on the test. As a rule of thumb, an item is said to have a high omit rate if more than 5% of students failed to respond to the item.

This examination of omit rates complies with Standard 4.14 of the AERA, APA, & NCME (2014) *Standards for Educational and Psychological Testing*. This standard is concerned with the speededness of a test:

> For a test that has a time limit, test development research should examine the degree to which scores include a speed component and should evaluate the appropriateness of that component, given the domain the test is designed to measure. (90)

The results presented in Tables 6.4 through 6.17 show that omit rates were less than 1% for most items on all tests. The only item with an omit rate larger than 5% was item 1 on the Grade 3 ELA test, which was omitted by approximately 6% of students. Also, item #1 on the Grade 7 ELA test was omitted by just over 4% of students. These omit rates were investigated. No issues within test engine functionality that would potentially remove a student's answer, skip a question, or submit the test prematurely due to an outage were found.

6.2 Item Response Theory

Item parameters for items contained in MAP tests were estimated using a marginal maximum-likelihood procedure to simultaneously estimate the item parameters for multiple-choice (MC) and non-MC items using the 3-parameter logistic (3PL) model and 2-parameter partial credit (2PPC) IRT model (Bock & Aitkin, 1981; Thissen, 1982). All non-MC items were treated as CR items in the calibration. Under the 3PL model, the probability that a student with the trait or scale score θ will respond correctly to multiple-choice item *j* is

$$P_j(\theta) = c_j + (1 - c_j)/[1 + \exp(-1.7a_j(\theta - b_j))].$$

In the equation, a_j is the item discrimination, b_j is the item difficulty, and c_j is the

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probability of a correct response by a very low-ability student. Under the 2PPC model, the probability that a student with trait or scale score θ will respond in category k to partial-credit item j is

$$P_{jk}(\theta) = \exp(z_{jk}) / \sum_{i=1}^{m_j} \exp(z_{ji}),$$

$$\text{where } z_{jk} = (k-1)f_j - \sum_{i=0}^{k-1} g_{ji}, \text{ and } g_{j0} = 0 \text{ for all } j.$$

The summary output of the 3PL and 2PPC models is in two different metrics. The location and discrimination parameters for the MC items are in the traditional 3PL metric and are labeled b and a, respectively. In the 2PPC model, f (alpha) and g (gamma) are analogous to b and a, where alpha is the discrimination parameter and gamma over alpha (g/f) is the location where adjacent trace lines cross on the ability scale. Because of the different metrics used, the 3PL parameters b and a are not directly comparable to the 2PPC parameters f and g; however, they can be converted to a common metric. The two metrics are related by $b = g/f$ and $a = f / 1.7$ (Burket, 2002). As a result of this procedure, the MC and non-MC items are placed on the same scale. Note that for the 2PPC model, there are m_j–1 (where m_j is a score level j) independent g's and one f, for a total of m_j independent parameters estimated for each item, while there is one a and one b per item in the 3PL model.

Using the 3PL/2PPC model for estimation of ELA, Mathematics, and Science item parameters was consistent with the past methodology (except for administration year 2014–15) implemented for these content areas. Item parameters estimated after the 2015–16 test administration were used to score Missouri students who took ELA, Mathematics, and Science test forms in Spring 2017. A detailed description and the results of the ELA and Mathematics assessment item calibration can be found in the *Missouri Assessment Program, Grade-Level Assessments Grades 3 through 8 English Language Arts and Mathematics Technical Report 2016* (https://dese.mo.gov/sites/default/files/asmt-gl-2016-tech-report-ela-and-math.pdf) and in the *Missouri Assessment Program, Grade-Level Assessments Science Grades 5 and 8 Technical Report 2016* (https://dese.mo.gov/sites/default/files/asmt-gl-2016-tech-report-science.pdf).

6.2.1 Scaling and Equating

Because the Spring 2016 item parameter estimates were used to score Missouri students after the Spring 2017 test administration, this section summarizes the scaling procedures implemented for ELA and Mathematics, and scaling and equating procedures for Science assessments after the 2015–16 test administration. Different procedures were implemented for ELA and Mathematics assessments, and for Science assessments; therefore, the ELA and Mathematics scaling, and the Science scaling and equating are discussed separately.

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The purpose of scaling a test is to enhance the validity of the test score interpretation by increasing the comparability of test takers' scores. In this section, we explicate the way in which the MAP scales are produced to comply with Standard 5.2 of the AERA, APA, & NCME (2014) *Standards*, which states the following:

> The procedures for constructing scales used for reporting scores and the rationale for these procedures should be described clearly. (102)

The MAP scores are produced using the 3PL/2PPC IRT models (explained previously), which assume that each of the items and tasks is an independent indicator of the underlying ability governing the propensity for students to answer an item correctly (or with greater correctness, in the case of the multilevel constructed-response items).

Vertical Scaling of ELA and Mathematics

New scales were established for ELA and Mathematics after the 2015–16 test administration. The test forms in adjacent grade levels of each content area shared common items and were calibrated concurrently at that grade level.

Concurrent calibration is a method that allows for establishing the common scale in a single step—the calibration phase—by simultaneously estimating parameters for all items at all grades. The estimated parameters in the theta metric are on the same scale. In addition, population ability estimates are obtained for multiple groups. The population mean and standard deviation for the base grade were then used to compute the $M1$ and $M2$ transformation parameters to convert the parameter estimates of the other grades onto the common scale score metric.

After placing item parameters on common (vertical) scales for ELA and Mathematics, the mean and standard deviation of population ability estimates for the base Grade 5 were used to identify transformation constants that would allow the transformation of item parameter estimates in a theta metric into a scale score metric and produce a scale with a target mean of 500 and a target standard deviation of 50 for Grade 5 of both ELA and Mathematics assessments. A detailed description of the vertical scaling procedures and results of the ELA and Mathematics assessments can be found in the *Missouri Assessment Program, Grade-Level Assessments Grades 3 through 8 English Language Arts and Mathematics Technical Report 2016* (https://dese.mo.gov/sites/default/files/asmt-gl-2016-tech-report-ela-and-math.pdf).

In addition, as described in the *Missouri Assessment Program, Grade-Level Assessments Grades 3 through 8 English Language Arts and Mathematics Technical Report 2016*, ELA and Mathematics MAP scales were produced to comply with Standard 1.8 of the AERA, APA, & NCME (2014) *Standards*:

> The composition of any sample of test takers from which validity evidence is obtained should be described in as much detail as is practical and permissible,

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> including major relevant socio-demographic and developmental characteristics. (25)

The Spring 2016 ELA and Mathematics calibration samples contained close to 100% of the student data, and the characteristics of the Spring 2016 calibration samples were very similar to those of the Spring 2016 Missouri population.

Scaling and Equating of Science

This section summarizes the scaling and equating procedures implemented for Science assessments after the 2015–16 test administration. As described in the *Missouri Assessment Program, Grade-Level Assessments Science Grades 5 and 8 Technical Report 2016* (https://dese.mo.gov/sites/default/files/asmt-gl-2016-tech-report-science.pdf), the Science scales were established after the 2008 test administration and maintained through the current test administration.

In compliance with the AERA, APA, & NCME (2014) Standard 1.8 (cited in the previous section), census Grades 5 and 8 data were used to calibrate, scale, and equate Science test data after the Spring 2015–16 test administration.

A common-item, nonequivalent-groups design was used to link the 2015–16 tests to the established MAP Science scales. All items administered to Missouri students in Spring 2016 served as the anchor items. After the initial IRT item calibration, item parameters were linked to the MAP Science scales using the Stocking & Lord (1983) equating procedure. The assessment equating methodology and results are presented in the *Missouri Assessment Program, Grade-Level Assessments Science Grades 5 and 8 Technical Report 2016* (Appendix C, Section C.1.2: Linking Methods). The equating methodology of the Science test forms complied with Standard 5.13 of the AERA, APA, & NCME (2014) *Standards*, which states the following:

> When claims of form-to-form score equivalence are based on equating procedures, detailed technical information should be provided on the method by which equating functions were established and on the accuracy of the equating functions. (105)

In addition, AERA, APA, & NCME (2014) Standard 5.15 requires information about the anchors, stating the following:

> In equating studies that employ an anchor test design, the characteristics of the anchor test and its similarity to the forms being equated should be presented, including both content specifications and empirically determined relationships among test scores. If anchor items are used in the equating study, the representativeness and psychometric characteristics of the anchor items should be presented. (105)

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Two statistical methods were used to evaluate anchor items after the 2015–16 test equating: (1) iterative linking (Candell & Drasgow, 1988) using Stocking & Lord's (1983) test characteristic curve method and (2) differences between the item-ability regression curves. In adherence to Standard 5.15, the characteristics of the anchor sets used in test equating are also described in the *Missouri Assessment Program, Grade-Level Assessments Science Grades 5 and 8 Technical Report 2016* (Appendix C, Section C1.3: Anchor Items).

6.3 Pre-equated Design

The term "pre-equating" refers to equating prior to the operational testing. Post-equating, similarly, refers to conducting equating after the operational testing. Both equating processes are widely used in K–12 large-scale assessment programs. Because with post-equating, statistical adjustment of test difficulty is applied to operational test data after the operational test administration, the resultant parameters are sometimes considered to yield more accurate scores.

In the MAP ELA, Mathematics, and Science pre-equated design, statistical procedures (e.g., calibration, scaling, and equating) were applied to the assessments administered in Spring 2015–16. The item parameter estimates obtained after the 2015–16 test administration were then used to score students who participated in the 2016–17 MAP assessments. Because the pre-equated item parameters were obtained in the operational test administration and the Missouri student populations participating in the ELA, Mathematics, and Science assessments are comparable between the two administration years, the use of one-year-old item parameters in student scoring was appropriate. In fact, research shows that item parameters and resultant student scores have been found to be acceptably accurate under pre-equating (Bejar & Wingersky, 1982; Tong, Wu, & Xu, 2008).

The use of pre-equating facilitates the operational process in terms of rapid score reporting and more time for quality control. For these reasons, pre-equating is commonly used in large state assessment programs.

6.3.1 Post-equating Verification

As stated in the previous section, the Spring 2016 item parameters were used to score students who were administered ELA, Mathematics, and Science MAP tests in 2017. Following the test administration and reporting, DRC conducted post-equating item parameter evaluation. The 2017 operational test data were calibrated and equated to the 2016 scales using the 2016 item parameters from post-equating as anchors. Student scores derived using the pre-equated and post-equated item parameters were also compared. The results of post-equating are presented in Appendix C of this report.
In summary, the comparison of mean scale scores, scale score standard deviations, and percentages of students classified in the four achievement levels revealed only very small differences in student performance based on the use of the pre-equated versus post-equated item parameters, supporting the use of pre-equated parameters in MAP ELA, Mathematics, and Science student scoring.

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6.4 Lowest and Highest Obtainable Scale Scores

A maximum likelihood procedure cannot produce scale score estimates for students with perfect scores or scores below the level expected by guessing. In addition, although maximum likelihood estimates are available for students with extreme scores other than zero or perfect, occasionally these estimates have standard errors of measurement that are very large, and differences between these extreme values have little meaning. Therefore, scores are established for these students based on a rational but necessarily non-maximum likelihood procedure. These values, which are set separately by grade, are called the lowest obtainable scale score (LOSS) and the highest obtainable scale score (HOSS). The LOSS and HOSS for ELA and Mathematics were set to increase as the grade level increases while minimizing the standard error around them during the scale development after the Spring 2016 test administration. Science LOSS and HOSS remained unchanged since its first administration in Spring 2008. Table 6.18 shows the LOSS and HOSS values used for each grade of the ELA, Mathematics, and Science MAP tests.

6.5 Item-Pattern Scoring

The MAP scale scores are derived using item-pattern scoring; thus, these scale scores are based on the student's responses to all items on a given test, and scale scores account for the characteristics of the items that are in the test (such as item difficulty). A scale score can be interpreted as a highly probable estimate of a student's ability in each content area.

Using item-pattern scoring, a student's scale score is based on the student's responses to each item (his/her item-response vector). Each item uses optimal item weights in terms of item information, meaning that items do not contribute equally to the overall scale score. Students with the same raw score may be assigned to different scale scores, depending on which items they answered correctly.

6.6 Summary

In summary, the overall purpose of the operational data analyses is to ensure that the test items, as well as the overall test, are functioning appropriately. It also helps maintain the test scale across years so that test results may be appropriately compared across years. The data analyses undertaken by DRC are in alignment with multiple best practices of the testing industry and, in particular, support the following AERA, APA, & NCME (2014) standards:

- Standard 1.8—The composition of any sample of test takers from which validity evidence is obtained should be described in as much detail as is practical and permissible, including major relevant socio-demographic and developmental characteristics.
- Standard 4.14—For a test that has a time limit, test development research should examine the degree to which scores include a speed component and should evaluate the appropriateness of that component, given the domain the test is designed to measure.

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- Standard 5.2—The procedures for constructing scales used for reporting scores and the rationale for these procedures should be described clearly.
- Standard 5.13—When claims of form-to-form score equivalence are based on equating procedures, detailed technical information should be provided on the method by which equating functions were established and on the accuracy of the equating functions.
- Standard 5.15—In equating studies that employ an anchor test design, the characteristics of the anchor test and its similarity to the forms being equated should be presented, including both content specifications and empirically determined relationships among test scores. If anchor items are used in the equating study, the representativeness and psychometric characteristics of the anchor items should be presented.
- Standard 7.2—The population for whom a test is intended and specifications for the test should be documented. If normative data are provided, the procedures used to gather the data should be explained; the norming population should be described in terms of relevant demographic variables; and the year(s) in which the data were collected should be reported.

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Table 6.1: MAP Means and Standard Deviations for Raw Scores, *p*-values, Item-Total Correlation (R_{it}): English Language Arts

Grade	Total Items	Total Points	Mean Raw Score	Raw Score SD	Mean *p*-Value	*p*-Value SD	Mean R_{it}	R_{it} SD
3	52	52	27.47	9.93	0.53	0.18	0.37	0.09
4	52	52	31.94	10.10	0.62	0.17	0.39	0.09
5	49	58	35.30	10.46	0.60	0.16	0.40	0.11
6	52	52	28.63	9.85	0.55	0.18	0.37	0.11
7	52	52	28.00	10.70	0.54	0.14	0.39	0.09
8	49	58	33.83	10.89	0.56	0.19	0.41	0.10

Table 6.2: MAP Means and Standard Deviations for Raw Scores, *p*-values, Item-Total Correlation (R_{it}): Mathematics

Grade	Total Items	Total Points	Mean Raw Score	Raw Score SD	Mean *p*-Value	*p*-Value SD	Mean R_{it}	R_{it} SD
3	42	42	23.84	8.83	0.57	0.20	0.42	0.10
4	42	42	22.27	9.32	0.53	0.17	0.43	0.11
5	42	42	18.52	8.43	0.44	0.19	0.39	0.13
6	46	46	21.12	8.79	0.46	0.24	0.40	0.11
7	46	46	17.99	9.08	0.39	0.17	0.39	0.14
8	46	46	16.95	7.64	0.37	0.17	0.32	0.12

Table 6.3: MAP Means and Standard Deviations for Raw Scores, *p*-values, Item-Total Correlation (R_{it}): Science

Grade and Form	Total Items	Total Points	Mean Raw Score	Raw Score SD	Mean *p*-Value	*p*-Value SD	Mean R_{it}	R_{it} SD
5 A	41	60	34.94	10.69	0.61	0.18	0.38	0.09
5 B	41	60	40.89	9.49	0.68	0.17	0.37	0.08
8 A	39	61	31.64	12.78	0.55	0.14	0.43	0.11
8 B	38	60	31.67	11.32	0.54	0.14	0.39	0.13

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Table 6.4: Item Statistics: English Language Arts, Grade 3

English Language Arts						
Form	**Session**	**Item**	***p*-value**	**R_{it}**	**% Omit**	**Adj. N**
1	1	1	0.54	0.30	6.07	64,930
1	1	2	0.35	0.38	0.12	69,045
1	1	3	0.77	0.43	0.07	69,077
1	1	4	0.70	0.32	0.07	69,078
1	1	5	0.57	0.47	0.07	69,075
1	1	6	0.47	0.37	0.11	69,046
1	1	7	0.63	0.49	0.07	69,078
1	1	8	0.73	0.45	0.14	69,026
1	1	9	0.26	0.36	0.14	69,031
1	1	10	0.50	0.11	0.44	68,820
1	1	11	0.58	0.31	0.11	69,047
1	1	12	0.50	0.41	0.09	69,062
1	1	13	0.31	0.36	1.15	68,330
1	1	14	0.71	0.49	0.12	69,040
1	1	15	0.29	0.43	0.04	69,099
1	1	16	0.38	0.23	0.17	69,008
1	1	17	0.29	0.42	0.20	68,984
1	1	18	0.84	0.21	1.78	67,895
1	1	19	0.52	0.40	0.12	69,045
1	1	20	0.53	0.35	0.13	69,034
1	2	25	0.40	0.35	1.40	68,160
1	2	26	0.64	0.33	0.05	69,092
1	2	27	0.25	0.31	0.24	68,956
1	2	28	0.66	0.31	0.05	69,088
1	2	29	0.27	0.37	0.05	69,089
1	2	30	0.63	0.40	0.11	69,049
1	2	31	0.36	0.43	0.05	69,093
1	2	32	0.83	0.45	0.12	69,042
1	2	35	0.58	0.51	0.07	69,074
1	2	36	0.56	0.28	0.10	69,055
1	2	37	0.58	0.41	0.13	69,036
1	2	38	0.49	0.33	0.09	69,063
1	2	39	0.79	0.50	0.12	69,039
1	2	40	0.86	0.33	0.07	69,079
1	2	41	0.44	0.22	0.41	68,843
1	2	42	0.65	0.36	0.21	68,982
1	2	43	0.89	0.36	0.13	69,038
1	2	44	0.16	0.30	0.15	69,022
1	2	45	0.32	0.17	0.09	69,063
1	2	46	0.20	0.41	0.20	68,987

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Table 6.4: Item Statistics: English Language Arts, Grade 3 (cont.)

English Language Arts						
Form	**Session**	**Item**	***p*-Value**	**R_{it}**	**% Omit**	**Adj. N**
1	2	47	0.47	0.30	0.09	69,063
1	2	48	0.47	0.48	0.06	69,082
1	2	49	0.69	0.54	0.10	69,058
1	2	50	0.50	0.31	0.21	68,982
1	3	51	0.23	0.40	0.03	69,103
1	3	52	0.62	0.31	0.10	69,056
1	3	53	0.40	0.40	0.02	69,114
1	3	54	0.65	0.31	0.10	69,053
1	3	55	0.70	0.49	0.07	69,078
1	3	56	0.69	0.43	0.09	69,066
1	3	57	0.56	0.47	0.07	69,074
1	3	58	0.57	0.49	0.02	69,110

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Table 6.5: Item Statistics: English Language Arts, Grade 4

English Language Arts						
Form	**Session**	**Item**	***p*-Value**	**R_{it}**	**% Omit**	**Adj. N**
1	1	1	0.83	0.46	0.08	69,236
1	1	2	0.57	0.56	0.06	69,248
1	1	3	0.83	0.45	0.05	69,258
1	1	4	0.32	0.47	0.43	68,996
1	1	5	0.55	0.40	0.07	69,244
1	1	6	0.68	0.49	0.12	69,211
1	1	7	0.76	0.37	0.09	69,233
1	1	8	0.66	0.27	0.28	69,097
1	1	9	0.78	0.37	1.39	68,331
1	1	10	0.75	0.41	0.13	69,200
1	1	11	0.49	0.31	0.10	69,225
1	1	12	0.53	0.55	0.11	69,220
1	1	13	0.67	0.47	0.09	69,231
1	1	14	0.72	0.37	0.09	69,230
1	1	15	0.45	0.25	0.05	69,256
1	1	16	0.78	0.41	0.09	69,234
1	1	17	0.80	0.48	0.30	69,087
1	1	18	0.56	0.43	0.36	69,045
1	1	19	0.28	0.45	0.05	69,261
1	1	20	0.80	0.47	0.09	69,229
1	2	25	0.93	0.29	0.09	69,232
1	2	26	0.28	0.32	0.03	69,270
1	2	27	0.45	0.25	0.05	69,259
1	2	28	0.93	0.31	0.02	69,277
1	2	29	0.43	0.31	0.07	69,243
1	2	30	0.93	0.39	0.02	69,277
1	2	31	0.41	0.53	0.18	69,165
1	2	32	0.77	0.46	0.11	69,215
1	2	35	0.51	0.32	0.07	69,243
1	2	36	0.52	0.43	0.08	69,240
1	2	37	0.62	0.46	0.08	69,236
1	2	38	0.70	0.33	0.08	69,241
1	2	39	0.63	0.34	0.08	69,238
1	2	40	0.81	0.40	0.05	69,259
1	2	41	0.33	0.28	0.10	69,224
1	2	42	0.63	0.28	0.19	69,160
1	2	43	0.29	0.20	0.25	69,121
1	2	44	0.49	0.35	0.03	69,270
1	2	45	0.65	0.57	0.07	69,243
1	2	46	0.75	0.48	0.05	69,256

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Table 6.5: Item Statistics: English Language Arts, Grade 4 (cont.)

English Language Arts						
Form	**Session**	**Item**	***p*-Value**	**R_{it}**	**% Omit**	**Adj. N**
1	2	47	0.49	0.40	0.30	69,082
1	2	48	0.59	0.28	0.08	69,241
1	2	49	0.65	0.33	0.06	69,248
1	2	50	0.85	0.41	0.07	69,246
1	3	51	0.53	0.27	0.06	69,253
1	3	52	0.41	0.47	0.08	69,237
1	3	53	0.59	0.51	0.02	69,282
1	3	54	0.63	0.35	0.08	69,235
1	3	55	0.54	0.47	0.06	69,253
1	3	56	0.51	0.34	0.02	69,280
1	3	57	0.62	0.35	0.05	69,260
1	3	58	0.67	0.43	0.05	69,259

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Table 6.6: Item Statistics: English Language Arts, Grade 5

English Language Arts						
Form	**Session**	**Item**	***p*-Value**	**R_{it}**	**% Omit**	**Adj. N**
1	1	1	0.54	0.41	0.21	67,601
1	1	2	0.78	0.42	0.01	67,732
1	1	3	0.63	0.44	0.09	67,682
1	1	4	0.18	0.33	0.07	67,696
1	1	5	0.76	0.29	0.10	67,676
1	1	6	0.49	0.20	0.08	67,687
1	1	7	0.38	0.14	0.12	67,663
1	1	8	0.57	0.47	0.03	67,720
1	1	9	0.84	0.44	0.14	67,648
1	1	10	0.71	0.37	0.06	67,699
1	1	11	0.73	0.27	0.08	67,689
1	1	12	0.44	0.45	0.08	67,685
1	1	13	0.50	0.43	0.16	67,636
1	1	14	0.54	0.51	0.08	67,689
1	1	15	0.65	0.51	0.10	67,670
1	1	16	0.33	0.27	0.36	67,495
1	1	17	0.60	0.63	0.62	67,319
1	1	18	0.62	0.42	0.17	67,626
1	1	19	0.66	0.54	0.13	67,655
1	1	20	0.58	0.37	0.13	67,656
1	2	25	0.50	0.04	0.04	67,712
1	2	26	0.69	0.27	0.06	67,701
1	2	27	0.51	0.38	0.10	67,674
1	2	28	0.65	0.41	0.08	67,688
1	2	29	0.46	0.57	0.10	67,673
1	2	30	0.86	0.39	0.04	67,713
1	2	31	0.74	0.42	0.05	67,705
1	2	32	0.76	0.46	0.38	67,486
1	2	35	0.69	0.29	0.09	67,681
1	2	36	0.83	0.41	0.09	67,682
1	2	37	0.28	0.21	0.12	67,660
1	2	38	0.83	0.46	0.05	67,705
1	2	39	0.48	0.44	0.06	67,697
1	2	40	0.76	0.45	0.30	67,540
1	2	41	0.41	0.37	0.06	67,699
1	2	42	0.48	0.30	0.10	67,670
1	2	43	0.72	0.46	0.10	67,671
1	2	44	0.52	0.48	0.06	67,698
1	2	45	0.55	0.45	0.71	67,258
1	2	46	0.60	0.37	0.05	67,704

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Table 6.6: Item Statistics: English Language Arts, Grade 5 (cont.)

English Language Arts						
Form	**Session**	**Item**	***p*-Value**	**R_{it}**	**% Omit**	**Adj. N**
1	3	47	0.75	0.36	0.05	67,709
1	3	48	0.60	0.53	0.01	67,732
1	3	49	0.39	0.40	0.09	67,681
1	3	50	0.82	0.48	0.06	67,700
1	3	51	0.70	0.20	0.06	67,701
1	3	52	0.44	0.40	0.09	67,682
1	3	53	0.47	0.44	0.01	67,733
1	3	54	0.64	0.37	0.02	67,726
1	4	58	0.88	0.49	0.00	67,741
1	4	58	0.61	0.55	0.00	67,741
1	4	58	0.61	0.55	0.00	67,741

Note: WP statistics are presented separately for the three traits: A–Organization/Purpose, B–Evidence/Elaboration, and C–Conventions. The omit rate for writing item traits is not available because condition codes are given at the item level. Condition codes at the item level are converted to a score of 0 at the trait level. The omit rates for WPs at the item level were inspected and were found to be smaller than 1% in Grade 5.

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Table 6.7: Item Statistics: English Language Arts, Grade 6

English Language Arts						
Form	**Session**	**Item**	***p*-Value**	**R_{it}**	**% Omit**	**Adj. N**
1	1	1	0.74	0.51	1.05	66,026
1	1	2	0.65	0.33	0.21	66,581
1	1	3	0.83	0.36	0.15	66,622
1	1	4	0.72	0.33	0.06	66,682
1	1	5	0.57	0.34	0.09	66,663
1	1	6	0.51	0.45	0.01	66,717
1	1	7	0.62	0.37	0.15	66,621
1	1	8	0.48	0.48	0.04	66,697
1	1	9	0.67	0.50	0.36	66,484
1	1	10	0.52	0.20	0.25	66,560
1	1	11	0.59	0.48	0.27	66,546
1	1	12	0.56	0.40	0.09	66,664
1	1	13	0.15	0.34	0.08	66,673
1	1	14	0.21	0.38	0.30	66,524
1	1	15	0.12	0.22	0.02	66,708
1	1	16	0.51	0.37	0.14	66,632
1	1	17	0.71	0.35	0.13	66,637
1	1	18	0.68	0.56	0.04	66,700
1	1	19	0.52	0.35	0.25	66,558
1	1	20	0.65	0.43	0.10	66,657
1	2	25	0.66	0.44	0.10	66,654
1	2	26	0.77	0.39	0.08	66,669
1	2	27	0.42	0.39	0.04	66,694
1	2	28	0.67	0.27	0.08	66,668
1	2	29	0.36	0.10	0.10	66,655
1	2	30	0.65	0.16	0.18	66,607
1	2	31	0.66	0.43	0.10	66,654
1	2	32	0.51	0.35	0.20	66,592
1	2	35	0.61	0.36	0.12	66,646
1	2	36	0.06	0.07	0.11	66,652
1	2	37	0.66	0.35	0.11	66,650
1	2	38	0.43	0.24	0.08	66,670
1	2	39	0.44	0.24	0.10	66,660
1	2	40	0.63	0.46	0.09	66,664
1	2	41	0.63	0.40	0.16	66,618
1	2	42	0.41	0.13	0.19	66,595
1	2	43	0.50	0.28	0.25	66,560
1	2	44	0.71	0.46	0.11	66,651
1	2	45	0.57	0.57	0.07	66,677
1	2	46	0.52	0.50	0.10	66,657

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Table 6.7: Item Statistics: English Language Arts, Grade 6 (cont.)

English Language Arts						
Form	**Session**	**Item**	***p*-Value**	**R_{it}**	**% Omit**	**Adj. N**
1	2	47	0.42	0.36	0.10	66,659
1	2	48	0.76	0.41	0.11	66,649
1	2	49	0.31	0.39	0.19	66,598
1	2	50	0.30	0.26	0.16	66,616
1	3	51	0.32	0.36	0.04	66,700
1	3	52	0.71	0.37	0.03	66,707
1	3	53	0.81	0.43	0.12	66,643
1	3	54	0.82	0.40	0.08	66,673
1	3	55	0.67	0.51	0.09	66,667
1	3	56	0.30	0.47	0.10	66,656
1	3	57	0.62	0.33	0.03	66,706
1	3	58	0.76	0.50	0.06	66,682

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Table 6.8: Item Statistics: English Language Arts, Grade 7

English Language Arts						
Form	**Session**	**Item**	***p*-Value**	**R_{it}**	**% Omit**	**Adj. N**
1	1	1	0.64	0.41	4.32	63,360
1	1	2	0.68	0.38	0.24	66,061
1	1	3	0.65	0.39	0.10	66,150
1	1	4	0.63	0.29	0.15	66,121
1	1	5	0.27	0.14	0.09	66,158
1	1	6	0.80	0.41	0.15	66,117
1	1	7	0.65	0.27	0.13	66,131
1	1	8	0.58	0.52	0.04	66,195
1	1	9	0.72	0.44	3.49	63,907
1	1	10	0.59	0.34	0.40	65,957
1	1	11	0.71	0.44	0.08	66,166
1	1	12	0.30	0.39	0.12	66,138
1	1	13	0.44	0.32	0.13	66,131
1	1	14	0.48	0.46	0.03	66,199
1	1	15	0.58	0.44	0.10	66,154
1	1	16	0.55	0.37	0.18	66,100
1	1	17	0.40	0.49	0.27	66,041
1	1	18	0.70	0.50	0.18	66,098
1	1	19	0.45	0.32	0.14	66,123
1	1	20	0.48	0.30	0.13	66,133
1	2	25	0.20	0.21	0.22	66,075
1	2	26	0.66	0.39	0.15	66,118
1	2	27	0.42	0.60	0.09	66,158
1	2	28	0.65	0.52	0.08	66,166
1	2	29	0.56	0.22	0.14	66,128
1	2	30	0.74	0.45	0.24	66,059
1	2	31	0.63	0.44	0.12	66,141
1	2	32	0.46	0.47	0.05	66,185
1	2	35	0.46	0.45	0.10	66,153
1	2	36	0.51	0.33	0.12	66,140
1	2	37	0.64	0.34	0.13	66,131
1	2	38	0.50	0.52	0.07	66,173
1	2	39	0.51	0.33	0.14	66,123
1	2	40	0.30	0.35	0.08	66,164
1	2	41	0.57	0.32	0.09	66,162
1	2	42	0.65	0.34	0.29	66,029
1	2	43	0.41	0.36	0.28	66,036
1	2	44	0.74	0.49	0.11	66,144
1	2	45	0.78	0.39	0.11	66,148
1	2	46	0.45	0.27	0.12	66,141

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Table 6.8: Item Statistics: English Language Arts, Grade 7 (cont.)

English Language Arts						
Form	**Session**	**Item**	***p*-Value**	**R_{it}**	**% Omit**	**Adj. N**
1	2	47	0.29	0.38	0.10	66,150
1	2	48	0.47	0.38	0.14	66,126
1	2	49	0.53	0.34	0.14	66,129
1	2	50	0.49	0.28	0.17	66,107
1	3	51	0.41	0.49	0.04	66,192
1	3	52	0.49	0.41	0.03	66,200
1	3	53	0.57	0.58	0.14	66,128
1	3	54	0.44	0.42	0.09	66,160
1	3	55	0.66	0.32	0.12	66,140
1	3	56	0.49	0.50	0.04	66,190
1	3	57	0.42	0.49	0.08	66,169
1	3	58	0.69	0.33	0.07	66,174

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Table 6.9: Item Statistics: English Language Arts, Grade 8

English Language Arts						
Form	**Session**	**Item**	***p*-Value**	**R_{it}**	**% Omit**	**Adj. N**
1	1	1	0.50	0.19	0.16	65,594
1	1	2	0.74	0.39	0.12	65,620
1	1	3	0.67	0.51	0.03	65,685
1	1	4	0.75	0.49	0.12	65,626
1	1	5	0.85	0.40	0.14	65,611
1	1	6	0.43	0.28	0.04	65,677
1	1	7	0.38	0.36	0.22	65,555
1	1	8	0.58	0.37	0.27	65,526
1	1	9	0.44	0.47	0.19	65,579
1	1	10	0.47	0.49	0.12	65,620
1	1	11	0.60	0.47	0.15	65,601
1	1	12	0.57	0.53	0.14	65,609
1	1	13	0.66	0.45	0.11	65,630
1	1	14	0.50	0.41	0.29	65,512
1	1	15	0.64	0.52	0.12	65,626
1	1	16	0.39	0.25	0.25	65,539
1	1	17	0.56	0.40	0.59	65,316
1	1	18	0.23	0.44	0.20	65,573
1	1	19	0.49	0.56	0.16	65,597
1	1	20	0.59	0.61	0.14	65,611
1	2	25	0.17	0.35	0.06	65,662
1	2	26	0.75	0.45	0.08	65,649
1	2	27	0.49	0.35	0.28	65,516
1	2	28	0.34	0.31	0.08	65,647
1	2	29	0.64	0.43	0.09	65,642
1	2	30	0.89	0.40	0.11	65,627
1	2	31	0.92	0.38	0.09	65,644
1	2	32	0.56	0.31	0.32	65,490
1	2	35	0.71	0.37	0.09	65,641
1	2	36	0.09	0.34	0.27	65,524
1	2	37	0.46	0.44	0.10	65,635
1	2	38	0.26	0.29	0.18	65,585
1	2	39	0.21	0.12	0.10	65,635
1	2	40	0.61	0.38	0.23	65,550
1	2	41	0.37	0.45	0.12	65,624
1	2	42	0.57	0.46	0.12	65,620
1	2	43	0.38	0.52	0.22	65,557
1	2	44	0.41	0.40	0.17	65,590
1	2	45	0.71	0.47	0.11	65,632
1	2	46	0.71	0.41	0.09	65,642

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Table 6.9: Item Statistics: English Language Arts, Grade 8 (cont.)

English Language Arts						
Form	**Session**	**Item**	***p*-Value**	**R_{it}**	**% Omit**	**Adj. N**
1	3	47	0.60	0.26	0.05	65,668
1	3	48	0.87	0.40	0.12	65,626
1	3	49	0.64	0.25	0.09	65,644
1	3	50	0.50	0.42	0.04	65,675
1	3	51	0.40	0.39	0.02	65,686
1	3	52	0.81	0.40	0.09	65,643
1	3	53	0.70	0.41	0.06	65,665
1	3	54	0.71	0.41	0.11	65,628
1	4	58	0.93	0.46	0.00	65,702
1	4	58	0.69	0.63	0.00	65,702
1	4	58	0.69	0.63	0.00	65,702

Note: WP statistics are presented separately for the three traits: A–Organization/Purpose, B–Evidence/Elaboration, and C–Conventions. The omit rate for writing item traits is not available because condition codes are given at the item level. Condition codes at the item level are converted to a score of 0 at the trait level. The omit rates for WPs at the item level were inspected and were found to be smaller than 1% in Grade 8.

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Table 6.10: Item Statistics: Mathematics, Grade 3

Mathematics						
Form	**Session**	**Item**	***p*-Value**	**R_{it}**	**% Omit**	**Adj. N**
1	1	2	0.64	0.46	0.06	69,232
1	1	3	0.76	0.44	0.05	69,237
1	1	4	0.78	0.47	0.08	69,218
1	1	6	0.75	0.45	0.10	69,201
1	1	7	0.54	0.43	0.07	69,227
1	1	8	0.84	0.41	0.25	69,100
1	1	9	0.45	0.40	0.40	68,999
1	1	11	0.83	0.45	0.07	69,227
1	1	12	0.53	0.37	0.09	69,208
1	1	13	0.55	0.44	0.09	69,212
1	1	14	0.71	0.39	0.13	69,185
1	1	15	0.62	0.59	0.07	69,225
1	1	16	0.42	0.37	0.12	69,188
1	1	17	0.46	0.24	0.31	69,059
1	1	18	0.46	0.35	0.14	69,173
1	1	19	0.19	0.30	0.08	69,215
1	1	20	0.40	0.44	0.10	69,203
1	1	21	0.31	0.40	0.08	69,217
1	1	22	0.73	0.50	0.10	69,203
1	1	23	0.48	0.50	0.10	69,204
1	1	24	0.46	0.41	0.20	69,137
1	2	26	0.48	0.62	0.04	69,247
1	2	27	0.88	0.34	0.07	69,222
1	2	28	0.64	0.43	0.10	69,206
1	2	30	0.58	0.47	0.10	69,206
1	2	31	0.63	0.38	0.08	69,218
1	2	32	0.59	0.59	0.24	69,108
1	2	33	0.81	0.44	0.08	69,219
1	2	34	0.56	0.35	0.12	69,192
1	2	35	0.40	0.21	0.10	69,207
1	2	36	0.67	0.47	0.10	69,205
1	2	37	0.44	0.42	0.11	69,197
1	2	38	0.71	0.48	0.09	69,214

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Table 6.10: Item Statistics: Mathematics, Grade 3 (cont.)

Mathematics						
Form	**Session**	**Item**	***p*-Value**	**R_{it}**	**% Omit**	**Adj. N**
1	2	39	0.20	0.27	0.09	69,210
1	2	40	0.69	0.51	0.30	69,063
1	2	41	0.80	0.37	0.11	69,200
1	2	42	0.81	0.48	0.09	69,209
1	2	43	0.10	0.06	0.07	69,227
1	2	44	0.66	0.57	0.07	69,225
1	2	45	0.50	0.49	0.08	69,216
1	2	46	0.11	0.33	0.12	69,193
1	2	47	0.70	0.48	0.09	69,211

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Table 6.11: Item Statistics: Mathematics, Grade 4

Mathematics						
Form	**Session**	**Item**	***p*-Value**	**R_{it}**	**% Omit**	**Adj. N**
1	1	2	0.34	0.48	0.06	69,492
1	1	3	0.45	0.30	0.08	69,478
1	1	4	0.59	0.37	0.06	69,495
1	1	6	0.68	0.54	0.09	69,469
1	1	7	0.74	0.45	0.07	69,486
1	1	8	0.62	0.51	0.09	69,474
1	1	9	0.76	0.40	0.17	69,420
1	1	11	0.38	0.31	0.10	69,467
1	1	12	0.62	0.39	0.10	69,467
1	1	13	0.49	0.60	0.09	69,473
1	1	14	0.41	0.31	0.10	69,462
1	1	15	0.42	0.35	0.10	69,463
1	1	16	0.34	0.48	0.09	69,472
1	1	17	0.52	0.61	0.25	69,362
1	1	18	0.53	0.56	0.06	69,491
1	1	19	0.41	0.46	0.11	69,459
1	1	20	0.59	0.47	0.15	69,433
1	1	21	0.62	0.31	0.12	69,451
1	1	22	0.70	0.40	0.09	69,471
1	1	23	0.66	0.41	0.06	69,494
1	1	24	0.44	0.49	0.19	69,404
1	2	26	0.89	0.32	0.09	69,475
1	2	27	0.64	0.40	0.05	69,502
1	2	28	0.47	0.50	0.09	69,472
1	2	30	0.47	0.60	0.13	69,444
1	2	31	0.60	0.50	0.05	69,503
1	2	32	0.70	0.40	0.34	69,301
1	2	33	0.33	0.38	0.10	69,468
1	2	34	0.41	0.29	0.14	69,440
1	2	35	0.53	0.58	0.07	69,484
1	2	36	0.29	0.48	0.05	69,498
1	2	37	0.76	0.43	0.09	69,472
1	2	38	0.08	0.35	0.60	69,115

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Table 6.11: Item Statistics: Mathematics, Grade 4 (cont.)

Mathematics						
Form	**Session**	**Item**	***p*-Value**	**R_{it}**	**% Omit**	**Adj. N**
1	2	39	0.42	0.49	0.07	69,485
1	2	40	0.72	0.45	0.27	69,348
1	2	41	0.35	0.54	0.10	69,464
1	2	42	0.48	0.62	0.11	69,458
1	2	43	0.28	0.19	0.07	69,489
1	2	44	0.59	0.51	0.08	69,481
1	2	45	0.62	0.42	0.07	69,488
1	2	46	0.54	0.08	0.05	69,500
1	2	47	0.82	0.38	0.08	69,481

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Table 6.12: Item Statistics: Mathematics, Grade 5

Mathematics						
Form	**Session**	**Item**	***p*-Value**	**R_{it}**	**% Omit**	**Adj. N**
1	1	2	0.82	0.31	0.06	67,940
1	1	3	0.16	0.53	0.07	67,934
1	1	4	0.56	0.19	0.13	67,895
1	1	6	0.38	0.38	0.11	67,909
1	1	7	0.49	0.59	0.10	67,917
1	1	8	0.64	0.40	0.12	67,901
1	1	9	0.34	0.57	0.27	67,798
1	1	11	0.20	0.54	0.10	67,917
1	1	12	0.40	0.34	0.14	67,884
1	1	13	0.72	0.43	0.10	67,915
1	1	14	0.33	0.62	0.13	67,896
1	1	15	0.74	0.44	0.09	67,919
1	1	16	0.66	0.12	0.13	67,895
1	1	17	0.51	0.55	0.13	67,895
1	1	18	0.44	0.50	0.16	67,871
1	1	19	0.47	0.57	0.13	67,891
1	1	20	0.56	0.42	0.13	67,897
1	1	21	0.08	0.25	0.15	67,881
1	1	22	0.45	0.28	0.14	67,888
1	1	23	0.46	0.27	0.09	67,922
1	1	24	0.46	0.55	0.20	67,845
1	2	26	0.55	0.35	0.10	67,917
1	2	27	0.41	0.53	0.11	67,910
1	2	28	0.26	0.15	0.10	67,911
1	2	30	0.17	0.43	0.08	67,928
1	2	31	0.18	0.49	0.26	67,804
1	2	32	0.41	0.51	0.42	67,695
1	2	33	0.50	0.38	0.10	67,915
1	2	34	0.55	0.29	0.14	67,890
1	2	35	0.52	0.47	0.11	67,904
1	2	36	0.73	0.20	0.07	67,934
1	2	37	0.23	0.51	0.56	67,599
1	2	38	0.72	0.35	0.10	67,916

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Table 6.12: Item Statistics Mathematics, Grade 5 (cont.)

Mathematics						
Form	**Session**	**Item**	***p*-Value**	**R_{it}**	**% Omit**	**Adj. N**
1	2	39	0.48	0.48	0.11	67,910
1	2	40	0.11	0.29	0.19	67,852
1	2	41	0.52	0.33	0.12	67,900
1	2	42	0.41	0.19	0.15	67,877
1	2	43	0.64	0.43	0.13	67,895
1	2	44	0.32	0.44	0.13	67,895
1	2	45	0.04	0.30	0.13	67,891
1	2	46	0.48	0.35	0.09	67,924
1	2	47	0.43	0.22	0.12	67,900

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Table 6.13: Item Statistics: Mathematics, Grade 6

Mathematics						
Form	**Session**	**Item**	***p*-Value**	**R_{it}**	**% Omit**	**Adj. N**
1	1	2	0.53	0.43	0.09	66,748
1	1	3	0.29	0.17	0.08	66,757
1	1	4	0.16	0.46	0.11	66,735
1	1	6	0.86	0.36	0.09	66,751
1	1	7	0.33	0.46	0.05	66,774
1	1	8	0.60	0.46	0.37	66,560
1	1	9	0.50	0.33	0.11	66,732
1	1	11	0.14	0.41	0.06	66,766
1	1	12	0.33	0.58	0.18	66,686
1	1	13	0.56	0.34	0.08	66,753
1	1	14	0.90	0.39	0.06	66,767
1	1	15	0.92	0.33	0.05	66,774
1	1	16	0.31	0.14	0.46	66,503
1	1	17	0.40	0.52	0.14	66,717
1	1	18	0.36	0.26	0.13	66,721
1	1	19	0.53	0.53	0.32	66,596
1	1	20	0.20	0.50	0.11	66,736
1	1	21	0.63	0.34	0.09	66,746
1	1	22	0.65	0.43	0.10	66,744
1	2	24	0.69	0.39	0.21	66,666
1	2	25	0.40	0.30	0.26	66,637
1	2	26	0.29	0.45	0.09	66,748
1	2	28	0.76	0.30	0.13	66,723
1	2	29	0.14	0.38	0.12	66,728
1	2	30	0.55	0.40	0.24	66,651
1	2	31	0.72	0.36	0.11	66,737
1	2	32	0.93	0.29	0.17	66,697
1	2	33	0.38	0.47	0.24	66,647
1	2	34	0.61	0.52	0.34	66,578
1	2	35	0.34	0.32	0.22	66,658
1	2	36	0.07	0.18	0.13	66,722
1	2	37	0.44	0.38	0.07	66,764
1	2	38	0.72	0.48	0.13	66,721

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Table 6.13: Item Statistics: Mathematics, Grade 6 (cont.)

Mathematics						
Form	**Session**	**Item**	***p*-Value**	**R_{it}**	**% Omit**	**Adj. N**
1	2	39	0.64	0.45	0.11	66,733
1	2	40	0.21	0.13	0.15	66,705
1	2	41	0.63	0.46	0.10	66,741
1	2	42	0.10	0.45	0.26	66,635
1	2	43	0.47	0.43	0.21	66,671
1	2	44	0.65	0.55	0.31	66,602
1	2	45	0.37	0.54	0.28	66,618
1	2	46	0.25	0.53	0.27	66,630
1	2	47	0.66	0.39	0.18	66,687
1	2	48	0.08	0.20	0.09	66,748
1	2	49	0.16	0.47	0.10	66,739
1	2	50	0.50	0.35	0.15	66,707
1	2	51	0.18	0.56	0.18	66,688

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Table 6.14: Item Statistics: Mathematics, Grade 7

Mathematics						
Form	**Session**	**Item**	***p*-Value**	**R_{it}**	**% Omit**	**Adj. N**
1	1	2	0.44	0.36	0.07	65,526
1	1	3	0.17	0.32	0.07	65,524
1	1	4	0.39	0.51	0.09	65,514
1	1	5	0.52	0.58	0.10	65,506
1	1	6	0.44	0.41	0.07	65,525
1	1	7	0.19	0.17	0.10	65,508
1	1	8	0.13	0.43	0.30	65,378
1	1	9	0.17	0.45	0.04	65,548
1	1	10	0.36	0.40	0.06	65,530
1	1	11	0.51	0.30	0.09	65,516
1	1	12	0.41	0.36	0.11	65,502
1	1	13	0.28	0.17	0.08	65,518
1	1	14	0.20	0.43	0.06	65,530
1	2	16	0.46	0.41	0.15	65,473
1	2	17	0.48	0.60	0.25	65,410
1	2	18	0.34	0.42	0.30	65,377
1	2	20	0.62	0.47	0.26	65,404
1	2	21	0.22	0.46	0.09	65,513
1	2	22	0.42	0.19	0.13	65,485
1	2	23	0.20	0.41	0.16	65,464
1	2	25	0.30	0.25	0.20	65,441
1	2	26	0.50	0.44	0.15	65,473
1	2	27	0.78	0.41	0.11	65,501
1	2	28	0.35	0.32	0.22	65,427
1	2	30	0.64	0.20	0.61	65,170
1	2	31	0.60	0.38	0.19	65,450
1	2	32	0.52	0.45	0.24	65,413
1	2	33	0.56	0.54	0.31	65,368
1	2	34	0.13	0.34	0.11	65,497
1	2	35	0.59	0.55	0.09	65,510
1	2	36	0.24	0.57	0.32	65,365
1	2	37	0.67	0.43	0.11	65,501
1	2	38	0.23	-0.05	0.13	65,485

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Table 6.14: Item Statistics: Mathematics, Grade 7 (cont.)

Mathematics						
Form	**Session**	**Item**	***p*-Value**	**R_{it}**	**% Omit**	**Adj. N**
1	2	39	0.45	0.49	0.11	65,503
1	2	40	0.54	0.30	0.11	65,497
1	2	41	0.30	0.45	0.25	65,411
1	2	42	0.57	0.25	0.24	65,416
1	2	43	0.69	0.26	0.25	65,406
1	2	44	0.33	0.53	0.25	65,406
1	2	45	0.09	0.41	0.29	65,385
1	2	46	0.48	0.23	0.50	65,244
1	2	47	0.32	0.41	0.15	65,473
1	2	48	0.19	0.57	0.45	65,277
1	2	49	0.50	0.52	0.15	65,475
1	2	50	0.27	0.63	0.37	65,328
1	2	51	0.26	0.32	0.16	65,470

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Table 6.15: Item Statistics: Mathematics, Grade 8

Mathematics						
Form	**Session**	**Item**	***p*-Value**	**R_{it}**	**% Omit**	**Adj. N**
1	1	2	0.21	0.09	0.08	52,918
1	1	3	0.46	0.30	0.06	52,932
1	1	4	0.45	0.36	0.04	52,940
1	1	5	0.44	0.38	0.10	52,910
1	1	6	0.06	0.36	0.35	52,776
1	1	7	0.37	0.22	0.05	52,939
1	1	8	0.36	0.37	0.04	52,941
1	1	9	0.31	0.56	0.51	52,695
1	1	10	0.43	0.32	0.10	52,908
1	1	11	0.03	0.26	0.56	52,666
1	2	13	0.33	0.39	0.18	52,869
1	2	14	0.60	0.22	0.25	52,828
1	2	15	0.55	0.39	0.24	52,837
1	2	17	0.08	0.40	0.49	52,703
1	2	18	0.11	0.29	0.14	52,887
1	2	19	0.54	0.34	0.15	52,886
1	2	20	0.16	0.44	0.94	52,466
1	2	22	0.19	0.23	0.16	52,876
1	2	23	0.45	0.25	0.19	52,865
1	2	24	0.36	0.27	0.17	52,874
1	2	25	0.63	0.31	0.19	52,865
1	2	27	0.22	0.17	0.31	52,801
1	2	28	0.44	0.48	0.27	52,821
1	2	29	0.33	0.05	0.18	52,868
1	2	30	0.40	0.47	1.00	52,435
1	2	31	0.46	0.13	0.30	52,804
1	2	32	0.30	0.30	0.20	52,857
1	2	33	0.22	0.49	0.99	52,439
1	2	34	0.45	0.24	0.18	52,867
1	2	35	0.57	0.25	0.19	52,860
1	2	36	0.70	0.42	0.17	52,873
1	2	37	0.31	0.15	0.24	52,838
1	2	38	0.49	0.40	0.21	52,850

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Table 6.15: Item Statistics: Mathematics, Grade 8 (cont.)

Mathematics						
Form	**Session**	**Item**	***p*-Value**	**R_{it}**	**% Omit**	**Adj. N**
1	2	39	0.72	0.39	0.18	52,866
1	2	40	0.45	0.34	0.31	52,799
1	2	41	0.52	0.41	0.32	52,792
1	2	42	0.19	0.49	0.39	52,757
1	2	43	0.36	0.27	0.39	52,757
1	2	44	0.21	0.21	0.36	52,771
1	2	45	0.27	0.06	0.27	52,819
1	2	46	0.37	0.29	0.30	52,802
1	2	47	0.28	0.41	0.83	52,526
1	2	48	0.61	0.48	0.23	52,843
1	2	49	0.16	0.49	1.09	52,385
1	2	50	0.65	0.35	0.22	52,845
1	2	51	0.22	0.30	0.29	52,812

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Table 6.16: Item Statistics: Science, Grade 5

Science						
Form	**Session**	**Item**	***p*-value**	**R_{it}**	**% Omit**	**Adj. N**
A	1	1	0.45	0.53	0.33	47,418
A	1	3	0.31	0.41	0.85	47,122
A	1	4	0.52	0.43	0.29	47,399
A	1	7	0.52	0.52	0.15	47,638
A	1	8	0.50	0.39	0.45	47,339
A	1	10	0.46	0.50	0.39	47,459
A	1	11	0.54	0.36	0.56	47,231
A	1	12	0.57	0.41	0.31	47,389
A	1	13	0.74	0.41	0.34	47,373
A	1	14	0.64	0.40	0.28	47,446
A	2	15	0.94	0.34	0.01	47,833
A	2	16	0.44	0.11	0.02	47,831
A	2	17	0.65	0.37	0.04	47,822
A	2	22	0.43	0.27	0.05	47,816
A	2	24	0.78	0.32	0.05	47,815
A	2	25	0.90	0.41	0.03	47,826
A	2	27	0.87	0.32	0.05	47,813
A	2	28	0.64	0.51	0.09	47,796
A	2	29	0.82	0.35	0.04	47,821
A	2	31	0.55	0.37	0.04	47,820
A, B	1	2	0.62	0.36	0.09	67,826
A, B	1	5	0.65	0.35	0.11	67,799
A, B	1	6	0.44	0.30	0.11	67,729
A, B	1	9	0.53	0.38	0.51	67,173
A, B	2	18	0.83	0.33	0.05	67,937
A, B	2	19	0.89	0.35	0.03	67,952
A, B	2	20	0.46	0.27	0.05	67,940
A, B	2	21	0.86	0.46	0.04	67,942
A, B	2	23	0.52	0.35	0.03	67,948
A, B	2	26	0.80	0.36	0.04	67,946
A, B	2	30	0.84	0.37	0.04	67,947
A, B	2	32	0.44	0.24	0.04	67,945
A, B	3	33	0.92	0.26	0.05	67,889
A, B	3	34	0.47	0.53	0.17	67,818
A, B	3	35	0.47	0.44	0.62	67,232

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Table 6.16: Item Statistics: Science, Grade 5 (cont.)

Science						
Form	**Session**	**Item**	***p*-value**	**R_{it}**	**% Omit**	**Adj. N**
A, B	3	36	0.59	0.57	0.18	67,693
A, B	3	37	0.70	0.41	0.55	67,130
A, B	3	38	0.73	0.33	0.42	67,369
A, B	3	39	0.27	0.42	0.45	67,217
A, B	3	40	0.30	0.44	0.64	67,065
A, B	3	41	0.47	0.45	0.21	67,829
B	1	1	0.57	0.30	0.04	20,108
B	1	3	0.64	0.37	0.04	20,114
B	1	4	0.65	0.34	0.02	20,116
B	1	7	0.77	0.30	0.04	20,089
B	1	8	0.66	0.44	0.08	20,093
B	1	10	0.77	0.42	0.03	20,107
B	1	11	0.62	0.40	0.19	20,024
B	1	12	0.66	0.43	0.32	19,976
B	1	13	0.78	0.35	0.14	20,065
B	1	14	0.77	0.47	0.09	20,083
B	2	15	0.73	0.19	0.02	20,128
B	2	16	0.79	0.37	0.04	20,123
B	2	17	0.79	0.24	0.04	20,123
B	2	24	0.89	0.33	0.07	20,118
B	2	25	0.92	0.32	0.01	20,129
B	2	26	0.82	0.37	0.02	20,128
B	2	27	0.85	0.34	0.04	20,124
B	2	28	0.73	0.35	0.08	20,115
B	2	29	0.76	0.36	0.09	20,114
B	2	31	0.81	0.35	0.04	20,124

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Table 6.17: Item Statistics: Science, Grade 8

Science						
Form	**Session**	**Item**	***p*-value**	**R_{it}**	**% Omit**	**Adj. N**
A	1	1	0.79	0.40	1.09	41,750
A	1	2	0.57	0.46	0.64	41,952
A	1	3	0.46	0.43	0.57	42,023
A	1	4	0.75	0.45	1.04	41,680
A	1	5	0.44	0.57	0.24	42,231
A	1	6	0.62	0.51	0.61	41,987
A	1	7	0.49	0.52	0.93	41,806
A	1	8	0.41	0.55	1.96	41,239
A	1	9	0.48	0.55	1.29	41,656
A	1	11	0.37	0.57	0.74	41,869
A	1	12	0.48	0.31	1.13	41,685
A	1	13	0.74	0.52	1.30	41,594
A	1	14	0.63	0.51	0.80	41,901
A	2	17	0.61	0.57	0.03	42,367
A	2	19	0.74	0.43	0.07	42,350
A	2	20	0.64	0.34	0.07	42,351
A	2	21	0.64	0.39	0.05	42,358
A	2	22	0.62	0.38	0.07	42,353
A	2	23	0.77	0.34	0.06	42,356
A	2	24	0.53	0.40	0.05	42,360
A	2	25	0.49	0.39	0.05	42,359
A	2	26	0.65	0.37	0.04	42,362
A	2	27	0.56	0.26	0.08	42,346
A	2	28	0.54	0.28	0.08	42,345
A, B	1	10	0.47	0.52	2.02	63,893
A, B	2	15	0.43	0.31	0.02	65,820
A, B	2	16	0.48	0.11	0.06	65,793
A, B	2	18	0.70	0.41	0.06	65,795
A, B	2	29	0.59	0.34	0.07	65,788
A, B	2	30	0.52	0.35	0.05	65,799
A, B	3	31	0.48	0.46	0.60	64,682
A, B	3	32	0.50	0.58	0.77	64,504
A, B	3	33	0.24	0.34	0.59	65,119
A, B	3	34	0.79	0.40	0.63	65,344
A, B	3	35	0.46	0.61	0.75	65,238

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Table 6.17: Item Statistics: Science, Grade 8 (cont.)

Science						
Form	**Session**	**Item**	***p*-value**	**R_{it}**	**% Omit**	**Adj. N**
A, B	3	36	0.53	0.52	0.84	64,799
A, B	3	37	0.37	0.44	3.38	61,710
A, B	3	38	0.35	0.54	1.21	64,506
A, B	3	39	0.31	0.42	1.63	64,082
B	1	1	0.56	0.50	0.56	23,261
B	1	2	0.65	0.55	1.02	23,150
B	1	3	0.54	0.54	0.58	23,264
B	1	4	0.48	0.57	0.60	23,278
B	1	5	0.68	0.41	0.81	23,165
B	1	6	0.47	0.58	3.00	22,579
B	1	7	0.45	0.48	0.87	23,184
B	1	8	0.54	0.33	0.30	23,353
B	1	9	0.45	0.49	2.51	22,700
B	1	11	0.37	0.36	0.61	23,241
B	1	12	0.65	0.49	1.87	22,891
B	1	13	0.70	0.38	1.30	23,065
B	1	14	0.62	0.34	1.13	23,090
B	2	17	0.62	0.34	0.05	23,441
B	2	19	0.40	0.15	0.04	23,444
B	2	20	0.78	0.37	0.05	23,442
B	2	21	0.74	0.27	0.07	23,437
B	2	22	0.57	0.24	0.07	23,436
B	2	23	0.59	0.26	0.01	23,451
B	2	24	0.55	0.21	0.03	23,447
B	2	25	0.81	0.33	0.06	23,440
B	2	26	0.51	0.23	0.04	23,443
B	2	27	0.39	0.12	0.05	23,441

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Table 6.18: Lowest and Highest Obtainable Scores

Grade	ELA		Mathematics		Science	
	LOSS	HOSS	LOSS	HOSS	LOSS	HOSS
3	230	730	290	650		
4	240	740	320	680		
5	250	780	340	710	470	855
6	260	790	350	730		
7	280	810	360	740		
8	290	820	390	770	540	895

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CHAPTER 7: TEST RESULTS

This chapter of the Technical Report contains information on the results of the Spring 2017 administration of the ELA, Mathematics, and Science MAP. The scale score results are presented here. Achievement level information is also provided. Presenting the results by achievement level translates the quantitative scale provided through scale scores into a qualitative description of student achievement: *Below Basic*, *Basic*, *Proficient*, and *Advanced*.

While the scale score provides an essential quantitative reference to student achievement, the achievement level information plainly outlines the meaning of the scores to parents, students, and educators. When combined, scale scores and achievement levels provide a comprehensive set of tools to assess Missouri student achievement by content and grade level.

This chapter also provides descriptions of the score reports, data structure, and interpretive guide. The AERA, APA, & NCME (2014) standards addressed in Chapter 7 are 5.1, 6.10, 7.0, and 12.18. Each standard will be presented in the pertinent section of this chapter.

Results presented in this chapter are based on Missouri student census data. The results presented here may differ slightly from the official state summary report of all student populations due to ongoing resolution of test materials and student information. The results in the tables in this chapter are presented as evidence of reliability and validity of the intended interpretation of scores from the MAP assessments, and they should not be used for state accountability purposes.

7.1 Test Completion

The following subgroups are reported during the administration of the MAP tests (other demographic information is collected separately and merged into the MAP data after DRC sends DESE the General Research File [GRF]):

- Gender: Female and Male
- Race/Ethnicity: White, Black, Hispanic, Asian/Pacific Islander, American Indian, and Other
- Accommodations: Students receiving testing accommodations

For the purposes of this report, test completion rate is defined as the percentage of students who receive a valid scale score given the total number of students eligible to take the online test or receive a test book. These test completion rates are summarized in Tables 7.1 through 7.10. The tables show both the percentage of students classified as reportable and the number of students classified as accountable. Reportable students include all students with a valid scale score (teacher-invalidated students are excluded). The Accountable columns show the total number of students eligible to take an online

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test or receive a test book. These numbers include students who should have received a MAP scale score but did not take the test and could not be assigned a scale score. It should be noted that approximately 20% of Grade 8 students took the Algebra 1 assessment instead of the Mathematics assessment. The exclusion of these students from the Mathematics assessment may affect the state-level student performance in Mathematics.

7.2 Current Administration Data

The ELA and Mathematics MAP assessments were administered to students in Grades 3 through 8. The Science assessments were administered in Grades 5 and 8. Tables 7.11, 7.12, and 7.13 provide a summary of the scale scores based on the state population for the 2017 administration of the ELA, Mathematics, and Science assessments, respectively.

Evidence of the validity of the ELA growth scale is provided by the increase of the scale score at selected percentiles as the grade level increases. Table 7.11 shows the scale score means and standard deviations, as well as the scale scores at several percentile points, for Spring 2017 ELA assessments. The scale score means increase as the grade level increases, reflecting vertical properties of the ELA scale. The scale scores at the 10th, 25th, 50th, 75th, and 90th percentiles indicate the growth, or change, in score by grade for students at different ability levels. Ideally, the scale score associated with each percentile will increase from one grade to the next. Table 7.11 shows that there is an upward progression of scale scores across all grades in ELA, except for Grades 6 and 7; a higher scale score is observed for Grade 6 than for Grade 7 at the bottom of the ability scale (the 10th percentile).

Table 7.12 contains the mean scale scores, the scale score standard deviations, and the scale scores at the 10th, 25th, 50th, 75th, and 90th percentiles of the score distributions for Spring 2017 Mathematics assessments. A growth pattern similar to the one present in ELA is observed for Mathematics from Grade 3 to Grade 7: the scale score means increase as the grade increases, and the upward progression of the scale scores at all percentile points is observed. Unlike for ELA, almost no growth was observed between Grades 7 and Grade 8. While grade-to-grade growth between the two highest grades was observed at the 25th and 50th percentiles, higher scale scores for Grade 7 were found at the 10th percentile and at and above the 75th percentile than for Grade 8. This scale score pattern between Grades 7 and 8 indicates that, while lower-to-middle-ability Grade 8 students performed better on the Mathematics assessment than lower-to-middle-ability Grade 7 students, the opposite may be true for the very low-ability students and for higher-ability students. While this is not an expected growth pattern, a contributing factor may be the fact that the population of Grade 8 students who are administered the Mathematics tests is not fully comparable to the Grade 7 population. Rather, the Grade 8 Mathematics test takers are a subpopulation of the Grade 8 students. Approximately 20% of Grade 8 Mathematics students take the Algebra 1 test instead of the Mathematics test, and these students tend to be of higher ability. Removing higher-ability students from the population of Grade 8 students taking the Mathematics test may subsequently contribute

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to the little or no growth between Grades 7 and 8 that was observed at the upper end of the ability scale.
Evidence of the validity of the Science MAP growth scales is provided by the increase of the scale score at selected percentiles as the grade level increases and within a grade level. Table 7.13 displays the mean scale scores, scale score standard deviations, and scale scores at several percentile points for two Science grade levels. These scale scores show that there is an upward progression of scale scores within and across the two Science grades.

7.3 Cross-Year, Cross-Sectional Comparisons

It is often desirable to examine the scores of students over time and monitor group performance. This is possible if the test content and the construct measured by the test are comparable from year to year and if the scores are reported on the same scale over multiple years.

For the ELA and Mathematics assessments, two years of the test scores on the same reporting scale are available, and the state-level scale score means and standard deviations for 2016 and 2017 administration years are presented in Tables 7.14 and 7.15, respectively. For Science, the test content remained the same from 2008 through 2017, and the 2017 test scores were reported on the same scale as in the previous years. Table 7.16 shows the state-level scale score means and standard deviations for Grades 5 and 8 from 2008 through 2017.

The mean scale score for ELA increased approximately one scale score point for Grades 4, 5, 6, and 8 and two scale score points for Grades 3 and 7 between the Spring 2016 and Spring 2017 test administrations.

The mean scale score for Mathematics did not change for Grade 6 between the last two test administrations. The mean scale score for Mathematics increased by approximately half a point for Grades 3 and 8, one point for Grades 4 and 5, and by one and a half scale score points for Grade 7.

For Science, the mean scale score increased by approximately two scale score points for Grade 5 and by approximately one scale score point for Grade 8 between the 2016 and 2017 test administrations.

Table 7.17 shows the percentage of students in each achievement level from 2006 through 2017 ELA test administrations. It should be noted that different sets of cut scores were used to classify students into ELA proficiency levels over the years. ELA scores were reported on previous Missouri scales, and Missouri-specific cuts scores were used for student classification until the 2014 test administration. In the 2015 test administration, the ELA test scores were reported on the Smarter Balanced Assessment Consortium (SBAC) scale, and students were classified into the achievement levels based on the cut scores established after the 2014 SBAC field test. The ELA scores after the 2016 test administration were reported on a new Missouri scale, and new cut scores were

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established by Missouri educators in a process of standard setting in Summer 2016 to reflect Missouri student performance on these assessments. Therefore, the percentage of students in each achievement level after the 2015 test administration is not directly comparable to the percentage of students in each achievement level after the 2014 test administration; and the percentage of students in each achievement level after the 2016 test administration may differ from the percentage of students in each achievement level after the 2015 test administration. In the last two years of the ELA assessment administrations, students were classified into achievement levels using the same set of cut scores, so the achievement level data from Spring 2016 and Spring 2017 are directly comparable. The past data are provided in Table 7.17 for reference purposes only and are separated from the last two years of the administrations by gray horizontal bars.

Table 7.17 shows the percentage of students in each achievement level from 2006 through 2017 on the ELA test. As stated above, only the data from the last two administration years are directly comparable. A small increase in the percentage of students at or above *Proficient* was observed for all ELA grades, and it ranged from 0.5% for Grade 5 to 1.5% for Grade 3.

Table 7.18 shows the percentage of students in each achievement level from 2006 through 2017 on the Mathematics test. Similar to ELA, the Mathematics test scores were reported on the SBAC scale after the 2015 test administration, and students were classified into the achievement levels based on the cut scores established after the 2014 field test by SBAC. The Mathematics scores after the 2016 test administration were reported on a new Missouri vertical scale, and new cut scores were set by Missouri educators in a process of standard setting in Summer 2016. In the last two years of the Mathematics assessment administrations, students were classified into achievement levels using the same set of cut scores, so the achievement level data from Spring 2016 and Spring 2017 are directly comparable. The past data are provided in the table for reference purposes only and are separated from the last two years by gray horizontal bars.

Table 7.18 shows the percentage of students in each achievement level from 2006 through 2017 on the Mathematics assessment. Similar to ELA, only the data from the last two administration years are directly comparable. A small increase in the percentage of students at or above *Proficient* was observed for all Mathematics grades, and it ranged from approximately 0.5% for Grade 6 to close to 2% for Grades 7 and 8.

It is worth noting that not all Grade 8 students participate in the Mathematics assessment. As stated previously, approximately 20% of Grade 8 students take the Algebra 1 assessment instead of the Mathematics assessment. The exclusion of these students from the Mathematics assessment may affect the state-level student performance in Mathematics.

Table 7.19 shows the percentage of students in each achievement level from 2008 through 2017 on the Science test. The same set of cut scores was used to classify students into achievement levels in all years of the Science assessment administration. In Grade 5, the percentage of students at or above *Proficient* increased by approximately 3%, and in

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Grade 8, the percentage of students at or above *Proficient* increased by about 1% between the 2016 and 2017 test administrations. It should be noted that the increase in the percentage of students at or above *Proficient* for Grade 5 Science was larger than the corresponding increase for any other grade and content area. As can be seen in Table 7.19, a decrease of about 4% in the *Proficient* and above categories between the 2015 and 2016 test administrations was observed for Grade 5. The Spring 2017 Science Grade 5 student performance on the test and the resulting student classification were more in line with the Spring 2015 test results than with the Spring 2016 test results.

It should be noted that teacher-invalidated students were assigned to the lowest obtainable scale score (LOSS) and to the *Below Basic* achievement level. These students were excluded from the scale score summaries.

7.4 Reports

Score reports are the primary means of communicating test scores to relevant district personnel (i.e., test coordinators or superintendents), teachers, and parents. AERA, APA, & NCME (2014) Standard 6.10 states the following:

> When test score information is released, those responsible for testing programs should provide interpretations appropriate to the audience. The interpretations should describe in simple language what the test covers, what scores represent, the precision/reliability of the scores, and how scores are intended to be used. (119)

Standard 5.1 is related in that it states the following:

> Test users should be provided with clear explanations of the characteristics, meaning, and intended interpretation of scale scores, as well as their limitations. (102)

Interpretations related to the test scores are disseminated in two ways: (1) the individual score report and (2) the *Guide to Interpreting Results* (DRC, 2017).

It is important that the information not only provides interpretation but also is understandable by the target audience. Standard 7.0 of the AERA, APA, & NCME (2014) *Standards* states the following:

> Information relating to tests should be clearly documented so that those who use tests can make informed decisions regarding which test to use for a specific purpose, how to administer the chosen test, and how to interpret test scores. (125)

In support of Standard 7.0, the *Guide to Interpreting Results* (presented in Appendix D) is accessible to parents, teachers, and laypeople alike.

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The Individual Student Report (ISR) is the primary way to share student test results with parents. As such, it should be a stand-alone document from which parents can glean relevant information so they understand their child's test score. In the 2016–17 administration year, DRC reported the MAP Grade-Level Assessment through the Missouri MAP Online Reporting System. The MAP online reporting system is a browser-based system designed to deliver online interactive reporting to authorized users at the state and district level for Missouri public schools. It was delivered on the INSIGHT Online Reporting platform.

7.4.1 Description of Each Type of Report

In this section, descriptions for the following reports are provided: Student Roster, ISR, and Student Score Label. In addition, the Missouri Comprehensive Data System is briefly discussed.

In compliance with AERA, APA, & NCME (2014) Standard 12.18, the MAP score reports provide clear information about individual student achievement and groups of students. Standard 12.18 states the following:

> In educational settings, score reports should be accompanied by a clear presentation of information on how to interpret the scores, including the degree of measurement error associated with each score or classification level, and by supplementary information related to group summary scores. In addition, dates of test administration and relevant norming studies should be included in score reports. (200)

Student Roster

Available from the Missouri Online Reporting System is a student roster that displays a list of students based on the specific report filter options selected, such as test administration, grade, school, district, gender, race/ethnicity, and examiner. Scale scores and achievement level indicators are displayed in a table-type format for the content area chosen. Selecting a student from the roster will open the ISR.

Individual Student Report

The ISR is another type of report available through the Missouri Online Reporting System. The ISRs are provided to schools to be sent home to the parents. On the left side of the page, the student's identifying information and an overview of the performance, including the student's MAP scale score results for a given content area, are shown. In the middle of the page, a bar graph and the student's scale score are shown, along with the achievement level associated with that scale score for a given content area. This information is followed by a brief explanation of what the achievement level means. When a student does not receive a scale score, then his or her achievement level will be labeled "Level Not Determined" (LND). Invalidated students are assigned to the LOSS for a given content area and to the *Below Basic* achievement level. The ISR also contains a brief explanation of the meaning of the content area achievement level indicators.

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On the right side of the page, the content area achievement level descriptors and scale score ranges for each achievement level are listed. A sample ISR is provided in the *Guide to Interpreting Results* (page 15).

Student Score Label

The Student Score Label is designed so that each student's test results can be placed in the student's permanent record. A label is provided for every student who participated in the Spring 2017 administration of the MAP. Each label has a self-adhesive backing so that it can be peeled from the sheet and placed in the student's cumulative school record. The label presents a snapshot of the student's results on the MAP. Separate labels are generated for each grade and content area; thus, a student will have multiple labels—one for each content area administered. The label lists the student's scale score and achievement level for the content area. DRC provides multiple labels per student submitted for scoring. The labels are provided in print only. A sample Student Score Label report is provided in the *Guide to Interpreting Results* (page 16).

Missouri Comprehensive Data System

Schools and districts are able to access summary level reports through the online Missouri Comprehensive Data System (MCDS). The MCDS allows school district personnel with appropriate permissions to access MAP data at a variety of levels and to request on-demand, customized reports that are configured and disaggregated in ways that best meet their needs for such activities as evaluating programs, revising curriculum, and improving teaching and learning. Users access the MCDS from the Data Management tab on DESE's home page (http://dese.mo.gov/). From there, they access the data portal directly through the MCDS link. Each school and/or district is assigned a username and password so that it can access the site.

7.5 Data Structures

A data file referred to as GRF is provided to DESE by DRC. It contains one record for every test book submitted; each record contains demographic information for each student as well as item responses, total test raw scores and scale scores, student performance level classification, and percentage correct for each ELA, Mathematics, and Science content category.

7.5.1 General Research File

The layout for the state-level GRF is included in Appendix E.

7.6 Interpreting Test Results

The student's correct responses to the assessment questions are used to derive a MAP scale score. The scale score describes achievement on a continuum that, in most cases, spans the complete range of Grades 3–8. These scores range in value from 230 to 820 for ELA and from 290 to 770 for Mathematics. Because ELA and Mathematics assessments are on vertical scales, scores from adjacent grades may be compared within a content area. For example, it is appropriate to compare a student's Grade 5 Mathematics scale

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score with his or her Grade 6 Mathematics scale score in a subsequent administration year. ELA and Mathematics scale scores can also be compared, within a content area, across the last two test administrations: Spring 2016 and Spring 2017.

Science scores range from 470 to 855 for Grade 5 and from 540 to 895 for Grade 8. Science scores can be compared within a grade level in one test administration and across administrations. The scores can also be compared across different forms administered in the same grade level. Although Science scales have underlying vertical scale properties, comparing the scores across grades should be done with caution because Science tests are not administered in adjacent grades.

Scale scores cannot be compared across content areas. For example, it is not appropriate to compare Mathematics and ELA scores for the same student.

The MAP scale scores determine the student's achievement level. Student performance can be reported in terms of four performance, or achievement, levels that describe a pathway to proficiency and college and career readiness. Each achievement level represents standards of performance for each assessed content area. Achievement level scores provide a description of what students can do in terms of the content and skills assessed, as described in the Missouri Learning Standards.

The information on score interpretation is included in the *Guide to Interpreting Results*, which was written for Missouri teachers and administrators who receive score reports from the 2016–17 administration of the MAP. The *Guide to Interpreting Results* was developed collaboratively by DRC and DESE staff. DESE staff had opportunities to review, provide feedback, and give final approval.

This guide has three sections. The first section presents an overview of key terms and test-related concepts. The second section discusses assessment terms and types of scores that will be presented on the score reports, and it presents the achievement level descriptors for all grade/content areas. The third section presents sample score reports.

7.7 Summary

In summary, the overall purpose of reporting test results is to communicate information on student performance to stakeholders. These results are presented in the context of score reports that aid the user in understanding the meaning of the test scores. The reports and ancillary information developed by DRC are in alignment with multiple best practices of the testing industry and, in particular, support the following AERA, APA, & NCME (2014) standards:

- Standard 5.1—Test users should be provided with clear explanations of the characteristics, meaning, and intended interpretation of scale scores, as well as their limitations.
- Standard 6.10—When test score information is released, those responsible for testing programs should provide interpretations appropriate to the audience. The interpretations should describe in simple language what the test covers, what

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scores represent, the precision/reliability of the scores, and how scores are intended to be used.

- Standard 7.0—Information relating to tests should be clearly documented so that those who use tests can make informed decisions regarding which test to use for a specific purpose, how to administer the chosen test, and how to interpret test scores.
- Standard 12.18—In educational settings, score reports should be accompanied by a clear presentation of information on how to interpret the scores, including the degree of measurement error associated with each score or classification level, and by supplementary information related to group summary scores. In addition, dates of test administration and relevant norming studies should be included in score reports.

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Table 7.1: Test Completion Rates: All Students

Grade	Accountable in ELA	Percent Reportable in ELA	Accountable in Mathematics	Percent Reportable in Mathematics	Accountable in Science	Percent Reportable in Science
3	69,473	99.69%	69,510	99.94%		
4	69,624	99.72%	69,685	99.92%		
5	68,082	99.73%	68,112	99.92%	68,095	99.90%
6	66,945	99.76%	66,959	99.89%		
7	66,507	99.71%	65,744	99.84%		
8	66,043	99.68%	53,217*	99.76%	66,050	99.79%

*Grade 8 students had the option of taking Algebra 1 instead of MAP Grade 8 Mathematics test.

Table 7.2: Test Completion Rates: Males

Grade	Accountable in ELA	Percent Reportable in ELA	Accountable in Mathematics	Percent Reportable in Mathematics	Accountable in Science	Percent Reportable in Science
3	35,422	99.68%	35,447	99.92%		
4	35,395	99.68%	35,432	99.89%		
5	34,893	99.72%	34,916	99.89%	34,904	99.88%
6	34,207	99.73%	34,196	99.90%		
7	34,003	99.68%	33,575	99.81%		
8	33,749	99.63%	27,675*	99.71%	33,756	99.73%

*Grade 8 students had the option of taking Algebra 1 instead of MAP Grade 8 Mathematics test.

Table 7.3: Test Completion Rates: Females

Grade	Accountable in ELA	Percent Reportable in ELA	Accountable in Mathematics	Percent Reportable in Mathematics	Accountable in Science	Percent Reportable in Science
3	34,051	99.71%	34,063	99.96%		
4	34,229	99.76%	34,253	99.95%		
5	33,189	99.74%	33,196	99.95%	33,191	99.92%
6	32,738	99.78%	32,763	99.89%		
7	32,504	99.73%	32,169	99.88%		
8	32,294	99.74%	25,542*	99.81%	32,294	99.85%

*Grade 8 students had the option of taking Algebra 1 instead of MAP Grade 8 Mathematics test.

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Table 7.4: Test Completion Rates: White

Grade	Accountable in ELA	Percent Reportable in ELA	Accountable in Mathematics	Percent Reportable in Mathematics	Accountable in Science	Percent Reportable in Science
3	48,697	99.89%	48,706	99.94%		
4	49,006	99.88%	49,013	99.92%		
5	48,449	99.90%	48,452	99.93%	48,443	99.92%
6	48,126	99.90%	48,123	99.91%		
7	48,226	99.85%	47,603	99.86%		
8	48,131	99.82%	38,465*	99.77%	48,114	99.82%

*Grade 8 students had the option of taking Algebra 1 instead of MAP Grade 8 Mathematics test.

Table 7.5: Test Completion Rates: Black

Grade	Accountable in ELA	Percent Reportable in ELA	Accountable in Mathematics	Percent Reportable in Mathematics	Accountable in Science	Percent Reportable in Science
3	11,504	99.56%	11,507	99.95%		
4	11,518	99.67%	11,541	99.93%		
5	11,073	99.62%	11,084	99.95%	11,077	99.92%
6	10,556	99.59%	10,560	99.86%		
7	10,521	99.53%	10,509	99.81%		
8	10,401	99.52%	8,926*	99.70%	10,397	99.71%

*Grade 8 students had the option of taking Algebra 1 instead of MAP Grade 8 Mathematics test.

Table 7.6: Test Completion Rates: Hispanic

Grade	Accountable in ELA	Percent Reportable in ELA	Accountable in Mathematics	Percent Reportable in Mathematics	Accountable in Science	Percent Reportable in Science
3	4,437	98.69%	4,441	99.93%		
4	4,462	98.81%	4,477	99.91%		
5	4,344	98.92%	4,347	99.84%	4,347	99.79%
6	4,223	98.65%	4,242	99.83%		
7	3,965	98.71%	3,962	99.80%		
8	3,869	98.68%	3,169*	99.75%	3,891	99.74%

*Grade 8 students had the option of taking Algebra 1 instead of MAP Grade 8 Mathematics test.

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Table 7.7: Test Completion Rates: Asian/Pacific Islander

Grade	Accountable in ELA	Percent Reportable in ELA	Accountable in Mathematics	Percent Reportable in Mathematics	Accountable in Science	Percent Reportable in Science
3	1,539	96.95%	1,561	99.87%		
4	1,526	97.05%	1,541	99.81%		
5	1,500	97.40%	1,514	99.93%	1,515	99.80%
6	1,457	99.11%	1,452	99.93%		
7	1,500	98.93%	1,401	99.86%		
8	1,491	99.06%	909*	99.89%	1,500	99.93%

*Grade 8 students had the option of taking Algebra 1 instead of MAP Grade 8 Mathematics test.

Table 7.8: Test Completion Rates: American Indian

Grade	Accountable in ELA	Percent Reportable in ELA	Accountable in Mathematics	Percent Reportable in Mathematics	Accountable in Science	Percent Reportable in Science
3	281	100.00%	282	100.00%		
4	266	100.00%	266	100.00%		
5	240	100.00%	240	99.58%	241	99.59%
6	269	99.63%	269	99.63%		
7	291	99.31%	286	99.65%		
8	243	98.77%	219*	99.09%	243	99.18%

*Grade 8 students had the option of taking Algebra 1 instead of MAP Grade 8 Mathematics test.

Table 7.9: Test Completion Rates: Other Race/Ethnicity

Grade	Accountable in ELA	Percent Reportable in ELA	Accountable in Mathematics	Percent Reportable in Mathematics	Accountable in Science	Percent Reportable in Science
3	3,015	99.90%	3,013	100.00%		
4	2,846	99.86%	2,847	99.89%		
5	2,476	99.72%	2,475	99.80%	2,472	99.76%
6	2,314	99.87%	2,313	99.78%		
7	2,004	99.70%	1,983	99.75%		
8	1,908	99.74%	1,529*	99.74%	1,905	99.69%

*Grade 8 students had the option of taking Algebra 1 instead of MAP Grade 8 Mathematics test.

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Table 7.10: Test Completion Rates: Students Receiving Accommodations

Grade	Accountable in ELA	Percent Reportable in ELA	Accountable in Mathematics	Percent Reportable in Mathematics	Accountable in Science	Percent Reportable in Science
3	187	98.93%	179	99.44%		
4	216	99.07%	2,967	99.70%		
5	226	99.56%	3,832	99.71%	1,716	99.71%
6	4,350	99.86%	4,207	99.83%		
7	4,726	99.77%	4,395	99.70%		
8	4,331	99.52%	4,231*	99.48%	689	98.98%

*Grade 8 students had the option of taking Algebra 1 instead of MAP Grade 8 Mathematics test.

Table 7.11: State-Level Scale Score Statistics: English Language Arts

Grade	N	Mean SS	S.D. SS	Percentile				
				10th	25th	50th	75th	90th
3	69,259	459.74	50.39	398	429	461	493	521
4	69,427	486.65	50.45	423	456	490	520	546
5	67,899	500.47	49.76	437	469	504	535	560
6	66,782	507.59	45.99	448	478	509	538	564
7	66,311	516.81	55.24	445	480	519	555	584
8	65,834	528.65	54.29	462	496	531	565	594

Table 7.12: State-Level Scale Score Statistics: Mathematics

Grade	N	Mean SS	S.D. SS	Percentile				
				10th	25th	50th	75th	90th
3	69,469	456.55	50.15	393	428	461	490	516
4	69,628	482.93	56.37	419	458	490	518	543
5	68,058	501.09	51.62	435	470	505	537	562
6	66,887	507.07	49.41	444	476	510	541	567
7	65,642	516.20	51.42	453	486	520	551	577
8	53,088*	515.49	50.93	447	490	523	549	572

*Grade 8 students had the option of taking Algebra 1 instead of MAP Grade 8 Mathematics test.

Table 7.13: State-Level Scale Score Statistics: Science

Grade	N	Mean SS	S.D. SS	Scale Scores by Percentiles				
				10th	25th	50th	75th	90th
5	68,027	662.87	34.38	621	644	665	685	703
8	65,912	698.58	33.32	658	681	702	720	736

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Table 7.14: State-Level Scale Score Means, 2016 through 2017 Census Data: English Language Arts

Grade	Year	N	Mean SS	S.D. SS
3	2016	69,331	458.07	50.70
	2017	69,259	459.74	50.39
4	2016	67,804	485.45	50.82
	2017	69,427	486.65	50.45
5	2016	66,785	499.15	52.11
	2017	67,899	500.47	49.76
6	2016	66,372	506.70	45.29
	2017	66,782	507.59	45.99
7	2016	65,979	514.80	54.63
	2017	66,311	516.81	55.24
8	2016	65,691	527.55	52.42
	2017	65,834	528.65	54.29

Table 7.15: State-Level Scale Score Means, 2016 through 2017 Census Data: Mathematics

Grade	Year	N	Mean SS	S.D. SS
3	2016	69,314	456.01	48.59
	2017	69,469	456.55	50.15
4	2016	67,869	481.93	55.94
	2017	69,628	482.93	56.37
5	2016	66,846	499.97	49.86
	2017	68,058	501.09	51.62
6	2016	66,355	507.16	48.02
	2017	66,887	507.07	49.41
7	2016	65,148	514.69	50.24
	2017	65,642	516.20	51.42
8	2016	52,692*	515.07	49.06
	2017	53,088*	515.49	50.93

*Grade 8 students had the option of taking Algebra 1 instead of MAP Grade 8 Mathematics test.

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Table 7.16: State-Level Scale Score Means, 2008 through 2017 Census Data: Science

Grade	Year	N	Mean SS	S.D. SS
5	2008	65,586	661.64	31.52
	2009	67,118	662.22	30.40
	2010	66,558	664.76	32.48
	2011	67,196	666.04	33.43
	2012	66,492	667.99	34.23
	2013	65,850	667.54	33.03
	2014	65,935	664.06	30.50
	2015	66,381	664.00	31.72
	2016	66,871	660.97	32.31
	2017	68,027	662.87	34.38
8	2008	67,209	694.36	30.67
	2009	66,702	695.65	30.94
	2010	66,101	698.28	31.07
	2011	65,828	700.05	30.98
	2012	66,724	700.18	31.92
	2013	66,418	699.92	31.71
	2014	66,912	701.94	29.53
	2015	66,430	698.19	31.67
	2016	65,730	697.50	32.64
	2017	65,912	698.58	33.32

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Table 7.17: Percentage of Students in Achievement Levels, 2006 through 2017 Census Data: English Language Arts

Grade	Year	N	No Level	Below Basic	Basic	Proficient	Advanced	Prof. & Adv.
3	2006	65,344	1.3	8.8	47.5	25.7	16.7	42.4
	2007	67,259	1.4	9.4	46.6	25.8	16.8	42.6
	2008	66,357	0.3	9.3	50.2	25.2	15.1	40.3
	2009	67,357	0.3	9.6	49.8	25.1	15.2	40.3
	2010	66,947	0.3	8.2	48.4	26.9	16.2	43.1
	2011	66,487	0.4	7.6	48.4	27.0	16.6	43.6
	2012	66,323	0.3	8.0	46.5	27.2	18.1	45.3
	2013	66,754	0.3	7.8	44.2	27.7	20.1	47.8
	2014	67,211	0.3	9.8	48.3	25.5	16.0	41.6
	2015	67,998	0.2	19.4	23.3	24.0	33.1	57.1
	2016	69,490	0.2	18.5	20.7	42.2	18.4	60.6
	2017	69,472	0.3	17.5	20.1	42.7	19.4	62.1
4	2006	65,849	1.0	10.6	44.5	28.8	15.0	43.8
	2007	65,982	1.1	10.5	43.4	28.2	16.8	45.1
	2008	67,049	0.3	8.0	46.7	33.4	11.7	45.1
	2009	66,709	0.3	7.6	45.8	33.6	12.7	46.3
	2010	67,510	0.3	8.6	40.2	31.2	19.7	50.9
	2011	67,049	0.4	8.2	39.5	31.6	20.2	51.9
	2012	65,996	0.3	8.3	39.3	31.2	20.9	52.2
	2013	66,085	0.3	8.2	38.8	31.6	21.2	52.8
	2014	66,647	0.3	7.8	46.4	31.5	14.0	45.5
	2015	67,013	0.2	21.8	19.7	25.3	33.1	58.3
	2016	67,966	0.2	15.2	21.4	42.6	20.6	63.2
	2017	69,622	0.3	14.4	21.2	43.0	21.2	64.2

Note: Grey bars separate administrations in which student scores were reported on different scales and students were classified into achievement levels based on different sets of cut scores.

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Table 7.17: Percentage of Students in Achievement Levels, 2006 through 2017 Census Data: English Language Arts (cont.)

Grade	Year	N	No Level	Below Basic	Basic	Proficient	Advanced	Prof. & Adv.
5	2006	66,704	1.0	9.1	44.8	29.6	15.4	45.0
	2007	66,098	1.0	8.3	42.9	29.8	18.0	47.8
	2008	65,734	0.3	6.4	45.1	32.2	15.9	48.1
	2009	67,307	0.3	6.3	44.6	33.9	14.9	48.8
	2010	66,730	0.3	7.1	41.5	32.1	18.9	51.0
	2011	67,461	0.6	6.9	41.4	32.4	18.7	51.1
	2012	66,675	0.3	7.0	40.9	32.3	19.6	51.8
	2013	65,980	0.3	7.1	40.3	32.2	20.1	52.3
	2014	66,153	0.3	6.2	43.5	33.2	16.8	50.0
	2015	66,416	0.2	18.9	21.9	35.6	23.3	58.9
	2016	66,925	0.2	15.1	22.6	41.7	20.3	62.0
	2017	68,082	0.3	14.6	22.7	41.6	20.9	62.5
6	2006	67,709	1.1	11.9	44.8	31.6	10.6	42.2
	2007	67,045	1.2	11.2	44	31.8	11.7	43.6
	2008	65,830	0.2	9.0	43.5	34	13.4	47.4
	2009	65,908	0.3	8.6	43.4	33.8	13.9	47.7
	2010	67,476	0.3	7.8	42.3	33.9	15.7	49.6
	2011	66,633	0.3	7.3	41.9	34.3	16.2	50.5
	2012	67,342	0.3	7.5	42.0	34.7	15.5	50.2
	2013	66,731	0.4	7.2	41.4	34.9	16.1	51.0
	2014	66,019	0.3	8.5	43.8	32.9	14.5	47.5
	2015	66,059	0.2	19.6	25.3	35.0	19.8	54.9
	2016	66,500	0.2	18.6	22.9	41.7	16.6	58.3
	2017	66,945	0.2	18.4	21.9	42.0	17.5	59.5

Note: Grey bars separate administrations in which student scores were reported on different scales and students were classified into achievement levels based on different sets of cut scores.

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Table 7.17: Percentage of Students in Achievement Levels, 2006 through 2017 Census Data: English Language Arts (cont.)

Grade	Year	N	No Level	Below Basic	Basic	Proficient	Advanced	Prof. & Adv.
7	2006	71,632	1.9	13.7	41.8	30.5	12.2	42.7
	2007	68,404	1.8	13.1	40.7	32.8	11.6	44.4
	2008	66,923	0.3	10.0	40.7	36.1	12.9	49.0
	2009	66,531	0.3	8.7	40.3	37.2	13.6	50.8
	2010	66,279	0.4	9.8	38.1	35.2	16.5	51.7
	2011	67,517	0.4	9.0	36.9	36.0	17.8	53.8
	2012	66,845	0.3	8.7	35.8	36.6	18.7	55.2
	2013	67,319	0.3	9.0	35.7	36.5	18.4	55.0
	2014	66,893	0.4	8.2	36.0	36.9	18.6	55.4
	2015	66,000	0.3	18.4	24.1	38.6	18.5	57.2
	2016	66,143	0.2	23.4	18.3	39.0	19.0	58.0
	2017	66,507	0.3	22.6	17.9	38.6	20.6	59.2
8	2006	73,516	1.4	9.1	48.0	26.6	15.0	41.5
	2007	71,200	1.4	8.7	48.3	26.9	14.6	41.6
	2008	67,574	0.4	5.7	45.8	33.1	15.0	48.1
	2009	67,077	0.5	5.3	44.5	33.4	16.3	49.7
	2010	66,463	0.5	4.9	42.8	34.3	17.4	51.8
	2011	66,205	0.5	4.6	42.5	33.9	18.5	52.5
	2012	67,037	0.4	4.3	42.0	34.3	19.0	53.3
	2013	66,710	0.5	4.1	41.5	34.9	19.0	53.9
	2014	67,168	0.5	4.5	44.6	34.1	16.3	50.4
	2015	66,528	0.2	14.7	27.6	40.4	17.1	57.5
	2016	65,845	0.2	19.3	21.2	38.5	20.7	59.2
	2017	66,041	0.3	19.0	20.3	38.4	21.9	60.3

Note: Grey bars separate administrations in which student scores were reported on different scales and students were classified into achievement levels based on different sets of cut scores.

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Table 7.18: Percentage of Students in Achievement Levels, 2006 through 2017 Census Data: Mathematics

Grade	Year	N	No Level	Below Basic	Basic	Proficient	Advanced	Prof. & Adv.
3	2006	65,325	0.9	7.2	48.7	33.3	10.0	43.3
	2007	67,257	0.9	7.2	46.9	35.0	10.0	45.0
	2008	66,357	0.1	6.5	49.6	35.0	8.8	43.8
	2009	67,357	0.2	6.8	48.5	35.6	8.8	44.4
	2010	66,947	0.2	6.2	46.6	37.0	10.1	47.1
	2011	66,487	0.3	5.6	44.7	38.1	11.3	49.4
	2012	66,323	0.2	5.4	42.6	39.9	11.9	51.9
	2013	66,754	0.2	5.3	43.8	39.2	11.4	50.7
	2014	67,211	0.2	6.0	43.7	36.6	13.5	50.2
	2015	68,012	0.0	21.4	26.5	30.8	21.2	52.0
	2016	69,492	0.0	18.1	29.4	32.0	20.5	52.5
	2017	69,510	0.1	18.0	28.4	31.8	21.7	53.5
4	2006	65,845	0.8	8.3	47.5	34.4	9.0	43.4
	2007	65,975	0.9	8.1	46.5	35.2	9.3	44.5
	2008	67,049	0.2	7.6	48.0	36.0	8.2	44.2
	2009	66,709	0.2	7.3	48.2	36.6	7.8	44.4
	2010	67,510	0.2	6.1	45.4	39.3	9.1	48.4
	2011	67,049	0.3	5.6	43.7	39.9	10.5	50.5
	2012	65,996	0.1	5.7	43.7	40.5	10.0	50.5
	2013	66,085	0.1	5.5	44.2	40.7	9.4	50.1
	2014	66,647	0.2	6.6	51.1	34.5	7.6	42.1
	2015	67,023	0.0	16.8	33.6	29.9	19.6	49.6
	2016	67,968	0.1	15.5	31.6	30.6	22.3	52.9
	2017	69,684	0.1	15.3	30.3	31.0	23.2	54.2

Note: Grey bars separate administrations in which student scores were reported on different scales and students were classified into achievement levels based on different sets of cut scores.

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Table 7.18: Percentage of Students in Achievement Levels, 2006 through 2017 Census Data: Mathematics (cont.)

Grade	Year	N	No Level	Below Basic	Basic	Proficient	Advanced	Prof. & Adv.
5	2006	66,703	0.9	8.1	47.8	32.7	10.6	43.3
	2007	66,075	0.9	7.6	44.9	33.1	13.4	46.6
	2008	65,734	0.1	7.5	46.5	34.4	11.4	45.8
	2009	67,307	0.2	7.5	45.1	35.6	11.6	47.2
	2010	66,730	0.2	6.2	41.9	36.7	15.1	51.7
	2011	67,461	0.5	6.1	40.9	36.3	16.2	52.5
	2012	66,675	0.2	5.8	39.7	35.9	18.4	54.3
	2013	65,980	0.2	5.9	40.1	35.9	18.0	53.9
	2014	66,153	0.2	7.2	40.5	35.5	16.7	52.2
	2015	66,429	0.0	28.5	31.6	20.1	19.7	39.8
	2016	66,934	0.1	20.7	32.6	28.5	18.2	46.7
	2017	68,112	0.1	21.1	30.6	28.1	20.2	48.3
6	2006	67,706	1.0	11.1	44.1	34.4	9.5	43.9
	2007	67,039	1.1	11.1	40.0	35.5	12.3	47.8
	2008	65,830	0.2	9.5	39.6	37.8	12.9	50.7
	2009	65,908	0.2	8.9	40.7	37.5	12.6	50.1
	2010	67,476	0.2	7.8	36.6	40.3	15.0	55.4
	2011	66,633	0.2	7.5	35.4	40.5	16.4	56.9
	2012	67,342	0.2	7.4	36.7	39.7	16.0	55.7
	2013	66,731	0.3	7.1	36.4	39.9	16.3	56.2
	2014	66,019	0.3	7.2	36.9	40.3	15.3	55.6
	2015	66,014	0.1	28.7	33.1	21.6	16.5	38.1
	2016	66,486	0.1	20.5	36.1	27.9	15.4	43.3
	2017	66,958	0.1	21.0	35.1	27.4	16.3	43.7

Note: Grey bars separate administrations in which student scores were reported on different scales and students were classified into achievement levels based on different sets of cut scores.

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Table 7.18: Percentage of Students in Achievement Levels, 2006 through 2017 Census Data: Mathematics (cont.)

Grade	Year	N	No Level	Below Basic	Basic	Proficient	Advanced	Prof. & Adv.
7	2006	71,575	1.2	17.4	38.5	32.7	10.2	42.9
	2007	68,405	1.2	16.7	37.1	33.2	11.7	44.9
	2008	66,923	0.3	13.9	36.3	36.7	12.8	49.5
	2009	66,531	0.3	12.5	35.2	37.6	14.3	51.9
	2010	66,279	0.3	10.8	34.3	38.8	15.7	54.5
	2011	67,517	0.3	10.5	33.5	39.2	16.6	55.8
	2012	66,845	0.3	9.8	30.3	40.0	19.6	59.6
	2013	67,319	1.5	10.1	31.1	39.1	18.2	57.3
	2014	66,893	1.6	9.6	32.0	38.6	18.2	56.7
	2015	65,036	0.1	31.4	33.2	21.1	14.1	35.3
	2016	65,317	0.1	22.4	35.4	26.7	15.4	42.1
	2017	65,742	0.2	22.1	34.0	26.8	17.0	43.8
8	2006	73,523	1.3	21.1	37.8	27.6	12.2	39.8
	2007	71,190	1.4	21.4	36.6	26.6	14.0	40.6
	2008	67,574	0.4	18.0	37.7	29.9	13.9	43.8
	2009	67,077	0.5	16.4	36.8	31.5	14.9	46.4
	2010	66,463	0.4	14.9	33.3	32.1	19.2	51.3
	2011	66,205	0.4	15.0	33.9	31.0	19.8	50.8
	2012	67,037	0.3	14.1	33.6	31.8	20.2	52.0
	2013*	52,335	1.4	17.1	41.2	30.2	10.1	40.3
	2014*	52,818	1.6	17.5	38.7	30.9	11.3	42.2
	2015*	52,840	0.2	39.3	32.3	18.1	10.1	28.2
	2016*	52,861	0.2	27.9	43.5	19.3	9.0	28.3
	2017*	53,211	0.2	28.4	41.4	19.8	10.2	30.0

Note: Grey bars separate administrations in which student scores were reported on different scales and students were classified into achievement levels based on different sets of cut scores.
*Grade 8 students had the option of taking Algebra 1 instead of MAP Mathematics.

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Table 7.19: Percentage of Students in Achievement Levels, 2008 through 2017 Census Data: Science

Grade	Year	N	No Level	Below Basic	Basic	Proficient	Advanced	Prof. & Adv.
5	2008	65,734	0.2	11.2	44.0	29.6	14.9	44.5
	2009	67,307	0.3	10.6	44.1	30.3	14.8	45.1
	2010	66,730	0.3	10.4	40.5	29.6	19.3	48.9
	2011	67,461	0.4	10.0	39.1	29.5	21.0	50.5
	2012	66,675	0.3	9.8	38.5	27.2	24.3	51.4
	2013	65,980	0.2	9.6	39.0	28.1	23.1	51.3
	2014	66,153	0.4	9.0	43.3	31.5	15.9	47.3
	2015	66,411	0.0	10.6	42.4	28.8	18.1	47.0
	2016	66,914	0.1	11.8	45.2	28.0	14.9	42.9
	2017	68,092	0.1	12.0	41.8	27.4	18.7	46.1
8	2008	67,574	0.5	19.3	37.0	36.7	6.5	43.2
	2009	67,077	0.6	18.2	36.5	37.2	7.6	44.8
	2010	66,463	0.5	16.4	35.1	38.4	9.6	48.0
	2011	66,205	0.6	15.7	33.7	38.6	11.4	50.0
	2012	67,037	0.5	16.1	33.8	37.0	12.6	49.6
	2013	66,710	0.4	15.7	33.8	38.4	11.6	50.0
	2014	67,168	0.4	12.8	35.0	40.5	11.4	51.9
	2015	66,524	0.1	16.7	34.3	39.1	9.8	48.9
	2016	65,825	0.1	16.9	34.9	38.5	9.5	48.0
	2017	66,048	0.2	16.4	34.2	38.4	10.9	49.3

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CHAPTER 8: ACHIEVEMENT LEVEL SETTING

In this chapter, we briefly describe the MAP ELA, Mathematics, and Science achievement level setting (also called standard setting), and we present the cut scores established and the achievement level descriptors (ALDs) derived from the achievement level setting.

8.1 ELA and Mathematics Achievement Levels

A Bookmark standard setting was held in 2005 to establish cut scores for the Communication Arts and Mathematics MAP tests (refer to the *Missouri Assessment Program Final Bookmark Standard Setting Technical Report* [2005]). After 14 years of administration of these tests, Missouri students took ELA and Mathematics tests that measured different content and constructs in the 2014–15 test administration. These tests were built using the Smarter Balanced Assessment Consortium (SBAC) item bank and were fully aligned to the Common Core State Standards. The test scores were reported on the scales developed by SBAC, and students were classified into achievement levels based on the cut scores derived from SBAC's field test. A detailed discussion and the results of that standard setting can be found in the SBAC's *2013–14 Technical Report* (2016) posted at http://www.smarterbalanced.org/wp-content/uploads/2015/08/2013-14_Technical_Report.pdf.

New test forms were developed and new scales were established for the MAP ELA and Mathematics tests for the 2015–16 school year. Because the new tests were not linked to the 2014–15 test forms, a standard setting was conducted to establish cut scores for the MAP ELA and Mathematics tests that reflected the content-based expectations on the tests supported by the test data.

8.1.1 Standard Setting Process and Methodology

On July 12–14, 2016, DESE and DRC conducted the MAP standard setting for Grades 3–8 in ELA and Mathematics. The purpose of this workshop was to develop achievement standards for ELA and Mathematics, including the development of *cut points*, which divide students into four achievement levels: *Below Basic*, *Basic*, *Proficient*, and *Advanced.*

A committee of 88 Missouri educators participated in the cut point validation. Participants were divided into 12 groups of approximately 7–8 participants each, and each group focused on a single grade and content area combination (e.g., Grade 3 Mathematics, Grade 4 ELA). Participants worked individually and in concert to consider the test items and student data from the Spring 2016 administration of the MAP, the Missouri Learning Standards, and information from Missouri students' performance on current and previous administrations of the MAP.

Throughout the standard setting process, Missouri educators considered the expectations for students in each achievement level and then transformed those expectations into numeric cut points by using the Bookmark Standard Setting Procedure (BSSP).

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The BSSP is well suited for standard setting for these assessments because (a) the tests are composed of both multiple-choice and constructed-response items, (b) the items are scaled and can be mapped using item-mapping techniques, and (c) the BSSP allows participants to focus on the knowledge, skills, and abilities expected of students in each performance level. The BSSP has been well documented in standard setting literature. Developed in 1996, the BSSP has been implemented in over half of the states in the United States and abroad by DRC and by other major testing firms, making it the most widely used standard setting procedure in K–12 education (Karantonis & Sireci, 2006; Cizek & Bunch, 2007).

The standard setting process adheres to the following AERA, APA, & NCME (2014) standards:

Standard 5.21 When proposed score interpretations involve one or more cut scores, the rationale and procedures used for establishing cut scores should be documented clearly. (107)

Standard 5.22 When cut scores defining pass-fail or proficiency levels are based on direct judgments about the adequacy of item or test performances, the judgmental process should be designed so that the participants providing the judgments can bring their knowledge and experience to bear in a reasonable way. (108)

The ELA and Mathematics standard setting procedures are addressed in detail in the *Missouri Assessment Program Grades 3–8 English Language Arts and Mathematics Standard Setting 2016 Final Technical Report*, which was submitted to DESE in October 2016.

8.2 Science Achievement Levels

The first standard setting to establish cut scores for the Science MAP was held in 2008 (refer to the *Missouri Assessment Program Bookmark Standard Setting Technical Report 2008 for Missouri Achievement-Level Setting Grades 5, 8, and 11 Science* [2008]). The reporting scales and the cut scores for Grades 5 and 8 remained unchanged throughout assessment administrations. Given that items not previously field-tested in Missouri (developed by the University of Iowa) were included in the 2014–15 Science tests, a validation of Science cut points, after which the existing cut scores were upheld, was performed after the 2014–15 assessment administration. A short description of the cut point validation procedure for Science, during which the participants upheld the existing cut scores, is provided in Section 8.2.1. Details of the procedure and results may be found in the *Missouri Assessment Program Cut Point Validation Technical Report Grades 5 and 8 Science* (DRC, 2015). Both Technical Reports address AERA, APA, & NCME (2014) Standards 5.21 and 5.22, which were cited in Section 8.1.1 of this chapter.

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8.2.1 Cut Point Validation Process and Methodology

The cut point validation workshop was held in Columbia, Missouri, from June 11 to June 12, 2015. A modification of the BSSP (Lewis, Mitzel, & Green, 1996; Lewis, Mitzel, Mercado, & Schulz, 2012) was implemented to validate the cut points for the assessments. Workshop participants worked individually and in concert to consider cut points associated with four achievement levels: *Below Basic*, *Basic*, *Proficient*, and *Advanced*, with *Advanced* representing the highest level of knowledge, skills, and abilities. As mentioned earlier in this report, the existing cut points for these tests were established in 2008 following a standard setting with Missouri educators by using the BSSP (CTB/McGraw-Hill, 2008). A total of eighteen participants from across the state of Missouri participated in the workshop. The workshop was facilitated by researchers and content experts from McGraw-Hill Education CTB. During the workshop, participants considered the test items, ALDs, Grade-Level Expectations (GLEs), and test data. Following the workshop, DESE considered participants' recommendations. After consulting with McGraw-Hill Education CTB and with members of its technical advisory committee, DESE determined that participants' recommendations were consistent with the existing cut points. Accordingly, DESE found that participants validated the existing cut points and that the existing cut points (and associated ALDs) were suitable for continued use. Details and outcomes of the Science cut point validation workshop can be found in the *Missouri Assessment Program Cut Point Validation Technical Report for Grades 5 and 8 Science*, which was submitted to DESE in September 2015.

8.3 Achievement Level Descriptors

In terms of the validity of the intended interpretation of the MAP scores, it is essential to understand that ALDs and cut scores are established in a collaborative and participatory process. ALDs clearly establish, in plain language, the proper frame of reference for understanding how to interpret test scores, particularly cut scores. ALDs summarize the knowledge, skills, and abilities expected of students in each performance level. These ALDs, presented in the *Guide to Interpreting Results* (see Appendix D), describe DESE's vision for each performance level in each content area.

8.4 Cut Scores

The ELA and Mathematics cut scores established during the standard setting in July 2016 remained unchanged for the Spring 2017 test administration. There were no changes to the cut scores between the Spring 2015 and Spring 2017 test administrations for Science either. Tables 8.1, 8.2, and 8.3 show the cut scores for ELA, Mathematics, and Science, respectively.

8.5 Summary

This chapter presented a brief overview of the standard setting process used for establishing the ELA and Mathematics cut scores after the 2015–16 test administration. It also presented an overview of the cut point validation for Science that occurred after the 2014–15 test administration. Both the standard setting for ELA and Mathematics and the

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cut point validation for Science, undertaken by DESE and facilitated by DRC, support the following standards from the *Standards for Educational and Psychological Testing* (AERA, APA, & NCME, 2014):

- Standard 5.21—When proposed score interpretations involve one or more cut scores, the rationale and procedures used for establishing cut scores should be documented clearly.
- Standard 5.22—When cut scores defining pass-fail or proficiency levels are based on direct judgments about the adequacy of item or test performances, the judgmental process should be designed so that the participants providing the judgments can bring their knowledge and experience to bear in a reasonable way.

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Table 8.1: Cut Scores: English Language Arts

Grade	Cut Scores		
	Basic	Proficient	Advanced
3	416	447	502
4	436	473	526
5	449	488	541
6	468	499	550
7	476	506	563
8	486	518	570

Table 8.2: Cut Scores: Mathematics

Grade	Cut Scores		
	Basic	Proficient	Advanced
3	415	457	495
4	438	486	521
5	463	508	544
6	470	518	555
7	482	528	564
8	496	544	572

Table 8.3: Cut Scores: Science

Grade	Cut Scores		
	Basic	Proficient	Advanced
5	626	669	692
8	671	703	735

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CHAPTER 9: EVIDENCE OF CONSTRUCT-RELATED VALIDITY

Evidence of construct-related validity—supporting the intended interpretation of test scores and their use—is the central concept underlying the MAP ELA, Mathematics, and Science validation process. In this chapter, DRC presents evidence of construct-related validity through studies of test reliability, evaluation of internal test structure, and evaluation of the relationship of test scores with external variables. All analyses in this chapter are based on the calibration sample data.

Chapter 9 of this report demonstrates adherence to AERA, APA, & NCME (2014) Standards 1.13, 1.21, 2.0, 2.3, 2.13, 2.14, 2.16, and 2.19. Each standard will be discussed in the pertinent section of this chapter.

9.1 Minimization of Construct-Irrelevant Variance and Construct Underrepresentation

Minimization of construct-irrelevant variance and construct underrepresentation is addressed in the following steps of the test development process: 1) specification, 2) item writing, 3) review, 4) field testing, 5) test construction, and 6) item calibration. (See Chapter 3 for more information on steps 1 through 5 and Chapter 6 for more information on calibration.)

Construct-irrelevant variance refers to error variance that is caused by factors unrelated to the constructs measured by the test. For example, when tests are not administered under standardized conditions (e.g., one administration may be timed, but another administration may be untimed), differences in student performance related to different administration conditions may result. Careful specification of content and review of the items representing that content are first steps in minimizing construct-irrelevant variance. Then, empirical evidence, especially item-level data, is used to infer construct irrelevance.

Construct underrepresentation occurs when the assessment does not reflect the full range of content that it is expected to cover. Specification and review (in which test blueprints are developed and reviewed) and the alignment analysis are primary steps in the development process designed to ensure that content is appropriately represented.

9.2 Reliability

Reliability refers to the consistency of students' test scores on parallel forms of a test. A reliable test is one that produces scores that are expected to be relatively stable if the test is administered repeatedly under similar conditions. However, it is often impractical to administer multiple forms of the test, and reliability is estimated based on a single administration of the test. This type of reliability, known as internal consistency, provides an estimate of how consistently examinees perform across items within a test during a single test administration (Crocker & Algina, 1986). Reliability is a necessary, but not sufficient, condition for validity.

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The AERA, APA, & NCME (2014) *Standards* indicates the following:

> The term *reliability* has been used in two ways in the measurement literature. First, the term has been used to refer to the reliability coefficients of classical test theory, defined as the correlation between scores on two equivalent forms of the test, presuming that taking one form has no effect on performance on the second form. Second, the term has been used in a more general sense, to refer to the consistency of scores across replications of a testing procedure, regardless of how this consistency is estimated or reported (e.g., in terms of standard errors, reliability coefficients per se, generalizability coefficients, error/tolerance ratios, item response theory (IRT) information functions, or various indices of classification consistency). (33)

In accordance with the AERA, APA, & NCME (2014) *Standards* and in developing and maintaining tests of the highest quality, DRC has calculated the reliability of each MAP test in a variety of ways: reliability of raw scores, overall standard error of measurement (SEM), IRT-based conditional standard error of measurement, and decision consistency of achievement level classifications. There are several specific AERA, APA, & NCME (2014) standards that this chapter addresses:

Standard 2.0 Appropriate evidence of reliability/precision should be provided for the interpretation for each intended score use. (42)

Standard 2.3 For each total score, subscore, or combination of scores that is to be interpreted, estimates of relevant indices of reliability/precision should be reported. (43)

The total test score reliabilities are discussed in Section 9.2.1 of this chapter. The SEM of the total score is discussed in section 9.2.2. The subscore reliabilities and SEMs are presented in section 9.4.2.

Standard 2.13 The standard error of measurement, both overall and conditional (if reported), should be provided in units of each reported score. (45)

The raw score–based SEM is discussed in Section 9.2.2 and is presented in raw score units in Tables 9.1, 9.2, and 9.3 for ELA, Mathematics, and Science, respectively. The conditional SEM is discussed in Section 9.2.3 and is presented in scale score units in Tables 9.4, 9.5, and 9.6. Note that the SEM associated with any type of score is not reported on Individual Student Reports for the MAP.

Standard 2.19 Each method of quantifying the reliability/precision of scores should be described clearly and expressed in terms of statistics appropriate to the method. The sampling procedures used to select test takers for reliability/precision analyses and the descriptive statistics on these samples, subject to privacy obligations where applicable, should be reported. (47)

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Section 9.2 discusses different ways of measuring test reliability, including reliability of raw scores and test form SEM, IRT-based conditional SEM, and decision consistency of achievement level classifications. These statistics were computed based on Missouri student census data.

9.2.1 Test Reliability

The reliability of raw scores by test form was evaluated using Cronbach's (1951) coefficient alpha, which is a lower-bound estimate of test reliability. The reliability coefficient is a ratio of the variance of true test scores to the variance of the total observed scores, with the values ranging from 0 to 1. The closer the value of the reliability coefficient is to 1—where 1 refers to a perfectly consistent test—the more consistent the scores. As a rule of thumb, reliability coefficients that are equal to or greater than 0.8 are considered acceptable for tests of moderate lengths.

Cronbach's coefficient alpha was computed using the formula

$$\alpha = \frac{n}{n-1}\left[1 - \frac{\sum_{i=1}^{n} \sigma_i^2}{\sigma_X^2}\right], \tag{9.1}$$

where n is the number of items on the test, σ_i^2 is the variance of item i, and σ_X^2 is the variance of the total test score.

Total test reliability measures, such as Cronbach's coefficient alpha and SEM, consider the consistency (reliability) of performance over all test questions in a given form, the results of which imply how well the questions measure the content domain and could continue to do so over repeated administrations. The number of items in the test influences these statistics; a longer test can be expected to be more reliable than a shorter test.

The reliability coefficients for the MAP are reported in Tables 9.1, 9.2 and 9.3 for ELA, Mathematics, and Science, respectively. The reliability statistics ranged from 0.90 to 0.92 for all ELA forms. For Mathematics, the reliabilities ranged from 0.90 to 0.91, except for the Grade 8 form for which the reliability coefficient was 0.86. The reliability coefficients for Science ranged from 0.86 to 0.91 for all forms. These results indicate acceptable reliability coefficients for MAP tests.

The reliability statistics by subgroup are reported and discussed in Chapter 10.

9.2.2 Standard Error of Measurement

The reliability of reported test scores can be characterized by the standard errors associated with the scores. The SEM may be used to determine the range within which a student's true score is likely to fall. An observed score should be regarded not as a

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student's true score but as an estimate of a student's true score. It is expected that 68% of the time a student's score obtained from a single test administration would fall within one SEM of the student's true score and that 95% of the time the obtained score would fall within approximately two standard errors of the true score. The SEM is an index of the random variability in test scores and is defined as follows:

$$\text{SEM} = SD\sqrt{1 - R_{xx'}}\ , \tag{9.2}$$

where *SD* represents standard deviation of the raw score distribution, and $R_{xx'}$ is estimated by $\hat{\alpha}$, as expressed in formula 9.1.

The SEM at the test level was computed in raw score metric and is also presented in Tables 9.1, 9.2, and 9.3 for ELA, Mathematics, and Science, respectively.

9.2.3 Conditional Standard Error of Measurement

In contrast to SEM, the conditional standard error of measurement (CSEM) expresses the degree of measurement error in scale score units and are conditioned on the ability of the student. We report the CSEM in support of AERA, APA, & NCME (2014) Standard 2.14, which states the following:

> When possible and appropriate, conditional standard errors of measurement should be reported at several score levels unless there is evidence that the standard error is constant across score levels. Where cut scores are specified for selection or classification, the standard errors of measurement should be reported in the vicinity of each cut score. (46)

In further compliance with Standard 2.14, the CSEM of each cut score is reported in Tables 9.4, 9.5 and 9.6.

The CSEMs are defined as the reciprocal of the square root of the test information function and can be estimated across all points of the ability continuum (Hambleton & Swaminathan, 1985):

$$\text{CSEM}(\theta_i) = \frac{1}{\sqrt{I(\theta_i)}}\ , \tag{9.3}$$

where $I(\theta_i)$ is the test information function, as a sum of item information function 2, obtained as

$$I(\theta_i) = \sum_j \frac{p'_{ij}(\theta_i)^2}{p_{ij}(\theta_i)q_{ij}(\theta_i)}, \tag{9.4}$$

where $p'_{ij}(\theta_i)$ is the derivative of $p_{ij}(\theta_i)$, and $q_{ij}(\theta_i) = 1 - p_{ij}(\theta_i)$.

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Note that the CSEMs vary in magnitude across the entire range of student ability estimates (i.e., scale scores) and are smaller in the middle of the score distribution and higher at the tails. This pattern is seen for all MAP CSEMs and is to be expected when IRT methods are used. The CSEMs at the three cut scores that define the performance levels are presented in Table 9.4 for ELA, Table 9.5 for Mathematics, and Table 9.6 for Science. The CSEM values range from 11 to 15 scale score points for ELA, from 9 to 20 scale score points for Mathematics, and from 7 to 11 scale score points for Science, depending on the cut score.

Figures 9.1 through 9.6 display the pre-equated CSEM curves, with cut scores indicated, for ELA, Grades 3 through 8. Figures 9.7 through 9.12 display the pre-equated CSEM curves, with cut scores indicated, for Mathematics, Grades 3 through 8. Figures 9.13 through 9.16 display the pre-equated CSEM curves, with cut scores indicated, for Science, Grades 5 and 8. The estimates of measurement error tend to be higher at the low and high ends of the scale score range. The measurement error increases when there are few observations at a particular ability level. Generally, there are few students with extreme scores, and these score levels cannot be estimated as accurately as levels toward the middle of the ability range. Figures 9.1 through 9.16 demonstrate that the measurement error is minimized at the cut scores and in the middle of the scale range where most students are located.

9.2.4 Classification Accuracy and Consistency

Classification Consistency: Classification consistency (also known as decision consistency) is defined as the extent to which the classifications of students agree on the basis of two independent administrations of the test or one administration of two parallel test forms. It is difficult, however, to obtain data from repeated administrations of the same form because of cost, time, and students' recall of the first administration. Also, it is difficult to construct two parallel forms. A common practice, therefore, is to estimate decision consistency from one administration of a test. These analyses directly address AERA, APA, & NCME (2014) Standard 2.16:

> When a test or combination of measures is used to make classification decisions, estimates should be provided of the percentage of test takers who would be classified in the same way on two replications of the procedure. (46)

Classification Accuracy: Classification accuracy is defined as the extent to which the actual classifications of test takers agree with classifications that would be made on the basis of their true scores (Livingston & Lewis, 1995). It is common to estimate classification accuracy by utilizing a psychometric model to find true scores corresponding to observed scores.

In other words, classification *consistency* refers to the agreement between two observed scores, while classification *accuracy* refers to the agreement between the observed score and the true score. A straightforward approach to classification consistency estimation can be expressed in terms of a contingency table representing the probability of a particular classification outcome under specific scenarios. For example, the following

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table is a contingency table of (H + 1) × (H + 1), where H is the number of cut scores, such that two cut scores yield a 3×3 contingency table.

Example of Contingency Table with Two Cut Scores

	Level 1	Level 2	Level 3	Sum
Level 1	P_{11}	P_{21}	P_{31}	$P_{.1}$
Level 2	P_{12}	P_{22}	P_{32}	$P_{.2}$
Level 3	P_{13}	P_{23}	P_{33}	$P_{.3}$
Sum	$P_{1.}$	$P_{2.}$	$P_{3.}$	1.0

DRC used a method suggested by Kolen and Kim (2005) for estimating consistency and accuracy that involves the generation of item responses using item parameters based on the IRT model (see also Kim, Choi, Um, & Kim, 2006; Kim, Barton, & Kim, 2007). Two sets of item responses are generated using a set of item parameters and an examinee's ability distribution from a single test administration. These two sets of item responses are considered as an examinee's responses on two administrations of the same form. The procedure is described below and is implemented with KKCLASS software (Kim, 2005):

- Step 1: Obtain item parameters (**I**) and ability distribution weight ($\hat{g}(\theta)$) at each quadrature point from a single test.
- Step 2: Compute two raw scores at each quadrature point. At a given quadrature point θ_i, generate two sets of item responses using the item parameters from a test form, assuming that the same test form was administered twice to an examinee with the true ability θ_i.
- Step 3: Construct a classification matrix at each quadrature point. Determine the joint event for the cells in the table above using the raw scores obtained from Step 2.
- Step 4: Repeat Steps 2 and 3 *R* times and get average values from *R* replications.
- Step 5: Multiply ability distribution weight ($\hat{g}(\theta)$) by average values in Step 4 for each quadrature point, and sum across all quadrature points. From this final contingency table, decision consistency indices, such as consistency agreement and kappa, can be computed.
- Step 6: Because examinee ability is estimated at each quadrature point, this quadrature point can be considered the true score. Therefore, decision accuracy is computed using both examinee estimated ability (observed score) and quadrature point (true score).

Classification consistency and classification accuracy conditioned on achievement level (Table 9.7) and on cut score (Table 9.8) are presented for the 2016 MAP tests. As shown in Table 9.7, classification accuracy conditioned on achievement level ranges from 0.62 to 0.89 and classification consistency conditioned on achievement level ranges from 0.52 to 0.81 for all ELA achievement levels. For Mathematics, classification accuracy

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conditioned on achievement level ranges from 0.73 to 0.90, and classification consistency conditioned on achievement level ranges from 0.63 to 0.83. For Science, classification accuracy conditioned on achievement level ranges from 0.67 to 0.90, and classification consistency conditioned on achievement level ranges from 0.54 to 0.81. The magnitude of classification consistency and accuracy measures is influenced by key features of the test design, including the number of items, number of cut scores, test reliability and associated SEM, and student score distribution. For example, lower than expected classification consistency was found at the *Proficient* level for Science Grade 5. When the distribution of test item properties along the ability scale was examined, it was found that relatively few test items effectively measured students classified as *Proficient* on Grade 5 Science tests, likely contributing to the lower classification consistency at this achievement level. Consequently, it is recommended that more items effectively measuring students in the middle and upper part of the ability scale be included in the new Science forms in the future.

Perhaps the most important indices for accountability systems are those for the accuracy and consistency of classification decisions made at specific cut points. To evaluate decisions at specific cut points, the joint distribution of all the performance levels is collapsed into a dichotomized distribution around that specific cut point. As an example, the dichotomization at the cut point between the *Basic* and *Proficient* classifications was formed. The proportion of correct classifications below this particular cut point is equal to the sum of all the cells at the levels *Below Basic* and *Basic*, and the proportion of correct classifications above that particular cut point is equal to the sum of all the cells at the levels *Proficient* and *Advanced*. Table 9.8 shows the classification accuracy and consistency estimates when conditioned on MAP cut points. The classification accuracy statistics were at or above 0.90, and classification consistency statistics were at or above 0.86 for all test forms at all cut points for all three content areas. These results suggest that consistent and accurate performance level classifications are being made for students in Missouri based on the MAP.

9.3 Validity Evidence Based on Internal Test Structure

Analyses of the internal structure of a test can indicate the extent to which the relationships among test items conform to the construct the test purports to measure. For example, the MAP Mathematics test is designed to measure a single overall construct—Mathematics achievement. Therefore, the items comprising the Mathematics MAP test should only measure Mathematics, not Science, Language, or Reading.

This Technical Report summarizes additional statistics that contribute to the evidence of construct-related validity (Cronbach's coefficient alpha reported previously in this section and item fit reported in Chapter 6) through the evaluation of the internal test structure. The internal consistency coefficient (Cronbach's alpha) is a measure of item homogeneity. In order for a group of items to be homogeneous, they must measure the same construct or represent the same content domain. Because IRT models were used to calibrate test items and to report student scores, item fit is also relevant to construct-related validity. The extent to which test items function as the IRT model prescribes is

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relevant to the validation of the test score interpretation. As shown in Appendix C, only nine items were flagged for poor model-data fit for ELA and six items were flagged for Mathematics across all grade levels. For Science, no items were flagged for poor fit in Grade 5 and three items were flagged in Grade 8.

9.3.1 Principal Components Analysis

As another measure of the internal test structure, DRC examined the unidimensionality of each grade-level MAP test. One of the underlying assumptions of the IRT models used to scale MAP is that the tests being calibrated are unidimensional; that is, items comprising MAP in each grade/content area measure a single content domain. For example, Mathematics items should measure Mathematics ability and not Reading skills. Standard 1.13 of the AERA, APA, & NCME (2014) *Standards* states the following:

> If the rationale for a test score interpretation for a given use depends on premises about the relationships among test items or among parts of the test, evidence concerning the internal structure of the test should be provided. (26–27)

In this section, we examine the internal structure by evaluating the unidimensionality assumption through Principal Components Analysis (PCA). This analysis seeks evidence that there exists a single primary factor, the first principal component, which accounts for much of the relationship between items. The presence of a single or dominant factor suggests that a test is sufficiently unidimensional (i.e., measures one underlying construct).

A PCA was conducted on each grade/content area MAP. A large first principal component is evident in each analysis. It is common to have additional eigenvalues greater than 1.0, which may suggest the presence of other factors.

For all grades of ELA and Mathematics, the ratio of the variance accounted for by the first factor to the second and third is sufficiently large to support the claim that these tests are unidimensional (Cattell, 1952). All the MAP subject area tests exhibit first principal components accounting for more than 17% of the test variance for ELA (see Table 9.9), for more than 20% of the test variance for Mathematics (except Grade 8 where the first principal component accounts for over 15% of the variance—see Table 9.10), and for more than 17% of the test variance for Science (see Table 9.11). To further investigate the unidimensionality of the MAP tests, the ratio of the first eigenvalue to the second eigenvalue was explored (see Tables 9.9 through 9.11). These ratios show that the first eigenvalue is at least five times as large as the second eigenvalue for ELA grades and at least four times as large as the second eigenvalue for Mathematics and Science grades. This substantial difference in magnitude indicates that one factor appears to be dominant and that the ELA, Mathematics, and Science tests are essentially unidimensional.

This evidence supports the claim that there is a dominant dimension underlying the items/tasks in each test and that scores from each test represent performance primarily determined by that ability. Construct-irrelevant variance, such as factual knowledge

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irrelevant to doing well in a subject, does not appear to create significant nuisance factors.

9.4 Analyses by Content Strands

Three sets of analyses were conducted at the content strand level for ELA, Mathematics, and Science in another attempt to assess the internal structure of MAP. First, correlation coefficients that measure the relationship between the content strand scores were computed. Second, the reliability of each strand was computed. Finally, the SEM was computed for each content strand.

9.4.1 Correlations among Content Strand Subscores

In this section, we report the strength of the interrelationships among the content strands by computing correlation between them. Tables 9.12 through 9.14 report the uncorrected Pearson product-moment (PPM) correlation coefficients and the PPM corrected for attenuation (CAPPM). The PPM among the content strand subscores is presented below the diagonal portion of the matrix and the CAPPM is presented above the diagonal portion of the matrix.

The uncorrected PPM in Tables 9.12 through 9.14 should be interpreted in the context of the reliability coefficient. In general, we expect to see lower PPM coefficients between variables that are less reliable. In most cases, the PPM coefficients show that performance on one content strand is moderately to strongly related to performance on another content strand within the same grade and content area. For ELA, correlations ranged from 0.54 to 0.75 for any pair of content strands. For Mathematics, the correlations ranged from 0.39 to 0.75 for any pair of content strands. For Science, the correlations ranged from 0.32 to 0.58 for any pair of content strands. It should be noted that the value of the correlation coefficients will be affected by the limited number of items measuring each content strand. For example, the correlations coefficients for Science (see Table 9.14) tend to be lower than the correlation coefficients for ELA and Mathematics (see Tables 9.12 and 9.13, respectively) because Science content strands often have fewer items compared to ELA and Mathematics strands. Also, caution should be used when comparing the PPM coefficients measuring the relationships between content strands to those measuring the relationships between content areas (Table 9.18). We expect to see a more modest relationship reported between the content strands as a consequence of the lower number of items measuring each of the reporting categories. The PPM between two content strand subscores may be artificially low because of measurement error.

AERA, APA, & NCME (2014) Standard 1.21 states the following:

> When statistical adjustments, such as those for restriction of range or attenuation, are made, both adjusted and unadjusted coefficients, as well as the specific procedure used, and all statistics used in the adjustment, should be reported. Estimates of the construct-criterion relationship that remove the effects of

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measurement error on the test should be clearly reported as adjusted estimates. (29)

We can correct for the attenuation of the PPM statistically using Spearman's formula,

$$CAPPM = \frac{r_{xy}}{\sqrt{r_{xx} r_{yy}}}, \tag{9.5}$$

where r_{xy} is the PPM between two content strands, r_{xx} is the reliability of one of those content strands, and r_{yy} is the reliability for the other content strand.

In Tables 9.12 through 9.14, the CAPPMs indicate strong relationships between the content strands. In some cases, the CAPPM is greater than 1.00. "Disattenuated values greater than 1.00 indicate that measurement error is not randomly distributed" (Schumacker, 1996). The strong relationships suggested by the CAPPM in Tables 9.12 through 9.14 are further evidence of the validity of the test construct. Since the overall content area is comprised of the content strand subscores, and the content area is expected to measure a single dimension, we would expect that these subscores are also highly related.

9.4.2 Reliability and Standard Error of Measurement of Content Strands

Raw score summary statistics (mean and standard deviation), Cronbach's (1951) coefficient alpha, and SEM were computed for each of the content strands by grade and content area using the census data. These statistics are presented in Tables 9.15 through 9.17 for ELA, Mathematics, and Science, respectively. Reliability indices, such as Cronbach's coefficient alpha (and resulting SEM), are a function of the number of test items. It is expected that coefficient alpha would be lower for a content strand assessed by a small number of items compared to a content strand assessed by a larger number of items.

9.5 Validity Evidence Based on Relationship with Other Variables

Measures of different constructs should not be highly correlated with each other. The relationship between the test scores from the tests measuring different constructs can be assessed by the extent to which measures of constructs that theoretically should not be related to each other are, in fact, observed as not related to each other. Typically, correlation coefficients among measures of unrelated or distantly related constructs are examined in support of divergent evidence.

To assess the evidence of the validity of the intended interpretation of test scores based on the relationship with other variables, correlations were computed between the ELA, Mathematics, and Science scale scores for students who took more than one MAP subject area test in 2017. These correlations are based on the reportable census data; the results are shown in Table 9.18. The correlation coefficients ranged from 0.70 (between ELA and Mathematics in Grade 8) to 0.81 (between ELA and Science in Grade 8). The

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correlation coefficients suggest that individual student scores for ELA, Mathematics, and Science are highly related. Despite high correlations, the tests are not perfectly related to each other, suggesting that different constructs are being tapped; however, the test scores do appear highly related to one another, suggesting they may be tapping into a similar knowledge base or general underlying ability.

9.6 Summary

In summary, the analyses of the internal structure of the test can indicate the degree to which the relationship among test items and test components conform to the test construct, which in turn provide a basis for test score interpretation. This chapter of the report includes reliability analysis results indicating that the MAP tests produce scores that would be relatively stable if the test were administered repeatedly under similar conditions. The assumption that the content area MAP tests were unidimensional (that is, each grade level test measured one primary dimension) was confirmed through PCA. In addition, the divergent evidence of the validity of the intended interpretation of test scores was evaluated through the correlations computed between the ELA, Mathematics, and Science scale scores. These analyses conducted by DRC are in alignment with multiple best practices of the testing industry, but in particular, support the following standards from the *Standards for Educational and Psychological Testing* (AERA, APA, & NCME, 2014):

- Standard 1.13—If the rationale for a test score interpretation for a given use depends on premises about the relationships among test items or among parts of the test, evidence concerning the internal structure of the test should be provided.
- Standard 1.21—When statistical adjustments, such as those for restriction of range or attenuation, are made, both adjusted and unadjusted coefficients, as well as the specific procedure used, and all statistics used in the adjustment, should be reported. Estimates of the construct-criterion relationship that remove the effects of measurement error on the test should be clearly reported as adjusted estimates.
- Standard 2.0—Appropriate evidence of reliability/precision should be provided for the interpretation for each intended score use.
- Standard 2.3—For each total score, subscore, or combination of scores that is to be interpreted, estimates of relevant indices of reliability/precision should be reported.
- Standard 2.13—The standard error of measurement, both overall and conditional (if reported), should be provided in units of each reported score.
- Standard 2.14—When possible and appropriate, conditional standard errors of measurement should be reported at several score levels unless there is evidence that the standard error is constant across score levels. Where cut scores are specified for selection or classification, the standard errors of measurement should be reported in the vicinity of each cut score.
- Standard 2.16—When a test or combination of measures is used to make classification decisions, estimates should be provided of the percentage of test takers who would be classified in the same way on two replications of the procedure.

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- Standard 2.19—Each method of quantifying the reliability/precision of scores should be described clearly and expressed in terms of statistics appropriate to the method. The sampling procedures used to select test takers for reliability/precision analyses and the descriptive statistics on these samples, subject to privacy obligations where applicable, should be reported.

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Table 9.1: Reliability: English Language Arts

Grade	Form	Number of Items	Number of Score Points	Cronbach's Alpha	SEM	N-Count
3	1	52	52	0.90	3.09	69,120
4	1	52	52	0.91	3.01	69,280
5	1	51	58	0.91	3.06	67,728
6	1	52	52	0.90	3.08	66,720
7	1	52	52	0.91	3.15	66,208
8	1	51	58	0.92	3.10	65,696

Table 9.2: Reliability: Mathematics

Grade	Form	Number of Items	Number of Score Points	Cronbach's Alpha	SEM	N-Count
3	1	42	42	0.91	2.65	69,264
4	1	42	42	0.91	2.73	69,520
5	1	42	42	0.90	2.71	67,968
6	1	46	46	0.91	2.71	66,800
7	1	46	46	0.90	2.83	65,568
8	1	46	46	0.86	2.88	52,960

Table 9.3: Reliability: Science

Grade	Form	Number of Items	Number of Score Points	Cronbach's Alpha	SEM	N-Count
5	A	41	60	0.89	3.61	47,832
	B	41	60	0.86	3.54	20,132
8	A	39	61	0.91	3.75	42,376
	B	38	60	0.89	3.71	23,452

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Table 9.4: Conditional Standard Error of Measurement at the Basic, Proficient, and Advanced Cut Scores: English Language Arts

Content Area	Grade	Basic		Proficient		Advanced	
		Cut Score	CSEM	Cut Score	CSEM	Cut Score	CSEM
English Language Arts	**3**	416	14	447	12	502	14
	4	436	14	473	12	526	13
	5	449	14	488	12	541	13
	6	468	13	499	11	550	14
	7	476	15	506	14	563	14
	8	486	14	518	12	570	13

Table 9.5: Conditional Standard Error of Measurement at the Basic, Proficient, and Advanced Cut Scores: Mathematics

Content Area	Grade	Basic		Proficient		Advanced	
		Cut Score	CSEM	Cut Score	CSEM	Cut Score	CSEM
Mathematics	**3**	415	14	457	11	495	12
	4	438	19	486	10	521	10
	5	463	20	508	11	544	10
	6	470	15	518	12	555	10
	7	482	19	528	11	564	9
	8	496	19	544	11	572	10

Table 9.6: Conditional Standard Error of Measurement at the Basic, Proficient, and Advanced Cut Scores: Science

Grade/ Form	Basic		Proficient		Advanced	
	Cut Score	CSEM	Cut Score	CSEM	Cut Score	CSEM
5 / A	626	10	669	9	692	10
5 / B	626	10	669	10	692	11
8 / A	671	9	703	7	735	9
8 / B	671	10	703	8	735	9

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Table 9.7: Classification Accuracy and Consistency Conditioned on Level of Achievement

Content Area	Grade	Form	Accuracy				Consistency			
			Below Basic	Basic	Prof.	Adv.	Below Basic	Basic	Prof.	Adv.
English Language Arts	3	1	0.86	0.66	0.82	0.87	0.78	0.55	0.76	0.77
	4	1	0.86	0.71	0.82	0.86	0.79	0.64	0.75	0.77
	5	1	0.86	0.75	0.81	0.87	0.79	0.66	0.78	0.76
	6	1	0.87	0.69	0.79	0.85	0.77	0.58	0.75	0.76
	7	1	0.89	0.62	0.83	0.85	0.81	0.52	0.74	0.77
	8	1	0.86	0.69	0.83	0.87	0.81	0.59	0.77	0.79
Mathematics	3	1	0.85	0.78	0.76	0.87	0.81	0.66	0.69	0.80
	4	1	0.85	0.78	0.78	0.88	0.75	0.71	0.67	0.83
	5	1	0.83	0.73	0.75	0.90	0.74	0.63	0.66	0.81
	6	1	0.88	0.75	0.78	0.88	0.78	0.68	0.68	0.81
	7	1	0.84	0.75	0.79	0.87	0.75	0.66	0.68	0.81
	8	1	0.87	0.74	0.74	0.85	0.79	0.70	0.64	0.75
Science	5	A	0.86	0.83	0.68	0.84	0.79	0.76	0.55	0.72
	5	B	0.85	0.82	0.67	0.85	0.76	0.76	0.54	0.77
	8	A	0.90	0.79	0.81	0.84	0.81	0.75	0.75	0.67
	8	B	0.88	0.76	0.81	0.81	0.78	0.71	0.74	0.73

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Table 9.8: Classification Accuracy and Consistency at Achievement Cut Points

Content Area	Grade	Form	Accuracy			Consistency		
			Below Basic/ Basic	Basic/ Prof.	Prof./ Adv.	Below Basic/ Basic	Basic/ Prof.	Prof./ Adv.
English Language Arts	3	1	0.94	0.92	0.94	0.92	0.90	0.91
	4	1	0.96	0.93	0.93	0.94	0.91	0.89
	5	1	0.95	0.94	0.93	0.93	0.92	0.90
	6	1	0.94	0.92	0.93	0.91	0.89	0.91
	7	1	0.94	0.93	0.94	0.92	0.90	0.90
	8	1	0.95	0.93	0.94	0.92	0.91	0.91
Mathematics	3	1	0.95	0.93	0.93	0.93	0.89	0.91
	4	1	0.95	0.93	0.94	0.92	0.90	0.91
	5	1	0.92	0.93	0.94	0.88	0.89	0.92
	6	1	0.93	0.92	0.95	0.90	0.88	0.94
	7	1	0.92	0.93	0.95	0.88	0.90	0.94
	8	1	0.90	0.92	0.96	0.87	0.90	0.95
Science	5	A	0.96	0.91	0.93	0.94	0.86	0.90
	5	B	0.97	0.90	0.91	0.96	0.86	0.87
	8	A	0.95	0.92	0.95	0.93	0.90	0.93
	8	B	0.95	0.91	0.94	0.93	0.88	0.92

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Table 9.9: Principal Component Analysis: English Language Arts

Grade	Form	Components	Eigenvalue	Percent of Variance Explained	Cumulative Percent of Variance Explained
3	1	First Component	9.31	17.90	17.90
		Second Component	1.49	2.86	20.76
		Ratio (First/Second)	6.26	.	.
4	1	First Component	10.00	19.23	19.23
		Second Component	1.55	2.98	22.21
		Ratio (First/Second)	6.45	.	.
5	1	First Component	10.33	20.25	20.25
		Second Component	1.61	3.16	23.41
		Ratio (First/Second)	6.40	.	.
6	1	First Component	9.34	17.96	17.96
		Second Component	1.40	2.70	20.66
		Ratio (First/Second)	6.65	.	.
7	1	First Component	10.04	19.30	19.30
		Second Component	1.32	2.53	21.83
		Ratio (First/Second)	7.63	.	.
8	1	First Component	10.64	20.87	20.87
		Second Component	1.89	3.70	24.58
		Ratio (First/Second)	5.63	.	.

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Table 9.10: Principal Component Analysis: Mathematics

Grade	Form	Components	Eigenvalue	Percent of Variance Explained	Cumulative Percent of Variance Explained
3	1	First Component	9.34	22.24	22.24
		Second Component	1.64	3.90	26.14
		Ratio (First/Second)	5.71	.	.
4	1	First Component	9.83	23.41	23.41
		Second Component	1.45	3.44	26.85
		Ratio (First/Second)	6.80	.	.
5	1	First Component	8.81	20.97	20.97
		Second Component	1.52	3.63	24.60
		Ratio (First/Second)	5.78	.	.
6	1	First Component	9.34	20.31	20.31
		Second Component	2.16	4.70	25.01
		Ratio (First/Second)	4.32	.	.
7	1	First Component	9.50	20.64	20.64
		Second Component	1.63	3.54	24.18
		Ratio (First/Second)	5.83	.	.
8	1	First Component	7.10	15.44	15.44
		Second Component	1.54	3.35	18.79
		Ratio (First/Second)	4.61	.	.

Table 9.11: Principal Component Analysis: Science

Grade	Form	Components	Eigenvalue	Percent of Variance Explained	Cumulative Percent of Variance Explained
5	A	First Component	8.25	20.13	20.13
		Second Component	1.57	3.83	23.95
		Ratio (First/Second)	5.26	.	.
	B	First Component	7.09	17.28	17.28
		Second Component	1.53	3.74	21.02
		Ratio (First/Second)	4.63	.	.
8	A	First Component	9.60	24.62	24.62
		Second Component	1.24	3.19	27.81
		Ratio (First/Second)	7.73	.	.
	B	First Component	8.09	21.30	21.30
		Second Component	1.28	3.38	24.68
		Ratio (First/Second)	6.30	.	.

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Table 9.12: Uncorrected Correlation Coefficient (below Diagonal) and Corrected Correlation Coefficient (above Diagonal) among Content Strands: English Language Arts

Grade	Form	No.	Content Strand	Number of Items	1	2	3	4
3	1	1	Reading	20	.	0.95	0.93	0.94
		2	Writing	16	0.72	.	0.97	0.93
		3	Research	8	0.64	0.64	.	0.93
		4	Listening	8	0.68	0.65	0.59	.
4	1	1	Reading	20	.	0.94	0.97	0.92
		2	Writing	16	0.74	.	1.01	0.90
		3	Research	8	0.66	0.65	.	0.95
		4	Listening	8	0.68	0.63	0.57	.
5	1	1	Reading	20	.	0.91	0.96	0.97
		2	Writing	15	0.73	.	0.95	0.92
		3	Research	8	0.66	0.65	.	0.95
		4	Listening	8	0.70	0.66	0.58	.
6	1	1	Reading	20	.	0.94	0.94	0.91
		2	Writing	16	0.72	.	0.96	0.92
		3	Research	8	0.60	0.59	.	0.91
		4	Listening	8	0.68	0.65	0.54	.
7	1	1	Reading	20	.	0.95	0.96	0.93
		2	Writing	16	0.73	.	0.98	0.93
		3	Research	8	0.70	0.68	.	0.94
		4	Listening	8	0.70	0.67	0.64	.
8	1	1	Reading	20	.	0.91	0.94	0.92
		2	Writing	15	0.75	.	0.94	0.90
		3	Research	8	0.66	0.65	.	0.94
		4	Listening	8	0.65	0.63	0.56	.

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Table 9.13: Uncorrected Correlation Coefficient (below Diagonal) and Corrected Correlation Coefficient (above Diagonal) among Content Strands: Mathematics

Grade	Form	No.	Content Strand	Number of Items	1	2	3	4	5
3	1	1	Operations and Algebraic Thinking	15	.	0.99	0.94	0.98	0.91
		2	Numbers and Operations in Base Ten	6	0.75	.	0.95	0.99	0.91
		3	Numbers and Operations - Fractions	7	0.64	0.60	.	0.98	0.97
		4	Measurement and Data	10	0.70	0.66	0.58	.	0.94
		5	Geometry	4	0.59	0.55	0.52	0.54	.
4	1	1	Operations and Algebraic Thinking	10	.	1.01	0.95	0.98	0.87
		2	Numbers and Operations in Base Ten	8	0.68	.	0.96	0.98	0.85
		3	Numbers and Operations - Fractions	12	0.68	0.75	.	0.97	0.87
		4	Measurement and Data	8	0.63	0.68	0.72	.	0.97
		5	Geometry	4	0.39	0.42	0.46	0.46	.
5	1	1	Operations and Algebraic Thinking	6	.	0.96	0.93	0.92	0.97
		2	Numbers and Operations in Base Ten	8	0.62	.	0.91	0.89	0.87
		3	Numbers and Operations - Fractions	16	0.65	0.66	.	0.98	0.91
		4	Measurement and Data	7	0.54	0.54	0.64	.	0.95
		5	Geometry	5	0.53	0.49	0.55	0.49	.
6	1	1	Ratios and Proportional Relationships	6	.	1.02	0.99	0.96	0.98
		2	The Number System	13	0.66	.	0.97	0.94	0.98
		3	Expressions and Equations	15	0.63	0.75	.	0.98	0.99
		4	Geometry	6	0.55	0.65	0.67	.	0.98
		5	Statistics and Probability	6	0.41	0.50	0.50	0.44	.
7	1	1	Ratios and Proportional Relationships	10	.	0.95	0.94	0.93	0.95
		2	The Number System	8	0.65	.	1.00	0.96	0.99
		3	Expressions and Equations	13	0.68	0.69	.	0.97	1.01
		4	Geometry	7	0.59	0.58	0.62	.	0.97
		5	Statistics and Probability	8	0.61	0.60	0.65	0.55	.
8	1	1	The Number System	4	.	0.96	0.89	0.91	0.83
		2	Expressions and Equations	15	0.53	.	0.99	0.95	0.92
		3	Functions	10	0.46	0.64	.	0.94	1.04
		4	Geometry	11	0.42	0.55	0.51	.	0.86
		5	Statistics and Probability	6	0.39	0.54	0.57	0.42	.

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Table 9.14: Uncorrected Correlation Coefficient (below Diagonal) and Corrected Correlation Coefficient (above Diagonal) among GLE Strands: Science

Grade	Form	No.	GLE Strand	Number of Items	1	2	3	4	5	6	7	8
5	A	1	Matter and Energy	5	.	1.04	0.99	1.01	1.01	1.03	0.94	0.93
		2	Force and Motion	3	0.47	.	0.95	0.97	1.00	1.00	0.97	0.91
		3	Living Organisms	5	0.48	0.38	.	1.07	1.00	1.03	0.88	0.97
		4	Ecosystems	7	0.54	0.43	0.51	.	1.04	1.03	0.89	0.98
		5	Earth's Systems	6	0.53	0.44	0.47	0.54	.	1.01	0.93	0.94
		6	The Universe	4	0.48	0.39	0.42	0.47	0.46	.	0.95	1.00
		7	Scientific Inquiry	9	0.58	0.49	0.47	0.54	0.55	0.50	.	0.84
		8	Impact of Sci., Tech. and Human Activity	2	0.43	0.35	0.39	0.44	0.42	0.39	0.44	.
	B	1	Matter and Energy	5	.	0.89	1.00	0.99	0.99	0.96	0.84	0.99
		2	Force and Motion	3	0.35	.	0.87	0.82	0.87	0.84	0.77	0.84
		3	Living Organisms	5	0.36	0.33	.	1.03	1.02	0.97	0.86	1.01
		4	Ecosystems	7	0.43	0.37	0.43	.	1.03	0.96	0.87	1.05
		5	Earth's Systems	5	0.38	0.35	0.38	0.46	.	0.98	0.87	1.05
		6	The Universe	5	0.42	0.39	0.41	0.49	0.44	.	0.86	0.95
		7	Scientific Inquiry	9	0.42	0.40	0.41	0.50	0.44	0.51	.	0.83
		8	Impact of Sci., Tech. and Human Activity	2	0.36	0.32	0.35	0.44	0.39	0.40	0.40	.

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Table 9.14: Uncorrected Correlation Coefficient (below Diagonal) and Corrected Correlation Coefficient (above Diagonal) among GLE Strands: Science (cont.)

Grade	Form	No.	GLE Strand	Number of Items	1	2	3	4	5	6	7	8
8	A	1	Matter and Energy	6	.	1.10	0.98	0.99	1.02	1.02	0.94	1.03
		2	Force and Motion	2	0.51	.	0.98	1.02	1.04	1.09	1.04	1.04
		3	Living Organisms	4	0.60	0.44	.	0.98	1.01	0.99	0.89	1.01
		4	Ecosystems	4	0.59	0.45	0.56	.	1.02	1.03	0.88	1.09
		5	Earth's Systems	7	0.64	0.48	0.61	0.60	.	1.04	0.90	1.03
		6	The Universe	4	0.54	0.43	0.51	0.52	0.54	.	0.94	1.06
		7	Scientific Inquiry	9	0.66	0.54	0.61	0.58	0.63	0.56	.	0.91
		8	Impact of Sci., Tech. and Human Activity	3	0.46	0.34	0.43	0.46	0.45	0.40	0.45	.
	B	1	Matter and Energy	6	.	0.99	1.06	0.98	1.03	1.01	0.95	1.09
		2	Force and Motion	2	0.43	.	0.98	1.01	0.99	0.98	0.92	1.07
		3	Living Organisms	4	0.52	0.40	.	1.01	1.05	0.97	0.90	1.06
		4	Ecosystems	4	0.43	0.37	0.41	.	1.06	0.93	0.81	1.07
		5	Earth's Systems	6	0.50	0.40	0.48	0.43	.	0.97	0.84	1.10
		6	The Universe	4	0.56	0.46	0.51	0.43	0.50	.	0.87	1.06
		7	Scientific Inquiry	9	0.60	0.48	0.53	0.43	0.49	0.58	.	0.95
		8	Impact of Sci., Tech. and Human Activity	3	0.49	0.40	0.45	0.41	0.46	0.51	0.52	.

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Table 9.15: Mean, Standard Deviation, and Standard Error of Measurement of Content Strands: English Language Arts

Grade	Form	Strand	Number of Items	Number of Score Points	N Count	Mean	Std. Dev.	Cronbach's Alpha	SEM
3	1	1	20	20	69,120	10.40	4.16	0.78	1.94
		2	16	16	69,120	8.64	3.28	0.74	1.68
		3	8	8	69,120	4.02	1.88	0.60	1.19
		4	8	8	69,120	4.42	2.08	0.67	1.20
4	1	1	20	20	69,280	12.80	4.43	0.83	1.81
		2	16	16	69,280	9.51	3.39	0.74	1.73
		3	8	8	69,280	5.13	1.59	0.55	1.06
		4	8	8	69,280	4.50	2.13	0.66	1.24
5	1	1	20	20	67,728	11.51	4.37	0.81	1.90
		2	16	16	67,728	13.81	3.70	0.80	1.67
		3	8	8	67,728	5.16	1.86	0.59	1.20
		4	8	8	67,728	4.81	1.99	0.64	1.20
6	1	1	20	20	66,720	10.99	4.28	0.81	1.88
		2	16	16	66,720	7.95	3.31	0.72	1.74
		3	8	8	66,720	4.70	1.81	0.52	1.26
		4	8	8	66,720	5.00	1.98	0.68	1.11
7	1	1	20	20	66,208	11.22	4.35	0.80	1.95
		2	16	16	66,208	8.29	3.48	0.74	1.78
		3	8	8	66,208	4.32	2.04	0.66	1.20
		4	8	8	66,208	4.17	2.25	0.71	1.21
8	1	1	20	20	65,696	11.00	4.76	0.84	1.90
		2	15	22	65,696	12.84	4.04	0.80	1.79
		3	8	8	65,696	4.77	1.73	0.59	1.11
		4	8	8	65,696	5.22	1.87	0.60	1.18

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Table 9.16: Mean, Standard Deviation, and Standard Error of Measurement of Content Strands: Mathematics

Grade	Form	Strand	Number of Items	Number of Score Points	N Count	Mean	Std. Dev.	Cronbach's Alpha	SEM
3	1	1	15	15	69,264	9.20	3.69	0.82	1.58
		2	6	6	69,264	3.76	1.77	0.70	0.97
		3	7	7	69,264	3.94	1.54	0.56	1.03
		4	10	10	69,264	4.57	2.14	0.63	1.30
		5	4	4	69,264	2.37	1.25	0.52	0.87
4	1	1	10	10	69,520	5.76	2.16	0.61	1.34
		2	8	8	69,520	3.90	2.27	0.73	1.17
		3	12	12	69,520	6.75	3.42	0.84	1.38
		4	8	8	69,520	3.72	2.04	0.67	1.17
		5	4	4	69,520	2.14	1.13	0.33	0.92
5	1	1	6	6	67,968	2.61	1.61	0.63	0.98
		2	8	8	67,968	4.72	2.00	0.67	1.15
		3	16	16	67,968	6.76	3.57	0.78	1.68
		4	7	7	67,968	2.75	1.73	0.55	1.16
		5	5	5	67,968	1.69	1.26	0.48	0.91
6	1	1	6	6	66,800	2.60	1.40	0.53	0.96
		2	13	13	66,800	7.08	3.04	0.78	1.44
		3	15	15	66,800	6.55	3.37	0.77	1.63
		4	6	6	66,800	2.38	1.50	0.61	0.94
		5	6	6	66,800	2.50	1.05	0.33	0.86
7	1	1	10	10	65,568	5.36	2.55	0.72	1.35
		2	8	8	65,568	2.63	1.93	0.64	1.15
		3	13	13	65,568	4.49	2.84	0.73	1.47
		4	7	7	65,568	2.82	1.71	0.57	1.13
		5	8	8	65,568	2.68	1.76	0.57	1.16
8	1	1	4	4	52,960	1.14	1.04	0.44	0.78
		2	15	15	52,960	5.38	2.99	0.70	1.65
		3	10	10	52,960	3.87	2.09	0.60	1.32
		4	11	11	52,960	3.36	1.97	0.49	1.40
		5	6	6	52,960	3.21	1.53	0.50	1.08

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Table 9.17: Mean, Standard Deviation, and Standard Error of Measurement of GLE Strands: Science

Grade	Form	GLE Strand	Number of Items	Number of Score Points	N Count	Mean	Std. Dev.	Cronbach's Alpha	SEM
5	A	1	5	7	47,832	4.05	1.77	0.55	1.19
		2	3	5	47,832	2.09	1.34	0.37	1.06
		3	5	7	47,832	4.63	1.53	0.42	1.16
		4	7	9	47,832	5.76	1.88	0.53	1.28
		5	6	8	47,832	4.16	1.84	0.51	1.28
		6	4	6	47,832	3.85	1.42	0.40	1.10
		7	9	14	47,832	7.66	3.50	0.69	1.96
		8	2	4	47,832	2.74	1.03	0.39	0.81
	B	1	5	7	20,132	4.78	1.46	0.38	1.15
		2	3	5	20,132	3.11	1.45	0.41	1.11
		3	5	7	20,132	4.89	1.40	0.35	1.13
		4	7	9	20,132	6.95	1.62	0.50	1.14
		5	5	7	20,132	4.66	1.40	0.40	1.09
		6	5	7	20,132	4.94	1.58	0.51	1.10
		7	9	14	20,132	8.45	3.41	0.66	1.98
		8	2	4	20,132	3.10	1.08	0.35	0.87
8	A	1	6	8	42,376	4.52	2.14	0.63	1.30
		2	2	4	42,376	1.67	1.18	0.34	0.96
		3	4	6	42,376	3.10	1.72	0.59	1.10
		4	4	6	42,376	4.00	1.57	0.56	1.04
		5	7	9	42,376	4.66	2.34	0.61	1.46
		6	4	6	42,376	3.44	1.54	0.45	1.14
		7	9	17	42,376	7.09	4.37	0.78	2.04
		8	3	5	42,376	3.15	1.37	0.32	1.13
	B	1	6	8	23,452	4.50	2.01	0.52	1.39
		2	2	4	23,452	1.99	1.19	0.36	0.95
		3	4	6	23,452	3.11	1.54	0.46	1.13
		4	4	6	23,452	3.74	1.43	0.36	1.14
		5	6	8	23,452	4.44	1.57	0.45	1.17
		6	4	6	23,452	3.24	1.69	0.60	1.07
		7	9	17	23,452	7.79	4.20	0.76	2.07
		8	3	5	23,452	2.86	1.37	0.39	1.06

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Table 9.18: Correlations between Content Area Scale Scores

Grade	ELA /Mathematics	ELA/Science	Mathematics /Science
3	0.76		
4	0.73		
5	0.73	0.80	0.72
6	0.77		
7	0.73		
8	0.70	0.81	0.73

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Figure 9.1: CSEM Curve with Cut Scores: English Language Arts, Grade 3

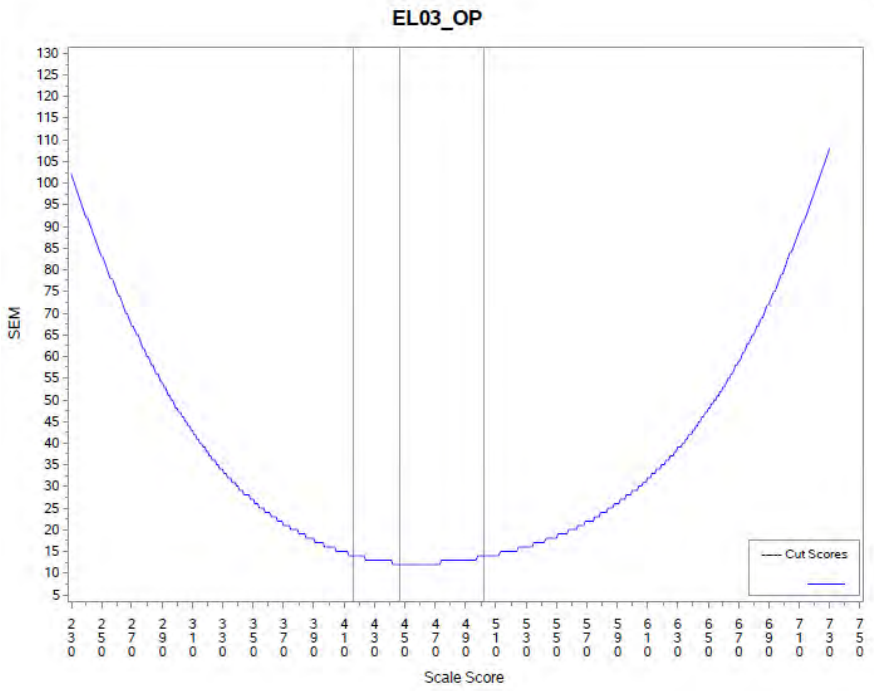

Figure 9.2: CSEM Curve with Cut Scores: English Language Arts, Grade 4

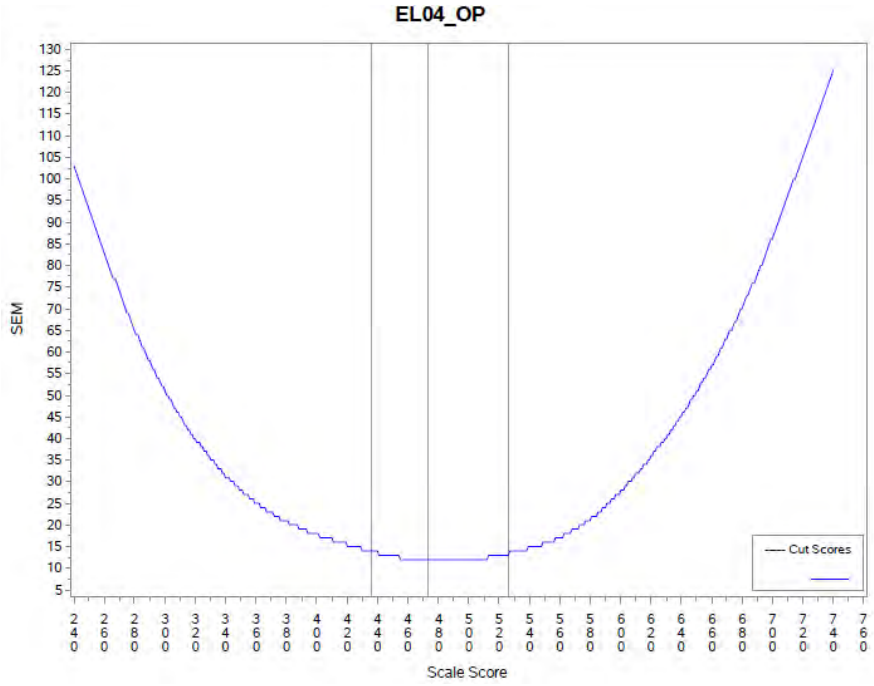

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Figure 9.3: CSEM Curve with Cut Scores: English Language Arts, Grade 5

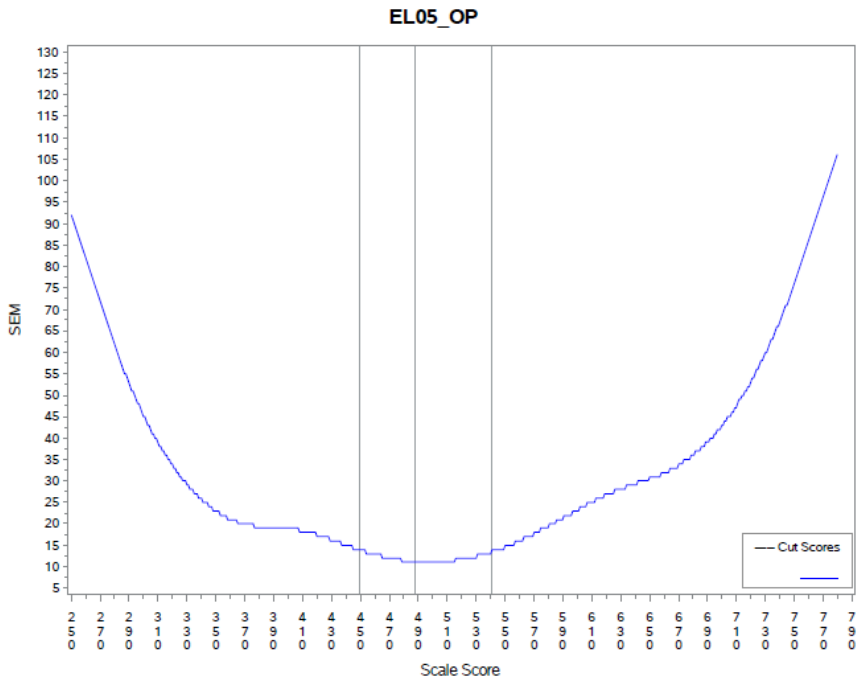

Figure 9.4: CSEM Curve with Cut Scores: English Language Arts, Grade 6

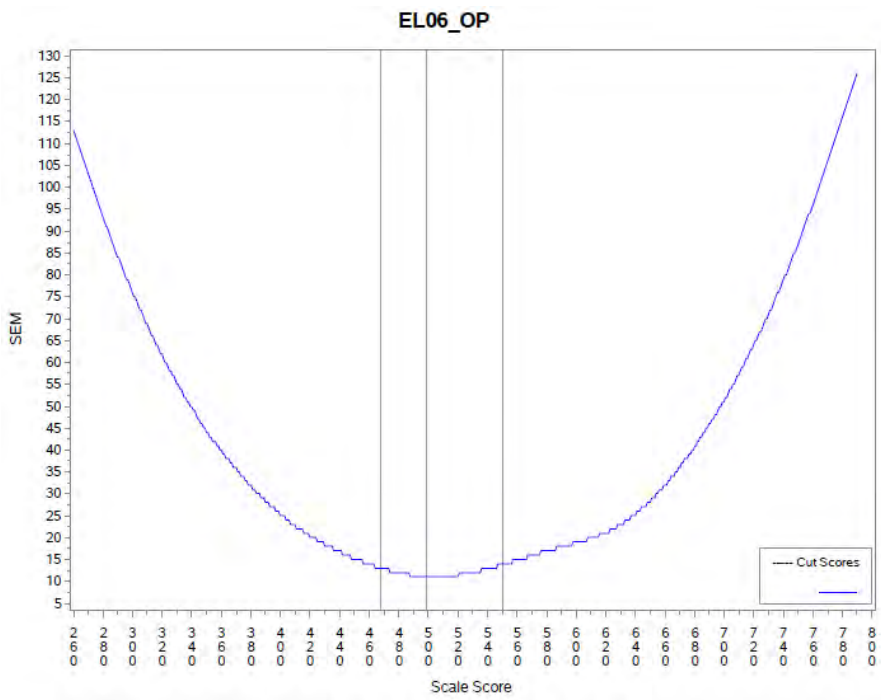

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Figure 9.5: CSEM Curve with Cut Scores: English Language Arts, Grade 7

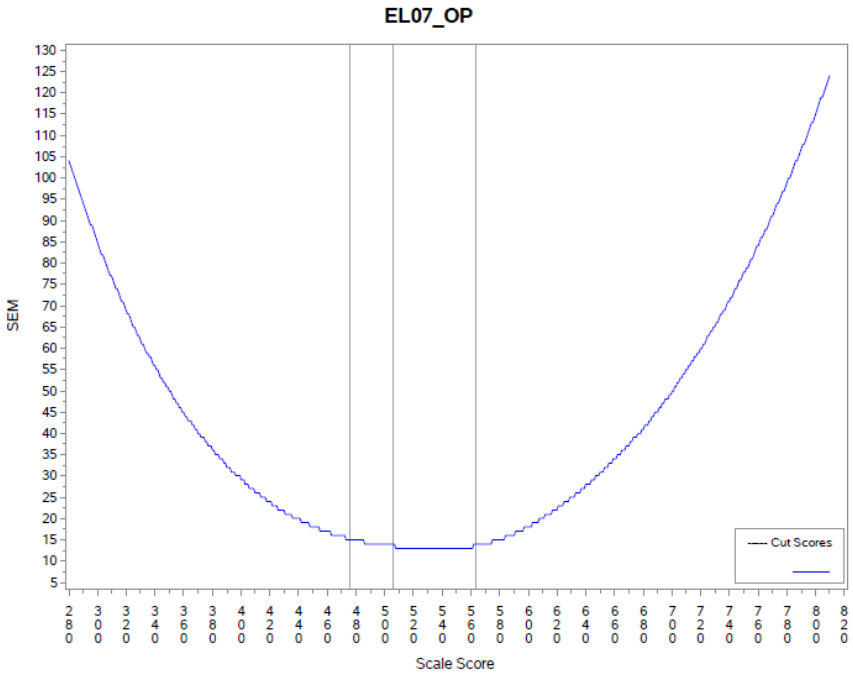

Figure 9.6: CSEM Curve with Cut Scores: English Language Arts, Grade 8

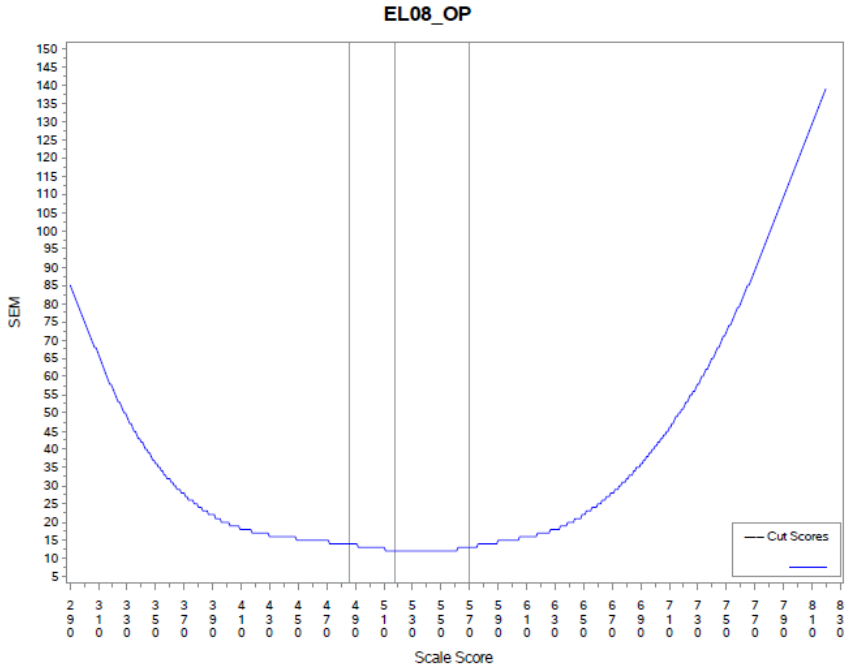

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Figure 9.7: CSEM Curve with Cut Scores: Mathematics, Grade 3

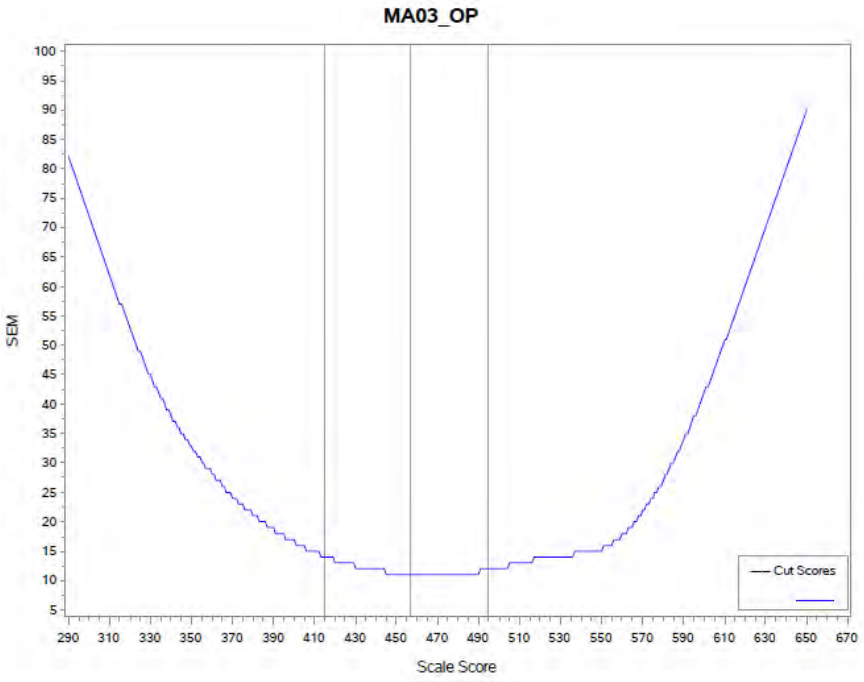

Figure 9.8: CSEM Curve with Cut Scores: Mathematics, Grade 4

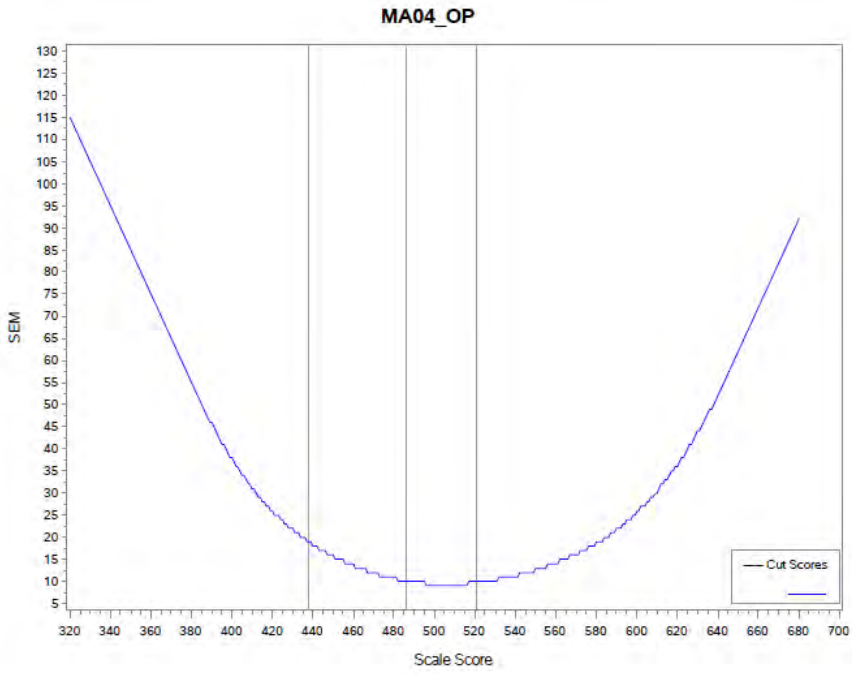

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Figure 9.9: CSEM Curve with Cut Scores: Mathematics, Grade 5

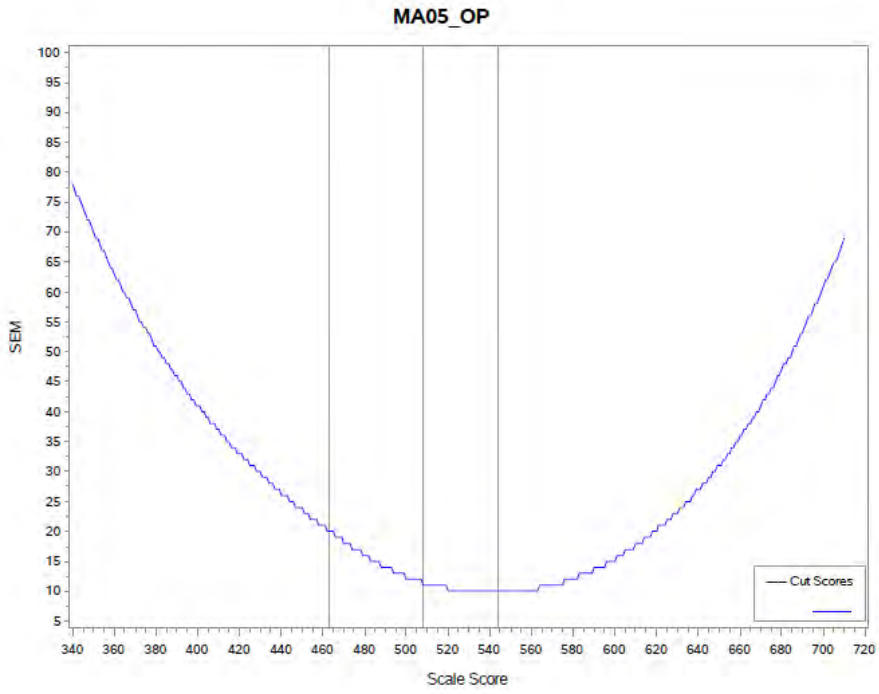

Figure 9.10: CSEM Curve with Cut Scores: Mathematics, Grade 6

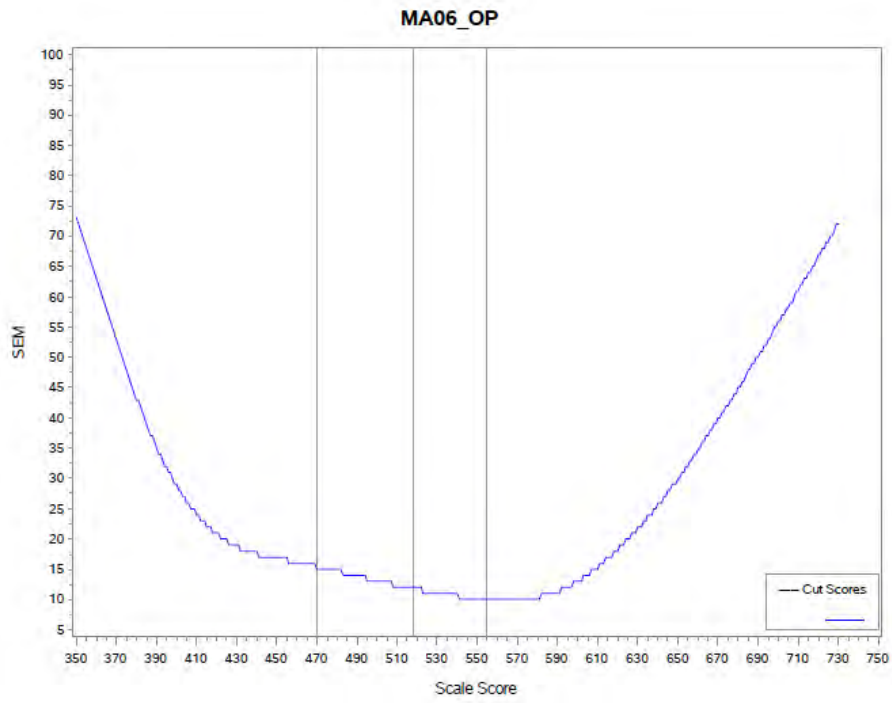

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Figure 9.11: CSEM Curve with Cut Scores: Mathematics, Grade 7

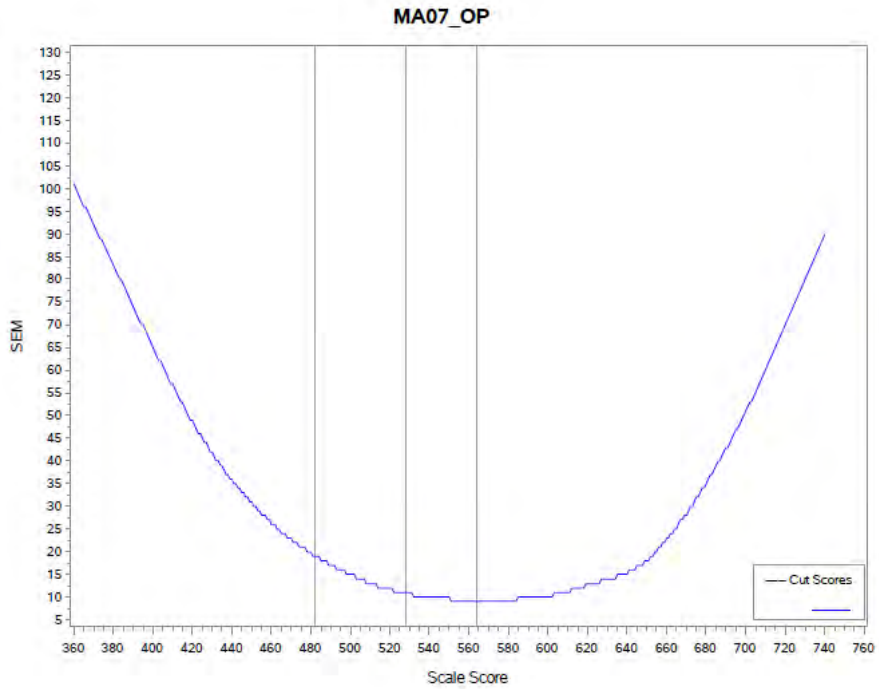

Figure 9.12: CSEM Curve with Cut Scores: Mathematics, Grade 8

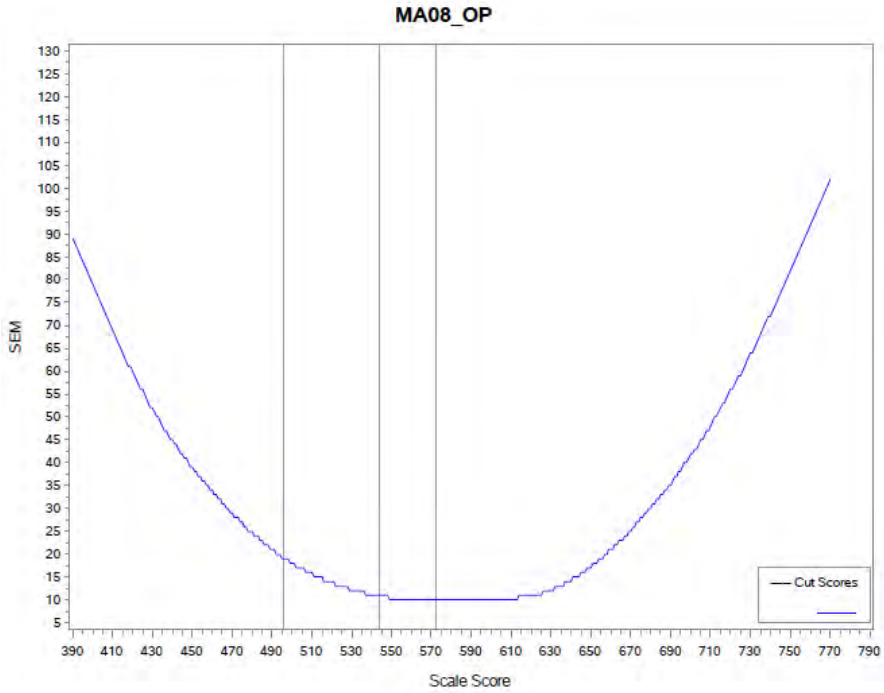

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Figure 9.13: CSEM Curve with Cut Scores: Science, Grade 5, Form A

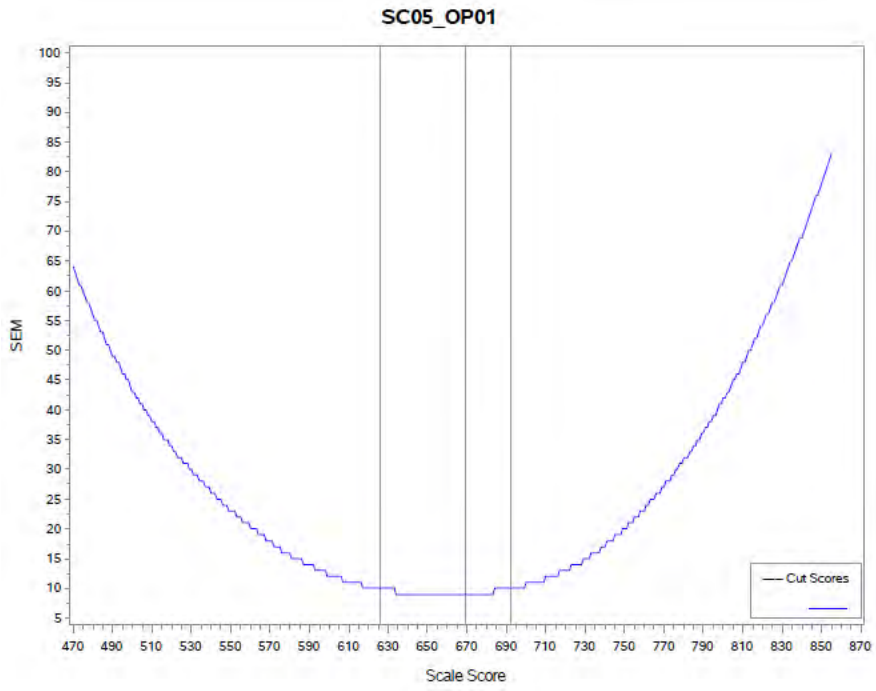

Figure 9.14: CSEM Curve with Cut Scores: Science, Grade 5, Form B

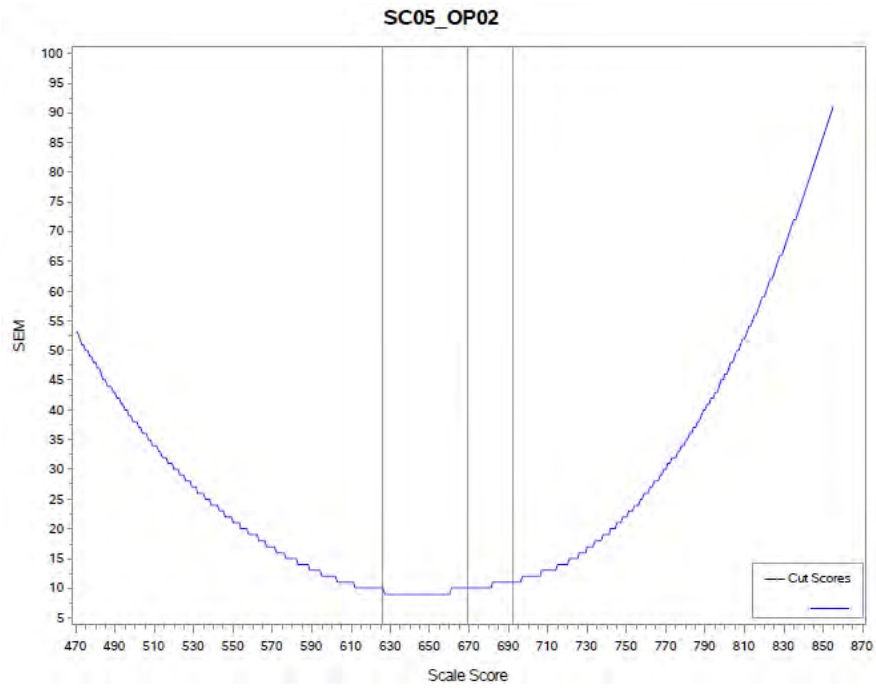

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Figure 9.15: CSEM Curve with Cut Scores: Science, Grade 8, Form A

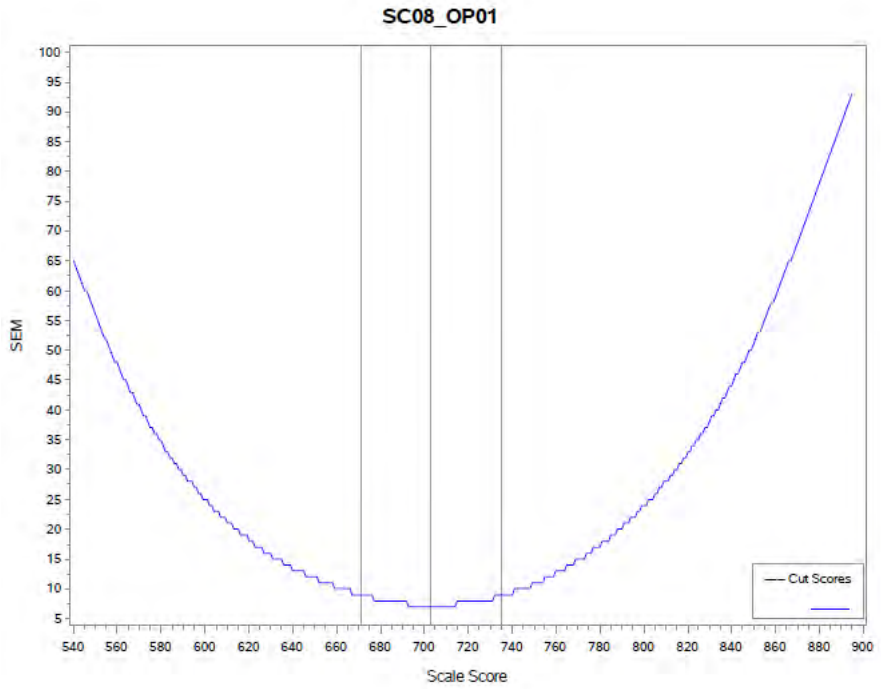
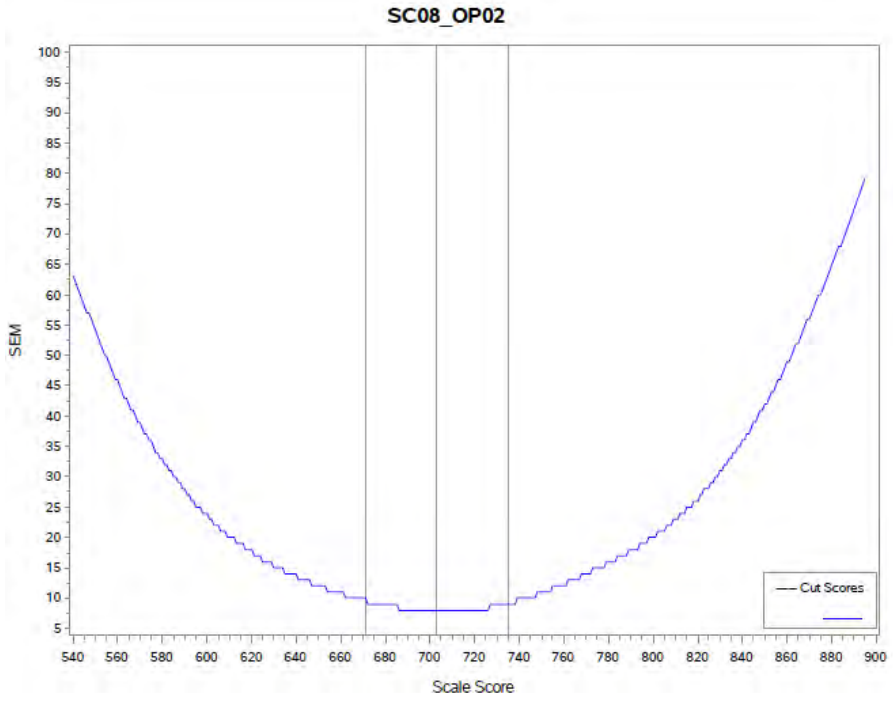


Figure 9.16: CSEM Curve with Cut Scores: Science, Grade 8, Form B



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CHAPTER 10: FAIRNESS

As noted in the *Standards for Educational and Psychological Testing* (AERA, APA, & NCME, 2014), there are varying definitions of fairness. In this chapter, we examine fairness as it relates to minimizing bias on a test. We then look at test performance among varying subgroups assessed by MAP ELA, Mathematics, and Science. It should be noted that differences in test performance among subgroups do not mean that a test is unfair—it simply means that groups perform differently on the test. Even when a test is carefully and properly constructed, differences may exist among subgroups as a result of differences in curriculum or learning by students in the subgroup.

This chapter is particularly relevant to AERA, APA, & NCME (2014) Standards 3.1, 3.2, 3.4, 3.5, and 3.6. These standards are from Chapter 3 of the AERA, APA, & NCME (2014) *Standards*, "Fairness in Testing." Each of these standards will be presented, as will the way the standard is addressed in this chapter. Standard 3.6 states the following:

> Where credible evidence indicates that test scores may differ in meaning for relevant subgroups in the intended examinee population, test developers and/or users are responsible for examining the evidence for validity of score interpretations for intended uses for individuals from those subgroups. What constitutes a significant difference in subgroup scores and what actions are taken in response to such differences may be defined by applicable laws. (65)

There is no particular research on MAP showing that the test scores of examinee subgroups differ in meaning; however, this is an ongoing concern in any large-scale testing program. To lessen the possibility of differences in test score meaning, DRC has several steps that are followed in item development and selections, as is explained in Section 10.1 of this chapter, which is directly relevant to Standards 3.1 and 3.2:

Standard 3.1 Those responsible for test development, revision, and administration should design all steps of the testing process to promote valid score interpretations for intended score uses for the widest possible range of individuals and relevant subgroups in the intended population. (63).

Standard 3.2 Test developers are responsible for developing tests that measure the intended construct and for minimizing the potential for tests' being affected by construct-irrelevant characteristics, such as linguistic, communicative, cognitive, cultural, physical, or other characteristics. (64)

In this section, we explain the steps DRC takes to minimize words, phrases, and content that may be regarded as offensive by members of demographic subgroups. Chapter 3 discusses item content considerations during item development and item reviews (including content and bias reviews) for items included in MAP. These reviews are also critical in fulfilling Standards 3.1 and 3.2.

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Moreover, standardized test administration and training of item readers for MAP writing prompts (WPs) in ELA Grades 5 and 8 and CR items in Science comply with Standards 3.4 and 3.5:

Standard 3.4 Test takers should receive comparable treatment during the test administration and scoring process. (65)

Standard 3.5 Test developers should specify and document provisions that have been made to test administration and scoring procedures to remove construct-irrelevant barriers for all relevant subgroups in the test-taker population. (65)

In addition, DRC conducts differential item functioning (DIF) studies following the operational administration of MAP. Typically, items are evaluated for possible DIF in the field test phase of the test development, and items flagged for DIF are typically further examined for possible bias. During the ELA and Mathematics test development, DRC content experts avoided including items that may potentially favor one demographic group over another. Science items were reviewed by DESE, CTB, and ITP prior to their inclusion in the operational test forms. Section 10.2 of this chapter explains the steps taken to evaluate MAP items using DIF procedures.

10.1 Minimizing Bias through Test Development

The development of a test that is fair for all examinees begins in the early stages of planning and development. The item and test development processes that were used to minimize bias are summarized below.

First, careful attention was paid to content-related validity during the item development and item selection processes. Bias can occur only if the test is measuring different things for different groups. By eliminating irrelevant skills or knowledge from the items, DRC reduced the possibility of bias.

Second, DRC item writers and test developers followed DRC's internal bias and sensitivity guidelines to help ensure that the items are fair for all groups of test takers, despite differences in characteristics, including, but not limited to, disability status, ethnic group, gender, regional background, native language, race, religion, sexual orientation, and socioeconomic status. Test developers reviewed all items included in MAP assessments and other testing materials with these guidelines in mind.

Finally, attention is typically given to item statistics (if available) throughout the test development process. As part of the test assembly process, attempts are made to avoid using or reusing items with poor statistical fit or distractors with positive point biserial correlations since this may indicate that an item is tapping an ability that is irrelevant to the construct being measured. Additional steps to reduce bias, including the use of content and bias committees comprised of Missouri participants, are described in more detail in Chapter 3 of this report.

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10.2 Evaluating Bias through Differential Item Functioning Statistics

After administering the test, an empirical approach known as DIF was used to examine the items. The DIF statistics indicate the degree to which members of one subgroup perform better or worse than expected on each item as compared to the members of the reference group. The DIF procedures used and the results of these analyses are detailed in this section. It should be noted, though, that all items included on the MAP ELA, Mathematics, and Science assessments have been thoroughly reviewed for content and bias by Missouri educators and DRC content experts to ensure that they do not tap knowledge or specific abilities irrelevant to the construct the test intends to measure. Therefore, DIF flags do not necessarily indicate that an item is biased; rather, DIF flags indicate that the item functions differently for equally able members of different groups (Camilli & Shepard, 1994). Items are not necessarily suppressed from operational scoring if they are flagged for DIF.

The position of DRC concerning test bias is based on two general propositions. First, students may differ in their background knowledge, cognitive and academic skills, language, attitudes, and values. To the degree that these differences are large, no one curriculum and no one set of instructional materials will be equally suitable for all. Therefore, no one test will be equally appropriate for all. Furthermore, it is difficult to specify what amount of difference can be called large and to determine how these differences will affect the outcome of a particular test. Second, schools have been assigned the tasks of developing certain basic cognitive skills and supporting development of these skills equitably among all students. Therefore, there is a need for tests that measure the common skills and bodies of knowledge that are common to all learners. The test publisher's task is to develop assessments that measure these key cognitive skills without introducing extraneous or construct-irrelevant elements into the performances on which the measurement is based. If these tests require that students have culturally specific knowledge and skills not taught in school, differences in performance among students can occur because of differences in student background and out-of-school learning. Such tests are measuring different things for different groups and can be called biased (Camilli & Shepard, 1994; Green, 1975).

In order to lessen such biases, DRC strives to minimize the role of extraneous elements, thereby increasing the number of students for whom the test is appropriate. As discussed above and in Chapter 3 of this report, careful attention is given during the test development and test construction processes to lessen the influence of these elements for large numbers of students (including the use of content and bias review committees). Unfortunately, in some cases, these elements may continue to play a substantial role. To assess the extent to which items may be performing differently for various subgroups of interest, DIF analyses are conducted after each operational test administration.

DIF statistics are used to quantify differences in item performance between two groups after controlling for examinees' overall achievement levels. Two DIF statistics that are commonly used for this purpose are the Mantel-Haenszel (MH) statistic (1959) and the

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standardized mean difference (SMD) between the reference and focal groups, proposed by Dorans & Schmitt (1991).

The MH statistic is computed as follows (Zwick, Donoghue, & Grima, 1993):

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

where F_k is the sum of scores for the focal group at the kth level of the matching variable. Note that the MH statistic is sensitive to N such that larger sample sizes increase the value of chi-square.

In addition to the MH chi-square statistic, the delta statistic (MH-D DIF) was computed for all items. Educational Testing Service first developed the MH-D DIF statistic. To compute delta, alpha (the odds ratio) is first computed:

$$\alpha_{MH} = \frac{\sum_{k=1}^{K} N_{r1k} N_{f0k} / N_k}{\sum_{k=1}^{K} N_{f1k} N_{r0k} / N_k},$$

where N_{r1k} is the number of correct responses in the reference group at ability level k, N_{f0k} is the number of incorrect responses in the focal group at ability level k, N_k is the total number of responses, N_{f1k} is the number of correct responses in the focal group at ability level k, and N_{r0k} is the number of incorrect responses in the reference group at ability level k. MH-D DIF is then computed:

$$\text{MH-D DIF} = -2.35 \ln(\alpha_{MH}).$$

For selected-response items, the MH (χ^2_{MH}) statistic was used to evaluate potential DIF items. In the MH procedure, subgroups are matched by their raw total test score using a contingency table with K ability levels. When applying the MH procedure, the log-odds ratio α is assumed to be constant across the K matched levels. The χ^2_{MH}, then, estimates a pooled common-odds ratio. Taking the natural logarithm of the common-odds ratio and its confidence limits and multiplying these by the constant −2.35 allows the resulting values to then be placed on the MH delta metric (Δ_{MH}) for interpretive purposes. Items were flagged for DIF using the following criteria:

- Moderate DIF: significant MH chi-square statistic ($p < 0.05$) and $1.0 \leq |\text{MH D-DIF}| < 1.5$
- Large DIF: significant MH chi-square statistic ($p < 0.05$) and $|\text{MH D-DIF}| \geq 1.5$

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For constructed-response items, an effect size (ES) statistic based on the MH chi-square will be used. The ES is obtained by dividing the SMD statistics by the standard deviation of the item. The SMD is an ES index of DIF, which is relatively easy to interpret (Zwick et al., 1993). The SMD compares the mean of the reference and focal group, adjusting for the distribution of reference and focal group members on the conditioning variable (Zwick et al., 1993), which for these analyses is the MAP raw score. SMD is computed as follows (Zwick et al., 1993):

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

where p_{Fk} is the proportion of the focal group members at the kth level of the matching variable, m_{Fk} is $1/N_{F1k}$, and m_{Rk} is $1/N_{R1k}$. Items are flagged using the same rules that are used in National Assessment of Educational Progress:

- Moderate DIF: If the MH statistic is significant ($p < .05$) and $|ES|$ is between 0.17 and 0.25
- Large DIF: If the MH statistic is significant ($p < .05$) and $|ES| \geq 0.25$

A positive DIF value indicates that the item favors the focal group, while a negative value indicates that the item disadvantages the focal group. Tables 10.1, 10.2, and 10.3 show the DIF results for ELA, Mathematics, and Science, for the following subgroups:

- ***Gender***: The focal group is females; the reference group is males.

- ***Race/Ethnicity***: The focal groups are students whose race/ethnicity is reported as Black, Hispanic, Asian/Pacific Islander, American Indian, or Other; the reference group is students whose race/ethnicity is reported as White.

- ***Accommodations***: The focal group is students who had one or more testing accommodations; the reference group is all others.

A negative SMD value implies that the focal group has a lower mean item score than the reference group, whereas a positive value implies that the focal group has a higher mean item score than the reference group, conditioned on the matching test score.

The minimum case count for the focal group was set at 200, and the minimum case count for the reference group was set at 400. The DIF analyses are not performed for subgroups of fewer than 200 students. In these cases, the statistical procedures do not have sufficient power to detect differences should they exist.

Tables 10.1, 10.2, and 10.3 summarize the number of moderate and large DIF flags by grade and test form for each focal group that included at least 200 students for ELA, Mathematics, and Science, respectively. A total of 27 operational items were flagged for ELA, 42 items were flagged for Mathematics, and 26 items were flagged for Science

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across all grades and test forms. For example, consider Grade 3 ELA in which two items were flagged. Both items were flagged for DIF against the Asian/Pacific Islander subgroup, and one of the flagged items was also flagged against the Hispanic subgroup—these items exhibited moderate negative DIF. No items were flagged for gender DIF or other ethnic group DIF. DIF analysis was not performed for a subgroup of students using testing accommodations versus all other students because the number of students using testing accommodations in Grade 3 ELA was less than 200.

Any items included on the MAP (including those items flagged for DIF) have been reviewed for content and bias by Missouri teachers, DESE staff, or DRC test development experts, prior to their inclusion on the test. Items with statistical DIF flags have also been reviewed by DRC test development staff after the Spring 2017 administration. Of the total of 95 items flagged for DIF in Spring 2017 administration, 70 items were also flagged in Spring 2016, across all grades and content areas. With two exceptions, items flagged for DIF in both administration years were flagged in favor or against the same group in both years. While the test developers confirmed that the content of the flagged items does not imply bias against any group, items with large DIF will be avoided in the development of future MAP test forms.

10.3 Impact Analysis

The impact of achievement testing on subgroups of students can be determined and reported in the form of average scores and also in terms of test score reliability.

10.3.1 Effect Size

One way to evaluate the magnitude of the differences is to calculate the ES. Cohen's *d* was used to calculate the ES. Cohen's *d* is given by the formula

$$d = \frac{\overline{x_a} - \overline{x_b}}{\sqrt{\frac{(n_a - 1)s_a^2 + (n_b - 1)s_b^2}{(n_a + n_b) - 2}}},$$

where $\overline{x_a}$ is the mean score of group A, $\overline{x_b}$ is the mean score of group B, s_a^2 is the variance of group A, s_b^2 is the variance of group B, n_a is the number of students in group A, and n_b is the number of students in group B.

Cohen's *d,* then, expresses the difference in group means in terms of the standard deviation. For example, if $d = .34$ for two groups, then it may be interpreted that the mean difference between the two groups is .34 of the pooled standard deviation. Cohen (1988) offered guidelines for interpreting the meaning of the *d* statistic: $d = .20$ is a small ES; $d = .50$ is a medium ES; and $d = .80$ is a large ES.

Using these guidelines, certain trends become apparent in Tables 10.4 through 10.9.

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In ELA, there is a small difference between the mean test scores of female students and male students, with female students outperforming male students in Grades 5 through 8 (no difference in Grades 3 and 4).

There is a medium difference in the mean ELA test scores of Black students compared to White students, with Black students underperforming White students in all grades. There is a small difference between the mean test scores of Hispanic and White students, with Hispanic students underperforming White students on ELA in all grades. There is a small difference between the mean test scores of Native Americans and White students, with Native American students underperforming White students on ELA in all grades. There is also a small difference between the mean ELA test scores of Asian/Pacific Islander students and White students, with Asian/Pacific Islander students outperforming White students in Grades 5 through 8 (no difference in Grades 3 and 4).

There is a large difference between the mean ELA test scores of students who use testing accommodations and students who do not use testing accommodations, with students who do not use testing accommodations outperforming their peers who use accommodations in all grade levels.

In Mathematics, there is no difference between the mean test scores of female students and male students in any of the testing grades.

There is a medium difference between the Mathematics mean tests scores of Black students and White students, with Black students underperforming White students in Grades 3, 5, and 8. There is a large difference between the mean tests scores of Black and White students, with Black students underperforming White students in Grades 4, 6, and 7. There is a small difference between the mean Mathematics test scores of Hispanic students and White students, with Hispanic students underperforming White students in all grades. There is a small difference between the mean test scores of Native American students and White students, with Native American students underperforming White students in all grades except Grade 8, where there is no difference. Finally, there is a small difference between the mean Mathematics test scores of Asian/Pacific Islander students and White students in all grades except Grade 5, where there is a medium difference between the mean test scores. Asian/Pacific Islander students outperform White students in all grades.

There is a large difference between the mean Mathematics test scores of students who do not use testing accommodations and students who use testing accommodations, with students who do not use testing accommodations outperforming students who use testing accommodations in all grades.

In Science, there is no difference between the mean test scores of female students and male students in either of the two testing grades.

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There is a large difference between the mean Science test scores of Black students and White students in both grades, with Black students underperforming White students. There is a small difference between the mean Science test scores of Hispanic students and White students in both grades, with Hispanic students underperforming White students. There is also a small difference between the mean Science test scores of American Indian students and White students in both grades, with American Indian students underperforming White students. Finally, there is a small difference between the mean Science test scores of Asian/Pacific Islander students and White students in Grade 8, with Asian/Pacific Islander students outperforming White students.

In addition, there is a large difference between the mean Science test scores of students who do not use testing accommodations and students who use testing accommodations in both grades, with students who do not use testing accommodations outperforming students who use testing accommodations.

The mean scale score difference trends observed in the Spring 2017 data are similar to the trends observed in the Spring 2016 data.

10.3.2 Reliability

Tables 10.10 through 10.12 show the test form reliability coefficients and standard errors of measurement (SEMs) by student ethnicity, student gender, and whether or not students used any testing accommodations for ELA, Mathematics, and Science, respectively.

The reliability coefficients for ELA forms ranged from 0.84 to 0.93. For Mathematics, the reliability coefficients ranged from 0.69 to 0.93. For Science, the reliability coefficients ranged from 0.83 to 0.93. Lower reliability coefficients were generally observed for students using testing accommodations and for Grade 8 Mathematics subgroups compared to other Mathematics groups or grades. Overall, this analysis shows that the test reliability is of acceptable magnitude for all subgroups.

10.4 Summary

In summary, the overall purpose of this chapter is to address fairness concerns that are relevant to the administration of MAP. The information in this chapter supports multiple best practices of the testing industry and, in particular, is related to the following AERA, APA, & NCME (2014) standards:

- Standard 3.1—Those responsible for test development, revision, and administration should design all steps of the testing process to promote valid score interpretations for intended score uses for the widest possible range of individuals and relevant subgroups in the intended population.
- Standard 3.2—Test developers are responsible for developing tests that measure the intended construct and for minimizing the potential for tests being affected by construct-irrelevant characteristics, such as linguistic, communicative, cognitive, cultural, physical, or other characteristics.

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- Standard 3.4—Test takers should receive comparable treatment during the test administration and scoring process.
- Standard 3.5—Test developers should specify and document provisions that have been made to test administration and scoring procedures to remove construct-irrelevant barriers for all relevant subgroups in the test-taker population.
- Standard 3.6—Where credible evidence indicates that test scores may differ in meaning for relevant subgroups in the intended examinee population, test developers and/or users are responsible for examining the evidence for validity of score interpretations for intended uses for individuals from those subgroups. What constitutes a significant difference in subgroup scores and what actions are taken in response to such differences may be defined by applicable laws.

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Table 10.1: Number of Items Flagged for DIF: English Language Arts

English Language Arts		Grade	3	4	5	6	7	8
		# of Items	52	52	51	52	52	51
Group	**DIF Magnitude**	**DIF Direction**	**Number of Flagged Items**					
Female	Moderate	Negative	0	0	1	2	1	2
		Positive	0	0	2	0	0	2
	Large	Negative	0	0	0	0	0	0
		Positive	0	0	0	0	0	0
Asian/ Pacific Islander	Moderate	Negative	2	1	1	1	0	1
		Positive	0	0	0	1	0	0
	Large	Negative	0	0	0	0	0	0
		Positive	0	0	0	0	0	0
Black	Moderate	Negative	0	0	1	2	1	0
		Positive	0	0	1	0	0	0
	Large	Negative	0	0	1	0	0	0
		Positive	0	0	0	0	0	0
Hispanic	Moderate	Negative	1	0	1	1	0	0
		Positive	0	0	0	0	0	0
	Large	Negative	0	1	0	0	0	0
		Positive	0	0	0	0	0	0
American Indian	Moderate	Negative	0	0	1	0	0	1
		Positive	0	0	0	1	0	0
	Large	Negative	0	0	0	0	0	0
		Positive	0	0	0	0	0	0
Ethnicity: Other	Moderate	Negative	0	0	0	0	0	0
		Positive	0	0	0	0	0	0
	Large	Negative	0	0	0	0	0	0
		Positive	0	0	0	0	0	0
Accommo-dations	Moderate	Negative	-	-	-	1	1	0
		Positive	-	-	-	1	0	2
	Large	Negative	-	-	-	0	0	3
		Positive	-	-	-	0	0	0
Total Number of Flagged Items*			2	1	6	6	3	9

Note: For Grades 5 and 8, the three components of the WPs were analyzed as separate items.
Note: '-' indicates that DIF analysis was not performed due to the number of students in a focal group being fewer than 200.
* Total number of flagged items is not always equal to the total number of flags because an item may be flagged for DIF for more than one group.

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Table 10.2: Number of Items Flagged for DIF: Mathematics

Mathematics		Grade	3	4	5	6	7	8
		# of Items	42	42	42	46	46	46
Group	**DIF Magnitude**	**DIF Direction**	**Number of Flagged Items**					
Female	Moderate	Negative	1	1	0	1	1	1
		Positive	2	0	0	1	0	0
	Large	Negative	1	0	0	0	0	0
		Positive	0	0	0	0	0	0
Asian/ Pacific Islander	Moderate	Negative	0	1	0	4	0	0
		Positive	2	1	0	1	1	0
	Large	Negative	0	0	0	0	0	0
		Positive	1	0	0	0	0	0
Black	Moderate	Negative	0	0	1	0	0	0
		Positive	0	0	0	1	0	0
	Large	Negative	0	0	0	0	0	0
		Positive	0	0	0	0	0	0
Hispanic	Moderate	Negative	0	0	0	0	0	0
		Positive	0	0	0	0	0	0
	Large	Negative	0	0	0	0	0	0
		Positive	0	0	0	0	0	0
American Indian	Moderate	Negative	1	0	0	1	0	0
		Positive	0	1	0	0	0	0
	Large	Negative	0	0	0	0	0	0
		Positive	0	0	0	0	0	0
Ethnicity: Other	Moderate	Negative	0	0	0	0	0	0
		Positive	0	0	0	0	0	0
	Large	Negative	0	0	0	0	0	0
		Positive	0	0	0	0	0	0
Accommo-dations	Moderate	Negative	-	2	1	0	2	1
		Positive	-	2	0	2	0	1
	Large	Negative	-	0	1	1	0	0
		Positive	-	0	2	0	2	1
Total Number of Flagged Items*			8	8	5	12	5	4

Note: '-' indicates that DIF analysis was not performed due to the number of students in a focal group being fewer than 200.
* Total number of flagged items is not always equal to the total number of flags because an item may be flagged for DIF for more than one group.

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Table 10.3: Number of Items Flagged for DIF: Science

Science		Grade	5		8	
		Form	A	B	A	B
		# of Items	41	41	39	38
Group	**DIF Magnitude**	**DIF Direction**	**Number of Flagged Items**			
Female	Moderate	Negative	1	1	2	0
		Positive	1	0	2	1
	Large	Negative	0	0	0	0
		Positive	0	0	1	1
Asian/ Pacific Islander	Moderate	Negative	3	4	0	1
		Positive	1	0	0	0
	Large	Negative	0	0	0	0
		Positive	0	0	1	0
Black	Moderate	Negative	0	2	1	0
		Positive	0	1	1	0
	Large	Negative	0	2	0	0
		Positive	0	0	0	0
Hispanic	Moderate	Negative	1	2	0	0
		Positive	0	0	0	0
	Large	Negative	0	0	0	0
		Positive	0	0	0	0
American Indian	Moderate	Negative	-	-	-	-
		Positive	-	-	-	-
	Large	Negative	-	-	-	-
		Positive	-	-	-	-
Other	Moderate	Negative	0	0	0	0
		Positive	0	0	0	0
	Large	Negative	0	0	0	0
		Positive	0	0	0	0
Accommo-dations	Moderate	Negative	0	-	2	-
		Positive	0	-	0	-
	Large	Negative	0	-	0	-
		Positive	0	-	0	-
Total Number of Flagged Items			6	9	8	3

Note: '-' indicates that DIF analysis was not performed due to the number of students in a focal group being fewer than 200.
* Total number of flagged items is not always equal to the total number of flags because an item may be flagged for DIF for more than one group.

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Table 10.4: Impact Analysis: Grade 3

Content Area	Category	Group	N	Mean	Std. Dev.	Effect Size
English Language Arts	Race/Ethnicity	White (not Hispanic)	48,642	466.95	48.51	.
		Asian/Pacific Islander	1,492	475.25	52.29	-0.17
		Black (not Hispanic)	11,453	431.78	48.98	0.72
		Hispanic	4,379	447.51	46.61	0.40
		American Indian	281	454.84	46.65	0.25
		Other	3,012	460.16	48.86	0.14
	Gender	Male	35,307	455.50	51.53	.
		Female	33,952	464.15	48.78	-0.17
	Accommodations	No	69,074	460.00	49.94	.
		Yes	185	363.24	99.47	1.93
Mathematics	Race/Ethnicity	White (not Hispanic)	48,676	463.69	47.65	.
		Asian/Pacific Islander	1,559	478.11	54.17	-0.30
		Black (not Hispanic)	11,501	428.52	50.09	0.73
		Hispanic	4,438	445.05	47.69	0.39
		American Indian	282	451.15	47.04	0.26
		Other	3,013	454.51	48.89	0.19
	Gender	Male	35,419	457.59	52.44	.
		Female	34,050	455.47	47.63	0.04
	Accommodations	No	69,291	456.71	50.02	.
		Yes	178	396.08	61.01	1.21

Table 10.5: Impact Analysis: Grade 4

Content Area	Category	Group	N	Mean	Std. Dev.	Effect Size
English Language Arts	Race/Ethnicity	White (not Hispanic)	48,949	493.83	48.36	.
		Asian/Pacific Islander	1,481	502.48	51.81	-0.18
		Black (not Hispanic)	11,480	457.95	49.46	0.74
		Hispanic	4,409	475.33	49.32	0.38
		American Indian	266	484.29	47.08	0.20
		Other	2,842	488.34	45.85	0.11
	Gender	Male	35,280	482.99	51.61	.
		Female	34,147	490.43	48.95	-0.15
	Accommodations	No	69,213	486.94	49.95	.
		Yes	214	392.19	100.42	1.89
Mathematics	Race/Ethnicity	White (not Hispanic)	48,974	491.53	51.31	.
		Asian/Pacific Islander	1,538	509.38	58.92	-0.35
		Black (not Hispanic)	11,533	447.15	61.35	0.83
		Hispanic	4,473	471.30	57.25	0.39
		American Indian	266	480.61	48.84	0.21
		Other	2,844	484.04	53.87	0.15
	Gender	Male	35,393	484.22	58.46	.
		Female	34,235	481.59	54.10	0.05
	Accommodations	No	66,670	486.12	53.84	.
		Yes	2,958	411.01	63.76	1.38

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Table 10.6: Impact Analysis: Grade 5

Content Area	Category	Group	N	Mean	Std. Dev.	Effect Size
English Language Arts	Race/Ethnicity	White (not Hispanic)	48,401	507.10	47.67	.
		Asian/Pacific Islander	1,461	519.10	53.62	-0.25
		Black (not Hispanic)	11,031	473.19	48.91	0.71
		Hispanic	4,297	489.40	47.63	0.37
		American Indian	240	491.45	52.94	0.33
		Other	2,469	501.55	48.32	0.12
	Gender	Male	34,795	494.96	51.03	.
		Female	33,104	506.26	47.72	-0.23
	Accommodations	No	67,674	500.73	49.37	.
		Yes	225	423.72	90.96	1.55
Mathematics	Race/Ethnicity	White (not Hispanic)	48,418	507.49	49.19	.
		Asian/Pacific Islander	1,513	532.66	59.44	-0.51
		Black (not Hispanic)	11,078	472.91	50.33	0.70
		Hispanic	4,340	491.04	50.42	0.33
		American Indian	239	491.99	49.51	0.32
		Other	2,470	501.07	50.87	0.13
	Gender	Male	34,879	500.31	53.88	.
		Female	33,179	501.90	49.11	-0.03
	Accommodations	No	64,237	504.06	50.31	.
		Yes	3,821	451.09	47.47	1.06
Science	Race/Ethnicity	White (not Hispanic)	48,403	668.45	31.25	.
		Asian/Pacific Islander	1,512	671.48	38.95	-0.10
		Black (not Hispanic)	11,068	640.70	37.35	0.85
		Hispanic	4,338	654.03	33.85	0.46
		American Indian	240	657.71	36.59	0.34
		Other	2,466	663.51	33.04	0.16
	Gender	Male	34,861	662.63	35.52	.
		Female	33,166	663.12	33.13	-0.01
	Accommodations	No	66,316	663.81	33.72	.
		Yes	1,711	626.40	39.36	1.10

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Table 10.7: Impact Analysis: Grade 6

Content Area	Category	Group	N	Mean	Std. Dev.	Effect Size
English Language Arts	Race/Ethnicity	White (not Hispanic)	48,080	513.86	44.15	.
		Asian/Pacific Islander	1,444	528.21	50.24	-0.32
		Black (not Hispanic)	10,513	480.57	43.28	0.76
		Hispanic	4,166	496.69	45.23	0.39
		American Indian	268	501.13	44.32	0.29
		Other	2,311	507.61	43.94	0.14
	Gender	Male	34,116	502.74	47.12	.
		Female	32,666	512.65	44.21	-0.22
	Accommodations	No	62,438	510.78	44.60	.
		Yes	4,344	461.70	40.90	1.11
Mathematics	Race/Ethnicity	White (not Hispanic)	48,080	513.92	46.73	.
		Asian/Pacific Islander	1,451	537.12	53.88	-0.49
		Black (not Hispanic)	10,545	476.01	48.29	0.81
		Hispanic	4,235	497.50	46.83	0.35
		American Indian	268	499.79	47.16	0.30
		Other	2,308	505.86	48.79	0.17
	Gender	Male	34,161	505.97	51.41	.
		Female	32,726	508.22	47.21	-0.05
	Accommodations	No	62,687	511.05	47.02	.
		Yes	4,200	447.68	46.13	1.35

Table 10.8: Impact Analysis: Grade 7

Content Area	Category	Group	N	Mean	Std. Dev.	Effect Size
English Language Arts	Race/Ethnicity	White (not Hispanic)	48,154	523.96	53.06	.
		Asian/Pacific Islander	1,484	541.44	59.68	-0.33
		Black (not Hispanic)	10,472	485.56	52.49	0.73
		Hispanic	3,914	504.83	53.42	0.36
		American Indian	289	509.06	56.75	0.28
		Other	1,998	514.46	56.45	0.18
	Gender	Male	33,895	511.17	56.87	.
		Female	32,416	522.71	52.84	-0.21
	Accommodations	No	61,596	521.02	53.56	.
		Yes	4,715	461.83	46.66	1.11
Mathematics	Race/Ethnicity	White (not Hispanic)	47,537	523.97	48.27	.
		Asian/Pacific Islander	1,399	542.93	55.78	-0.39
		Black (not Hispanic)	10,489	483.18	50.05	0.84
		Hispanic	3,954	503.13	50.44	0.43
		American Indian	285	509.79	48.51	0.29
		Other	1,978	512.58	52.50	0.24
	Gender	Male	33,511	516.19	53.50	.
		Female	32,131	516.20	49.16	0.00
	Accommodations	No	61,260	519.82	49.91	.
		Yes	4,382	465.59	45.25	1.09

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Table 10.9: Impact Analysis: Grade 8

Content Area	Category	Group	N	Mean	Std. Dev.	Effect Size
English Language Arts	Race/Ethnicity	White (not Hispanic)	48,045	535.43	51.16	.
		Asian/Pacific Islander	1,477	555.48	60.63	-0.39
		Black (not Hispanic)	10,351	497.46	55.76	0.73
		Hispanic	3,818	518.37	52.18	0.33
		American Indian	240	519.57	59.45	0.31
		Other	1,903	528.12	54.53	0.14
	Gender	Male	33,625	520.24	55.75	.
		Female	32,209	537.43	51.26	-0.32
	Accommodations	No	61,524	532.81	51.97	.
		Yes	4,310	469.32	51.97	1.22
Mathematics	Race/Ethnicity	White (not Hispanic)	38,378	522.00	47.97	.
		Asian/Pacific Islander	908	541.36	57.06	-0.40
		Black (not Hispanic)	8,899	488.14	52.82	0.69
		Hispanic	3,161	506.65	50.56	0.32
		American Indian	217	515.61	49.60	0.13
		Other	1,525	514.12	50.44	0.16
	Gender	Male	27,594	512.52	52.76	.
		Female	25,494	518.70	48.67	-0.12
	Accommodations	No	48,879	519.66	48.87	.
		Yes	4,209	467.14	49.51	1.07
Science	Race/Ethnicity	White (not Hispanic)	48,025	704.21	29.50	.
		Asian/Pacific Islander	1,499	711.92	35.32	-0.26
		Black (not Hispanic)	10,367	673.63	37.37	0.99
		Hispanic	3,881	690.61	33.43	0.46
		American Indian	241	694.96	33.91	0.31
		Other	1,899	698.80	32.03	0.18
	Gender	Male	33,665	698.14	34.89	.
		Female	32,247	699.04	31.60	-0.03
	Accommodations	No	65,230	698.96	33.04	.
		Yes	682	662.26	39.54	1.11

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Table 10.10: Reliability and SEM by Subgroup: English Language Arts

Grade	Category	Group	N Count	Cronbach's Alpha	SEM
3	Race/Ethnicity	White (not Hispanic)	48,560	0.90	3.07
		Asian/Pacific Islander	1,295	0.91	2.99
		Black (not Hispanic)	11,414	0.88	3.11
		Hispanic	4,373	0.89	3.12
		American Indian	281	0.89	3.08
		Other	3,005	0.90	3.09
	Gender	Male	35,224	0.91	3.09
		Female	33,896	0.90	3.08
	Accommodations	No	68,992	0.90	3.09
		Yes	130	0.89	3.12
4	Race/Ethnicity	White (not Hispanic)	48,856	0.91	2.98
		Asian/Pacific Islander	1,295	0.92	2.85
		Black (not Hispanic)	11,450	0.90	3.11
		Hispanic	4,402	0.90	3.08
		American Indian	266	0.91	3.02
		Other	2,838	0.90	3.01
	Gender	Male	35,200	0.91	3.03
		Female	34,088	0.91	2.98
	Accommodations	No	69,120	0.91	3.01
		Yes	158	0.91	3.12
5	Race/Ethnicity	White (not Hispanic)	48,320	0.91	3.03
		Asian/Pacific Islander	1,283	0.92	2.87
		Black (not Hispanic)	10,974	0.90	3.17
		Hispanic	4,284	0.91	3.12
		American Indian	239	0.92	3.08
		Other	2,466	0.91	3.07
	Gender	Male	34,688	0.92	3.09
		Female	33,048	0.91	3.02
	Accommodations	No	67,552	0.91	3.06
		Yes	188	0.91	3.22

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Table 10.10: Reliability and SEM by Subgroup: English Language Arts (cont.)

Grade	Category	Group	N Count	Cronbach's Alpha	SEM
6	Race/Ethnicity	White (not Hispanic)	48,048	0.90	3.05
		Asian/Pacific Islander	1,294	0.91	2.91
		Black (not Hispanic)	10,498	0.88	3.15
		Hispanic	4,160	0.89	3.12
		American Indian	268	0.89	3.12
		Other	2,306	0.90	3.09
	Gender	Male	34,080	0.90	3.09
		Female	32,636	0.90	3.06
	Accommodations	No	62,384	0.90	3.07
		Yes	4,335	0.84	3.12
7	Race/Ethnicity	White (not Hispanic)	48,112	0.91	3.14
		Asian/Pacific Islander	1,313	0.92	3.00
		Black (not Hispanic)	10,432	0.89	3.19
		Hispanic	3,903	0.90	3.19
		American Indian	289	0.91	3.16
		Other	1,994	0.91	3.16
	Gender	Male	33,840	0.92	3.15
		Female	32,376	0.91	3.15
	Accommodations	No	61,512	0.91	3.15
		Yes	4,702	0.84	3.12
8	Race/Ethnicity	White (not Hispanic)	47,992	0.92	3.07
		Asian/Pacific Islander	1,341	0.93	2.92
		Black (not Hispanic)	10,286	0.90	3.20
		Hispanic	3,812	0.91	3.14
		American Indian	240	0.92	3.14
		Other	1,895	0.92	3.10
	Gender	Male	33,528	0.92	3.13
		Female	32,168	0.92	3.04
	Accommodations	No	61,400	0.92	3.08
		Yes	4,300	0.86	3.23

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Table 10.11: Reliability and SEM by Subgroup: Mathematics

Grade	Category	Group	N Count	Cronbach's Alpha	SEM
3	Race/Ethnicity	White (not Hispanic)	48,544	0.91	2.62
		Asian/Pacific Islander	1,358	0.92	2.43
		Black (not Hispanic)	11,446	0.89	2.74
		Hispanic	4,432	0.90	2.71
		American Indian	281	0.90	2.70
		Other	3,008	0.91	2.66
	Gender	Male	35,288	0.91	2.64
		Female	33,976	0.90	2.66
	Accommodations	No	69,104	0.91	2.65
		Yes	163	0.86	2.80
4	Race/Ethnicity	White (not Hispanic)	48,912	0.91	2.72
		Asian/Pacific Islander	1,352	0.93	2.52
		Black (not Hispanic)	11,514	0.88	2.75
		Hispanic	4,466	0.90	2.76
		American Indian	266	0.88	2.80
		Other	2,839	0.91	2.73
	Gender	Male	35,328	0.92	2.71
		Female	34,200	0.91	2.74
	Accommodations	No	66,608	0.91	2.73
		Yes	2,916	0.80	2.69
5	Race/Ethnicity	White (not Hispanic)	48,376	0.89	2.72
		Asian/Pacific Islander	1,333	0.93	2.57
		Black (not Hispanic)	11,054	0.84	2.67
		Hispanic	4,333	0.88	2.71
		American Indian	239	0.87	2.74
		Other	2,467	0.90	2.71
	Gender	Male	34,832	0.90	2.70
		Female	33,144	0.89	2.72
	Accommodations	No	64,192	0.90	2.72
		Yes	3,788	0.74	2.57

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Table 10.11: Reliability and SEM by Subgroup: Mathematics (cont.)

Grade	Category	Group	N Count	Cronbach's Alpha	SEM
6	Race/Ethnicity	White (not Hispanic)	48,024	0.90	2.72
		Asian/Pacific Islander	1,300	0.92	2.62
		Black (not Hispanic)	10,526	0.86	2.66
		Hispanic	4,231	0.89	2.71
		American Indian	268	0.89	2.73
		Other	2,305	0.91	2.70
	Gender	Male	34,104	0.91	2.72
		Female	32,700	0.90	2.70
	Accommodations	No	62,656	0.90	2.71
		Yes	4,152	0.78	2.59
7	Race/Ethnicity	White (not Hispanic)	47,504	0.90	2.85
		Asian/Pacific Islander	1,231	0.93	2.78
		Black (not Hispanic)	10,458	0.84	2.71
		Hispanic	3,952	0.88	2.80
		American Indian	284	0.87	2.85
		Other	1,975	0.90	2.82
	Gender	Male	33,464	0.91	2.83
		Female	32,100	0.90	2.82
	Accommodations	No	61,200	0.90	2.84
		Yes	4,368	0.69	2.62
8	Race/Ethnicity	White (not Hispanic)	38,296	0.86	2.89
		Asian/Pacific Islander	782	0.93	2.82
		Black (not Hispanic)	8,860	0.81	2.78
		Hispanic	3,157	0.83	2.86
		American Indian	216	0.84	2.91
		Other	1,522	0.86	2.86
	Gender	Male	27,520	0.86	2.86
		Female	25,440	0.85	2.89
	Accommodations	No	48,776	0.86	2.89
		Yes	4,184	0.71	2.69

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Table 10.12: Reliability and SEM by Subgroup: Science

Grade	Form	Category	Group	N Count	Cronbach's Alpha	SEM
5	A	Race/Ethnicity	White (not Hispanic)	33,328	0.87	3.60
			Asian/Pacific Islander	922	0.91	3.55
			Black (not Hispanic)	8,346	0.88	3.60
			Hispanic	3,218	0.88	3.64
			American Indian	171	0.89	3.61
			Other	1,714	0.88	3.63
		Gender	Male	24,864	0.89	3.61
			Female	22,972	0.88	3.61
		Accommodations	No	46,192	0.88	3.61
			Yes	1,640	0.88	3.50
	B	Race/Ethnicity	White (not Hispanic)	15,044	0.84	3.50
			Asian/Pacific Islander	411	0.83	3.24
			Black (not Hispanic)	2,692	0.88	3.71
			Hispanic	1,117	0.85	3.62
			American Indian	69	0.88	3.59
			Other	751	0.86	3.55
		Gender	Male	9,962	0.86	3.52
			Female	10,168	0.86	3.56
		Accommodations	No	20,064	0.86	3.54
			Yes	68	0.88	3.73
8	A	Race/Ethnicity	White (not Hispanic)	30,708	0.90	3.75
			Asian/Pacific Islander	825	0.93	3.64
			Black (not Hispanic)	6,842	0.91	3.64
			Hispanic	2,569	0.91	3.76
			American Indian	158	0.90	3.77
			Other	1,178	0.91	3.76
		Gender	Male	21,984	0.92	3.71
			Female	20,392	0.91	3.77
		Accommodations	No	41,752	0.91	3.75
			Yes	626	0.90	3.45
	B	Race/Ethnicity	White (not Hispanic)	17,276	0.87	3.71
			Asian/Pacific Islander	536	0.89	3.54
			Black (not Hispanic)	3,491	0.89	3.59
			Hispanic	1,308	0.88	3.72
			American Indian	82	0.86	3.73
			Other	720	0.90	3.69
		Gender	Male	11,638	0.90	3.67
			Female	11,814	0.89	3.73
		Accommodations	No	23,400	0.89	3.71
			Yes	53	0.89	3.46

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Appendix A: Test Coordinator's Manual

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Missouri Assessment Program

Grade-Level Assessments Test Coordinator's Manual

English Language Arts
Grades 3, 4, 5, 6, 7, 8

Mathematics
Grades 3, 4, 5, 6, 7, 8

Science
Grades 5, 8

Spring 2017

Missouri Department of Elementary and Secondary Education

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DATA RECOGNITION DRC CORPORATION

This *Test Coordinator's Manual* is NOT a secure document. All administrators should read this manual before administering the test.

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Table of Contents

1.0 Overview of Important Information For The MAP Grade-Level Assessments . . . 1

1.1 This Test Coordinator's Manual . . . 1

1.2 Glossary of Terms . . . 1

1.3 About the Tests . . . 2

1.4 Schedule of Important Dates for Spring 2017 . . . 4

1.5 Special Populations, Optional Populations, and Special Circumstances . . . 5

2.0 Before Online Testing . . . 8

2.1 Advance Announcements and Preparation . . . 8

2.2 User Roles . . . 9

2.3 Test Security . . . 11

2.4 eDIRECT and INSIGHT . . . 13

2.5 Assessment Materials for Students/Administrators . . . 14

3.0 After Online Testing . . . 16

3.1 Submitting All Tests/Close of Testing Window . . . 16

3.2 Reporting Test Invalidations . . . 17

3.3 How to Handle Student Absences . . . 17

3.4 Securely Destroy Materials . . . 17

3.5 Individual Student Reports . . . 18

4.0 Large Print, Braille, and Paper-and-Pencil Editions . . . 19

4.1 Before Testing . . . 19

4.2 After Testing . . . 22

Appendix A: Handling Student Transfers and Changes in Testing Status . . . 26

Appendix B: Test Timing Guidelines . . . 27

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February 27, 2017: (Version 2) Updates
Page 4: Updated the Statewide Readiness Test window information in the Schedule of Important Dates table.

March 14, 2017: (Version 3) Update
Page 6: Updated the Home Schooled Students section with information on completing the MOSIS ID field.

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1.0 OVERVIEW OF IMPORTANT INFORMATION FOR THE MAP GRADE-LEVEL ASSESSMENTS

1.1 This Test Coordinator's Manual

The purpose of this *Test Coordinator's Manual* is to provide detailed instructions for administering the Missouri Assessment Program Grade-Level Assessments. The manual includes instructions for test preparation and post-test administration procedures. District Test Coordinators (DTCs) and School Test Coordinators (STCs) should thoroughly read the manual and view trainings before administering the tests.

1.2 Glossary of Terms

Accommodations	Changes in procedures or materials that increase equitable access to the MAP Grade-Level Assessments. Assessment accommodations allow students to access assessment content to show what they know and can do. Accommodations are available for students with documented Individualized Education Programs (IEPs) or 504 Plans.
Break/Pause	Action taken by a student or Test Examiner (TE) to temporarily halt the test during any part of the test, as needed. The online assessment provides an opportunity to pause the test for up to 20 minutes.
Constructed-Response Item Type	Test questions that require students to provide or input their response or responses using a keyboard or keypad. This type includes **short answer/text input, writing prompts,** and **keypad input** items.
eDIRECT	DRC's administrative platform—the Missouri Assessment Program Portal—from which district personnel will manage the assessments.
INSIGHT	DRC's INSIGHT is the secure, browser-based test engine for the MAP Grade-Level Assessments.
Item	A test question or stimulus presented to a student to elicit a response.
Performance Event	A performance event comprises Session 3 of the MAP Grade-Level Mathematics and Science Assessments. It is designed to provide students with an opportunity to demonstrate their ability to apply their knowledge and higher-order thinking skills to explore and analyze a complex, real-world scenario. A performance event will contain a variety of item types.
Selected-Response Item Type	Test questions that require students to respond to a stem by selecting an appropriate response or responses, usually from answers provided. This type includes **multiple-choice, matching, multi-select,** and **evidence-based selected-response** items.
Session	A specific part of a test assigned to a specific student, which is grouped by Test Examiner according to the precode file.

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Glossary of Terms continued

Stimulus/Stimuli	Material or materials used in the test context, which form the basis for assessing the knowledge and skills of students. Many items/tasks for the assessments include a stimulus along with a set of questions to which the student responds. Examples of stimuli include, but are not limited to, traditional reading passages/texts viewed on a computer screen, images with audio presentations, and simulated web pages.
Technology-Enhanced Items	Test questions that capitalize on technology to collect evidence through a non-traditional response type. These items are scored automatically. This item type includes **drag and drop, matching, hot text/select text, hot text/reorder text, hot spot, graphing, bar graphing, line graphing,** and **build a table**.
Universal Tools	Universal tools are available to students based on student preference and selection. Some tools, such as a ruler and sticky notes, are embedded in the online system, while others, such as a physical thesaurus and scratch paper, are external to the system. The availability of particular universal tools varies by item.
Writing Prompt	A special type of performance event that appears in the Grades 5 and 8 English Language Arts (ELA) Assessments is an open-ended item that requires students to demonstrate their writing proficiency.

1.3 About the Tests

- The Missouri State Board of Education identified the following purposes for the MAP Grade-Level Assessments:
  - Measuring and reflecting student mastery toward post-secondary readiness
  - Identifying students' strengths and weaknesses
  - Communicating expectations for all students
  - Serving as the basis for state and national accountability plans
  - Evaluating programs
  - Providing professional development for teachers

- The MAP Grade-Level Assessments are designed to adapt testing to the needs of Missouri districts, schools, teachers, and students, while meeting state and federal requirements.

- The MAP Grade-Level Assessments are based on the Missouri Learning Standards. 2017 assessments will include traditional multiple-choice items and innovative technology-enhanced items designed to elicit student knowledge and skills in new ways. English Language Arts assessments will include a writing prompt. Mathematics and Science assessments will include a performance event. The Science assessments also include constructed-response items.

  The Missouri Department of Elementary and Secondary Education (DESE) uses the information obtained through the MAP Grade-Level Assessments to monitor the progress of Missouri's students in meeting the Missouri Learning Standards, to inform the public and the state legislature about students' performance, and to help make informed decisions about educational issues.

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- Data Recognition Corporation (DRC) and DESE are collaborating to deliver Missouri's Spring 2017 Grade-Level Assessments. Missouri educators will use DRC's eDIRECT online platform for enrollment and test administration and INSIGHT for test delivery. DRC will also provide handscoring and reporting services. These cooperative efforts and systems comprise a fully integrated assessment platform to meet the needs of school districts, educators, students, and other Missouri stakeholders.

- The Spring 2017 MAP Grade-Level Assessments include the following:
  - English Language Arts Assessment for Grades 3–8
  - Mathematics Assessment for Grades 3–8
  - Science Assessment for Grades 5 and 8

- The English Language Arts Assessments consist of three sessions in grades 3, 4, 6, and 7. In grades 5 and 8, there will be four sessions. The first three sessions contain selected-response items and technology-enhanced items. The fourth session administered in grades 5 and 8 contains a writing prompt that is scored with a ten-point rubric.

- The Mathematics Assessments consist of three sessions. The first and second sessions contain selected-response items and technology-enhanced items. The third session contains a performance event.

- The Science Assessments consist of three sessions. The first session contains constructed-response items, the second session contains multiple-choice items, and the third session contains a performance event.

- All MAP Grade-Level Assessments are available only in INSIGHT, the secure online browser, unless a Large Print, Braille, or paper-and-pencil edition is required by the student as an accommodation. For students needing one of these versions, test examiners will be responsible for transcribing student responses into INSIGHT.

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1.4 Schedule of Important Dates for Spring 2017

Precode File Due to DESE	Student Test Setup Available in eDIRECT	MAP Grade-Level Assessment Test Window
Window 1 - February 10, 2017 Window 2 - March 3, 2017 Window 3 - March 17, 2017	Window 1 - February 27, 2017 Window 2 - March 13, 2017 Window 3 - March 27, 2017	April 3, 2017—May 26, 2017

Event	Schedule
eDIRECT test administration portal opens.	January 9, 2017
DTCs provide assessment test windows, purchase order numbers, and Large Print and Braille orders through eDIRECT Enrollments.	January 9, 2017—February 3, 2017. The deadline for ordering additional Large Print and Braille testing materials is May 15, 2017. Purchase Orders must be submitted to DRC at maphelpdesk@datarecognitioncorp.com by February 3, 2017.
STCs and District Information Technology Coordinators (DITCs) coordinate the installation of INSIGHT on all student workstations and complete the System Readiness Check for all testing devices.	For more information on the System Readiness Check please see *Using the System Readiness Check* in *Volume IV* of the *INSIGHT Technology User Guide*. The System Readiness Check must be completed for all testing devices before the statewide administration window begins on April 3, 2017.
STCs verify that all student accommodations and status codes are recorded through eDIRECT Test Setup.	February 27, 2017 is when Test Setup can begin. All accommodations and universal tools **must** be marked prior to testing for those who precoded in window 1.
DTCs are allowed to update assessment test windows (if needed).	February 27, 2017–March 31, 2017. DTCs update assessment test windows by contacting DRC MAP Service Line. **After March 31, 2017**, DTCs will need to obtain DESE approval in order to change test windows. DTCs must submit an Appeal Request to DESE in order to change test windows. Requests to close a test window early will not be allowed after March 31, 2017; only test window extensions will be allowed with DESE approval.
DTCs contact DRC to schedule pickup of Large Print, Braille, and paper-and-pencil test books.	May 30, 2017 is the deadline to schedule pickups. Materials must be picked up no later than June 2, 2017.
Test results and Individual Student Reports (ISRs) are available online via eDIRECT.	ISRs are available no later than the close of business on the 10th business day after each district content-area testing window closes.

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1.5 Special Populations, Optional Populations, and Special Circumstances

Inclusion of Special Populations

All students, including, but not limited to, the following groups of students, must participate in the required MAP Grade-Level Assessments.

- **Missouri Virtual Instruction Program (MoVIP):** Missouri students enrolled in MoVIP are required to participate in the MAP Grade-Level Assessments. For further inquiries regarding MoVIP participation, contact the MoVIP Section at 573-751-2453.
- **Homebound Students:** Homebound students must be tested, either at home or at the school, at the discretion of the district. If the student can come to the school, the student may take the test online. If the student cannot come to the school, the student may take the test online using a district-issued device that has a Testing Site Manager (TSM) installed. If, for any reason, the student cannot take the test online, then the student may take a paper-and-pencil edition of the test. (See instructions in the Large Print, Braille, and Paper-and-Pencil Editions section of this manual.) Test Examiners of homebound students should receive training in the administration of the MAP Grade-Level Assessments. Test Examiners are responsible for ensuring the security of the tests and transcribing student responses into INSIGHT for paper-and-pencil tests.
- **IEP Students:** Students with disabilities, as classified under the Individuals with Disabilities Education Act (IDEA), have an Individualized Education Program (IEP). All decisions regarding a student's participation in the MAP Grade-Level Assessments are made by the student's IEP team and documented in the IEP. All students, including those students with an IEP, must take the MAP Grade-Level Assessments that are required for accountability purposes. The IEP team has the responsibility and authority to determine accommodations needed to ensure accessibility to the MAP Grade-Level Assessments.
- **IAP/504 Students:** Students with an Individual Accommodation Program (IAP) are considered disabled under Section 504 of the 1973 Rehabilitation Act. These students are not served under IDEA and are not documented with a particular designation for the MAP Grade-Level Assessments. However, professionals knowledgeable about IAP students' disabilities and their educational needs will make decisions about universal tools and accommodations for these students as they would with IEP students. All IAP/504 accommodations should be marked in the same manner as the IEP student accommodations.
- **English Language Learner (ELL) Students:** Students who have been in the United States 12 cumulative months or fewer at the time of the test administration may be exempt from the English Language Arts Assessment. ELL students must participate in all other required assessments regardless of the length of time they have been in the United States. To indicate the ELA exemption for the students, mark them "absent" for the ELA Assessment.

Further Information on Special Populations

For further questions regarding special populations, contact the DESE Assessment Section at 573-751-3545 or the Special Education Section at 573-751-5739. Accommodation definitions and codes can be found in the *Examiner's Manuals*.

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Optional Populations

The following student groups MAY participate in MAP Grade-Level Assessments:

- **Foreign Exchange Students:** Foreign exchange students are allowed, but not required, to take the MAP Grade-Level Assessments at the discretion of the district.
- **Home Schooled Students:** Home schooled students may take part in the MAP Grade-Level Assessments at the discretion of the district. Home schooled students participating in the MAP Grade-Level Assessments will take the assessment(s) online at the local school with district-approved procedures in place during the school's testing window. When a home schooled student is entered into eDIRECT, the "Home School" box on the Testing Codes screen must be checked. The DESE's Missouri Student Information System (MOSIS) ID field should be populated using the prefix "HOME" and six-digits (e.g., HOME987654). Individual Student Reports for home schooled students will be available. See page 18 for more information on these reports. District Test Coordinators must collect contact information from the parents of home schooled students so that DTCs can notify the parents when reports become available.
- **Private School Students:** Private school students may also participate in the MAP Grade-Level Assessments. A representative from the private school must contact the MAP Service Line at 1-800-544-9868. Private schools must uphold the same standardized administration procedures and security measures that Missouri public schools uphold.

Special Circumstances

Some students may require special arrangements for testing. Please refer to the following guidelines for students requiring a change in test setting, test format, or test administration.

- **Universal Tools and Accommodations:** Prior to testing, be sure to consider any additional planning that may be required to administer the test using students' universal tools and/or accommodations. Universal tools/accommodations that require particular attention include, but are not necessarily limited to:
  - **Use of a Translator:** District staff may read Mathematics and Science Assessments and English items to students in their native language. Read aloud of English reading passages in a student's native language is allowed only if specified in a student's IEP or 504 Plan. For all assessments, ELL students may give their responses orally or in writing in their native language. Their responses must be translated into English and transcribed into INSIGHT.
  - Refer to the *Examiner's Manuals* for the appropriate universal tools/accommodation codes to use when a test is being translated. The translation and transcription must be an accurate interpretation of the student's responses.

    Translators must be trained in administering the Grade-Level Assessments. If needed, translators for students taking the assessments may have access to printed student test books in a secure environment to read and review before the test administration. Please see Section 4.0 for instructions regarding administering the Large Print, Braille, and paper-and-pencil editions of the tests.

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- **Use of a Scribe:** Scribes may be teachers, teacher aides, teacher assistants, or other school personnel who are appropriately trained and qualified. Translators for ELL students may also act as scribes. Parents, school volunteers, peer tutors, and other students may NOT act as scribes on Missouri's Grade-Level Assessments.
- **Paper-and-Pencil Test Accommodation:** See the Large Print, Braille, and Paper-and-Pencil Forms section in this manual for instructions concerning the paper-and-pencil accommodation procedures.
- **Large Print and Braille:** See the Large Print, Braille, and Paper-and-Pencil Forms section in this manual for instructions concerning Large Print and Braille procedures.
- **Students Testing Out-of-District:** Students receiving services in off-site placements (other districts, private agencies, correctional facilities, etc.) must be tested. They may be tested in those placements if necessary, or they may come to the school of residence if possible. The DTC from the district where the student resides must make arrangements for the student to test in the serving district/agency.

  Out-of-district students may take the online or the paper-and-pencil edition of the MAP Grade-Level Assessment. If the student takes the paper-and-pencil edition, his or her responses must be transcribed into INSIGHT (reference page 22 for transcription instructions). The DTC from the district of residence has several responsibilities in this process.

Additional guidelines for use of a scribe are located on the DESE website at http://dese.mo.gov/sites/default/files/asmt-scribing-guidelines.pdf. Refer to the *Examiner's Manuals* for the appropriate code for scribing.

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DTCs print the MAP Grade-Level Assessments as appropriate beginning March 3rd. Print copies of the assessments will have a barcode. Barcoded printed assessments must be returned to DRC after the tests have been transcribed into the test delivery system (INSIGHT).

MAP Grade-Level Assessments are available on the following devices:

- **Desktop Computers**
- **Laptops**
- **Netbooks**
- **Chromebooks**
- **iPads**
- **Android devices**

Students should be familiar with the device on which they will be taking the assessment prior to testing. Please see the INSIGHT User Guide for complete device specifications.

The DTC must contact the off-site district/agency prior to the first day of the district of residence's testing window to make arrangements:

- If the student is testing online at a school, arrange for the student's Test Tickets to be available through eDIRECT.
- If the student is testing online at an off-site location, arrange for the student to take the test using a district device.
- If the student is taking a paper-and-pencil edition of the assessment, follow the administration instructions in Section 4.0 of the manual.

2.0 BEFORE ONLINE TESTING

2.1 Advance Announcements and Preparation

Parents and guardians should be informed of the district MAP Grade-Level Assessment schedule so they can help ensure their students are present on days testing (without scheduled appointments or vacation days during the testing window) and prepared with the proper materials that may not be provided by the district.

In addition to completing the applicable content for their grade level, students should have experience using the specific device on which they will be taking the assessments. Students taking the assessments on a desktop, Chromebook, or laptop computer should know how to use a mouse and keyboard. Instead of a mouse, students may use the embedded touchpad in the keyboard of a laptop. Students taking the assessments on iPads or Android devices should know how to use a touchscreen (and/or stylus, if applicable). It is strongly recommended, but not required, that students taking the assessments on tablet devices have access to (and know how to use) an external keyboard. Students should review the INSIGHT Online Tools Training (OTT) for the MAP Grade-Level Assessment they will be taking. OTTs are for Test Examiners and students to become familiar with the format and functionality of the online test. The OTTs provide a preview of the item types included in the MAP Grade-Level Assessments.

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2.2 User Roles

The DTC is responsible for training all STCs on testing procedures. If a district does not have STCs, the DTC performs the role of the STC. While the training of Test Examiners may be delegated to each building's STC, the DTC is responsible for ensuring that all Test Examiners are well-prepared and trained. Training includes special education teachers, proctors, translators, and Test Examiners who are administering the MAP Grade-Level Assessments to homebound or out-of-district students.

District Test Coordinator Responsibilities

All DTCs are responsible for the following:

- View all trainings provided by DESE and DRC.
- Stay abreast of all communication regarding the MAP Grade-Level Assessments.
- Ensure that all STCs, Test Examiners, and other responsible district and/or school staff have been trained.
- Maintain the district's testing schedule and be prepared to provide it to DESE upon request. DTCs are allowed to update assessment test windows (if needed) from February 27, 2017, to March 31, 2017, by contacting the DRC MAP Service Line. **After March 31, 2017**, DTCs will need to obtain DESE approval in order to change test windows. DTCs must submit an Appeal Request to DESE in order to change test windows. Requests to close a test window early will not be allowed after March 31, 2017; only test window extensions will be allowed with DESE approval.
- Inform district staff of the testing schedule so that distractions such as PA announcements, lawn maintenance, or fire drills are avoided at the time of test administration.
- Update student demographic information to correct any errors, and ensure these corrections are also made in the local student information systems and DESE's Missouri Student Information System (MOSIS). See Appendix A in this manual for instructions on how to handle student transfers.
- Communicate with DRC and DESE on behalf of the district. The STC should contact the DTC if help is needed. If the DTC is unable to answer a question, he or she will contact DRC's dedicated MAP Service Line.

DTCs must ensure that all STCs, Test Examiners, and other responsible district and/or school staff have been trained.

The DTC is responsible for updating the district's assessment testing schedule if it changes.

DRC's dedicated MAP Service Line
1-800-544-9868
7:30 A.M. to 6:30 P.M. Central Time, Monday–Friday

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- Ensure the DTC's email account allows receipt of all communication from DESE's and DRC's email domains (@dese.mo.gov and @datarecognitioncorp.com).
- Verify with the STCs that INSIGHT has been installed and certified on all applicable workstations for the current statewide window.
- After verifying each building's security, ensure that STCs have access to eDIRECT and secure test administration materials.
- Enter Test Examiners into eDIRECT in order to generate their eDIRECT logins (for Test Examiners needing an eDIRECT login).
- Ensure test security is maintained by restricting Test Examiner access to the MAP Grade-Level Assessments and other secure testing materials before and after testing.
- Transcribe Large Print, Braille, and paper-and-pencil edition responses into INSIGHT (in districts where this role is not assigned to the Test Examiner).

Any Test Examiner who needs to set or check accommodations will need an eDIRECT account. Other Test Examiners do not need an eDIRECT account, as logging into eDIRECT is not required to start a test.

School Test Coordinator Responsibilities

All STCs are responsible for the following:

- View all trainings provided by the DTC, DESE, and DRC.
- Stay abreast of all communication from the DTC regarding the MAP Grade-Level Assessments.
- Ensure that all Test Examiners are trained on MAP Grade-Level Assessment procedures.
- Review the Tutorials and the Online Tools Training (OTT) prior to testing, and ensure that Test Examiners and students have an opportunity to review both the Tutorials and OTT prior to testing.
- Work with the DITC (if applicable) to ensure INSIGHT has been installed and certified on all applicable workstations.
- Verify the accuracy of student and Test Examiner information in eDIRECT for the school and update as needed. Confirm that any appropriate student accommodation codes are marked in **Test Setup** in eDIRECT.
- Communicate with the DTC regarding the school's testing schedule prior to testing. If the school's testing schedule changes in any way, the STC is responsible for updating the DTC.

STCs must ensure that all Test Examiners are trained on MAP Grade-Level Assessment procedures.

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- Ensure that all Test Examiners are knowledgeable about permitted and prohibited materials (see Section 2.5 Assessment Materials for Students/ Administrators).
- Verify that Test Examiners have eDIRECT access and necessary permissions to allow adequate time for reviewing documents and training in preparation for administering the tests.
- On each testing day, ensure that each Test Examiner has the following:
  - Student Test Tickets for each test session
  - The appropriate quantity of Large Print and Braille test books or access to paper-and-pencil editions as required per content area
  - Any required ancillary testing materials
- Ensure test security is maintained by restricting Test Examiner access to the MAP Grade-Level Assessments and other secure testing materials before and after testing.
- Validate that testing procedures are followed as written in this *Test Coordinator's Manual*. Printed copies of the manual should be destroyed at the building level after the final district content testing window has closed.

2.3 Test Security

Test security and ethical testing practices continue to be of utmost importance. A test security policy must be in place for each district and charter school. The test security policy should be placed in the District's Assessment Plan, which is locally board approved annually. The accurate assessment of student achievement is a critical component of the educational process in Missouri. It is the responsibility of everyone involved in the assessment process to understand the security measures in place to avoid any intentional or unintentional unethical behavior by students or staff members. Administrators and Test Examiners are responsible for reporting any of these behaviors to district administration and/or to the DESE Assessment Section at 573-751-3545 or assessment@dese.mo.gov.

Administrators and Test Examiners are responsible for reporting any intentional or unintentional unethical behavior by students or staff members to district administration and/or to the DESE Assessment Section at 573-751-3545 or assessment@dese.mo.gov.

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Preparing for computer-based testing includes determining the physical layout of the computer lab, training teachers and staff, and preparing students. Although DESE does not provide specific requirements for a computer lab, the lab must be set up with test security in mind. Workstations must have adequate space between them so that students are not able to view one another's screens.

Instructional materials must be removed or covered, including, but not limited to, information that might assist students in answering questions that is displayed on bulletin boards, chalkboards, dry-erase boards, or charts (e.g., wall charts that contain literary definitions, maps, mathematics formulas, etc.).

District and School Test Coordinators, Test Examiners, translators, proctors, and any other district and/or staff who have testing responsibilities must follow test security procedures. The tests **must not** be read, scored, reviewed, photocopied, duplicated, scanned, transported by students, or made accessible to personnel not responsible for testing. **Both written and/or verbal discussion of specific MAP Grade-Level Assessment items breach the security and integrity of the test and may result in an invalidation or loss of scores for accountability purposes.**

Translators and transcribers who read student test items and answers must maintain test security at all times. Test items or answers must not be discussed with anyone at any time. When hard-copy editions of the test are not in use, they must be stored in a secure, locked location outside of the classroom. **Large Print, Braille, and paper-and-pencil editions of the tests must be transcribed into INSIGHT and shipped back to DRC following the procedures in the *Examiner's Manual* once testing is complete.**

Manuals may be reviewed before testing, NOT the secure tests. Only translators may review secure test material prior to test administration.

Test security and ethics also include standardized training for all District and School Test Coordinators, Test Examiners, translators, proctors, and any district and/or school staff who have responsibilities in testing. Training webinars from DESE and manuals (including this manual) are provided for training purposes at http://dese.mo.gov/college-career-readiness/assessment/grade-level. This *Test Coordinator's Manual* is also available on the **Documents** page of eDIRECT.

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2.4 eDIRECT and INSIGHT

Two online systems support the MAP Grade-Level Assessments: eDIRECT and INSIGHT.

eDIRECT hosts the Missouri Assessment Portal. Through this system, Missouri educators are able to:

- Review documentation and training for the MAP Grade-Level Assessments.
- Download secure materials for administering the MAP Grade-Level Assessments.
- Download software for administering the MAP Grade-Level Assessments.
- Provide enrollment information, including orders for Large Print and Braille test books.
- View and update student data prior to testing, including indicating any accommodations or universal tools that will be used.
- Place students into test sessions and print Student Test Tickets.

Details are provided in the eDIRECT User Guides, which are available on the **Documents** page of eDIRECT.

INSIGHT is the secure browser-based test engine through which students take the MAP Grade-Level Assessments and that provides students with an engaging test experience. DITCs download the INSIGHT client software to the devices that will be used for testing.

Details are provided in the DRC INSIGHT Technology User Guide, which is available on the **Documents** page of eDIRECT.

eDIRECT hosts the Missouri Assessment Portal, https://mo.drcedirect.com.

The Documents page of eDIRECT contains manuals, trainings, and secure administration materials. Secure materials require login to access, while non-secure materials are publicly available. To access the page, click All Applications > General Information > Documents. Click the Show Documents button to display the available materials.

INSIGHT is the test engine for the MAP Grade-Level Assessments.

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2.5 Assessment Materials for Students/Administrators

This section concerns all materials required, permitted but not provided, or prohibited while taking Grade-Level Online Assessments.

Required Materials

- A workstation with Internet access, a monitor, a mouse, and a keyboard **OR** a tablet device with Internet access. Devices must have INSIGHT properly loaded and certified.
- Student Test Tickets (This ticket provides the secure login credentials (i.e., username and password) required for a student to use the testing software).
- The resources in Table 7

Table 7: Additional Required Resources for ELA, Mathematics, and Science

Content Area	Session 1	Session 2	Session 3	Session 4 (Writing Prompt)
ELA	• Headphones are required for students using text-to-speech. • Scratch paper should be provided for note taking if necessary.	• Headphones are required for students using text-to-speech. • Scratch paper should be provided for note taking if necessary.	• Headphones are required for all students taking this session. • Scratch paper should be provided for note taking if necessary.	• Headphones are required for students using text-to-speech. • Scratch paper should be provided for note taking if necessary.
Mathematics	• Headphones are required for students using text-to-speech. • Scratch paper is required for all grades.	• Headphones are required for students using text-to-speech. • Scratch paper is required for all grades.	• Headphones are required for students using text-to-speech. • Scratch paper is required for all grades.	N/A
Science	• Headphones are required for students using text-to-speech. • Graph paper is required. • Scratch paper is required.	• Headphones are required for students using text-to-speech. • Scratch paper is required.	• Headphones are required for students using text-to-speech. • Graph paper is required. • Scratch paper is required.	N/A

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Permitted Materials

- Scratch paper and grid/graph paper are allowed for all assessments even if not required.
- A physical calculator can be accessed for calculator-allowed items for the Mathematics assessments.
  - For grade 6 Mathematics assessments Sessions 2 and 3, a four-function calculator with square root and percentage functions is permitted.
  - For grades 7 and 8 Mathematics assessments Sessions 2 and 3, a scientific calculator with exponents, trigonometry, and logarithmic functionalities is permitted.
  - Test Examiners are responsible for ensuring and verifying that any calculator with the ability to store functions and equations, e.g., a scientific calculator, has the memory cleared before and after each Mathematics assessment.
  - Calculators cannot have Internet connectivity or be able to connect to anyone inside or outside the classroom during testing.
  - Students cannot use a calculator on a laptop or other portable computer, pocket organizer, cell phone, device with a typewriter-style keyboard, electronic writing pad, or pen-input device unless a particular assistive device is required for a student and is specified on his or her IEP.
  - No calculators with QWERTY keyboards are allowed.
- An English dictionary and a thesaurus may be available for the ELA session 4 writing prompt. ELL students may use an English, a non-English, and a bilingual dictionary and thesaurus as needed during session 4.

Prohibited Materials

- Electronic devices, including any portable device that can connect to the Internet or to anyone inside or outside of the classroom, must not be accessible during the testing sessions. Such items include, but are not limited to:
  - cellular/mobile phones
  - electronic music players
  - digital cameras
  - handheld scanners
  - portable gaming devices
  - any device that can connect to the Internet
- If students are allowed to enter the testing room with cell phones, the phones **must** be collected prior to testing and returned at the end of the testing session. Students are not allowed to have cell phones in their pockets, purses, or backpacks during testing.

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Assessment Materials and Training for Test Examiners

- *Test Examiner Manual*
- Grade-Level Assessment training provided online by DESE
- Student Test Tickets (obtained from the School Test Coordinator)

  NOTE: All materials distributed to the students with usernames and passwords must be collected before the students leave the testing area.
- Extra pencils and a supply of scratch and grid/graph paper

  NOTE: Physical scratch paper should be collected and destroyed immediately upon conclusion of a testing session.

Accessing and Printing Listening Script

The use of some tools/accommodations requires access to a printed copy of the listening script for ELA Session 3. The script will need to be downloaded and printed at the school level. The scripts are secure; do not allow unauthorized persons to access them. Maintaining the security of all test materials is crucial to obtaining valid and reliable test results. Therefore, test materials must be kept in locked storage, except during actual test administration. It is the responsibility of all individuals who administer the test to follow security procedures.

NOTE: The DTC must contact the MAP Service Line to request access to specific listening scripts.

3.0 AFTER ONLINE TESTING

3.1 Submitting All Tests/Close of Testing Window

After all testing for a grade level/content area is completed, the DTC/STC should review the Testing Status for each student in eDIRECT and communicate with Test Examiners to resolve any tests that appear as "In Progress." The DTC or DITC should also check the Testing Site Manager (if used) to ensure that there are no unsent responses.

DTCs are allowed to update assessment test windows (if needed) from February 27, 2017, to March 31, 2017, by contacting the DRC MAP Service Line. **After March 31, 2017,** DTCs will need to obtain DESE approval in order to change test windows. DTCs must submit an Appeal Request to DESE in order to change test windows. Requests to close a test window early will not be allowed after March 31, 2017; only test window extensions will be allowed with DESE approval.

The Appeal Request must be emailed to DESE Assessment at assessment@dese.mo.gov.

On official district letterhead, please include:

- Date
- District Name
- County District Code
- Rationale for your request to extend the testing window, including requested extension dates
- Name, phone, and email address of a contact person
- Signature of the Superintendent

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3.2 Reporting Test Invalidations

Neither a student's behavior during testing nor the judgment of a student's effort during testing can invalidate a student's test.

A MAP Grade-Level Assessment should be invalidated if a student is discovered cheating. To do so, select the "Teacher Invalidation" bubble for the affected content area in eDIRECT. (See the eDIRECT User Guide for instructions.) Cheating is the only time the "Teacher Invalidation" code is used. This code invalidates all sessions of the content area.

If the "Teacher Invalidation" bubble is used due to cheating, adhere to the following process:

1. The STC and the Test Examiner agree that a particular student's test should be invalidated.
2. A district invalidation letter on district letterhead and signed by the superintendent is faxed to DESE's Office of Accountability Data at 573-526-3045.
3. The district invalidation fax should include the following information:
   a. Student Name
   b. MOSIS ID
   c. Date of Birth
   d. Grade
   e. School Name
   f. County District Code
   g. District Name
   h. School Code
   i. Content Area
   j. The reason the testing session is being invalidated/description of the incident
4. The district files a copy of the fax for its records and future reference.

3.3 How to Handle Student Absences

If a student is absent for any or all of the MAP Grade-Level Assessments and unable to test in district-determined make-up sessions, then mark the student as absent in eDIRECT. Additionally, mark absent students who have been in the United States 12 cumulative months or fewer that are being exempted from the ELA Assessment.

3.4 Securely Destroy Materials

Federal law—the Family Educational Rights and Privacy Act (FERPA)—prohibits the release of any student's personally identifiable information. Any printed materials must be securely stored and then shredded.

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The STC or DTC should destroy the following materials at the building level:

- Printed copies of the *Test Coordinator's Manual* should be destroyed after the final district content testing window has closed.
- All manuals for Large Print, Braille, and paper-and-pencil administrations should be destroyed after the final district content testing window has closed. Electronic files must be deleted.

Scratch paper and grid/graph paper must be kept in a securely locked room or locked cabinet that can be opened only with a key or keycard by staff responsible for test administration. All test materials must remain secure at all times. Scratch paper and grid/graph paper must be collected and inventoried at the end of each test session and then given to the School Test Coordinator to securely destroy.

3.5 Individual Student Reports

Individual Student Reports (ISRs) are available in INSIGHT Online Reporting. A link to INSIGHT Online Reporting is in eDIRECT under All Applications – Report Delivery. Select the MAP Grade-Level Reports to be taken to INSIGHT Online Reporting. ISRs are available no later than the close of business on the tenth business day after each district content-area testing window closes.

Districts have the option to order printed ISRs for the flat fee of $350. Districts will receive two printed copies of each ISR for all tested students in the district. These are the same ISRs that are available electronically in the reporting system, just in hard copy and color format for easy distribution to parents. ISRs are packaged by school and shipped to the district. Each school package is sorted by grade level and then alphabetically by student for each content area. Orders must be placed in eDIRECT between April 17–June 23, 2017. The ordering page can be accessed in eDIRECT under All Applications > Materials > Enrollments. POs must be entered in the system and emailed to maphelpdesk@datarecognitioncorp.com. ISRs will be delivered to districts on August 11, 2017. Contact the MAP Service Line at 1-800-544-9868 if you have any questions about ordering printed ISRs.

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4.0 LARGE PRINT, BRAILLE, AND PAPER-AND-PENCIL EDITIONS

Large Print, Braille, and paper-and-pencil editions of the MAP Grade-Level Assessments will be available for students with designated IEPs or special circumstances for spring 2017 testing. Large Print and Braille forms may be ordered online via eDIRECT during the enrollment period, January 9, 2017, to February 3, 2017. Test Examiners will work with the DTC to generate paper-and-pencil editions from eDIRECT (after students are assigned such an accommodation). Unique identification numbers will be used to produce barcodes that will be printed onto the paper-and-pencil editions. After testing, student responses for Large Print, Braille, and paper-and-pencil editions must be entered into the INSIGHT system and all test materials must be collected for return to DRC for processing and storage.

For additional information regarding Large Print and Braille forms, refer to the Large Print and Braille Kit.

4.1 Before Testing

Paper-and-Pencil Materials

For special circumstances that require students to test on paper, a paper-and-pencil edition is available. To activate the paper-and-pencil-edition print function, Test Examiners access the Test Setup feature in eDIRECT to mark the applicable accommodation and code for students who require the paper version of the test. Once accommodations are assigned, the Test Examiner will contact the District Test Coordinator to generate a paper version. Using the information collected during the precode and enrollment processes, the administration component of the online testing system will generate a unique barcode number for a paper-and-pencil edition prior to local printing. Depending on the printed accommodation needed for a particular student, the unique barcode number will then become embedded into the electronic version on each page of the paper-and-pencil form. During local printing, the embedded barcode number will print along with each page of the paper-and-pencil edition. Each barcode number will be unique to a student for the purposes of linking the printed form to the student's record in the master database. Barcode numbers will be recorded and associated with each student's record.

For specific instructions regarding how to generate and download a paper-and-pencil edition, see the *eDIRECT User Guide – Test Setup*, available on the **Documents** page of eDIRECT, https://mo.drcedirect.com.

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Unless a student's IEP requires a paper-based accommodation, **districts will be charged a processing fee of $15** for each paper-and-pencil PDF form of the test that is printed per content area.

Once the PDF downloads, it is available for printing on the local network printer.

The Test Examiner should become familiar with the directions for administering a paper-and-pencil edition. The paper-and-pencil edition of the test is secure and should be treated as such.

Reasons for using Paper/Pencil Assessment

Reason	Instructions
Student has IEP/504 Plan that allows use of Paper/Pencil Assessment	Mark code A102 for Paper/ Based Assessment
ELL student is using the Translation tool (S109) or Read Aloud – Native Language (S111) and the translator needs access to the assessment prior to administration to conduct translation services	Mark code S112. If using this for a group, choose this tool for just ONE student in the group. That student should still take the assessment online. **NOTE:** There is a $15 charge to the district for each printed Paper/Pencil assessment not required by an IEP.
Student is in an off-site non-district building (e.g., hospital, juvenile facility, etc.) and cannot take the assessment online	Mark code S112. **NOTE:** There is a $15 charge to the district for each printed Paper/Pencil assessment not required by an IEP.
Student has Read Aloud – Human Reader and the examiner would like to read from a Paper copy of the assessment	Mark code S112. If using this for a group, choose this tool for just ONE student in the group. That student should still take the assessment online. **NOTE:** There is a $15 charge to the district for each printed Paper/Pencil assessment not required by an IEP.

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Large Print and Braille Materials

Large Print and Braille forms can be ordered online via eDIRECT. Material orders must be placed between January 9, 2017, and February 3, 2017. DTCs should order all Large Print and Braille materials through the Enrollments tab in eDIRECT. See the *eDIRECT User Guide – User Administration* for enrollment instructions.

Test Examiners or Test Coordinators must transcribe students' responses into INSIGHT.

Large Print and Braille testing materials are packaged by building and shipped to the district's office address.

District Test Coordinator

For every building administering a Large Print, Braille, or paper-and-pencil assessment, the DTC needs to complete the Accountability Form located under the Materials section of eDIRECT. Reference the *eDIRECT User Guide – User Administration* for specific instructions. Complete the following steps for each building before distributing materials to the STC:

1. Confirm the box count of the Large Print and Braille testing materials shipment from DRC (e.g., Box 1 of 5 through Box 5 of 5).
2. Verify the security barcode numbers of the test books against the packing list.
3. Record the number of test books listed on the packing list and the number of paper-and-pencil tests that were downloaded on the Accountability Form.
4. Report any discrepancies to DRC's dedicated MAP Service Line at 1-800-544-9868 between the hours of 7:30 A.M. and 6:30 P.M. Central Time, Monday–Friday.

School Test Coordinator

After receiving the testing materials from the DTC, complete the following steps:

1. Verify that security barcode numbers printed on the Large Print and Braille test books match the numbers listed on the packing list (located in Box 1 of the building's shipment).
2. Confirm that the proper accommodation code is marked in eDIRECT.
3. Complete the Accountability Form, following the directions in the *eDIRECT User Guide – User Administration*.
4. Document any Large Print and Braille security barcode discrepancies.
5. Notify the DTC of any discrepancies immediately.
6. If any student is taking a MAP Grade-Level Assessment out of district/building, or if the student is homebound, note the barcode number of the test book before delivering it to the testing site to ensure proper accounting of all test books when they are returned to the district.
7. Ensure all test books have been accounted for before they are shipped to DRC.
8. Follow the procedures in the Contaminated Test Materials section of this manual for any contaminated test materials.
9. Maintain the Accountability Form during the test administration.

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Test Examiner

Count the number of Large Print and Braille books received and assign each test book to a student. Write the student's name and MOSIS ID on the front of each test book.

Document this information in preparation for returning the test books to the STC.

Contaminated Test Materials

Test materials are considered *contaminated* due to: a) a student health issue that affects the test book itself (blood, fluids, etc.) or b) contact with any potentially hazardous material. If test materials are contaminated, the Test Examiner should notify the School Test Coordinator for instructions for handling the contaminated materials since **all** printed testing material must be accounted for. The DTC, STC, or TE is responsible for transcribing the answers into the online system, and then the contaminated test materials must be securely destroyed at the test site by the DTC or STC. The DTC or STC should fill out the Missing Materials section of the Accountability Form to account for the contaminated test materials located under the Materials section of eDIRECT.

4.2 After Testing

Assemble Materials for Return and for Entry into INSIGHT

After testing has been completed, prepare materials to be returned to the School Test Coordinator. Check test books to make sure there are no sticky notes, staples, pins, paper clips, or tape of any kind on any pages. Check to make sure that no scratch or graph paper was left inside test books. Remove any extraneous material.

Transcription of Large Print, Braille, and Paper-and-Pencil Editions

After testing, student responses for Large Print, Braille, and paper-and-pencil editions **must** be transcribed into the INSIGHT testing software before the district's test window closes. It is recommended that transcription occur as soon after testing as possible. To transcribe responses requires the Test Examiner or other designated and authorized district or school personnel to log in to INSIGHT using the student's Test Ticket. Follow these steps to transcribe student answers:

1. In eDIRECT Test Setup, ensure that the student has been assigned the appropriate accommodation:
   a. Paper-Based Assessment
   b. Paper-Based Braille
   c. Paper-Based Large Print
2. In eDIRECT Test Setup, assign the student to a test session and print his or her Test Ticket. Retain the Test Ticket rather than distributing it to the student.
3. After the student has completed the test on paper, use a device that has the INSIGHT client software installed and use the student's Test Ticket to log in to the student's test.
4. Begin transcribing student responses. Once you have finished, select End Test and Submit. The Test Examiner should then return all printed test materials to the STC.

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Transcribe the student's responses as faithfully and as completely as possible using the following guidelines:

- Do not transcribe erased or crossed out words or marks.
- If a student's response consists of incomprehensible squiggles, marks, etc., which clearly are not words or word fragments, then leave the item blank.
- If a student's response is wholly or partly illegible, enter "ILLEGIBLE" for the entire response or for the part where applicable.
- If 50% or more of a student's response is written in any language other than English, then note "WRITTEN IN ANOTHER LANGUAGE" where applicable.
- If part of a student's response cannot be entered into INSIGHT, then leave that part blank.
- If no part of a student's response can be entered, then leave the entire item blank.
- Additional clarifying notes may be entered as needed if the item type allows text entry.

Arrange for the Return Shipment of Test Materials to DRC

DTCs MUST use DRC boxes to return Large Print, Braille, and Paper-and-Pencil test books; Braille Test Administrator notes; and Test Administration scripts for Large Print, Braille, or Paper-and-Pencil editions via UPS. Braille and Large Print Assessments are shipped to the district in a kit that includes boxes and labels necessary for returning testing materials. Paper-and-Pencil test books may be returned in the same shipping boxes with Braille and Large Print test books.

If the district downloaded Paper-and-Pencil test books, but did not order any Braille or Large Print test books, the DTC must order DRC boxes and return shipping labels via Additional Materials in eDIRECT. DRC is responsible for all return shipping costs for the Large Print, Braille, and Paper-and-Pencil test books; however, the DTC must make shipping arrangements at least 24 hours in advance of package pickup. Detailed information about the Additional Materials process can be found in the *eDIRECT User Guide – User Administration*.

Organize Materials for the District Test Coordinator

Instructions for the School Test Coordinator

Make sure that all Large Print, Braille, and Paper-and-Pencil testing materials, including Braille test administrator notes and test administration scripts, are received from each Test Examiner in the school. Contact any Test Examiner who delays returning student testing materials.

Follow these guidelines for packaging testing materials for the DTC:

1. **Obtain Boxes**

   Test materials must be returned in the DRC boxes. Reuse the boxes in which the Large Print and Braille testing materials arrived. If the DTC does not have DRC boxes or needs additional boxes, the DTC can order these via Additional Materials in eDIRECT.

   Prior to packing test materials, securely tape the bottom of each box to prevent breakage. Use three pieces of packing tape and overlap the tape. Make sure it wraps around the sides at least 2 inches.

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2. **Package Materials**

   Place the following materials in boxes in the order specified below, with the first items listed on the top in Box 1.

   - Paper-and-Pencil test books (staple, paper clip, or band pages together to ensure loose pages are not lost)
   - Braille test books
   - Large Print test books
   - Braille Test Administrator notes
   - Test Administration scripts

3. **Affix Shipping Labels**
   - Affix the green shipping labels to the boxes. Green labels should be placed on the top of the box on one of the flaps.
   - Affix the UPS label to the boxes. UPS labels should be placed on the top of the box on the other flap.

   Return shipping labels are scannable and cannot be photocopied. If more return shipping labels are needed, the DTC can order these via Additional Materials in eDIRECT.

4. **Send Materials to the District Test Coordinator**
   - Do not seal the boxes of test books.
   - The DTC will review the contents of each box.

Package and Ship Testing Materials

Instructions for the District Test Coordinator

Make sure that all testing materials are received from each school in the district. Contact any STC who delays returning school testing materials. Verify that the STC followed the instructions in this *Test Coordinator's Manual*.

If a box from an STC is received without a return shipping label on it, affix one of the blank District return shipping labels that were provided in the DTC's Package. Fill out the School information on the label to ensure correct processing.

Do **not** return the following to DRC:

- *Test Coordinator's Manuals*
- listening scripts (must be **securely** destroyed by district)
- scratch and/or grid paper used for the English Language Arts, Mathematics, and Science Assessments (must be **securely** destroyed by district)
- contaminated test materials (must be **securely** destroyed by district; see page 21 in this manual)
- unused return shipping labels

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Check all materials from the STCs to ensure they have correctly followed the procedure described in this manual.

1. **Add Packing Material**

   To avoid damage caused when materials shift during transit, add sufficient packing material to fill all voids and hold documents firmly in place. We strongly recommend using crumpled, recycled paper for this purpose. Do **not** use foam packing "peanuts" or "popcorn."

2. **Seal Boxes**

   Seal each box securely by overlapping three pieces of packing tape over the top and making sure it wraps around the sides at least 2 inches. This will prevent damage to the boxes and subsequent loss of test materials.

3. **Schedule Testing Material Pickup**

   The DTC will return MAP Grade-Level Assessment testing materials via UPS. Contact UPS no later than May 30, 2017, to schedule your pickup date. Please allow 1–3 days for pickup of your test materials. All materials must be picked up no later than June 2, 2017.

   Test materials must be returned via UPS in order to ensure secure tracking of materials.

   Materials must be returned in a single shipment unless prior arrangements are made with DRC.

   Instructions for scheduling the pickup of MAP Grade-Level Assessment testing materials:

   a. Ensure that each box has a green return shipping label and a UPS-RS label affixed.
   b. Keep all boxes for a school together and store the materials in a secure place until UPS arrives.
   c. If you do not have a daily scheduled pickup, call UPS at 1-866-857-1501. Tell UPS that you would like to schedule a pickup and that you have return service labels. Give the service representative the tracking number on one UPS return service label. This will let UPS know that DRC will be paying all return charges. Also, tell the service representative what day and time your packages will be ready.

      NOTE: There is a tear-off portion of the UPS-RS label. You can retain the bottom portion of the label for your records, as it will contain the tracking number for the package.

   d. **Questions**

      For answers to any questions regarding the return procedures described in this manual, call the DRC dedicated MAP Service Line at 1-800-544-9868.

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APPENDIX A: HANDLING STUDENT TRANSFERS AND CHANGES IN TESTING STATUS

Students Who Move Before or During the MAP Grade-Level Assessment Administration

If . . .	***then . . .***
a new student moves into the district:	Add the new student in eDIRECT. Then assign the student to the appropriate test session(s).* **NOTE:** If the DTC is unable to add the new student, the DTC must contact the MAP Service Line.
a student moves out of the district prior to or during the district test administration window:	Remove the student from any test session in eDIRECT. Do **not** log into the test and do **not** mark any status code(s) for the student.*
a student moves from one building to another building within the same district **prior** to testing:	The DTC should edit the student's information in eDIRECT before the student begins testing so that the student's scores report to the correct building. The DTC must move the student to a different test session in eDIRECT.*
a student moves from one building to another building within the same district **after** the student has begun testing:	The DTC should edit the student's information in eDIRECT to update the student's school and put the student in the new test session for the content areas they will test at their new school. **NOTE:** It is recommended that students complete all sessions for a content area at the same school.

*See the *eDIRECT User Guide – Test Setup*, available on the **Documents** page of eDIRECT, https://mo.drcedirect.com.

Please contact the DRC dedicated MAP Service Line at 1-800-544-9868 if there are any questions regarding moving a student within a school or district.

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APPENDIX B: TEST TIMING GUIDELINES

Math Timing Estimates		
Grade/Session	**Recommended Range (minutes)**	**Recommended Range (Total Test)**
Grades 3–5 Session 1	35–50	1 hr 25 min–2 hr 10 min
Grades 3–5 Session 2	35–50	
Grades 3–5 Session 3 (PE)	15–30	
Grade 6 Session 1	35–45	1 hr 45 min–2 hr 15 min
Grade 6 Session 2	45–60	
Grade 6 Session 3 (PE)	25–30	
Grade 7 Session 1	20–25	1 hr 45 min–2 hr 15 min
Grade 7 Session 2	60–80	
Grade 7 Session 3 (PE)	25–30	
Grade 8 Session 1	15–20	1 hr 45 min–2 hr 15 min
Grade 8 Session 2	65–85	
Grade 8 Session 3 (PE)	25–30	

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APPENDIX B: TEST TIMING GUIDELINES (CONTINUED)

English Language Arts Timing Estimates		
Grade/Session	**Recommended Range (minutes)**	**Recommended Range (Total Test)**
Grades 3–4 Session 1	45–80	1 hr 35 min–2 hr 50 min
Grades 3–4 Session 2	30–50	
Grades 3–4 Session 3	20–40	
Grade 5 Session 1	45–80	3 hr–4 hr 45 min
Grade 5 Session 2	25–45	
Grade 5 Session 3	20–40	
Grade 5 Session 4	90–120	
Grades 6–7 Session 1	45–80	1 hr 35 min–2 hr 50 min
Grades 6–7 Session 2	30–50	
Grades 6–7 Session 3	20–40	
Grade 8 Session 1	45–80	3 hr–4 hr 45 min
Grade 8 Session 2	25–45	
Grade 8 Session 3	20–40	
Grade 8 Session 4	90–120	

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APPENDIX B: TEST TIMING GUIDELINES (CONTINUED)

Science Timing Estimates		
Grade/Session	**Recommended Range (minutes)**	**Recommended Range (Total Test)**
Grade 5 Session 1	45–55	1 hr 50 min–2 hr 25 min
Grade 5 Session 2	20–25	
Grade 5 Session 3	45–65	
Grade 8 Session 1	45–55	1 hr 50 min–2 hr 25 min
Grade 8 Session 2	20–25	
Grade 8 Session3	45–65	

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Grade-Level Assessments
Test Coordinator's Manual

DATA RECOGNITION
DRC
CORPORATION

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Appendix B: Examiner's Manual

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Missouri Assessment Program

Examiner's Manual

Grade 5
English Language Arts, Mathematics, and Science Assessments
Spring 2017

Missouri Department of Elementary
and Secondary Education

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Table of Contents

1.0 Overview of Important Information For The MAP Grade-Level Assessments 1
1.1 This Examiner's Manual 1
1.2 Glossary of Terms 1
1.3 About the Tests 2
1.4 Test Administration Policies. 4
1.5 Scheduling the Tests. 6
1.6 Accommodations and Special Populations. 9
1.7 Online Tools Training and Tutorials 24
2.0 Before Online Testing 26
2.1 Advance Announcements and Preparation 26
2.2 User Roles 26
2.3 Test Security 28
2.4 Assessment Materials for Students/Administrators 30
3.0 During Online Testing 33
3.1 Specific Administration Information. 34
3.2 Moving a Student During an Assessment. 43
4.0 After Online Testing 44
4.1 Reporting Test Invalidations 44
4.2 How to Handle Student Absences. 44
5.0 Large Print, Braille, and Paper/Pencil Editions 45
5.1 Before Testing 45
5.2 During Testing 50
5.3 After Testing. 51
Appendix A: Item Types. 53
Appendix B: INSIGHT Keyboard Shortcuts and Icons 55

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1.0 OVERVIEW OF IMPORTANT INFORMATION FOR THE MAP GRADE-LEVEL ASSESSMENTS

1.1 This Examiner's Manual

The purpose of this *Examiner's Manual* is to provide detailed instructions for administering the Missouri Assessment Program (MAP) Grade-Level Assessments. The manual includes instructions for test preparation, scripts for administering the tests, and post test administration procedures. Test Examiners (TEs) should thoroughly read this manual and view trainings before administering the tests.

1.2 Glossary of Terms

Accommodations	Changes in procedures or materials that increase equitable access to the MAP Grade-Level Assessments. Assessment accommodations allow students to access assessment content to show what they know and can do. Accommodations are available for students with documented Individualized Education Programs (IEPs) or 504 Plans.
Break/Pause	Action taken by a student or Test Examiner (TE) to temporarily halt the test during any part of the test, as needed. The online assessment provides an opportunity to pause the test for up to 20 minutes.
Constructed-Response Item Type	Test questions that require students to provide or input their response or responses using a keyboard or keypad. This type includes **short answer/text input, writing prompts,** and **keypad input** items.
eDIRECT	DRC's administrative platform—the Missouri Assessment Program Portal—from which district personnel will manage the assessments.
INSIGHT	DRC's INSIGHT is the secure, browser-based test engine for the MAP Grade-Level Assessments.
Item	A test question or stimulus presented to a student to elicit a response.
Performance Event	A performance event comprises Session 3 of the MAP Grade-Level Mathematics and Science Assessments. It is designed to provide students with an opportunity to demonstrate their ability to apply their knowledge and higher-order thinking skills to explore and analyze a complex, real-world scenario. A performance event will contain a variety of item types. See Appendix A: Item Types.
Selected-Response Item Type	Test questions that require students to respond to a stem by selecting an appropriate response or responses, usually from answers provided. This type includes **multiple-choice, matching, multi-select,** and **evidence-based selected-response** items.
Session	A specific part of a test assigned to a specific student, which is grouped by Test Examiner according to the precode file.

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Glossary of Terms, continued

Stimulus/Stimuli	Material or materials used in the test context, which form the basis for assessing the knowledge and skills of students. Many items/tasks for the assessments include a stimulus along with a set of questions to which the student responds. Examples of stimuli include, but are not limited to, traditional reading passages/texts viewed on a computer screen, images with audio presentations, and simulated web pages.
Technology-Enhanced Items	Test questions that capitalize on technology to collect evidence through a non-traditional response type. These items are scored automatically. This item type includes **drag and drop, matching, hot text/select text, hot text/reorder text, hot spot, graphing, bar graphing, line graphing,** and **build a table**. See Appendix A: Item Types.
Universal Tools	Universal tools are available to students based on student preference and selection. Some tools, such as a ruler and sticky notes, are embedded in the online system, while others, such as a physical thesaurus and scratch paper, are external to the system. The availability of particular universal tools varies by item.
Writing Prompt	A special type of performance event that appears in the Grades 5 and 8 English Language Arts (ELA) Assessments is an open-ended item that requires students to demonstrate their writing proficiency.

1.3 About the Tests

- The Missouri State Board of Education identified the following purposes for the MAP Grade-Level Assessments:
    - Measuring and reflecting student mastery toward post-secondary readiness
    - Identifying students' strengths and weaknesses
    - Communicating expectations for all students
    - Serving as the basis for state and national accountability plans
    - Evaluating programs
    - Providing professional development for teachers
- The MAP Grade-Level Assessments are designed to adapt testing to the needs of Missouri districts, schools, teachers, and students, while meeting state and federal requirements.
- The MAP Grade-Level Assessments are based on the Missouri Learning Standards. 2017 assessments will include traditional multiple-choice items and innovative technology-enhanced items designed to elicit student knowledge and skills in new ways. English Language Arts assessments will include a writing prompt. Mathematics and Science assessments will include a performance event. The Science assessments also include constructed response items. See Appendix A: Item Types.

  The Missouri Department of Elementary and Secondary Education (DESE) uses the information obtained through the MAP Grade-Level Assessments to monitor the progress of Missouri's students in meeting the Missouri Learning Standards, to inform the public and the state legislature about students' performance, and to help make informed decisions about educational issues.

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- Data Recognition Corporation (DRC) and DESE are collaborating to deliver Missouri's Spring 2017 Grade-Level Assessments. Missouri educators will use DRC's eDIRECT online platform for enrollment and test administration and INSIGHT for test delivery. DRC will also provide handscoring and reporting services. These cooperative efforts and systems comprise a fully integrated assessment platform to meet the needs of school districts, educators, students, and other Missouri stakeholders.

- The Spring 2017 MAP Grade-Level Assessments include the following:
  - English Language Arts Assessment for Grades 3–8
  - Mathematics Assessment for Grades 3–8
  - Science Assessment for Grades 5 and 8

- The English Language Arts Assessments consist of three sessions in grades 3, 4, 6, and 7. In grades 5 and 8, there will be four sessions. The first three sessions contain selected-response items and technology-enhanced items. The fourth session administered in grades 5 and 8 contains a writing prompt that is scored with a ten-point rubric.

- The Mathematics Assessments consist of three sessions. The first and second sessions contain selected-response items and technology-enhanced items. The third session contains a performance event. See Appendix A: Item Types.

- The Science Assessments consist of three sessions. The first session contains constructed-response items, the second session contains multiple-choice items, and the third session contains a performance event. See Appendix A: Item Types.

- All MAP Grade-Level Assessments are available only in INSIGHT, the secure online browser, unless a Large Print, Braille, or paper/pencil edition is required by the student as an accommodation. For students needing one of these versions, test examiners will be responsible for transcribing student responses into INSIGHT.

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1.4 Test Administration Policies

General Rules of Online Testing

Students in grade 5 will take online tests for English Language Arts (ELA), Mathematics, and Science. The ELA and Mathematics tests consist of selected-response (SR) and technology-enhanced (TE) items. The SR and TE items are included in all sessions. The Mathematics test includes a performance event (PE), which will be presented as a separate session within the test. The ELA test includes a writing prompt (WP). The Science test consists of selected- and constructed-response items (CR) and a performance event, which are presented as separate sessions within the test. The Mathematics test includes a performance event (PE), which will be presented as a separate session within the test.

Basic online testing parameters:

- Within each test there will be sessions. A student may not return to a session once it has been completed and submitted.
- Some items include multiple parts over more than one page. Students may need to use the vertical scroll bar to view an entire item on a page.
- Students may mark items for review and return to those items within a session.
- If a student starts the test near the end of the testing window, the student must finish before the district administration window officially closes. The assessment will automatically end at 8 P.M. on the last day of the scheduled district administration window, even if the student has not finished.

If a student starts the test near the end of the testing window, the student must finish before the district administration window officially closes. The assessment will automatically end at 8 P.M. on the last day of the scheduled district administration window, even if the student has not finished.

Pause Rules

The INSIGHT system includes a "Pause" feature that allows a student to pause a test, either to take a short break of up to 20 minutes, or to continue testing at a later time as indicated by the district's testing schedule. While the test is paused, a large count-down timer displays in the INSIGHT system on the student's computer. This allows the Test Examiner to easily monitor which students have activated the feature and how much time remains in their break. If a student does not resume testing before 20 minutes elapses, then the student is logged out of the test and is required to log back in to the test using the login and password from his or her Test Ticket. Students may also choose to exit the test from the Pause screen.

The "Pause" feature allows a student to pause a test, either to take a short break of up to 20 minutes or to continue testing at a later time.

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During the assessments:

- If a test is paused for 20 minutes or more, the student can return to the session and continue entering his or her responses. The student may also review and change previously answered items. The student is not permitted to return to items in a different session.
- Any highlighted text and sticky notes **will** be saved when a test is paused regardless of how long the assessment is paused.
- In the event of a technical issue (e.g., power outage or network failure), students will be logged out and the test will automatically be paused. Student responses will not be lost, and students may move to a different device connected to the same Testing Site Manager (TSM) as the original device. The students will need to log in again upon resuming the test.

Any highlighted text and sticky notes will be saved when a test is paused regardless of how long the test is paused.

Test Timeout (Due to Inactivity)

As a security measure, students are automatically logged out of the test after 20 minutes of inactivity. Activity is defined as selecting an answer or navigation option in the assessment (e.g., clicking [Next] or [Back] or using the quick navigation drop-down list to move to another item). Moving the mouse or clicking on an empty space on the screen is not considered activity. Test timeout occurs when the test is not paused.

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1.5 Scheduling the Tests

The following table lists general estimates of the time it will take most students to complete each component of the online MAP Grade-Level Assessments. These times do not include time needed to start computers, load secure browsers, and log in students. Nor do they include time needed for students to complete the INSIGHT Tutorials.

Duration and Timing Information

The scheduling/rules for each assessment are included in tables 1, 2, and 3. Note that the duration, timing, and session recommendations vary for each content area.

Table 1: Assessment Sequence—English Language Arts

ELA	Session 1	Session 2	Session 3	Session 4 (Writing Prompt)
Content and Duration of Sessions	This session assesses the Reading Strand. It contains passage-based selected-response and technology-enhanced items. **Recommendation:** • Session duration ranges from 45–80 minutes.	This session assesses the Research and Writing Strands. It contains selected-response and technology-enhanced items. **Recommendation:** • Session duration ranges from 25–45 minutes.	This session assesses the Listening Strand. It contains passage-based selected-response and technology-enhanced items. **Recommendation:** • Session duration ranges from 20–40 minutes.	The writing prompt is presented in one session. **Recommendation:** • Session duration ranges from 90–120 minutes.
Total Duration	**Recommendation:** • Student completes this component within three days of starting.	**Recommendation:** • Student completes this component within three days of starting.	**Recommendation:** • Student completes this component within three days of starting.	**Recommendation:** • Student completes in one test session.

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Table 2: Assessment Sequence—Mathematics

Mathematics	Session 1	Session 2	Session 3 (Performance Event)
Number and Duration of Sessions	This session assesses the Mathematics Strands. It contains selected-response and technology-enhanced items. **Recommendation:** • Session duration ranges from 35–50 minutes.	This session assesses the Mathematics Strands. It contains selected-response and technology-enhanced items. **Recommendation:** • Session duration ranges from 35–50 minutes.	This session assesses the Mathematics Strands. It contains a performance event that is comprised of related selected-response and technology-enhanced items. **Recommendation:** • Session duration ranges from 15–30 minutes.
Total Duration	**Recommendation:** • Student completes this component within two days of starting.	**Recommendation:** • Student completes this component within two days of starting.	**Recommendation:** • Student completes this component within three days of starting.

Table 3: Assessment Sequence—Science

Science	Session 1	Session 2	Session 3 (Performance Event)
Number and Duration of Sessions	• Administer in one session. • Session duration ranges from 45–55 minutes.	• Administer in one session. • Session duration ranges from 20–25 minutes.	• Administer in one session. • Session duration ranges from 45–65 minutes.
Total Duration	**Recommendation:** • Student completes Session 1 in a single session.	**Recommendation:** • Student completes Session 2 in a single session.	**Recommendation:** • Student completes Session 3 in a single session.

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Additional Administration Recommendations:

- For the performance events, students may be best served by sequential, uninterrupted time that may exceed the time allotted in a student's schedule.
- When responding to the writing prompt, students may wish to write their rough draft on scratch paper. To do this, the student must first log in to the test using his or her Test Ticket, in order to view the writing prompt. After reading the prompt, the student must press "Pause" to pause the test. Once the student has finished the rough draft and is ready to input the final response into the online test, the student should press "Resume Test." (If the 20-minute countdown has expired, the student will need to log back into the test, using the original test ticket.) Students must complete both the rough draft on paper and the final draft in the online test during the same testing session.
- Minimize the amount of time between beginning and completing each test within a content area.

Important reminders:

- The test can be spread out over multiple days as needed. See the sub-heading *Testing Over Multiple Sessions or Days* within this manual for more guidance within Section 3.1 Specific Administration Information.
- Breaks can be provided during the test session using the software's "Pause" feature. If the test is paused for more than 20 minutes, the student will be able to go back to items on the previous screens in that session.
- Review the test directions in this *Examiner's Manual* in advance. Examiner's Manuals are not secure and can be viewed in advance.

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1.6 Accommodations and Special Populations

Updated Accommodations Procedures/Codes

The accommodations for the MAP Grade-Level Assessments are provided as Universal Tools and Accommodations.

- Universal Tools are available to all students taking a Grade-Level Assessment, unless otherwise noted.
- Accommodations must appear in a student's Individualized Education Program (IEP)/ 504 Plan.

For Special Education students, the IEP team should choose **all** of the accommodations that a student will receive.

Some tools and accommodations are only for ELL students with an IEP/504 Plan.

Prior to testing, Test Examiners should log in to eDIRECT to check and set tools and accommodations for students from the Edit Student window. See the eDIRECT User Guide for detailed instructions.

Table 4: Universal Tools

UNIVERSAL TOOLS

These tools for use on the Grade-Level Assessment are available to **ALL STUDENTS** unless otherwise noted.

Please note:

- Some tools need to be marked in eDIRECT prior to the assessment. Please read the description to determine if the tool must be marked in eDIRECT, under student accommodations.
- Some tools are only for use by English Language Learner (ELL) students (ELL students are those marked LEP-RCV or LEP-NRC in MOSIS).

Tool	Description	Code
Bilingual Dictionary	**ELL students** may have access to a physical bilingual dictionary for use **ONLY** on the writing prompt in grades 5 and 8. If the bilingual dictionary is electronic, it may not connect to the Internet. This tool must be chosen in the eDIRECT system under student accommodations prior to testing.	S431
Break (Pause)	All students may take breaks of up to 20 minutes as needed. There is no limit to how many times a student may use this during an assessment. The INSIGHT platform allows all students to pause the online assessment for up to 20 minutes. If the test is paused for more than 20 minutes, the student will have to log back in. If the need arises to move a student from one computer to another, pause the test and choose the Exit button. The test will remain incomplete until the student logs back in and completes the test.	N/A

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Table 4: Universal Tools, continued

UNIVERSAL TOOLS

These tools for use on the Grade-Level Assessment are available to **ALL STUDENTS** unless otherwise noted.

Please note:

- Some tools need to be marked in eDIRECT prior to the assessment. Please read the description to determine if the tool must be marked in eDIRECT, under student accommodations.
- Some tools are only for use by English Language Learner (ELL) students (ELL students are those marked LEP-RCV or LEP-NRC in MOSIS).

Tool	Description	Code
Calculator (For Calculator-Allowed Items Only) **Grades 6–8**	All students may have access to a physical calculator, on items where calculator use is allowed (Sessions 2 and 3, Grades 6–8). The memory of the physical calculator must be cleared before and after testing by the test examiner. *Please Note: Use of a calculator is only for the Mathematics assessment.* The INSIGHT platform features an embedded calculator for all students to use on items where calculator use is allowed (Sessions 2 and 3, Grades 6–8).	N/A
Color Contrast—Online	The INSIGHT platform allows all students to adjust background or font color based on student needs or preferences.	N/A
Color Contrast—Paper	All students taking the paper/pencil assessment may have the test printed in different colors based on student needs or preferences. This tool must be chosen in the eDIRECT system under student accommodations prior to testing.	S102
Color Overlay	All students taking the paper/pencil assessment may have a color transparency placed over the test presented to them based on student needs or preferences. This tool must be chosen in the eDIRECT system under student accommodations prior to testing.	S103
English Dictionary	All students may have access to a physical English Dictionary for use **ONLY** on the writing prompt in grades 5 and 8. If the English Dictionary is electronic, it may not connect to the Internet. The INSIGHT platform features an embedded English Dictionary for use **ONLY** on the writing prompt in grades 5 and 8.	N/A
Grammar Handbook	All students may have access to a physical Grammar Handbook for use **ONLY** on the writing prompt in grades 5 and 8. If the Grammar Handbook is electronic, it may not connect to the Internet. The Grammar Handbook must be one that is published. It cannot be a district-, school-, or classroom-made handbook.	N/A
Graphing Tool	The INSIGHT platform allows all students to use an embedded tool to graph functions.	N/A
Highlighter	The INSIGHT platform allows all students access to a highlighter for marking desired text. All students may have access to a physical highlighter.	N/A
Keyboard Navigation	The INSIGHT platform allows all students to navigate through the text by using the keyboard.	N/A

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Table 4: Universal Tools, continued

UNIVERSAL TOOLS

These tools for use on the Grade-Level Assessment are available to **ALL STUDENTS** unless otherwise noted.

Please note:

- Some tools need to be marked in eDIRECT prior to the assessment. Please read the description to determine if the tool must be marked in eDIRECT, under student accommodations.
- Some tools are only for use by English Language Learner (ELL) students (ELL students are those marked LEP-RCV or LEP-NRC in MOSIS).

Tool	Description	Code
Line Guide	The INSIGHT platform allows all students to use an embedded horizontal line that brings focus to a single line of text.	N/A
Magnifier (Zoom)	The INSIGHT platform allows all students to magnify the screen by 1.5 or 2 times the original size. All students taking the paper/pencil or Large Print assessments may have access to a magnifying device.	N/A
Magnification—Assistive Technology	**Students with visual impairments** may use assistive technology software that magnifies the screen beyond the built-in capabilities of the magnifier (zoom) tool. The software can be used in conjunction with the INSIGHT platform. The software must be provided by the district. *Please Note: The use of assistive technology software should be familiar to the student and should be software the student uses in the everyday classroom.* *Please Note: While the use of assistive technology software is not directly supported by DRC, the help desk will work with districts needing to use the software.* This tool must be chosen in the eDIRECT system under student accommodations prior to testing.	S105
Mark for Review	The INSIGHT platform allows all students to mark an item for review.	N/A
Masking—Online	The INSIGHT platform allows all students to block off content that is not of immediate need or that may be distracting by using an embedded masking tool.	N/A
Masking—Paper	All students taking the paper/pencil or Large Print assessments may use a masking tool to block off content that is not of immediate need or that may be distracting. This tool must be chosen in the eDIRECT system under student accommodations prior to testing.	S107

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Table 4: Universal Tools, continued

UNIVERSAL TOOLS		
These tools for use on the Grade-Level Assessment are available to **ALL STUDENTS** unless otherwise noted. Please note: • Some tools need to be marked in eDIRECT prior to the assessment. Please read the description to determine if the tool must be marked in eDIRECT, under student accommodations. • Some tools are only for use by English Language Learner (ELL) students (ELL students are those marked LEP-RCV or LEP-NRC in MOSIS).		
Tool	**Description**	**Code**
Non-Accommodation Paper Based Assessment	This tool is available for the following scenarios: For students that need to test off-site in a non-district building (e.g. hospital, juvenile facility, etc.), the student may use the Paper Based Assessment. For **ELL students** who are using the Translation tool (S109) or Read Aloud – Native Language (S111), where the translator needs access to the assessment prior to administration to conduct translation services, choose this tool for just ONE student in the group. That student should still take the assessment online. For students using Read Aloud – Human Reader (S043) where the examiner needs a paper copy to read from, choose this tool for just ONE student in the group. That student should still take the assessment online. *Please Note: There is a $15 charge to the district for each printed paper/pencil assessment not required by an IEP. If the off-site student does have an IEP that requires using a paper/pencil assessment, use accommodation A102 instead.* *Please Note: Answers from students who access the assessment using the paper/pencil format must be entered into eDIRECT prior to shipping the paper assessment back. Please follow the return instructions found in the Test Coordinator's Manual.* *Please Note: All the answers given in the online system must be in English.* This tool must be chosen in the eDIRECT system under student accommodations prior to testing.	S112
Protractor	The INSIGHT platform allows all students to use an embedded protractor on specific items where appropriate. All students taking the paper/pencil, Large Print or Braille assessments may have access to a physical protractor for use on specific items where appropriate.	N/A

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Table 4: Universal Tools, continued

UNIVERSAL TOOLS

These tools for use on the Grade-Level Assessment are available to **ALL STUDENTS** unless otherwise noted.

Please note:

- Some tools need to be marked in eDIRECT prior to the assessment. Please read the description to determine if the tool must be marked in eDIRECT, under student accommodations.
- Some tools are only for use by English Language Learner (ELL) students (ELL students are those marked LEP-RCV or LEP-NRC in MOSIS).

Tool	Description	Code
Read Aloud (Not Including ELA Reading Passages)—Text-To-Speech	The INSIGHT platform allows **all students** to have the test directions and items in English Language Arts, Mathematics and Science read aloud via embedded text-to-speech technology. The student can control the speed and volume of the voice. The system also includes a follow-along feature, where the word being read is highlighted for the student. *Please Note: This tool **DOES NOT** read ELA reading passages to the student. In order to have ELA reading passages Read Aloud, a student **MUST** have that accommodation in their IEP/504 plan.* *Please Note: DESE does not recommend the use of Read Aloud for students who do not use it as part of their everyday learning in the classroom. The use of Read Aloud for some students can prove distracting and become a hindrance to student performance.* This tool must be turned on in the eDIRECT system under student accommodations prior to testing.	S041
Read Aloud (Not Including ELA Reading Passages)—Human Reader	Any student taking the online, paper/pencil, Large Print or Braille assessments may have the test directions and items in English Language Arts, Mathematics and Science read aloud by a human reader. *Please Note: Read Aloud of ELA Listening items will require the download of a script.* *Please Note: Use of this tool **DOES NOT** allow the reading of ELA passages to the student. In order to have ELA reading passages Read Aloud, a student **MUST** have that accommodation in their IEP/504 plan.* *Please Note: The Human Reader should be familiar to the student and have read aloud experience with the student in some capacity prior to the state assessment.* *Please Note: DESE does not recommend the use of Read Aloud for students who do not use it as part of their everyday learning in the classroom. The use of Read Aloud for some students can prove distracting and become a hindrance to student performance.* This tool must be chosen in the eDIRECT system under student accommodations prior to testing.	S043

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Table 4: Universal Tools, continued

UNIVERSAL TOOLS

These tools for use on the Grade-Level Assessment are available to **ALL STUDENTS** unless otherwise noted.

Please note:

- Some tools need to be marked in eDIRECT prior to the assessment. Please read the description to determine if the tool must be marked in eDIRECT, under student accommodations.
- Some tools are only for use by English Language Learner (ELL) students (ELL students are those marked LEP-RCV or LEP-NRC in MOSIS).

Tool	Description	Code
Read Aloud (Not Including ELA Reading Passages)—Assistive Technology	**Students with Disabilities** that use specific text-to-speech assistive technology software in the everyday classroom may use that technology in conjunction with the INSIGHT testing platform. The software must be provided by the district. *Please Note: Use of this tool **DOES NOT** allow the reading of ELA passages to the student. In order to have reading passages Read Aloud, a student **MUST** have that accommodation in their IEP/504 plan.* *Please Note: DESE does not recommend the use of Read Aloud for students who do not use it as part of their everyday learning in the classroom. The use of Read Aloud for some students can prove distracting and become a hindrance to student performance.* *Please Note: The use of assistive technology software should be familiar to the student and should be software the student uses in the everyday classroom.* *Please Note: While the use of assistive technology software is not directly supported by DRC, the help desk will work with districts needing to use the software.* This tool must be chosen in the eDIRECT system under student accommodations prior to testing.	S042
Read Aloud (Not Including ELA Reading Passages)—Native Language	**ELL students** taking either the online, paper/pencil, Large Print or Braille assessments may have the test directions and items in English Language Arts, Mathematics and Science read aloud in the students' native language by a human reader. *Please Note: Use of this tool **DOES NOT** allow the reading of ELA passages in the students' native language to the student. In order to have ELA reading passages Read Aloud, a student **MUST** have that accommodation in their IEP/504 plan.* *Please Note: If the translator needs access to the assessment prior to administration to conduct translation services, the student must use the paper/pencil assessment (Code S114). There is a $15 charge to the district for each printed paper/pencil assessment not required by an IEP.* *Please Note: All the answers given in the online system must be in English.* This tool must be chosen in the eDIRECT system under student accommodations prior to testing.	S111
Ruler	The INSIGHT platform allows all students to use an embedded ruler on specific items where appropriate. All students taking the paper/pencil, Large Print or Braille assessments may have access to a physical ruler for use on specific items where appropriate.	N/A

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Table 4: Universal Tools, continued

UNIVERSAL TOOLS

These tools for use on the Grade-Level Assessment are available to **ALL STUDENTS** unless otherwise noted.

Please note:

- Some tools need to be marked in eDIRECT prior to the assessment. Please read the description to determine if the tool must be marked in eDIRECT, under student accommodations.
- Some tools are only for use by English Language Learner (ELL) students (ELL students are those marked LEP-RCV or LEP-NRC in MOSIS).

Tool	Description	Code
Scratch Paper (Sticky Notes)	The INSIGHT platform allows all students to use an embedded notepad (called Sticky Notes) to make notes about an item. Electronic notes **DO NOT** carry over from previous sessions. If a student logs off prior to finishing a session, any electronic notes **WILL NOT** carry over when the student logs back in. As long as you do not log out or finish the session, they remain. All students taking the online, paper/pencil, Large Print or Braille assessments may have access to physical scratch paper to make notes about an item. Scratch paper can be blank, ruled, graph or grid paper. Physical scratch paper should be collected and destroyed **IMMEDIATELY** upon the conclusion of a testing session.	N/A
Scribe	Students may dictate their responses to a scribe, who must follow the scribing guidelines (http://dese.mo.gov/sites/default/files/asmt-scribing-guidelines.pdf). *Please Note: DESE does not recommend the use of Scribe for students who do not use it as part of their everyday learning in the classroom. The use of Scribe for some students can prove distracting and become a hindrance to student performance.* *Please Note: The Scribe should be familiar to the student and have scribing experience with the student in some capacity prior to the state assessment.* *Please Note: Students who obtain a physical injury prior to testing that prevents them from responding may also dictate their responses to a scribe.* This tool must be chosen in the eDIRECT system under student accommodations prior to testing.	S351
Separate Setting	Students may be allowed to test in a separate setting from other students. This includes testing individually or testing as part of a smaller group. This tool must be chosen in the eDIRECT system under student accommodations prior to testing.	S501
Strikethrough (Cross Off)	The INSIGHT platform allows all students to cross out answer options.	N/A
Thesaurus	All students may have access to a physical Thesaurus for use **ONLY** on the ELA writing prompt in grades 5 and 8. If the Thesaurus is electronic, it may not connect to the Internet.	N/A

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Table 4: Universal Tools, continued

UNIVERSAL TOOLS

These tools for use on the Grade-Level Assessment are available to **ALL STUDENTS** unless otherwise noted.

Please note:

- Some tools need to be marked in eDIRECT prior to the assessment. Please read the description to determine if the tool must be marked in eDIRECT, under student accommodations.
- Some tools are only for use by English Language Learner (ELL) students (ELL students are those marked LEP-RCV or LEP-NRC in MOSIS).

Tool	Description	Code
Translation	**ELL students** may respond to any assessment in their native language. The responses must be translated and transcribed. *Please Note: If the translator needs access to the assessment prior to administration to conduct translation services (Code S112), there is a $15 charge to the district for each printed paper/pencil assessment not required by an IEP.* *Please Note: All the answers given in the online system must be in English.* This tool must be chosen in the eDIRECT system under student accommodations prior to testing.	S109
Writing Tools	The INSIGHT platform allows all students to use writing tools on specific items where appropriate. The tools include the ability to bold, italicize and underline text, create bullet points, undo/redo typing, and copy/paste text the student has typed.	N/A

Table 5: Accommodations

ACCOMMODATIONS

These accommodations for use on the Grade-Level Assessment are available only to students with the accommodation in their IEP/504 plan.

Please note:

- All accommodations need to be marked in eDIRECT prior to the assessment.
- Some accommodations are only for use by English Language Learner (ELL) students with an IEP/504 plan (ELL students are those marked LEP-RCV or LEP-NRC in Core Data).

Accommodation	Description	Code
Abacus	Students with this accommodation in their IEP/504 plan may have access to an abacus. This accommodation must be chosen in the eDIRECT system under student accommodations prior to testing.	A391
Alternate Response Options	Students with this accommodation in their IEP/504 plan may respond to items using an alternate option, including but not limited to: Adapted Keyboards, StickyKeys, MouseKeys, FilterKeys, Adapted Mouse, Touch Screen, Head Wand and Switches. This accommodation must be chosen in the eDIRECT system under student accommodations prior to testing.	A441

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Table 5: Accommodations, continued

ACCOMMODATIONS

These accommodations for use on the Grade-Level Assessment are available only to students with the accommodation in their IEP/504 plan.

Please note:

- All accommodations need to be marked in eDIRECT prior to the assessment.
- Some accommodations are only for use by English Language Learner (ELL) students with an IEP/504 plan (ELL students are those marked LEP-RCV or LEP-NRC in Core Data).

Accommodation	Description	Code
Braille	**Students with visual impairments** with this accommodation in their IEP/504 plan may access the assessment via a Braille version. Tactile overlays and graphics tools may be used to assist the student in accessing the content. *Please Note: Answers from students who access the assessment using the Braille format must be entered into eDIRECT prior to shipping the Braille assessment back. Please follow the instructions found in the virtual Braille kit (available from eDIRECT).* This accommodation must be chosen in the eDIRECT system under student accommodations prior to testing.	A012
INVALIDATION **Calculator (For Non-Calculator-Allowed Items Only)** **GRADE 3 ONLY** ***INVALIDATION***	Students in 3rd grade with this accommodation in their IEP/504 plan may have access to a physical calculator on items where calculator use is not allowed. The memory of the physical calculator must be cleared before and after testing by the test examiner. *Please Note: Use of this accommodation will cause an invalidation for the Mathematics Assessment and the student will receive the Lowest Obtainable Scale Score (LOSS).* This accommodation must be chosen in the eDIRECT system under student accommodations prior to testing.	A392
Calculator (For Non-Calculator-Allowed Items Only) **GRADES 4–8**	Students in grades 4–8 with this accommodation in their IEP/504 plan may have access to a physical calculator on items where calculator use is not allowed. The memory of the physical calculator must be cleared before and after testing by the test examiner. This accommodation must be chosen in the eDIRECT system under student accommodations prior to testing.	A393
Large Print	Students with visual impairments with this accommodation in their IEP/504 plan may access the assessment via a Large Print version. *Please Note: Answers from students who access the assessment using the Large Print format must be entered into eDIRECT prior to shipping the Large Print assessment back. Please follow the instructions found in the virtual Large Print kit (available from eDIRECT).* This accommodation must be chosen in the eDIRECT system under student accommodations prior to testing.	A021

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Table 5: Accommodations, continued

ACCOMMODATIONS

These accommodations for use on the Grade-Level Assessment are available only to students with the accommodation in their IEP/504 plan.

Please note:

- All accommodations need to be marked in eDIRECT prior to the assessment.
- Some accommodations are only for use by English Language Learner (ELL) students with an IEP/504 plan (ELL students are those marked LEP-RCV or LEP-NRC in Core Data).

Accommodation	Description	Code
INVALIDATION **Multiplication Table** **GRADE 3 ONLY** ***INVALIDATION***	Students in 3rd grade with this accommodation in their IEP/504 plan may have access to a single-digit multiplication table. *Please Note: Use of this accommodation will cause an invalidation for the Mathematics Assessment and the student will receive the Lowest Obtainable Scale Score (LOSS).* This accommodation must be chosen in the eDIRECT system under student accommodations prior to testing.	A394
Multiplication Table GRADES 4–8	Students in grades 4–8 with this accommodation in their IEP/504 plan may have access to a single-digit multiplication table. This accommodation must be chosen in the eDIRECT system under student accommodations prior to testing.	A395
Paper Based Assessment	Students with this accommodation in their IEP/504 plan may take the assessment using the paper/pencil format. *Please Note: Answers from students who access the assessment using the paper/pencil format must be entered into eDIRECT prior to shipping the Paper Based Assessment back. Please follow the return instructions found in the Test Coordinator's Manual.* This accommodation must be chosen in the eDIRECT system under student accommodations prior to testing.	A102
INVALIDATION **Read Aloud (ELA Reading Passages)—Text-To-Speech** **GRADES 3–5** ***INVALIDATION***	Students in grades 3–5 with this accommodation in their IEP/504 plan can have the INSIGHT platform read the ELA Reading Passages via embedded text-to-speech technology. The student can control the speed and volume of the voice. The system also includes a follow-along feature, where the word being read is highlighted for the student. *Please Note: Use of this accommodation will cause an invalidation for the English Language Arts Assessment and the student will receive the Lowest Obtainable Scale Score (LOSS).* *Please Note: DESE does not recommend the use of Read Aloud for students who do not use it as part of their everyday learning in the classroom. The use of Read Aloud for some students can prove distracting and become a hindrance to student performance.* This accommodation must be chosen in the eDIRECT system under student accommodations prior to testing.	A040

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Table 5: Accommodations, continued

ACCOMMODATIONS

These accommodations for use on the Grade-Level Assessment are available only to students with the accommodation in their IEP/504 plan.

Please note:

- All accommodations need to be marked in eDIRECT prior to the assessment.
- Some accommodations are only for use by English Language Learner (ELL) students with an IEP/504 plan (ELL students are those marked LEP-RCV or LEP-NRC in Core Data).

Accommodation	Description	Code
INVALIDATION **Read Aloud (ELA Reading Passages)—Human Reader** **GRADES 3–5** ***INVALIDATION***	Students in grades 3–5 with this accommodation in their IEP/504 plan taking the online, paper/pencil, Large Print or Braille assessments may have the ELA Reading Passages read aloud by a human reader. *Please Note: The Human Reader should be familiar to the student and have read aloud experience with the student in some capacity prior to the state assessment.* *Please Note: Use of this accommodation will cause an invalidation for the English Language Arts Assessment and the student will receive the Lowest Obtainable Scale Score (LOSS).* *Please Note: DESE does not recommend the use of Read Aloud for students who do not use it as part of their everyday learning in the classroom. The use of Read Aloud for some students can prove distracting and become a hindrance to student performance.* This accommodation must be chosen in the eDIRECT system under student accommodations prior to testing.	A041
INVALIDATION **Read Aloud (ELA Reading Passages)—Assistive Technology** **GRADES 3–5** ***INVALIDATION***	Students in grades 3–5 with this accommodation in their IEP/504 plan that use specific text-to-speech assistive technology software in the everyday classroom may use that technology in conjunction with the INSIGHT testing platform to have the ELA Reading Passages read aloud by the software. The software must be provided by the district. *Please Note: The use of assistive technology software should be familiar to the student and should be software the student uses in the everyday classroom.* *Please Note: Use of this accommodation will cause an invalidation for the English Language Arts Assessment and the student will receive the Lowest Obtainable Scale Score (LOSS).* *Please Note: DESE does not recommend the use of Read Aloud for students who do not use it as part of their everyday learning in the classroom. The use of Read Aloud for some students can prove distracting and become a hindrance to student performance.* *Please Note: While the use of assistive technology software is not directly supported by DRC, the help desk will work with districts needing to use the software.* This accommodation must be chosen in the eDIRECT system under student accommodations prior to testing.	A042

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Table 5: Accommodations, continued

ACCOMMODATIONS		
These accommodations for use on the Grade-Level Assessment are available only to students with the accommodation in their IEP/504 plan. Please note: • All accommodations need to be marked in eDIRECT prior to the assessment. • Some accommodations are only for use by English Language Learner (ELL) students with an IEP/504 plan (ELL students are those marked LEP-RCV or LEP-NRC in Core Data).		
Accommodation	**Description**	**Code**
INVALIDATION **Read Aloud (ELA Reading Passages)—Native Language** **GRADES 3–5** ***INVALIDATION***	ELL students in grades 3–5 with this accommodation in their IEP/504 plan taking the online, paper/pencil, Large Print or Braille assessments may have the ELA Reading Passages read aloud to them in their native language by a human reader. *Please Note: Use of this accommodation will cause an invalidation for the English Language Arts Assessment and the student will receive the Lowest Obtainable Scale Score (LOSS).* This accommodation must be chosen in the eDIRECT system under student accommodations prior to testing.	A111
Read Aloud (ELA Reading Passages)—Text-To-Speech **GRADES 6–8**	Students in grades 6–8 with this accommodation in their IEP/504 plan can have the INSIGHT platform read the ELA Reading Passages via embedded text-to-speech technology. The student can control the speed and volume of the voice. The system also includes a follow-along feature, where the word being read is highlighted for the student. *Please Note: DESE does not recommend the use of Read Aloud for students who do not use it as part of their everyday learning in the classroom. The use of Read Aloud for some students can prove distracting and become a hindrance to student performance.* This accommodation must be chosen in the eDIRECT system under student accommodations prior to testing.	A043
Read Aloud (ELA Reading Passages)—Human Reader **GRADES 6–8**	Students in grades 6–8 with this accommodation in their IEP/504 plan taking the online, paper/pencil, Large Print or Braille assessments may have the ELA Reading Passages read aloud by a human reader. *Please Note: The Human Reader should be familiar to the student and have read aloud experience with the student in some capacity prior to the state assessment.* *Please Note: DESE does not recommend the use of Read Aloud for students who do not use it as part of their everyday learning in the classroom. The use of Read Aloud for some students can prove distracting and become a hindrance to student performance.* This accommodation must be chosen in the eDIRECT system under student accommodations prior to testing.	A045

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Table 5: Accommodations, continued

ACCOMMODATIONS

These accommodations for use on the Grade-Level Assessment are available only to students with the accommodation in their IEP/504 plan.

Please note:

- All accommodations need to be marked in eDIRECT prior to the assessment.
- Some accommodations are only for use by English Language Learner (ELL) students with an IEP/504 plan (ELL students are those marked LEP-RCV or LEP-NRC in Core Data).

Accommodation	Description	Code
Read Aloud (ELA Reading Passages)—Assistive Technology **GRADES 6–8**	Students in grades 6–8 with this accommodation in their IEP/504 plan that use specific text-to-speech assistive technology software in the everyday classroom may use that technology in conjunction with the INSIGHT testing platform to have the ELA Reading Passages read aloud by the software. The software must be provided by the district. *Please Note: The use of assistive technology software should be familiar to the student and should be software the student uses in the everyday classroom.* *Please Note: While the use of assistive technology software is not directly supported by DRC, the help desk will work with districts needing to use the software.* *Please Note: DESE does not recommend the use of Read Aloud for students who do not use it as part of their everyday learning in the classroom. The use of Read Aloud for some students can prove distracting and become a hindrance to student performance.* This accommodation must be chosen in the eDIRECT system under student accommodations prior to testing.	A044
Read Aloud (ELA Reading Passages)—Native Language **GRADES 6–8**	ELL students in grades 6–8 with this accommodation in their IEP/504 plan taking the online, paper/pencil, Large Print or Braille assessments may have the ELA Reading Passages read aloud to them in their native language by a human reader. This accommodation must be chosen in the eDIRECT system under student accommodations prior to testing.	A112
Read-Aloud (ELA reading passages)—Blind Students	Blind students at any grade level who do not yet possess adequate Braille skills with this accommodation in their IEP/504 plan may have the ELA Reading Passages read aloud by a human reader. This accommodation must be chosen in the eDIRECT system under student accommodations prior to testing.	A046
Sign Language	Hearing Impaired students with this accommodation in their IEP/504 plan may have ELA listening items translated into American Sign Language (ASL), Signing Exact English (SEE) or any other form of sign language. *Please Note: Signing of ELA Listening items will require the download of a script.* This accommodation must be chosen in the eDIRECT system under student accommodations prior to testing.	A052

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Table 5: Accommodations, continued

ACCOMMODATIONS		
These accommodations for use on the Grade-Level Assessment are available only to students with the accommodation in their IEP/504 plan. Please note: • All accommodations need to be marked in eDIRECT prior to the assessment. • Some accommodations are only for use by English Language Learner (ELL) students with an IEP/504 plan (ELL students are those marked LEP-RCV or LEP-NRC in Core Data).		
Accommodation	**Description**	**Code**
Specialized Calculator (For Calculator-Allowed Items Only)	Students with this accommodation in their IEP/504 plan may have access to a specialized calculator on items where calculator use is allowed (Sessions 2 and 3). The specialized calculator can include a talking calculator or Braille calculator among others. The memory of the physical calculator must be cleared before and after testing by the test examiner. This accommodation must be chosen in the eDIRECT system under student accommodations prior to testing.	A396
Speech-to-Text—Assistive Technology	Students with this accommodation in their IEP/504 plan that use specific speech-to-text assistive technology software in the everyday classroom may use that technology in conjunction with the INSIGHT testing platform. The software must be provided by the district. *Please Note: The use of assistive technology software should be familiar to the student and should be software the student uses in the everyday classroom.* *Please Note: While the use of assistive technology software is not directly supported by DRC, the help desk will work with districts needing to use the software.* This accommodation must be chosen in the eDIRECT system under student accommodations prior to testing.	A352

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Table 6: Tools/Accommodations on Test Tickets

TOOLS/ACCOMMODATIONS ON TEST TICKETS

The following are the only tools and accommodations that will appear on a student Test Ticket.

For descriptions of these Tools/Accommodations, please see the appropriate table in this section.

Tool/Accommodation	Code	Ticket Abbreviation
Braille	A012	Braille
Large Print	A021	LargePrint
Non-Accommodation Paper Based Assessment	S112	SCPaper
Paper Based Assessment	A102	PaperBased
Sign Language	A052	A052
Translation	S109	S109
Read Aloud (Not Including ELA Reading Passages)—Text-To-Speech	S041	TTS
Read Aloud (GRADES 3–5 OR GRADES 6–8) (ELA Reading Passages)—Text-To-Speech	S041/A040 OR S041/A043	TTSPASSAGE
Read Aloud (Not Including ELA Reading Passages)—Human Reader	S043	S043
Read Aloud (GRADES 3–5) (ELA Reading Passages)—Human Reader	A041	A041
Read Aloud (GRADES 6–8) (ELA Reading Passages)—Human Reader	A045	A045
Read Aloud (Not Including ELA Reading Passages)—Assistive Technology	S042	S042
Read Aloud (GRADES 3–5) (ELA Reading Passages)—Assistive Technology	A042	A042
Read Aloud (GRADES 6–8) (ELA Reading Passages)—Assistive Technology	A044	A044
Read Aloud (Not Including ELA Reading Passages)—Native Language	S111	S111
Read Aloud (GRADES 3–5) (ELA Reading Passages)—Native Language	A111	A111
Read Aloud (GRADES 6–8) (ELA Reading Passages)—Native Language	A112	A112
Read Aloud (ELA Reading Passages)—Blind Students	A046	A046

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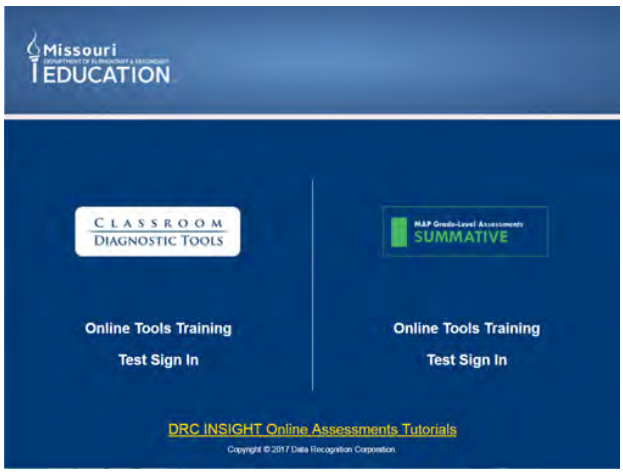
1.7 Online Tools Training and Tutorials

Online Tools Training

In preparation for the test and to expose students to the various item types in each content area (see Appendix A for item types), it is highly recommended that all students access the Online Tools Training (OTT) for each content area. Each OTT is designed to provide students and educators with an opportunity to quickly familiarize themselves with the software and navigational tools that they will use on the MAP Grade-Level Assessments. The OTT for each content area includes a variety of item types. Even though a student's test form may not include every item type, the OTT provides an opportunity to practice all item types. The OTTs also include a comprehensive reflection of embedded universal tools and accommodations. The OTTs should also be provided to students with any non-embedded universal tools and accommodations as allowed on the operational assessments.

The OTTs can be accessed via the INSIGHT desktop icon once the testing software has been installed. Non-accommodated versions of the OTTs can be publicly accessed using the Google Chrome browser at https://wbte.drcedirect.com/MO/portals/mo. Students should choose Online Tools Training on the right-hand side of the page.



Tutorials

The Tutorials provide step-by-step video instructions on how to navigate the online system and give detailed explanations about the key features of the software. **The Tutorials should be reviewed at least once by Test Examiners who will supervise any of the MAP Grade-Level Assessments and by students in advance of their first test day. Allow students to repeat the Tutorials as often as desired and needed.**

Students should review the Tutorials before completing the Online Tools Training (OTT). It has been proven beneficial for schools to schedule a Tutorial session for students immediately before at least one OTT session.

If computer lab availability is limited, the Tutorials may be presented to school personnel and students in a classroom using an LCD projector and a single Internet connection.

The Tutorials can be accessed via the Online Tutorials desktop icon once the testing software has been installed. The Tutorials may also be accessed through eDIRECT.

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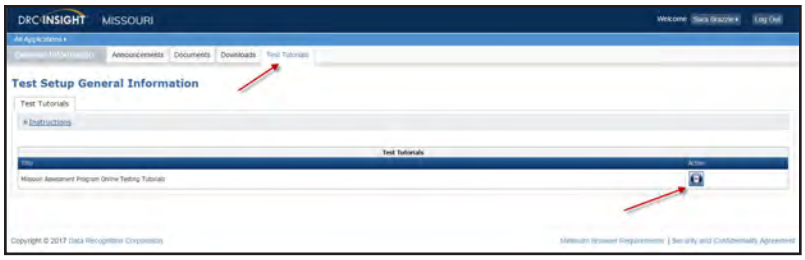
Instructions for Accessing the Tutorials through eDIRECT



1. Navigate to eDIRECT, https://mo.drcedirect.com. (Login is not required.)
2. Under **Test Setup** select **General Information**.
3. Select the **Test Tutorials** tab.
4. Select the **Play Tutorial** action button.
5. Select **Play All** or choose from different sections within the tutorial.

The Tutorials walk students through the software and tools that are available. In the Tutorial, the student can move forward as directed or jump around if desired. A menu at the left of the page allows the student to select specific sections for review.

List of INSIGHT Keyboard Shortcuts and Icons

During online testing, all students may have access to a printed list of the keyboard shortcuts and icons available in INSIGHT. The list may be printed from Appendix B or may be accessed on the **Documents** page of eDIRECT, https://mo.drcedirect.com.

Science Practice Items

Additional practice items for Science include constructed-response items and a performance event for grades 5 and 8. They allow students to practice with the item types and the functionality of the testing environment that they will experience during summative testing. The Science practice items can be accessed via the INSIGHT desktop icon once the testing software has been installed. Science practice items can also be publicly accessed using the Google Chrome browser at https://wbte.drcedirect.com/MO/portals/mo. Scoring materials for the practice items are available on the **Documents** page of eDIRECT (login required). After a practice test is closed, student responses are no longer available in the online system.

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2.0 BEFORE ONLINE TESTING

2.1 Advance Announcements and Preparation

Parents and guardians should be informed of the district MAP Grade-Level Assessment schedule so they can help ensure their students are present on the testing days (without scheduled appointments or vacation days during the testing window) and prepared with the proper materials that may not be provided by the district.

In addition to completing the applicable content for their grade level, students should have experience using the specific device on which they will be taking the assessments. Students taking the assessments on a desktop or laptop computer should know how to use a mouse and keyboard. Instead of a mouse, students may use the embedded touchpad in the keyboard of a laptop. Students taking the assessments on iPads or Android devices should know how to use a touchscreen (and/or stylus, if applicable). It is strongly recommended, but not required, that students taking the assessments on tablet devices have access to (and know how to use) an external keyboard. Students should review the INSIGHT Online Tools Training (OTT) for the MAP Grade-Level Assessment they will be taking. OTTs are for Test Examiners and students to become familiar with the format and functionality of the online test. The OTTs provide a preview of the item types included in the MAP Grade-Level Assessments. Item types are listed and described in Appendix A.

MAP Grade-Level Assessments are available on the following devices:

- **Desktop Computers**
- **Laptops**
- **Netbooks**
- **Chromebooks**
- **iPads**
- **Some Android devices**

Students should be familiar with the device on which they will be taking the assessment prior to testing. Please see the INSIGHT User Guide for complete device specifications.

DTCs must ensure that all STCs/ Test Examiners, and other responsible district and/or school staff have been trained.

2.2 User Roles

The District Test Coordinator (DTC) is responsible for training all School Test Coordinators (STCs) on testing procedures. If a district does not have STCs, the DTC performs the role of the STC. While the training of Test Examiners may be delegated to each building's STC, the DTC is responsible for ensuring that all Test Examiners are well-prepared and trained. Training includes special education teachers, proctors, translators, and Test Examiners who are administering the MAP Grade-Level Assessments to homebound or out-of-district students.

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Test Examiner Responsibilities

All Test Examiners are responsible for the following:

- Ensure all grade-level testing materials are secure at all times. **Both written and verbal discussion of specific MAP Grade-Level Assessment items breach the security and integrity of the test.** Discussion between Test Examiners, proctors, translators, or any district staff regarding test items is not permitted.

- Ensure any additional testing materials or tools are available or provided, such as:
  - a dictionary and a thesaurus for the ELA writing prompt
  - scratch and graph paper
  - Braille paper (if provided)

- After testing is complete:
  - Check that tests have been submitted.
  - Check that tests are closed in the system.
  - Collect the Large Print, Braille, and/or paper/pencil materials from the students, and prepare materials for return to the STC.
  - Transcribe Large Print, Braille, and paper/pencil edition responses into INSIGHT.
  - Contact the STC for guidance regarding the handling of any contaminated test materials.
  - Collect all draft, scratch, grid, graph, or Braille paper and return all used materials to the DTC/STC for secure shredding.

Test Examiners must ensure that all grade-level testing materials are secure at all times. Although this manual is not considered secure, it contains links to secure test materials.

Both written and verbal discussion of specific MAP Grade-Level Assessment items breach the security and integrity of the test.

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2.3 Test Security

Administrators and Test Examiners are responsible for reporting any intentional or unintentional unethical behavior by students or staff members to district administration and/or to the DESE Assessment Section at 573-751-3545 or assessment@dese.mo.gov.

Test security and ethical testing practices continue to be of utmost importance. A test security policy must be in place for each district and charter school. The test security policy should be placed in the District's Assessment Plan, which is approved by the local board annually. The accurate assessment of student achievement is a critical component of the educational process in Missouri. It is the responsibility of everyone involved in the assessment process to understand the security measures in place to avoid any intentional or unintentional unethical behavior by students or staff members. Administrators and Test Examiners are responsible for reporting any of these behaviors to district administration and/or to the DESE Assessment Section at 573-751-3545 or assessment@dese.mo.gov.

Preparing for computer-based testing includes determining the physical layout of the computer lab, training teachers and staff, and preparing students. Although DESE does not provide specific requirements for a computer lab, the lab must be set up with test security in mind. Workstations must have adequate space between them so that students are not able to view one another's screens.

Instructional materials must be removed or covered, including, but not limited to, information that might assist students in answering questions that is displayed on bulletin boards, chalkboards, dry-erase boards, or charts (e.g., wall charts that contain literary definitions, maps, mathematics formulas, etc.).

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District and School Test Coordinators, Test Examiners, translators, proctors, and any other district and/or staff who have testing responsibilities must follow test security procedures. The tests **must not** be read, scored, reviewed, photocopied, duplicated, scanned, transported by students, or made accessible to personnel not responsible for testing. **Both written and/or verbal discussion of specific MAP Grade-Level Assessment items breach the security and integrity of the test and may result in an invalidation or loss of scores for accountability purposes.**

Both written and/or verbal discussion of specific MAP Grade-Level Assessment items breach the security and integrity of the test and may result in an invalidation or loss of scores for accountability purposes.

Translators and transcribers who read student test items and answers must maintain test security at all times. Test items or answers must not be discussed with anyone at any time. When hard-copy editions of the test are not in use, they must be stored in a secure, locked location outside of the classroom. **Large Print, Braille, and paper/pencil editions of the tests must be transcribed into INSIGHT and shipped back to DRC following the procedures in Section 5.3 in this manual once testing is complete.**

Test security and ethics also include standardized training for all District and School Test Coordinators, Test Examiners, translators, proctors, and any district and/or school staff who have responsibilities in testing. Training webinars from DESE and manuals (including this manual) are provided for training purposes at http://dese.mo.gov/college-career-readiness/assessment/grade-level. This *Test Examiner Manual* is also available on the **Documents** page of eDIRECT.

This *Test Examiner Manual* may be reviewed before testing, NOT the secure tests. Only translators may review secure test material prior to test administration.

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2.4 Assessment Materials for Students/Administrators

This section concerns all materials required, permitted but not provided, or prohibited while taking Grade-Level Online Assessments.

Required Materials

- A workstation with Internet access, a monitor, a mouse, and a keyboard for each student, **OR** a tablet device with Internet access if a student will be testing on a tablet. Devices must have INSIGHT properly loaded and certified.
- Student Test Tickets (This ticket provides the secure login credentials (i.e., username and password) required for a student to use the testing software.)
- The resources in Table 7.

Table 7: Additional Required Resources for ELA, Mathematics, and Science

Content Area	Session 1	Session 2	Session 3	Session 4 (Writing Prompt)
ELA	• Headphones are required for students using text-to-speech. • Scratch paper should be provided for note taking if necessary.	• Headphones are required for students using text-to-speech. • Scratch paper should be provided for note taking if necessary.	• Headphones are required for all students taking this session. • Scratch paper should be provided for note taking if necessary.	• Headphones are required for students using text-to-speech. • Scratch paper should be provided for note taking if necessary.
Mathematics	• Headphones are required for students using text-to-speech. • Scratch paper is required for all grades.	• Headphones are required for students using text-to-speech. • Scratch paper is required for all grades.	• Headphones are required for students using text-to-speech. • Scratch paper is required for all grades.	N/A
Science	• Headphones are required for students using text-to-speech. • Graph paper is required. • Scratch paper is required.	• Headphones are required for students using text-to-speech. • Scratch paper is required.	• Headphones are required for students using text-to-speech. • Graph paper is required. • Scratch paper is required.	N/A

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Permitted Materials

- Scratch paper and grid/graph paper are allowable for all assessments even if not required.
- A physical calculator can be accessed for calculator-allowed items for the Mathematics assessments.
  - For grade 6 Mathematics assessments, a four-function calculator with square root and percentage functions is permitted.
  - For grades 7 and 8 Mathematics assessments, a scientific calculator with exponents, trigonometry, and logarithmic functionalities is permitted.
  - Test Examiners are responsible for ensuring and verifying that any calculator with the ability to store functions and equations (e.g., a scientific calculator) has the memory cleared before and after each Mathematics assessment.
  - Calculators cannot have Internet connectivity or be able to connect to anyone inside or outside the classroom during testing.
  - Students cannot use a calculator on a laptop or other portable computer, pocket organizer, cell phone, device with a typewriter-style keyboard, electronic writing pad, or pen-input device unless a particular assistive device is required for a student and is specified on his or her IEP.
  - No calculators with QWERTY keyboards are allowed.
- An English dictionary and a thesaurus may be available for the ELA session 4 writing prompt. ELL students may use an English, a non-English, and a bilingual dictionary and thesaurus as needed during session 4.

Prohibited Materials

- Electronic devices, including any portable device that can connect to the Internet or to anyone inside or outside of the classroom, must not be accessible during the testing sessions. Such items include, but are not limited to:
  - cellular/mobile phones
  - electronic music players
  - digital cameras
  - handheld scanners
  - portable gaming devices
  - any device that can connect to the Internet
- If students are allowed to enter the testing room with cell phones, the phones **must** be collected prior to testing and returned at the end of the testing session. Students are not allowed to have cell phones in their pockets, purses, or backpacks during testing.

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Assessment Materials and Training for Test Examiners

- *Test Examiner Manual*
- Grade-Level Assessment training provided online by DESE
- Student Test Tickets (obtained from the School Test Coordinator)

  NOTE: All materials distributed to the students with usernames and passwords must be collected before the students leave the testing area.
- Extra pencils and a supply of scratch and grid/graph paper

NOTE: Physical scratch paper should be collected and destroyed immediately upon conclusion of a testing session.

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3.0 DURING ONLINE TESTING

Use the following information and script to assist students with the login procedures.

The Test Examiner (TE) should verify the security of the testing environment prior to beginning a test session. TEs must ensure that students do not have access to prohibited devices and materials during testing.

To ensure that all students are tested under the same conditions, the TE should adhere strictly to the script for administering the test. These instructions can be found after the word "SAY" on the following pages. When asked, the TE should answer questions raised by students but should never help the class or individual students with specific test items. Except for single words, no test items can be read to any student for any content area, unless specified as an accommodation.

Please remember that the script must be followed exactly and used each time a test is administered. If the class is resuming a test and the TE is sure that all students are able to log in without hearing the login directions again, the TE may skip the italicized portions of the directions for the login section.

All directions that a TE needs to read to students are indicated by the word "SAY" so they stand out from the regular text. They should be read exactly as they are written, using a natural tone and manner. If the TE makes a mistake in reading a direction, the TE should stop and say, "I made a mistake. Listen again." Then the direction should be reread.

The TE should try to maintain a natural classroom atmosphere during the test administration. Before each test begins, he or she should encourage students to do their best.

Any time a student logs in to the testing system, the TE should follow this script. This includes logging in to complete any session of the Assessment.

For sessions requiring listening devices, including ELA Session 3 and all sessions using text-to-speech technology, please ensure prior to testing that all listening devices are working properly and that the volume is set at an acceptable level (e.g., headphones, earbuds).

The TE should adhere strictly to the script for administering the test.

Test Examiners may read/pronounce one word per sentence to any student.

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3.1 Specific Administration Information

1. The TE distributes the Test Tickets.

You should have received Test Tickets for this testing session from your DTC or STC. Before beginning, ensure that you have all of the correct test tickets for the students who will be testing. Note the Test Name and read it aloud where the script states [Test Name].

If students are starting a new session:

SAY **You are about to take (the) [Test Name].**

If students are resuming a session:

SAY **You are about to continue (the) [Test Name].**

I will now hand out a Test Ticket to each of you. When you receive your Test Ticket, check that your name appears on the ticket. If your name does not appear, raise your hand.

Distribute test tickets to each student, ensuring that each student is given the correct ticket with his or her name printed on it. Contact your STC or DTC if a ticket is missing or incorrect.

2. The TE directs students to the test sign-in page.

SAY **Now select the "DRC INSIGHT Online Assessments" icon that appears on your screen.**

Students using a laptop or desktop workstation should double click on the icon. Students using a Chromebook, iPad, or Android device should tap on the icon. Help students if they have trouble activating the icon. Some devices are configured for multiple assessments. If that is the case, read number 3 below to the students. If not, go to number 4.

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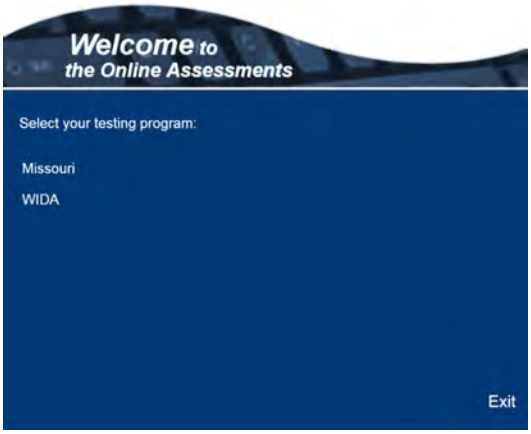
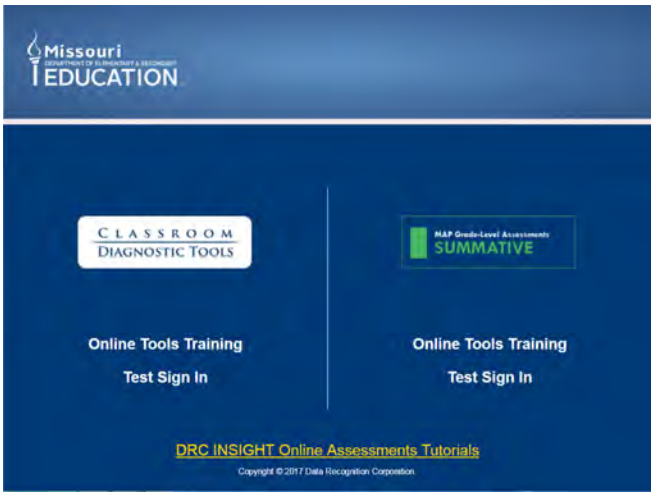
3. **The TE instructs students to select testing program.**

SAY **On your screen, you will be asked to select your testing program. Select "Missouri."**

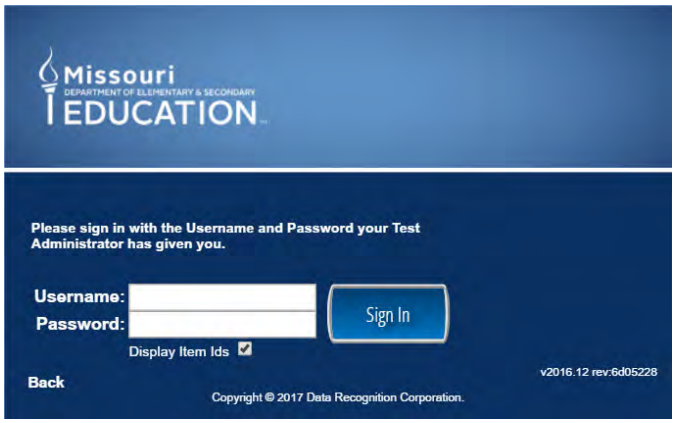


4. **The TE instructs students to log in.**

SAY **At the top of your screen you should see "Missouri Department of Elementary & Secondary Education." On the right-hand side, you will see links for the Online Tools Training and Test Sign in for the MAP Grade-Level Assessments Summative test. Please select "Test Sign In."**



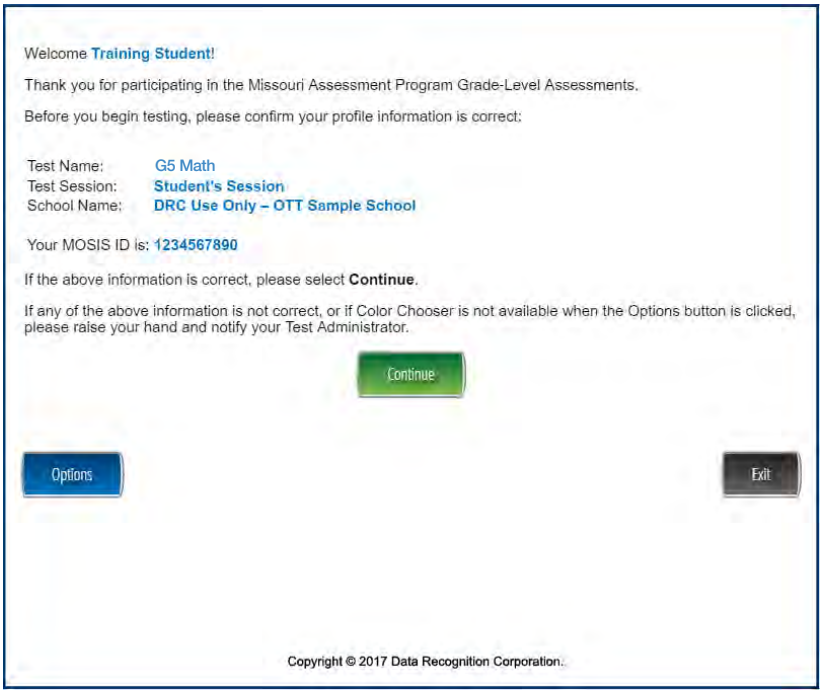
SAY **This is the Login screen. Type your username and password from your Test Ticket into the correct boxes on the screen. Then select "Sign In."**



Test Ticket information is unique to each student and each session but is not case sensitive. Assist students as needed; TEs may have to help students type in this information. After the login, make sure all students are on the correct screen. Wait for all students to reach this page.

SAY **This is the Welcome screen. Please check that your name appears at the top of the screen. Check that the test name is [Test Name] and the test session is [Test Session]. Then check that your school is correct. If everything is correct, select "Continue." If your information is not correct, please raise your hand.**

If a student's information is incorrect, the TE should contact the STC and/or the DTC.



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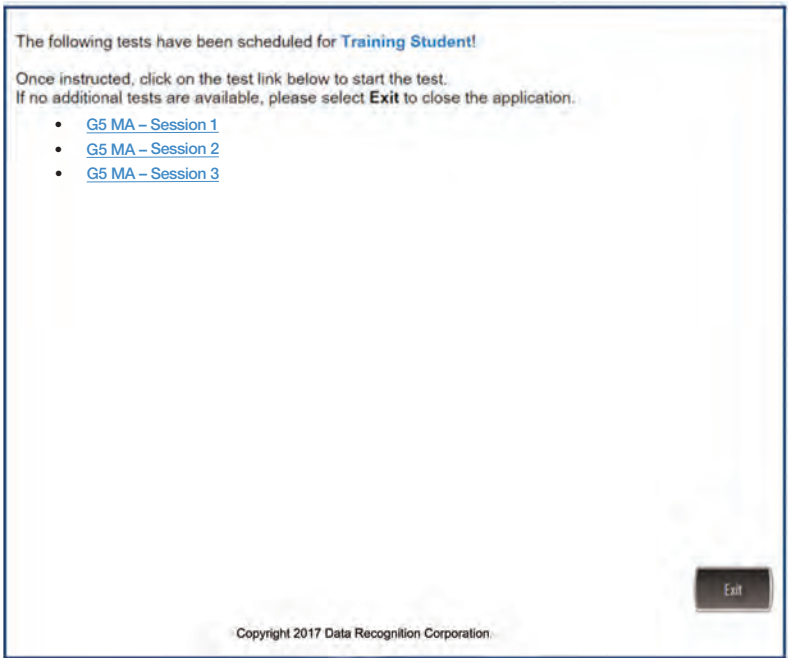
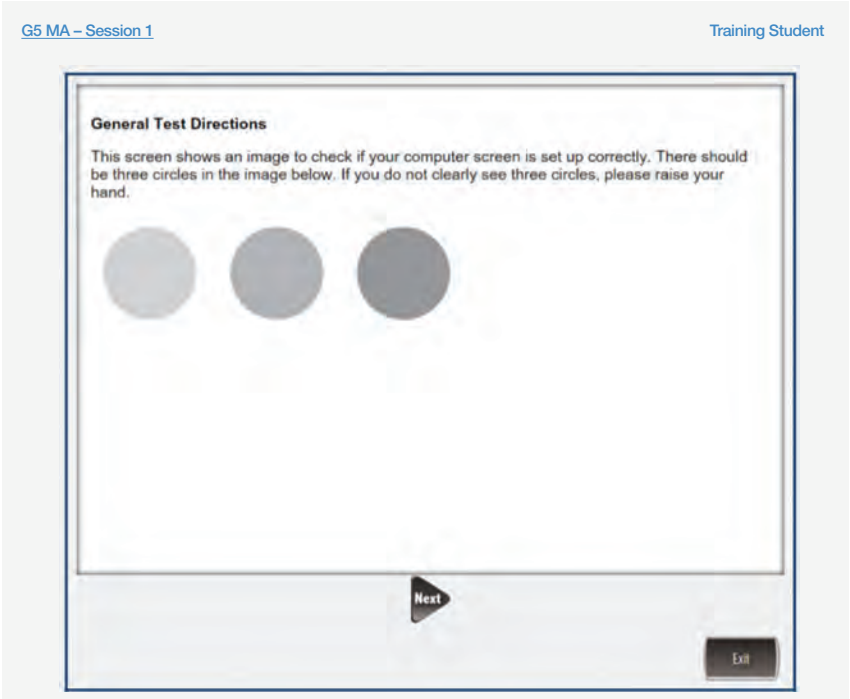
SAY **You are now on the screen that shows the name of the test you are scheduled to take. If you do not see this, please raise your hand. Please select the test link that is shown.**



SAY **You are now on a screen that is used to make sure your computer screen is set up correctly. If you do not see three circles, please raise your hand.**

Once you have confirmed that all students have three circles,

SAY **Select the NEXT arrow to continue.**



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SAY

The following screens contain the test directions for the test you are taking today. Please read the directions carefully. If you have any questions about the directions, raise your hand. You can find the directions during your test by clicking the HELP button in the top right corner.

During the test, you may see a page with no test questions. Follow the directions on the page to continue taking the test.

If you are unsure of an answer, provide what you think is the best answer; there is no penalty for guessing. If you would like to review that answer at a later time, mark the item for review by clicking the FLAG at the bottom of the screen before going on to the next question. Flagging the item will remind you to go back and decide whether or not you want to change the answer.

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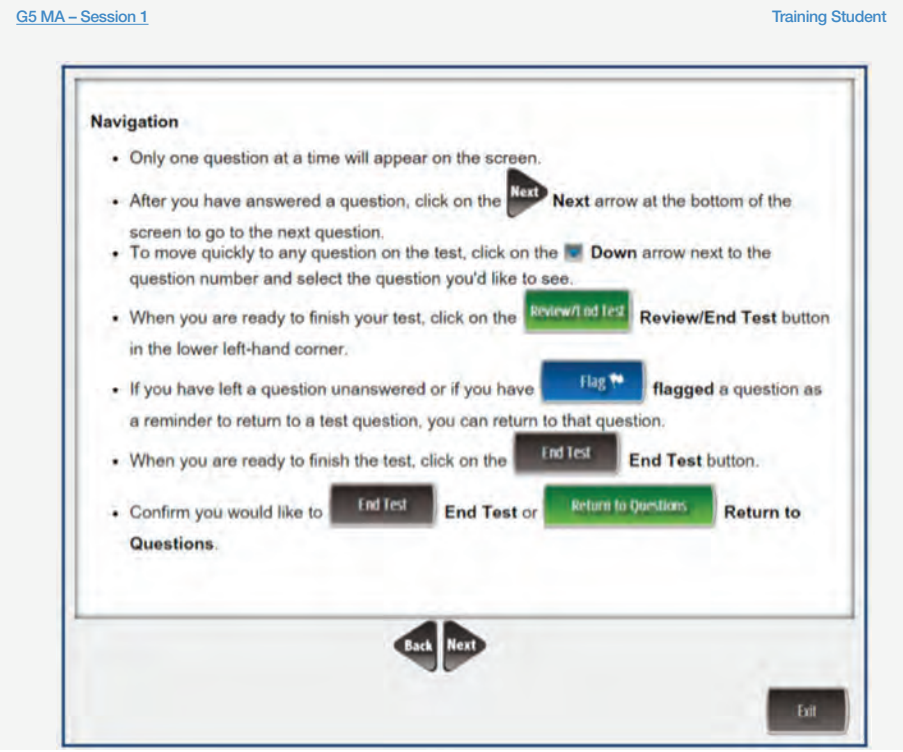
SAY

You may PAUSE at any point in the test by clicking PAUSE after answering an item. The PAUSE button is used to stop the test. Please raise your hand if you need a break and ask me before you click PAUSE. After pausing, a timer will appear on your screen. After your break, click on the RESUME button to continue. If you pause for more than 20 minutes, you will need to log back in.

Your answers need to be your own work. Please keep your eyes on your own test and remember that there should be no talking.

When you are ready to begin your test, click BEGIN THE TEST.



Students may PAUSE at any point in the test by clicking PAUSE after answering an item. The PAUSE button is used to stop the test. Students must raise their hands if they need a break and ask the TE before clicking PAUSE. After pausing, students must click on the RESUME button to continue. If students pause for more than 20 minutes, they will need to log back in.

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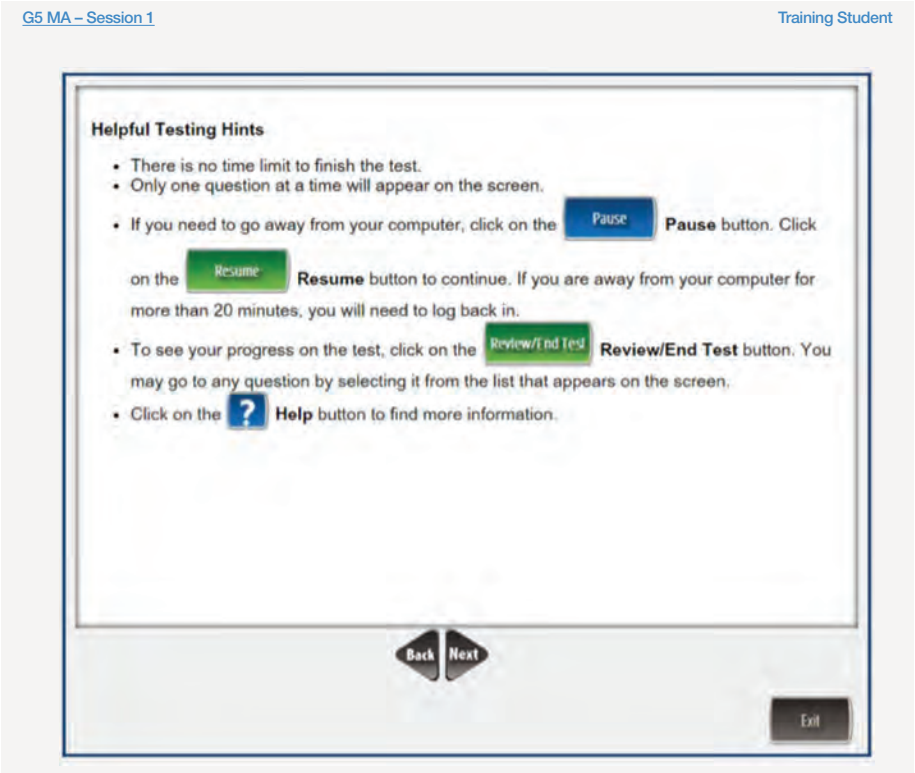

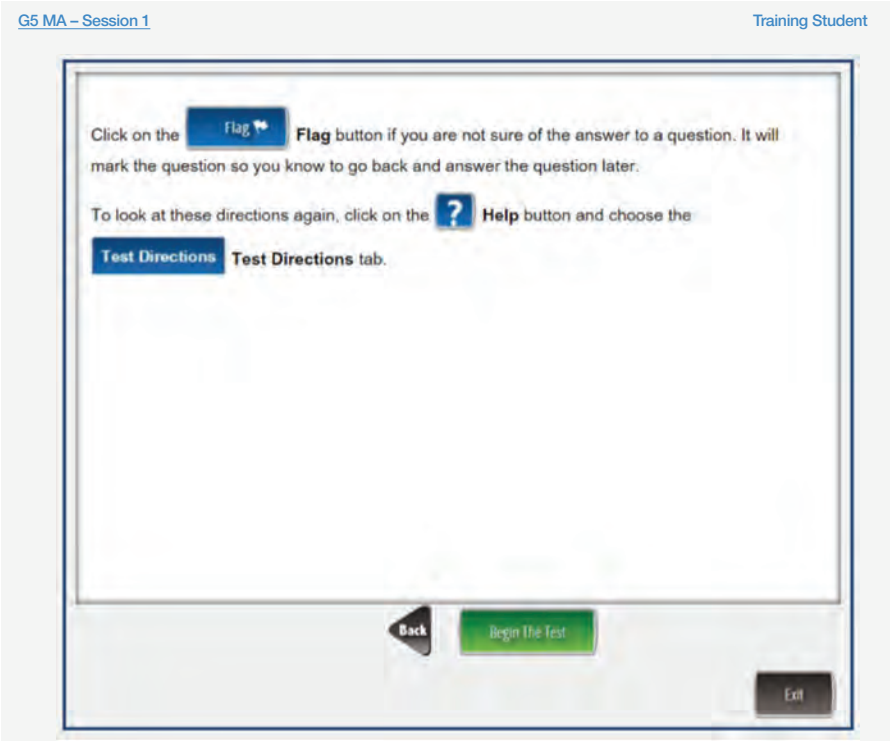

5. The TE monitors student progress.

Monitoring Test Progress

Once students have started their tests, the TE should circulate through the room to ensure that all conditions of test security are maintained. If the TE witnesses or suspects the possibility of a test security incident, the STC and DTC should be contacted immediately in accordance with the security guidance provided in this manual.

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If the TE notices that a student is off task, the TE may say the following statement to the student, verbatim, to keep him or her focused.

SAY **It is important that you do your best. Do you need to pause the test and take a break? Be sure to press the Pause button. Do not end the test.**

If a student asks for assistance either in answering an item or manipulating an item type, the TE should let the student know that he or she should try his or her best, but that the TE cannot help answer an item.

SAY **I can't help you with your test. Check the HELP button to read the directions.**

The TE may remind the student to reread the instructions for that item.

6. The TE ends the test session.

When there are approximately ten minutes left in the test session, the TE should give students a brief warning.

If students will continue this portion of the test at a later time, read aloud the following two scripts:

SAY **We are nearing the end of this test session. Please review any completed or marked items now. You will be able to finish the test at another time.**

At the end of the session:

SAY **This test session is now over. Click PAUSE, then click EXIT, and then click YES, EXIT. You will be able to finish at another time. I will now collect any scratch paper or other material.**

If students are completing this portion of the test, read aloud the following two "SAY" scripts:

Test Examiners may read/pronounce one word per sentence to any student.

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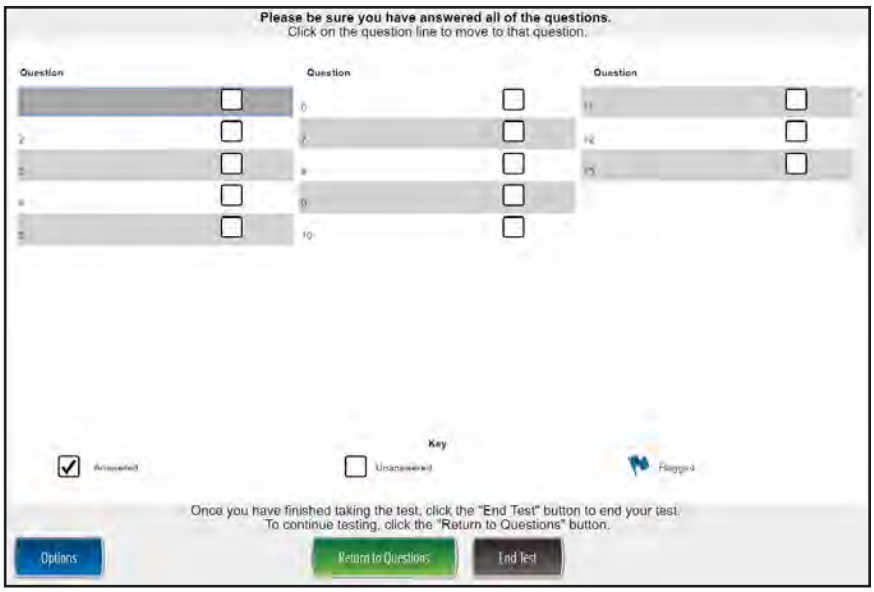
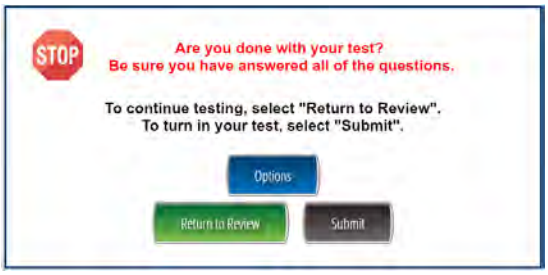
SAY **We are nearing the end of this test session. Please review any completed or marked items now. Do not submit your test unless you have answered all of the questions.**



After answering the last item in each session, the student will press the Review/End Test button at the bottom left-hand corner of the screen. The student is then presented with a screen prompting him or her to review answers (marked and unmarked) for all items prior to submitting the test. At that point, the student can either click the Return to Questions button to answer previously unanswered questions or press End Test to submit the test. Once the student has pressed on the End Test button, the student must provide a confirmation that he or she is done. If a student needs additional testing time, direct him or her to pause the test and then exit so testing can continue at another time.

SAY **This test session is now over. When you have finished, click the "End Test" button. Then click on Submit, confirming that you are done. Then click on the last screen to close the test. I will now collect any scratch paper or other material.**



TEs should collect any scratch paper.

Testing Over Multiple Sessions or Days

For some tests, students may be best served by sequential, uninterrupted time that may exceed the time in the regular class schedule.

If the TE intends to administer a session over the course of multiple days for a student or group of students, TEs may ask students to pause and exit after they reach a designated point. For most tests, there is nothing built into the system to prevent students from progressing from one section of the test to another. In those cases, the TE should give the students clear directions on when to pause. For example, TEs may designate a certain amount of time for testing. This guidance may be written on a dry-erase board, chalkboard, or another place that students can easily see.

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3.2 Moving a Student During an Assessment

Occasionally a student must be moved to a new location to continue testing. In order for the student to continue his or her test, complete the following steps:

1. Pause and end the student's online assessment. To do so, select the "Pause" button, then select the "Exit" button, and then select the "Yes, Exit" button. (Once the student exits the test, the workstation becomes immediately available for other use.)

2. Escort the student to the new location.

3. Using the login and password from the student's Test Ticket, log the student in to his or her assessment at the new workstation to complete the assessment.

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4.0 AFTER ONLINE TESTING

4.1 Reporting Test Invalidations

Neither a student's behavior during testing nor the judgment of a student's effort during testing can invalidate a student's test.

A MAP Grade-Level Assessment should be invalidated if a student is discovered cheating. To do so, select the "Teacher Invalidation" bubble for the affected content area in eDIRECT. (See the eDIRECT User Guide for instructions.) Cheating is the only time the "Teacher Invalidation" code is used. This code invalidates all sessions of the content area.

If the "Teacher Invalidation" bubble is used due to cheating, adhere to the following process:

1. The STC and the Test Examiner agree that a particular student's test should be invalidated.

2. A district invalidation letter on district letterhead and signed by the superintendent is faxed to DESE's Office of Accountability Data at 573-526-3045.

3. The district invalidation fax should include the following information:
   a. Student Name
   b. MOSIS ID
   c. Date of Birth
   d. Grade
   e. School Name
   f. County District Code
   g. District Name
   h. School Code
   i. Content Area
   j. The reason the testing session is being invalidated/description of the incident

4. The district files a copy of the fax for its records and future reference.

4.2 How to Handle Student Absences

If a student is absent for any or all of the MAP Grade-Level Assessments and unable to test in district determined make-up sessions, then mark the student as absent in eDIRECT. (ELLs in-country less than one year and being exempted from the ELA assessments are also treated as absences in eDIRECT.)

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5.0 LARGE PRINT, BRAILLE, AND PAPER/ PENCIL EDITIONS

Large Print, Braille, and paper/pencil editions of the MAP Grade-Level Assessments will be available for students with designated IEPs or special circumstances for spring 2017 testing. Test Examiners will work with the District Test Coordinator to generate paper/pencil editions from eDIRECT (after students are assigned an accommodation). Unique identification numbers will be used to produce barcodes that will be printed onto the paper/pencil editions. After testing, student responses for Large Print, Braille, and paper/pencil editions must be entered into the INSIGHT system, and all test materials must be collected for return to DRC for processing and storage.

For additional information regarding Large Print and Braille forms, refer to the Large Print and Braille Kit and follow the instructions in the Braille Omit Return Instruction Sheet.

5.1 Before Testing

Paper/Pencil Materials

For special circumstances that require students to test on paper, a paper/pencil edition is a part of the test delivery system. To activate the paper/pencil edition print function, Test Examiners access the Test Setup feature in eDIRECT to mark the applicable accommodation and code for students who require the paper version of the test. Once accommodations are assigned, the Test Examiner will contact the District Test Coordinator to generate the paper version. Using the information collected during the precode and enrollment processes, the administration component of the online testing system will generate a unique barcode number for a paper/pencil edition prior to local printing. Depending on the printed accommodation needed for a particular student, the unique barcode number will then become embedded into the electronic version on each page of the paper/pencil form. During local printing, the embedded barcode number will print along with each page of the paper/pencil edition. Each barcode number will be unique to a student for the purposes of linking the printed form to the student's record in the master database. Barcode numbers will be recorded and associated with each student's record.

For specific instructions regarding how to generate and download a paper/pencil edition from eDIRECT, see the *eDIRECT User Guide—Test Setup*, available on the **Documents** page of eDIRECT, https://mo.drcedirect.com.

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Once the PDF downloads, it is available for printing on the local network printer. Test Examiners will work with the District Test Coordinators to obtain the printed versions of the test so that proper accountability is maintained.

The Test Examiner should become familiar with the directions for administering a paper/pencil edition. The paper/pencil edition of the test is secure and should be treated as such.

Large Print and Braille Materials

Test Examiners or Test Coordinators must transcribe students' responses into INSIGHT.

Large Print and Braille testing materials are packaged by building and shipped to the district's office address (or the shipping address indicated by the district during the registration process). The materials shipped to the district are based on the content-specific test window entered during registration.

Test Examiners must also count the number of books received and assign each test book to a student. Write the student's name and MOSIS ID on the front of each test book.

Document this information in preparation for returning the test books to the STC.

Contaminated Test Materials

Test materials are considered **contaminated** due to: a) a student health issue that affects the test book itself (blood, fluids, etc.) or b) contact with any potentially hazardous material. If test materials are contaminated, the Test Examiner should notify the School Test Coordinator for instructions for handling the contaminated materials since **all** printed testing material must be accounted for. The DTC, or STC, or TE is responsible for transcribing the answers into the online system, and then the contaminated test materials must be securely destroyed at the test site by the DTC or STC. The DTC or STC should fill out the Missing Materials section of the Accountability Form to account for the contaminated test materials located under the Materials section of eDIRECT.

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Duration and Timing Information

The scheduling/rules for each component of the Large Print, Braille, and paper/pencil assessments are included in tables 8, 9, and 10. Note that the duration, timing, break/pause rules, and session recommendations vary for each content area and component. This information is for scheduling purposes only, as the assessments are untimed.

Table 8: Assessment Sequence for Large Print, Braille*, and Paper/Pencil—English Language Arts

ELA	Session 1	Session 2	Session 3	Session 4 (writing prompt)
Content and Duration of Sessions	This session assesses the Reading Strand. It contains passage-based selected-response and enhanced items. **Recommendation:** • Session duration ranges from 45–80 minutes.	This session assesses the Research and Writing Strands. It contains selected-response and enhanced items. **Recommendation:** • Session duration ranges from 25–45 minutes.	This session assesses the Listening Strand. It contains passage-based selected-response and enhanced items. **Recommendation:** • Session duration ranges from 20–40 minutes.	The writing prompt is presented in one session. **Recommendation:** • Session duration ranges from 90–120 minutes.
Total Duration	**Recommendation:** • Student completes this component within three days of starting.	**Recommendation:** • Student completes this component within three days of starting.	**Recommendation:** • Student completes this component within three days of starting.	**Recommendation:** • Student completes in one test session.

*Braille administration times will likely be longer than the times indicated here.

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Table 9: Assessment Sequence for Large Print, Braille*, and Paper/Pencil—Mathematics

Mathematics	Session 1	Session 2	Session 3 (Performance Event)
Number and Duration of Sessions	This session assesses the Mathematics Strands. It contains selected-response and technology-enhanced items. **Recommendation:** • Session duration ranges from 35–50 minutes.	This session assesses the Mathematics Strands. It contains selected-response and technology-enhanced items. **Recommendation:** • Session duration ranges from 35–50 minutes.	This session assesses the Mathematics Strands. It contains a performance event that is comprised of related selected-response and technology-enhanced items. **Recommendation:** • Session duration ranges from 15–30 minutes.
Total Duration	**Recommendation:** • Student completes this component within two days of starting.	**Recommendation:** • Student completes this component within two days of starting.	**Recommendation:** • Student completes this component within three days of starting.

*Braille administration times will likely be longer than the times indicated here.

Table 10: Assessment Sequence for Large Print, Braille*, and Paper/Pencil—Science

Science	Session 1	Session 2	Session 3 (Performance Event)
Number and Duration of Sessions	• Administer in one session. • Session duration ranges from 45–55 minutes.	• Administer in one session. • Session duration ranges from 20–25 minutes.	• Administer in one session. • Session duration ranges from 45–65 minutes.
Total Duration	**Recommendation:** • Student completes Session 1 in a single session.	**Recommendation:** • Student completes Session 2 in a single session.	**Recommendation:** • Student completes Session 3 in a single session.

*Braille administration times will likely be longer than the times indicated here.

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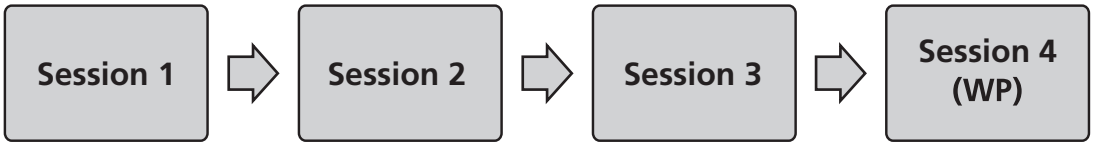
Recommended Order of Test Administration for ELA



Recommended Order of Test Administration for Mathematics

Recommended Order of Test Administration for Science

Students may take sessions on separate days. Districts/schools may opt to administer in a different order, if needed.

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5.2 During Testing

This section provides an overview of preparing the testing environment, guidelines for test administration, and directions for accessing specific scripts for administering the Large Print, Braille, and paper/pencil editions. Test Examiners should become familiar with this section well in advance of the start of testing.

The scripts are secure; do not print or allow unauthorized persons to access them. Maintaining the security of all test materials is crucial to obtaining valid and reliable test results. Therefore, test materials must be kept in locked storage, except during actual test administration. It is the responsibility of all individuals who administer the test to follow security procedures.

Before administering the assessment, make sure that you have the following materials available for students:

- A test book for each student
- At least two sharpened No. 2 pencils
- Blank scratch paper for each student
- An English dictionary and a thesaurus for the writing prompt
- A four-function calculator with square root and percentage functions is permitted for students in grades 3–5 as an accommodation only, as the assessments include no calculator-allowed items. (Calculators must meet the guidelines below.)
    - DESE does not provide, endorse, or recommend a list of calculator brands or types that students are permitted to use. Test Examiners should follow their own district's general education policy for the types of calculators permitted during district-administered quizzes, benchmark tests, common assessments, chapter/unit tests, and final exams.
    - Calculators cannot contain stored equations or functions at the time of the MAP Grade-Level Mathematics Assessments. Test Examiners are responsible for ensuring and verifying that calculators that have the ability to store functions and equations, e.g., a scientific calculator, have the memory cleared before and after each Mathematics Assessment.
    - Calculators cannot have Internet connectivity or be able to connect to anyone inside or outside the classroom during testing. Students cannot use a calculator on a laptop or other portable computer, pocket organizer, cell phone, device with a typewriter-style keyboard, electronic writing pad, or pen-input device unless a particular assistive device is required for a student and is specified on his or her IEP.
    - No calculators with QWERTY keyboards are allowed.

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Specific Directions for Administering the Braille Form

The directions in this manual also apply to the administration of the Braille version of the Summative Assessments. Additional Braille instructions are as follows:

- The student's name, Test Examiner's name, district, and school must be printed on the front cover of each Braille test book.
- Because extra time may be needed for administering the Braille version, it is recommended that students be tested individually or in a small-group setting.
- When a Braille student responds by pointing to the answers or giving a verbal response in English only, the Test Examiner is permitted during the course of test administration to fill in student responses in the student test book. When a Braille student responds by using a Braillewriter or marking answers in the test book, the procedures for transcribing student responses detailed in the 5.3 "After Testing" section of this manual should be followed. In each instance, the Test Examiner must provide written affirmation to the School Test Coordinator that student responses have been completed in the student test book with accuracy. Under no circumstances should a student's answer be altered or edited—to do so is a direct violation of test security.

Scripts for Administering the Large Print, Braille, and Paper/Pencil Editions

The specific scripts for administering the Large Print, Braille, and paper/pencil editions of each assessment are located on the **Documents** page of eDIRECT, https://mo.drcedirect.com.

1. From the eDIRECT homepage, log in using your eDIRECT credentials.
2. In the left navigation pane, under **General Information**, select **Documents**.
3. In the main page on the **Documents** tab,
   a. Choose "Summative Grade-Level Assessments Spring 2017" from the Administration drop-down.
   b. Choose "Scripts" from the Document Type drop-down.
   c. Click "Show Documents." A list of all available scripts will appear in the grid.

5.3 After Testing

Assemble Materials for Return and for Entry into INSIGHT

After testing has been completed, prepare materials to be returned to the School Test Coordinator. Check test books to make sure there are no sticky notes, staples, pins, paper clips, or tape of any kind on any pages. Check to make sure that no scratch or graph paper was left inside test books. Remove any extraneous material.

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Transcription of Large Print, Braille, and Paper/Pencil Editions

After testing, student responses for Large Print, Braille, and paper/pencil editions **must** be transcribed into the INSIGHT testing software before the district's test window closes. It is recommended that transcription occur as soon after testing as possible. To transcribe responses requires the Test Examiner or other designated and authorized district or school personnel to log in to INSIGHT using the student's Test Ticket. Follow these steps to transcribe student answers:

1. In eDIRECT Test Setup, ensure that the student has been assigned the appropriate accommodation:

    a. Paper-Based Assessment

    b. Paper-Based Braille

    c. Paper-Based Large Print

2. In eDIRECT Test Setup, assign the student to a test session and print his or her Test Ticket. Retain the Test Ticket rather than distributing it to the student.

3. After the student has completed the test on paper, use a device that has the INSIGHT client software installed and use the student's Test Ticket to log in to the student's test.

4. Begin transcribing student responses. Once you have finished, select End Test and Submit. The Test Examiner should then return all printed test materials to the STC.

Transcribe the student's responses as faithfully and as completely as possible using the following guidelines:

- Do not transcribe erased or crossed out words or marks.
- If a student's response consists of incomprehensible squiggles, marks, etc., which clearly are not words or word fragments, then leave the item blank.
- If a student's response is wholly or partly illegible, enter "ILLEGIBLE" for the entire response or for the part where applicable.
- If 50% or more of a student's response is written in any language other than English, then note "WRITTEN IN ANOTHER LANGUAGE" where applicable.
- If part of a student's response cannot be entered into INSIGHT, then leave that part blank.
- If no part of a student's response can be entered, then leave the entire item blank.
- Additional clarifying notes may be entered as needed if the item type allows text entry.

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APPENDIX A: ITEM TYPES

As students engage with the MAP Grade-Level Assessments, they will be asked test questions that require them to use technology to respond in several ways, some of which may be new to students. The following table lists the different item types and briefly describes each one. The Online Tools Training (OTT) and Tutorials provide an opportunity to see examples of the item types administered on the assessments.

Content Area	Type of Item	Brief Description of How to Respond
ELA, Mathematics, and Science	Multiple Choice, single correct response	Select the radio button corresponding to one of four options. To deselect an option, select a different radio button. Select only one option.
	Short Answer/Text Input	Respond via keyboard entry into text box (no text formatting). This item type offers the ability to edit previously entered text.
	Drag and Drop	Click and drag an object to the appropriate location in the response area.
ELA and Mathematics	Multi-select, multiple correct responses	Mark a checkbox corresponding to an option. To deselect an option, click on the checkbox that is already marked. Mark one or more options.
	Matching (with connecting lines)	Select an option from the first column and then select the corresponding option from the second column to create a line between them. You can match more than one corresponding option in the second column. To deselect an option, use the undo or redo buttons.
	Matching Tables (with a variation True/False or Yes/No)	Select a checkbox corresponding to an option in a table cell. To deselect an option, select a checkbox that is already marked.
Mathematics and Science	Table Fill In	Respond via keyboard entry into table cells or drag and drop objects into table cells.

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Appendix A: Item Types, continued

Content Area	Type of Item	Brief Description of How to Respond
ELA Only	Evidence-Based Selected-Response (EBSR)	This item type has two parts. Each part may consist of one of three item types: Multiple Choice, single correct response; Multi-select, multiple correct responses; and Hot Text, Select Text. See those item types for descriptions of how to respond.
	Hot Text, Select Text	Highlight an option by selecting it. To deselect an option, click on it to remove the highlighting. Select one or more options.
	Hot Text, Reorder Text	Select text and then click and drag text to a new area.
	Writing Prompt	Respond via keyboard entry using text formatting buttons. This item type offers the ability to edit previously entered text.
Mathematics Only	Hot Spot	Select targeted areas in the response area.
	Keypad Input	Select buttons representing numbers and mathematic symbols to create a numeric response or equation.
	Graphing	Plot points and/or draw lines in the response area.
Science Only	Line Graphing	Plot points and/or draw lines in the response area. Respond via keyboard entry into response fields.
	Build a Table	Respond via keyboard to make entries into table fields.

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APPENDIX B: INSIGHT KEYBOARD SHORTCUTS AND ICONS

The following list contains the keyboard shortcuts and icons available in INSIGHT. All students may have access to a printed copy of this list during online testing.

INSIGHT Function	Keyboard Shortcuts		
	Desktop	Chromebook	iPad
Transfers the focus from one button to the next (from left to right). The focus is indicated by a red box that appears around the selected tool or function button when the Tab key is pressed.	Tab	Tab	N/A
Transfers the focus from one button to the next (from right to left). The focus is indicated by a red box that appears around the selected tool or function button when the Shift key and Tab key are pressed.	Shift + Tab	Shift + Tab	N/A
Activates the tool or function highlighted by the red box. Pressing the Enter key or Space Bar a second time deactivates the tool or function (with the exception of tools that keep the focus, such as Sticky Notes).	Enter/Space Bar	Enter/Space Bar	N/A
Selects the highlighted test question from the Review/End Test page Selects the Sign In button after a Username and Password are entered Selects Continue from the Student Verification Page Selects the Go To Page number within the quick navigation drop-down menu	Enter	N/A	N/A

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Appendix B: INSIGHT Keyboard Shortcuts and Icons, continued

INSIGHT Function	Keyboard Shortcut		
	Desktop	Chromebook	iPad
Closes the Magnifier and "?" [Help] button when activated. If the red box is activated and the Esc key is pressed while on the tool bar without having any tools activated, the red box will move to the Pointer button.	Esc	Esc	N/A
Selects an answer option (i.e., ABCD) on a multiple-choice question when only one set of "ABCD bubbles" exists. Entering one of the letters fills or unfills the letter bubble before the answer option. Both uppercase and lowercase letters can be used.	ABCD, abcd	ABCD, abcd	N/A
Exits the online testing system from each page that has an Exit button	Alt + X	Alt + X	N/A
Moves any pop-up tool, such as the "?" [Help] button around the screen. (Does not work with Sticky Notes.)	CTRL + Right Arrow CTRL + Left Arrow CTRL + Up Arrow CTRL + Down Arrow	CTRL + Right Arrow CTRL + Left Arrow CTRL + Up Arrow CTRL + Down Arrow	N/A
Rotates the active tool +/– 1 degree	CTRL + plus [+] CTRL + minus [–]	CTRL + plus [+] CTRL + minus [–]	N/A
Moves the cursor up and down through a list of choices (such as questions on the Review/End Test screen)	Up/Down Arrows	Up/Down Arrows	N/A
Switches between multiple active pop-up tools on the screen	CTRL + Tab	CTRL + Tab	N/A
Activates the Review/End Test button and moves the user to the Review page of the test	Alt + R	Alt + R	Option + R
Activates the Pause button and pauses the test	Alt + P	Alt + P	Option + P

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Appendix B: INSIGHT Keyboard Shortcuts and Icons, continued

INSIGHT Function	Keyboard Shortcuts		
	Desktop	Chromebook	iPad
Activates the Flagged button and marks an item as flagged, or removes flag from an item	Alt + F	Alt + F	Option + F
Activates the Back button and moves the student back a question	Alt + B	Alt + B	N/A
Activates the Next button and moves the student forward a question	Alt + N	Alt + N	
INSIGHT Calculator Function			
Clears the calculator screen	Alt + Delete	Alt + Delete	N/A
Works as a shortcut key for subtracting on all calculators	–	–	
Works as a shortcut key for factorial on the Scientific Calculator/Graphing Tool	!	!	
Works as a shortcut key for using open parenthesis on the Scientific Calculator/Graphing Tool	(	(	
Works as a shortcut key for using closed parenthesis on the Scientific Calculator/Graphing Tool	)	)	
Works as a shortcut key for multiplying on all calculators	*	*	
Works as a shortcut key for dividing on all calculators	/	/	
Works as a shortcut key for squaring on the Scientific Calculator/Graphing Tool	@	@	
Works as a shortcut key for adding on all calculators	+	+	
Work as shortcut keys for numeric entry on all calculators	0–9	0–9	
Works as a backspace on all calculators	Backspace	Backspace	

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Appendix B: INSIGHT Keyboard Shortcuts and Icons, continued

INSIGHT Calculator Function	Keyboard Shortcut		
	Desktop	Chromebook	iPad
Works as a delete function on all calculators	Delete	N/A	N/A
Works as a shortcut to take a number to a specific power on the Scientific Calculator/ Graphing Tool	^	^	N/A
Works as the negate key on the Basic Calculator	,	‘	N/A
INSIGHT Audio (TTS) Function			
Activates the Options button and opens or closes the Audio settings selection pop-up window	Alt + A	Alt + A	Option + A
Activates the Options button and opens or closes the Color Chooser selection pop-up window	Alt + O	Alt + O	Option + O
Activates the Play/Pause button when Audio is active	F8 (Mac — use FUNC F8)	N/A	N/A
INSIGHT Writing Tools Function			
Undo	CTRL + Z	N/A	CMD + Z
Redo	CTRL + Y	N/A	CMD + Shift + Z
Highlight text to the left	Shift + left arrow	Shift + left arrow	N/A
Highlight text to the right	Shift + right arrow	Shift + right arrow	N/A
Highlight all text	CTRL + A	CTRL + A	CMD + A
Cut highlighted text	CTRL + X	CTRL + X	CMD + X
Copy text from clipboard	CTRL + C	CTRL + C	CMD + C
Paste text from clipboard	CTRL + V	CTRL + V	CMD + V
Move to start of next word	CTRL + right arrow	CTRL + right arrow	Option + right arrow
Move to start of previous word	CTRL + left arrow	CTRL + left arrow	Option + left arrow

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Appendix B: INSIGHT Keyboard Shortcuts and Icons, continued

INSIGHT Writing Tools Function	Keyboard Shortcut		
	Desktop	Chromebook	iPad
Move cursor forward one character	Right Arrow	Right Arrow	Right Arrow
Move cursor backward one character	Left Arrow	Left Arrow	Left Arrow
Delete text (from cursor position) to the end of the line	N/A	N/A	Control + K
Delete text (from cursor position) to the beginning of the line	N/A	N/A	CMD + Delete
Delete the word before the cursor	N/A	N/A	Option + Delete
Jump cursor location to end of text entered	N/A	N/A	CMD + Left Arrow
Jump cursor location to the beginning of text entered	N/A	N/A	CMD + Right Arrow
Jump cursor location to previous start of line	N/A	N/A	Option + Up Arrow
Jump cursor location to next end of line	N/A	N/A	Option + Down Arrow
Apply bold formatting / repeat to turn off	N/A	N/A	CMD + B
Apply italic formatting / repeat to turn off	N/A	N/A	CMD + I
Apply underline formatting / repeat to turn off	N/A	N/A	CMD + U

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Appendix B: INSIGHT Keyboard Shortcuts and Icons, continued

Tool Icon	Tool Name	Tool Definition
	Pointer	The **Pointer** tool is the default tool that is active when you begin. It is used to select answers as well as other tools and features within the online assessment. The **Pointer** will change to a pencil head when moved over a multiple-choice answer bubble. Use it to select your answer. If another tool has been selected, you can return to the **Pointer** tool mode by clicking on the Pointer tool button. This button is at the far left of the tools row.
	Cross-Off	The **Cross-Off** tool is used to narrow down the possible answer choices by allowing you to mark answer choices you believe to be incorrect. This tool is only available for multiple-choice items.
	Highlighter	The **Highlighter** tool is used to highlight important information.
	Sticky Note	The **Sticky Note** allows you to place a short note almost anywhere within the window that contains a question, passage, or scenario. Use a note to mark a special part or to leave a reminder of some important information in that question, passage, or scenario.
	Magnifier	The **Magnifier** allows you to enlarge the entire screen. Other tools, including the **Line Guide, Cross-Off, Highlighter,** and **Calculator,** can be used when the **Magnifier** is turned on.
	Line Guide	The **Line Guide** tool provides a horizontal line that brings the focus to a single line of text. The **Line Guide** can be used to track a passage or an individual question.
   	Measurement Tools	The **Measurement Tools** button allows you to access the ruler or protractor, which can be used to measure an object. The ruler can be moved around the screen and can also be rotated.

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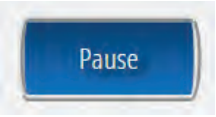
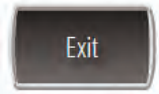
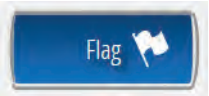
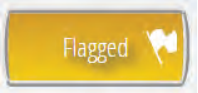
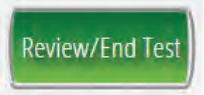
Appendix B: INSIGHT Keyboard Shortcuts and Icons, continued

Tool Icon	Tool Name	Tool Definition
	Calculator	The **Calculator** tool may be used to assist with calculations necessary to answer questions on the exam. You will be given a Basic or Scientific calculator.
	Graphing Tool	The **Graphing Tool** is designed to graph functions when solved for the "Y" variable and has the ability to give the corresponding "Y" values for given "X" values.
	Next Button **Back Button**	The **Next** and **Back** buttons are used to navigate between questions on the test. They are also used to move between pages on multi-page questions. Click on the **Next** button to move forward to the next question or page. Click on the **Back** button to move backward to the previous question or page.
 	**Pause** and **Resume**	When the **Pause** button is clicked, the test will be temporarily stopped. The test cannot be paused for more than 20 minutes. A countdown timer will be displayed showing how much longer the test will be paused. At any time during the countdown, the test can be resumed by clicking on the **Resume** button.
	**Exit**	The **Exit** button appears on the Pause Page. Click on **Exit** to close the test. WARNING: If a student exits a test using this button, the test remains incomplete. The student must log in again to complete the test.
 	**Flag**	Click on the **Flag** button to mark a test question for review at a later time. When you click on the **Flag** button, the color of the button will change to yellow to indicate the question is flagged. To unflag a test question, use the **Pointer** tool to click the button again.
	**Review/End Test**	The **Review/End Test** button allows you to see all of the test questions you have flagged for review. The Review Page also shows which questions have been answered and which have not.

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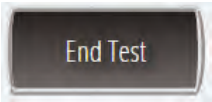
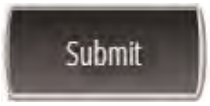
Appendix B: INSIGHT Keyboard Shortcuts and Icons, continued

Tool Icon	Tool Name	Tool Definition
	Return to Questions	The **Return to Questions** button appears on the Review Page. Clicking **Return to Questions** will take the student back to the most recently visited question. The student can then review any questions, and proceed by clicking **Review/End Test** again.
	**End Test**	The **End Test** button appears on the Review Page. Clicking this button will provide a prompt for the student to confirm whether they would like to **Return to Review** or **Submit.**
	**Submit**	The **Submit** button appears on the window that prompts a student to **Return to Review** or **Submit**. Selecting the **Submit** button will end the exam.
	Return to Review	The **Return to Review** button appears on the window that prompts a student to **Return to Review** or **Submit**. Selecting the **Return to Review** button will take the student back to the Review Page.
	Go to Question	To quickly navigate to any question, passage, or scenario on the test, click on the down arrow next to the question number in the upper-left corner of the screen. A list of all available test questions and scenarios will appear. Click on the number of the test question, passage, or scenario you want to go to, and that question will appear on the screen. Click on the passage or scenario and you will be taken to the first question that appears with the passage or scenario.

Review Page Key

Key Icon	Key Description
☐	Unanswered item
☑	Answered item
	Flagged item
S	Scenario indicator for Science; example: (S1)
P	Passage indicator for ELA; example: (P1)

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Examiner's Manual

Grade 5
English Language Arts, Mathematics, and Science Assessments

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Appendix C: English Language Arts, Mathematics, and Science Post-equating

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English Language Arts, Mathematics, and Science Post-equating

The purpose of the English Language Arts (ELA), Mathematics, and Science post-equating procedure was twofold: (1) examine stability of the operational item parameter estimates after the 2017 Spring administration and (2) evaluate student scores estimated using pre-equated versus post-equated item parameters. Census data were used to conduct post-equating.

C.1 Data Calibration, Equating, and Scaling

For the purpose of item parameter evaluation and update, the item parameters for the items contained in ELA, Mathematics, and Science assessments were calibrated and the parameters were re-estimated after the Spring 2017 test administration. Calibrations were conducted separately for each grade level and content area. The data were calibrated using the 3PL model for MC items and the 2PPC model for CR items. These models are explained in detail in Section 6.2 of this report. In the process of item calibration, the number of estimation cycles was set to 99, with the convergence criterion of 0.001 for all content areas. The maximum value of *a*-parameter was set to 5.0, and the range for *b*-parameter was set between –7.5 and 7.5. For all items, the estimated *a*- and *b*-parameters were within the prescribed parameter ranges. The *c*-parameter estimates were fixed to their values from the Spring 2016 test administration. The calibration was performed using the PARDUX program (Burket, 2002).

C.1.1 Model Fit

A procedure developed by Yen (1981) was used to assess model-to-data fit for all test items. In this procedure, students are rank ordered on the basis of their $\hat{\theta}$ values and sorted into ten cells, with 10% of the sample in each cell. Each item *j* in each decile *i* has a response from N_{ij} examinees. The fitted IRT models are used to calculate an expected proportion E_{ijk} of examinees who respond to item *j* in category *k*. The observed proportion O_{ijk} is also tabulated for each decile. The fit index for item *i* is

$$Q_{1j} = \sum_{i=1}^{10} \sum_{k=1}^{m_j} \frac{N_{ij}(O_{ijk} - E_{ijk})^2}{E_{ijk}}.$$

Q_{1j} should be approximately chi-square distributed with degrees of freedom (*DF*) equal to the number of "independent" cells, $10(m_j - 1)$, minus the number of estimated parameters. For the 3PL model, $m_j = 2$, so $DF = 10(2-1) - 3 = 7$. For the 2PPC model, $DF = 10(m_j - 1) - m_j = 9m_j - 10$. Since *DF* differs between MC and CR items and between CR items with different score levels, m_j, Q_{1j} is transformed, yielding the test statistic

$$Z_j = \frac{Q_{1j} - DF}{\sqrt{2DF}}.$$

This statistic is useful for flagging items that fit relatively poorly. Z_j is sensitive to sample size, and cutoff values for flagging an item based on Z_j have been developed and were used to identify

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items for the item review. The cutoff value is (N/1500 x 4) for a given test, where N is the sample size.

Nine items were flagged for poor fit in ELA across all grades, and six items were flagged for poor fit in Mathematics across all grades. Three items were flagged in the Science Grade 8 assessment. Table C.1 shows the chi-square statistic and the Z statistic for each flagged item. The average percentage correct across ten cells of observed percentage correct and predicted percentage correct is also provided. The difference between the observed and predicted percentages provides an indication of how well the modeled response curves reflect the empirical curves.

Each of the flagged items was examined more closely by studying its item characteristic curve (ICC) at each nonzero score point. The ICC models the relationship between the examinees' performance on an item and the examinees' underlying ability. In most cases for which model misfit occurs, relatively few students occupy these scale score ranges, which are typically at the lower and upper tails of the distribution. Poor fit may occur in one of these ranges of the underlying ability distribution, where there are relatively few students. The model tends to show good model-data fit for the flagged items in the middle of the theta distribution, where the majority of students perform.

It is important to notice that while items may be flagged for misfit, these flags may not be of practical importance. Items flagged for misfit that have content validity are often retained for use in one assessment and monitored over a period of usage. A large number of items flagged for misfit in an assessment would indicate that caution should be exercised in the interpretation of the overall score.

C.1.2 Linking Methods

DRC used a common-item design to link the current year's assessment to the established MAP ELA, Mathematics, and Science scales. All items on the test served as anchor items, and the Spring 2017 census data were used for linking purposes. After the item calibration, item parameters were linked to the ELA, Mathematics, and Science scales using the Stocking & Lord (1983) equating procedure implemented in the PARDUX program. Note that the input anchor item parameters for ELA and Mathematics were in the theta metric, and the Science input anchor item parameters were in the scale score metric. Equating of Missouri Science test forms has been conducted in scale score metric since the test's first administration in Spring 2008.

Standard 5.13 of the AERA, APA, & NCME (2014) *Standards* states the following:

> When claims of form-to-form score equivalence are based on equating procedures, detailed technical information should be provided on the method by which equating functions were established and on the accuracy of the equating functions. (105)

The Stocking & Lord (1983) procedure minimizes the mean squared difference between the two test characteristics curves (TCCs), one based on estimates from the previous calibration and the other on transformed estimates from the current calibration. Let $\hat{\psi}_j$ be the TCC based on

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estimates from a previous calibration and $\hat{\psi}_j^*$ be the TCC based on transformed estimates from the current calibration.

$$\hat{\psi}_j = \hat{\psi}(\theta_j) = \sum_{i=1}^{n} P_i(\theta_j; a_i, b_i, c_i),$$

$$\hat{\psi}_j^* = \hat{\psi}(\theta_j) = \sum_{i=1}^{n} P_i(\theta_j; \frac{a_i}{M_1}, M_1 b_i + M_2, c_i)$$

The TCC method determines the equating constants (M_1 and M_2) by minimizing the following quadratic loss function (F):

$$F = \frac{1}{N} \sum_{a=1}^{N} (\hat{\psi}_j - \hat{\psi}_j^*)^2.$$

The standard error of the equating (SEE) is difficult and cumbersome to estimate for IRT equating procedures like the Stocking & Lord procedure (Kolen & Brennan, 1995; Michaelides & Haertel, 2004). The estimation of the SEE is beyond the scope of this report.

C.1.3 Anchor Items

AERA, APA, & NCME (2014) Standard 5.15 requires information about the anchors, stating the following:

> In equating studies that employ an anchor test design, the characteristics of the anchor test and its similarity to the forms being equated should be presented, including both content specifications and empirically determined relationships among test scores. If anchor items are used in the equating study, the representativeness and psychometric characteristics of the anchor items should be presented. (105)

Two statistical methods are used to evaluate anchor items: (1) iterative linking (Candell & Drasgow, 1988) using Stocking & Lord's (1983) test characteristic curve method and (2) differences between the item-ability regression curves.

Test Characteristic Curve Method

The Stocking & Lord (1983) procedure, also called the test characteristic curve method, for which the mathematical equation was provided in Section C.1.2 (Linking Methods), minimizes the mean squared difference between the two TCCs, one based on estimates from the previous calibration and the other on transformed estimates from the current calibration.

Differential item functioning was evaluated by examining previous (input) and transformed (estimated) item parameters. Items with an absolute difference of parameters greater than two

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times the root mean square deviation were flagged. These differences were also monitored by plotting input and estimated item parameters.

Item Response Theory Item-Ability Regression Curves

Differences between the item-ability regression curves of the items in the 2016–17 ELA and Mathematics test administration and the previous test administration were computed and evaluated using the following statistics:

- UnWtd Mean = Average signed difference in estimated probability
- UnWtd Mean Abs = Average Absolute (unsigned) difference in estimated probability
- UnWtd RMSD = Root mean squared difference
- Wtd Mean = Weighted average signed difference in estimated probability
- Wtd Mean Abs = Weighted average Absolute (unsigned) difference in estimated probability
- Wtd RMSD = Weighted Root mean squared difference

Both unweighted and weighted versions of these statistics were calculated. Unweighted differences give equal weight to differences across the ability spectrum. Weighted differences assign weights according to the number of test takers that are impacted, that is, the frequency distribution of estimated student abilities during the calibration.

For the six statistics listed above, differences greater than +.10 are considered large, and differences between +.07 and +.10 are considered moderate.

Additionally, the Maximum Absolute difference (MaxAbs) was identified. For MaxAbs, large differences are those greater than +.15, and moderate differences are all differences between +.125 and +.15.

Removal of Anchor Items

One of the key requirements of anchor items in deriving valid reliable linking results is that the anchor items form a miniature of the test, in terms of content coverage or test blueprint. While dropping an anchor item flagged based solely on statistical criteria has its simplicity, this option may change the content coverage and invalidate results. Before an anchor item may be dropped from an anchor set, the item characteristics, adequacy of the content coverage, and impact to the size of the anchor set must be evaluated.

As stated above, an item is removed from the anchor set only if it adversely affects the quality of scaling, not the desirability of the results. As such, DRC does not consider how the removal of an item affects the overall mean scale score or the impact data (percentage of students in each achievement level) when recommending items for removal.

Items removed from the anchor set are still scored as part of the whole test. Anchor items are considered for exclusion from the MAP equating set under the following conditions:

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- An item may be a candidate for removal when it is flagged for large differences on four of the seven statistics (listed above) considered when examining the differences between the IRT regression curves.
- Removal of the item will only be considered after alternative explanations have been considered that may explain shifts in performance. For example, performance on the anchor item may improve because of a statewide initiative emphasizing instruction on a particular set of skills. In this case, improved performance on the item represents true growth in that area. Removing the anchor item may artificially lower test scores.
- Removal of the item may not significantly alter the content distribution of the anchor set. The distribution of the anchor items across the content standards must remain within 10% of the MAP test blueprint, though within 5% is preferred.
- The number of remaining items will remain at an acceptable level of anchor set reliability. Operationally, this means the anchor set will still be representative of the total test blueprint and may not be less than 20% of the total test length.

C.1.4 Results of Anchor Evaluation

Table C.2 provides results for the TCC method. This table summarizes the following information for each grade content area: grade level, number of anchors, number of iterations, quadratic loss function (F), correlation between the *a*-parameter input and estimates, correlation between the *b*-parameter input and estimates, number of *a*- and *b*-parameter outliers as indicated by the root mean square deviation method, and scaling constants (M1 and M2).

A visual inspection of the overall alignment of the anchor input and estimate TCCs revealed that the curve alignment was very good for all grades and content areas. The correlations between the *a*-parameter input and estimates were 0.98 or higher for all ELA grades. The number of anchor items flagged as an *a*-parameter outlier was between one and three depending on grade level. The correlations between the *b*-parameter input and estimates were 1.00 for all ELA grades, except for Grade 7, where the correlation for the *b*-parameter was 0.99. The number of anchor items flagged as *b*-parameter outliers was between zero and three depending on grade level, as indicated by the root mean square deviation method.

For Mathematics, except for Grade 5, the correlations between the *a*-parameter input and estimates were 0.97 or higher for all other grades. The *a*-parameter correlation for Grade 5 was 0.77. Between one and three anchor items were flagged as *a*-parameter outliers. The correlations between the *b*-parameter input and estimates ranged from 0.99 to 1.00 for all Mathematics grades. The number of anchor items flagged as *b*-parameter outliers was either one or two per grade, as indicated by the root mean square deviation method.

For Science, the correlations between the *a*-parameter input and estimates were 1.00 and 0.99 for Grade 5 and Grade 8, respectively. One anchor item was flagged in Grade 5 and two anchor items were flagged in Grade 8 as the *a*-parameter outliers. The correlation between the *b*-parameter input and estimates was 1.00 for both Science grades. One anchor item was flagged in Grade 5 and two anchor items were flagged in Grade 8 as the *b*-parameter outliers.

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Table C.3 presents the item-ability regression statistics for anchor items flagged using the item–ability regression curve criteria described in an earlier section of this appendix. One item on the Grade 5 Mathematics test and one item on the Grade 5 Science test were flagged using four or more of the statistics used to examine ICC differences using the IRT item-ability regression curve. Figures C.1 and C.2 show the ICCs before and after equating for the Mathematics and Science items, respectively. In these figures, the dashed red line is the ICC before equating (based on input parameters) and the solid blue line is the ICC after equating (based on new parameter estimates).

All flagged items were reviewed by DRC test development experts who verified that no changes to item content or format occurred between the Spring 2016 and Spring 2017 administrations. In addition, for the flagged constructed-response anchor item on Grade 5 Science test, it was verified that no changes to scoring rubrics occurred between the two administrations. Given no changes to the items or scoring rubrics, those items remained part of the anchor sets.

C.1.5 Test Scaling

Following the test equating, the equated item parameter estimates in the theta metric were transformed into the scale score metric for ELA and Mathematics. The scaling constants, A and B, used to transform equated item parameters in the theta metric into the scale score metric are the same as used in the Spring 2016 scale development and are presented in Table C.4. The transformation formulae are presented below:

$$A_{ss} = a_\theta / A$$
$$B_{ss} = M1 * b_\theta + B$$
$$F_{ss} = f_\theta / A$$
$$G_{ss} = g_\theta + (f_\theta / A) * B$$
$$C_{ss} = c_\theta,$$

where
A_{ss} is a discrimination parameter in scale score metric for MC items,
B_{ss} is a difficulty parameter in scale score metric for MC items,
F_{ss} is a discrimination parameter in scale score metric for CR items,
G_{ss} is a difficulty level (gamma) for category m_j in scale score metric for CR items,
a_θ is a discrimination parameter in the original theta metric for MC items,
b_θ is a difficulty parameter in the original theta metric for MC items,
f_θ is a discrimination parameter in the original theta metric for CR items,
g_θ is a difficulty level (gamma) for category m_j in the original theta metric for CR items, and
C_{ss} and c_θ is a guessing parameter in the original theta metric.

The Science scaling constants were obtained in the process of equating (which was conducted in the scale score metric) and are also presented in Table C.4.

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C.1.6 Test Characteristic Curves and Standard Error Curves

The ELA and Mathematics vertical scales were developed for MAP after the Spring 2016 operational test administration, and have remained the same through the 2016–17 test administration. Science scales are grade specific and remained the same since the first Science test administration in Spring 2008.

Figure C.3 shows the test characteristic curves (TCCs) and Figure C.4 shows the standard error (SE) curves for ELA. These curves were generated using post-equated item parameters. The ELA TCCs, except for TCCs for Grades 3 and 4, and TCCs for Grades 7 and 8, are generally ordinal across grades, indicating that the test difficulty increases as the grade level increases. Grades 3 and 4 TCCs are overlapping at the upper end of the ability scale, indicating comparable difficulty of the Grade 3 and Grade 4 tests for the highest-ability students. Grades 7 and 8 TCCs are crossing at the lower end of the ability scale, indicating that the Grade 8 assessment may be easier for the lower-ability students than the Grade 7 assessment. Grades 7 and 8 TCCs are also overlapping in the middle and upper end of the ability scale, indicating comparable difficulty of these tests for the middle and higher-ability students. However, it should be noted that even if the adjacent grade assessments are of comparable difficulty for some students, the higher-grade students are of higher ability as demonstrated by the increasing scale score means across grades at different percentiles (as demonstrated in Chapter 7, Table 7.11 of this report).

The post-equated ELA standard error curves presented in Figure C.4 are U-shaped (as expected), indicating smaller errors around ability estimates roughly in the middle of the scale score distribution. The SE is expected to be higher at the top and bottom ends of the ability scale, where fewer items measuring very high- and very low-achieving students are found. Overall, the standard errors around the scale score were found to be reasonable for ELA tests.

Figure C.5 and C.6 show the post-equated TCCs and SE curves for Mathematics, respectively. The TCCs for Mathematics, except for the Grades 5 and 6 TCCs, are ordinal, indicating increasing difficulty of the assessment as the grade level increases. The crossing of the Grades 5 and 6 TCCs indicates that the Grade 6 assessment is more difficult for the middle-to-higher-ability students compared to the Grade 5 assessment but appears to be easier than the Grade 5 test for the lower-ability students. Despite the Grades 5 and 6 tests being of similar difficulty, the Grade 6 students are of higher ability than the Grade 5 students (as demonstrated by the higher scale scores for Grade 6 compared to the scale scores for Grade 5 at selected percentiles; see Chapter 7, Table 7.12).

The post-equated Mathematics standard error curves presented in Figure C.6 are U-shaped, indicating smaller errors around ability estimates roughly in the middle of the scale score distribution. The SE is expected to be higher at the top and bottom ends of the ability scale, where fewer items measuring these students are found. Overall, the standard errors around the scale score were found to be reasonable for Mathematics tests.

Science TCCs and SE curves are presented in Figures C.7 and C.8, respectively. The TCCs and SE curves are presented separately for each test form. Figure C.7 shows that Grade 5 Form A (SC05_OP01) is more difficult than Grade 5 Form B (SC05_OP02) for students at all ability

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levels. Grade 8 TCCs indicate that Forms A and B are of comparable difficulty at the lower end of the ability scale, but Form A (SC08_OP01) tends to be easier than Form B (SC08_OP02) in the middle and at the upper end of the ability scale. However, the form difficulty is adjusted through test equating resulting in score comparability between the forms at each grade level.

The post-equated Science standard error curves, presented in Figure C.8, are U-shaped, indicating smaller errors around ability estimates in the middle of the scale score distribution. The SE is expected to be higher at the top and bottom ends of the ability scale, where fewer items measuring these students are found.

C.2 Student Scoring

In order to evaluate the accuracy of student scores estimated using pre-equated versus post-equated item parameters, students who took ELA, Mathematics, and Science tests were scored using the item pattern method and both sets of parameters. The mean and standard deviation of the scale scores were computed, and both the pre-equated and post-equated results are presented in Table C.5 for ELA, Table C.6 for Mathematics, and Table C.7 for Science. In addition, students were classified into achievement levels using the post-equated scale scores. The percentage of students in each achievement level based on pre-equated and post-equated results is also presented in these tables.

As shown in Table C.5, the differences between the scale score means derived using the pre- and post-equated item parameters were approximately half a scale score point or less for all ELA grades. In all grades, except for Grade 5, the scale scores derived using post-equated item parameters resulted in slightly higher mean scale scores than the mean scale scores based on the pre-equated item parameters. The standard deviations of the scale scores derived using both sets of item parameters were comparable for all grades. When looking at the percentages of students in different achievement levels for ELA, it can be observed that the pre- and post-equating methods produced similar results. The differences in the percentages of students in different achievement levels were less than 1% for any level and grade. When the percentages of students in the *Proficient* or above categories were considered, the differences between the pre- and post-equating scoring method were approximately 0.5% or less at any grade level.

For Mathematics (see Table C.6), except for Grade 5, the differences between the mean scale scores obtained using the pre- and post-equated item parameters were less than one scale score point. The difference between the pre- and post-equated mean scale scores for Grade 5 was less than two scale score points. In all grades, the scale scores derived using post-equated item parameters resulted in higher mean scale scores than the mean scale scores based on the pre-equated item parameters. The standard deviations of the scale scores derived using both sets of item parameters were comparable in all grades and differed by no more than one scale score point, except for Grade 5, where the standard deviation of scores derived from the pre-equated parameters was higher by more than one scale score point than the standard deviation of scores derived from the post-equated item parameters. Regarding the percentages of students in different achievement levels, it was observed that the differences between the pre- and post-equating scoring approaches resulted in less than 1% difference in student achievement classification for any achievement category in Grades 3, 6, 7, and 8. Differences, ranging from

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approximately 1% to 2% at the *Below Basic* and *Basic* levels, were observed for Grades 4 and 5. In both cases, the pre-equated scoring method resulted in a higher percentage of students classified in the *Below Basic* category and a lower percentage of students classified in the *Basic* category than the post-equating scoring approach. When the percentages of students in the *Proficient* or above categories were considered, the differences between the pre- and post-equating scoring methods were approximately 0.5% or less at any grade level.

For Science (see Table C.7), the scale score mean based on the pre-equated item parameters was about one scale score point higher than the scale score mean based on the post-equated item parameters for Grade 5. For Grade 8, the pre-equated scale score mean was about half a scale score point lower than the post-equated scale score mean. The standard deviations of the scale scores derived using both sets of item parameters were comparable in both grades. When looking at the percentages of students in different achievement levels for Science, it can be observed that, with two exceptions, the differences in the percentage of students classified in any achievement level were less than 1% in both grades. The exceptions were differences at the *Basic* and *Advanced* achievement levels in Grade 5, where the pre-equated scoring resulted in about 1% less students in the *Basic* level and in approximately 2% more students in the *Advanced* achievement level when compared to the post-equated scoring results. When the percentages of students in the *Proficient* or above categories were considered, approximately 1% more students were classified as *Proficient* or above in the pre-equated scoring in Grade 5 and about 1% less students were classified as *Proficient* or above in the pre-equated scoring in Grade 8.

C.3 Summary and Recommendation

In summary, the pre-equated item parameters that were obtained in the Spring 2016 operational test administration were used in student scoring after the Spring 2017 test administration. The use of the one-year-old item parameters is supported by the comparability of the Missouri student populations participating in the ELA, Mathematics, and Science assessments in the two administration years and by the results of the calibration and post-equating of the Spring 2017 ELA, Mathematics, and Science data. The calibration results were satisfactory, with very few items flagged for poor fit across all grade levels and content areas. The equating results showed high or very high correlations between the input and estimates of *a*- and *b*-parameters and very good alignment of anchor and estimate TCCs. Only two anchor items (one in Grade 5 Mathematics and one in Grade 5 Science) were flagged using the item-ability regression method, and, upon evaluation of the item content and scoring rubrics, none were removed from the anchor set. In addition, the comparison of mean scale scores, scale score standard deviations, and percentages of students classified in the four achievement levels revealed only very small differences in student performance based on the use of the pre-equated versus post-equated item parameters. Taken together, the use of pre-equated parameters in MAP ELA, Mathematics, and Science student scoring is appropriate.

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Table C.1: Item-Fit Statistics for Items Flagged for Misfit

Content	Grade	Item Number	Form	Chi-Square	DF	Total N	Z	Ob-served	Pre-dicted	Obs-Pred
ELA	3	35	1	1192.79	8	69,121	296.20	0.4348	0.4353	-0.0005
	4	50	1	969.74	8	69,253	240.44	0.5105	0.5118	-0.0013
	5	35	1	889.31	8	67,740	220.33	0.4048	0.4078	-0.0030
	6	15	1	1122.63	8	66,718	278.66	0.1192	0.1228	-0.0036
	6	30	1	1441.76	7	66,718	383.46	0.0636	0.0660	-0.0024
	7	29	1	1878.35	8	66,212	467.59	0.4572	0.4584	-0.0013
	8	20	1	888.35	8	65,681	220.09	0.5909	0.5912	-0.0003
	8	32	1	1073.93	8	65,681	266.48	0.2591	0.2620	-0.0029
	8	33	1	733.24	7	65,681	194.10	0.2122	0.2104	0.0018
Mathematics	4	41	1	778.19	7	69,357	206.11	0.5383	0.541	-0.0027
	5	37	1	5440.53	8	67,932	1358.13	0.4103	0.4073	0.0030
	6	3	1	6465.77	7	66,798	1726.18	0.1626	0.2664	-0.1038
	6	24	1	949.83	8	66,798	235.46	0.1412	0.1448	-0.0036
	6	31	1	886.43	8	66,798	219.61	0.0694	0.0705	-0.0012
	7	29	1	796.52	8	65,547	197.13	0.1254	0.1274	-0.0020
Science	8	3	A	1379.87	17	42,378	233.73	0.4594	0.4579	0.0015
	8	37	A, B	1197.43	17	65,831	202.44	0.3454	0.3480	-0.0026
	8	44	B	910.02	17	23,453	153.15	0.6724	0.6717	0.0007

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Table C.2: Equating Evaluation Results, Stocking and Lord Method

Content	Grade	Number of Anchors	Stocking and Lord TCC Method Results						Equating Constants	
			TCC Results		Parameter Comparison Statistics					
					A-Parameter		B-Parameter			
			# Itera-tions	F Value	Corr	# RMSD Outliers	Corr	# RMSD Outliers	M1	M2
ELA	3	52	4	0.0154	1.00	1	1.00	1	1.1472	-1.2208
	4	52	7	0.1509	0.98	1	1.00	0	1.1437	-0.5382
	5	51	6	0.2316	0.99	3	1.00	2	1.1511	-0.1953
	6	52	4	0.0234	0.99	1	1.00	2	1.0637	-0.0163
	7	52	4	0.0733	0.99	2	0.99	1	1.2766	0.2361
	8	51	6	0.4367	0.98	1	1.00	3	1.2525	0.5367
Math	3	42	3	0.2086	0.98	2	1.00	2	1.0163	-1.0862
	4	42	9	0.1989	0.97	3	0.99	2	0.9842	-0.4004
	5	42	18	0.3083	0.77	1	0.99	1	0.9908	0.0051
	6	46	10	0.0813	0.99	2	1.00	2	1.0381	0.0810
	7	46	21	0.1032	0.98	2	1.00	2	1.0031	0.3499
	8	46	39	0.0706	0.97	2	0.99	1	0.9298	0.3643
Science	5	61	10	0.1148	1.00	1	1.00	1	29.3448	662.3138
	8	62	3	0.0680	0.99	2	1.00	2	28.8166	700.0456

Note: ELA and Mathematics equating constants are in the theta metric. Science equating constants are in the scale score metric.

Table C.3: Statistics Comparing IRT Item-Ability Regression Curves for Flagged Items

Content	Grade	Anchor Item Position	UnWtd RMSD	UnWtd Mean Abs Difference	Max Abs Difference	UnWtd Mean	Wtd RMSD	Wtd Mean Abs Difference	Wtd Mean
Math	5	13	0.0911	0.0803	0.1560	0.0278	0.1171	0.1100	0.1028
Science	5	40	0.1210	0.0796	0.2732	0.0796	0.1707	0.1434	0.1434

Table C.4: Scaling Constants A and B

Content	Grades	A	B
ELA	3–8	39.2157	508.2353
Mathematics	3–8	42.7716	504.7049
Science	5	29.3448	662.3138
Science	8	28.8166	700.0456

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Table C.5: Pre- and Post-equated Student Scoring Results: ELA

Grade	Equating Method	Student N	Mean Scale Score	Scale Score SD	Percentage of Students in Achievement Level				
					Below Basic	Basic	Proficient	Advanced	Proficient & Advanced
3	Pre	69,125	460.13	49.58	17.39	20.20	42.95	19.46	62.41
3	Post	69,125	460.18	49.47	17.38	20.23	42.90	19.49	62.39
4	Pre	69,293	487.03	49.61	14.34	21.25	43.15	21.26	64.41
4	Post	69,293	487.57	49.60	13.99	21.76	42.75	21.50	64.25
5	Pre	67,741	500.90	48.84	14.43	22.83	41.80	20.95	62.75
5	Post	67,741	500.58	49.32	14.06	23.29	42.41	20.24	62.65
6	Pre	66,724	507.66	45.91	18.40	21.98	42.10	17.52	59.62
6	Post	66,724	507.74	46.03	18.36	22.06	42.02	17.55	59.57
7	Pre	66,219	516.97	55.04	22.54	17.93	38.81	20.72	59.53
7	Post	66,219	517.09	55.04	22.45	18.07	38.75	20.73	59.48
8	Pre	65,702	528.93	53.90	18.95	20.41	38.59	22.05	60.64
8	Post	65,702	529.53	53.46	19.40	20.53	37.68	22.40	60.08

Table C.6: Pre- and Post-equated Student Scoring Results: Mathematics

Grade	Equating Method	Student N	Mean Scale Score	Scale Score SD	Percentage of Students in Achievement Level				
					Below Basic	Basic	Proficient	Advanced	Proficient & Advanced
3	Pre	69,273	456.99	49.50	17.80	28.51	31.89	21.80	53.69
3	Post	69,273	457.72	49.24	17.36	29.15	31.56	21.93	53.49
4	Pre	69,536	483.04	56.28	15.26	30.37	31.10	23.27	54.37
4	Post	69,536	483.91	55.77	14.25	31.58	30.87	23.30	54.17
5	Pre	67,982	501.18	51.53	21.03	30.59	28.19	20.19	48.38
5	Post	67,982	502.90	49.93	18.94	32.23	28.90	19.93	48.83
6	Pre	66,808	507.17	49.31	20.99	35.20	27.46	16.35	43.81
6	Post	66,808	507.36	49.13	20.99	34.99	27.63	16.38	44.01
7	Pre	65,573	516.30	51.33	22.05	34.03	26.87	17.05	43.92
7	Post	65,573	516.61	51.34	21.46	34.58	26.99	16.97	43.96
8	Pre	52,964	515.65	50.82	28.33	41.59	19.84	10.24	30.08
8	Post	52,964	516.28	50.13	27.74	42.43	19.38	10.45	29.83

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Table C.7: Pre- and Post-equated Student Scoring Results: Science

Grade	Equating Method	Student N	Mean Scale Score	Scale Score SD	Percentage of Students in Achievement Level				
					Below Basic	Basic	Proficient	Advanced	Proficient & Advanced
5	Pre	67,972	662.94	33.90	12.00	41.88	27.43	18.69	46.12
5	Post	67,972	661.95	33.21	12.02	43.04	28.36	16.58	44.94
8	Pre	65,837	698.68	33.11	16.33	34.23	38.51	10.93	49.44
8	Post	65,837	699.08	33.12	16.10	33.60	39.04	11.26	50.30

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Figure C.1: Pre-and Post-Equating Item Characteristic Curve for Mathematics, Grade 5, Anchor 13

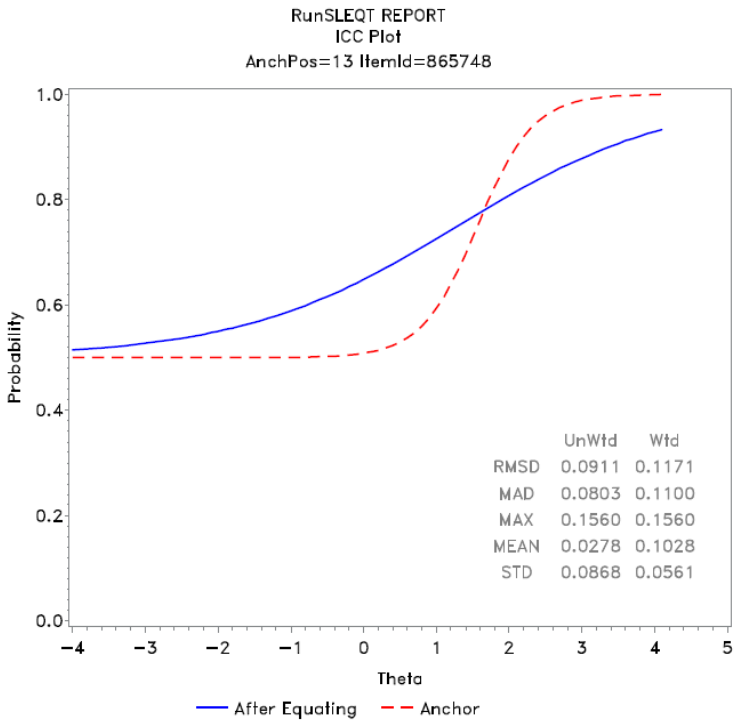

Figure C.2: Pre-and Post-Equating Item Characteristic Curve for Science, Grade 5, Anchor 40

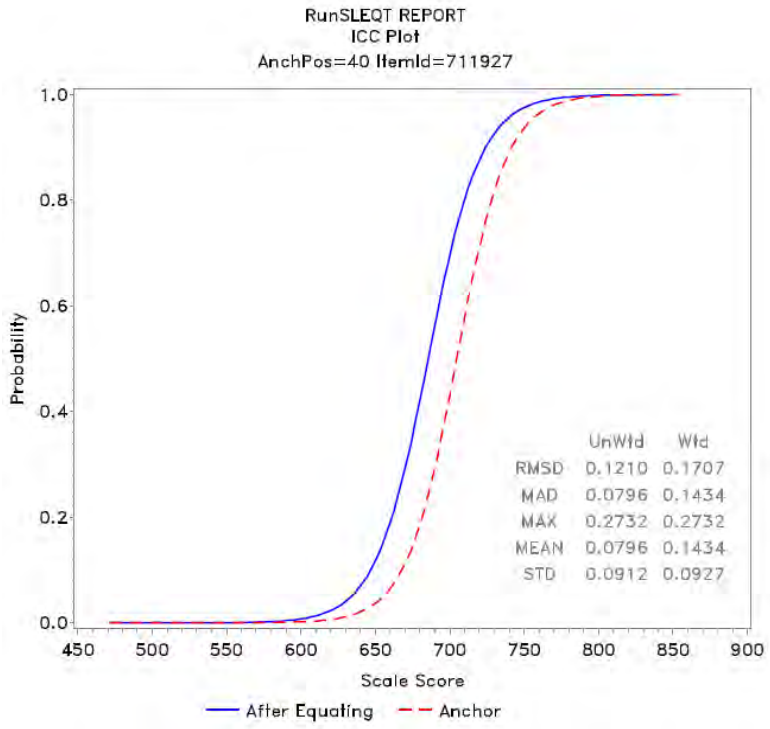

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Figure C.3: Test Characteristic Curves: English Language Arts

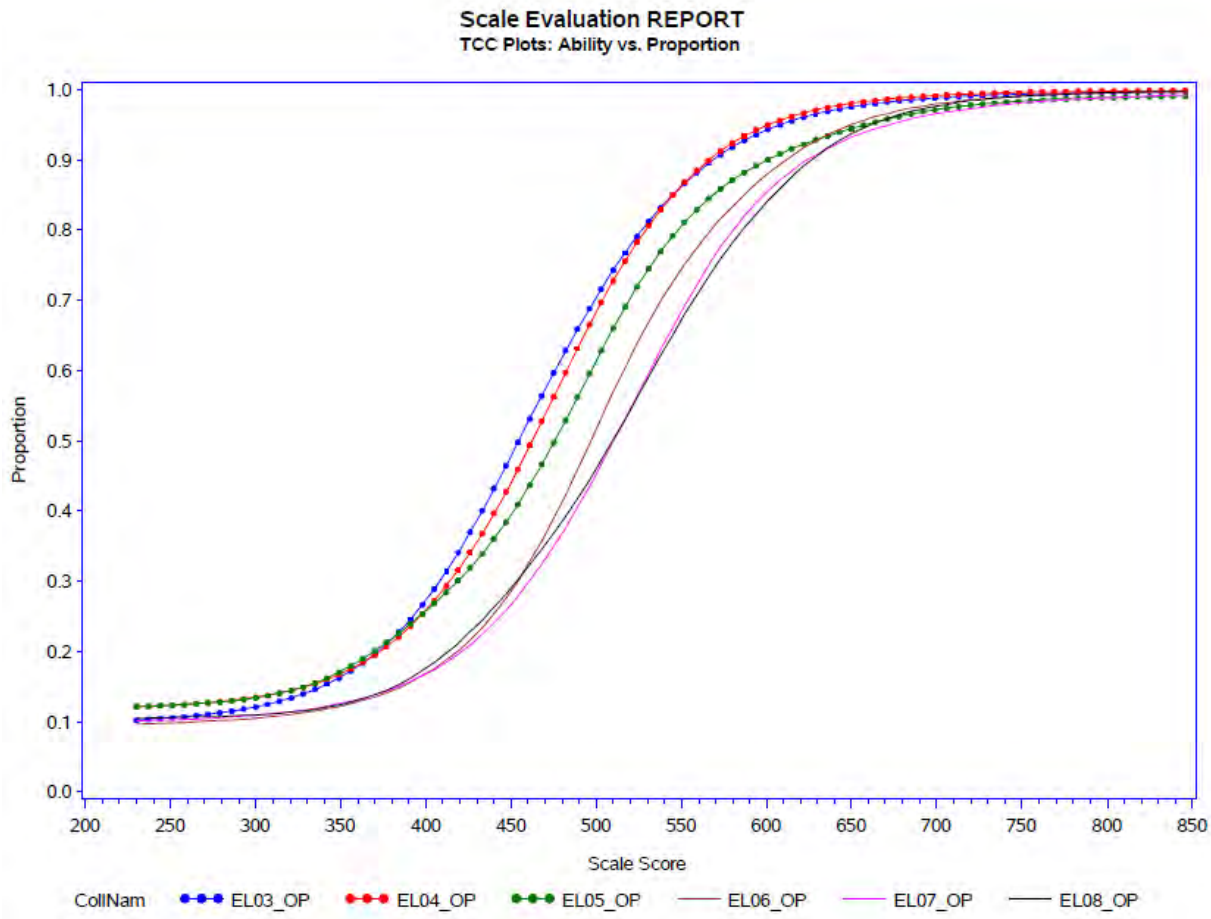

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Figure C.4: Standard Error Curves: English Language Arts

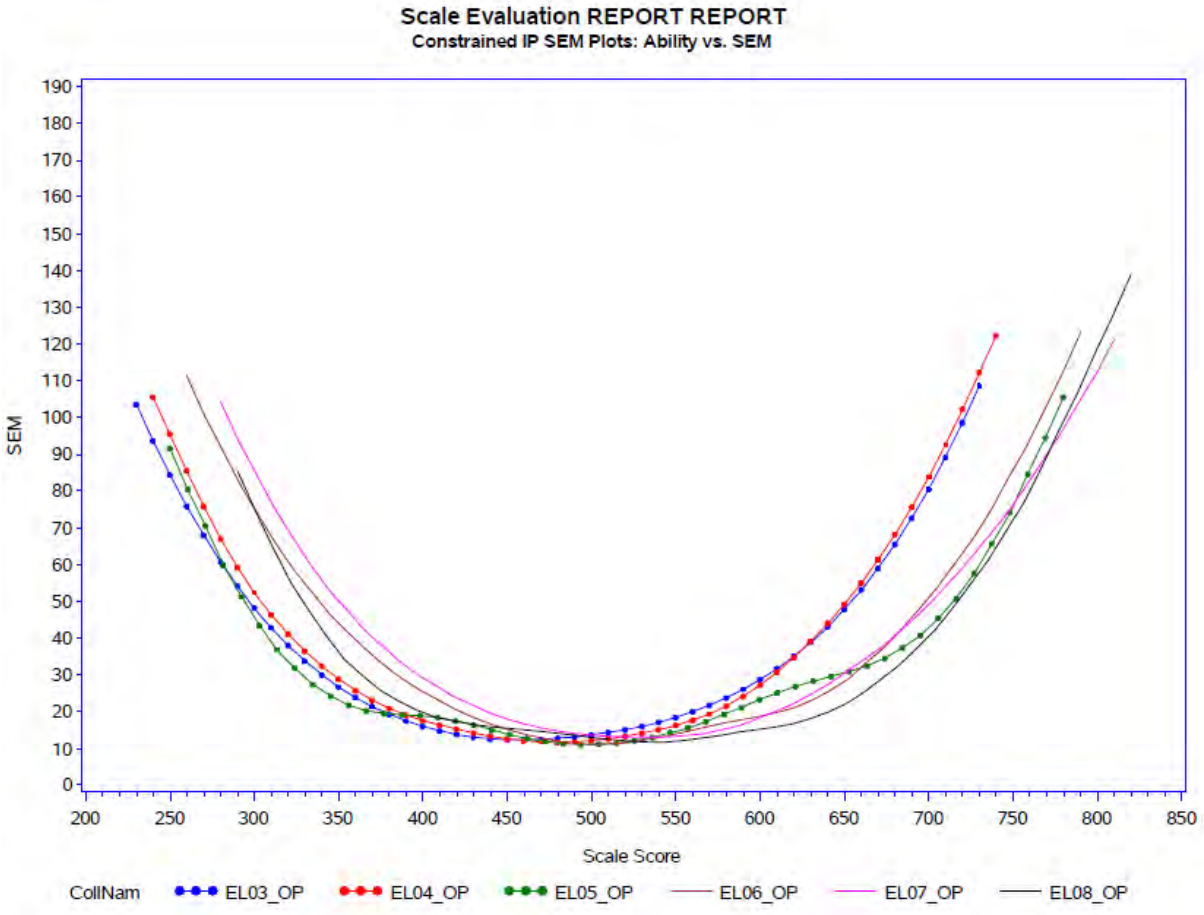

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Figure C.5: Test Characteristic Curves: Mathematics

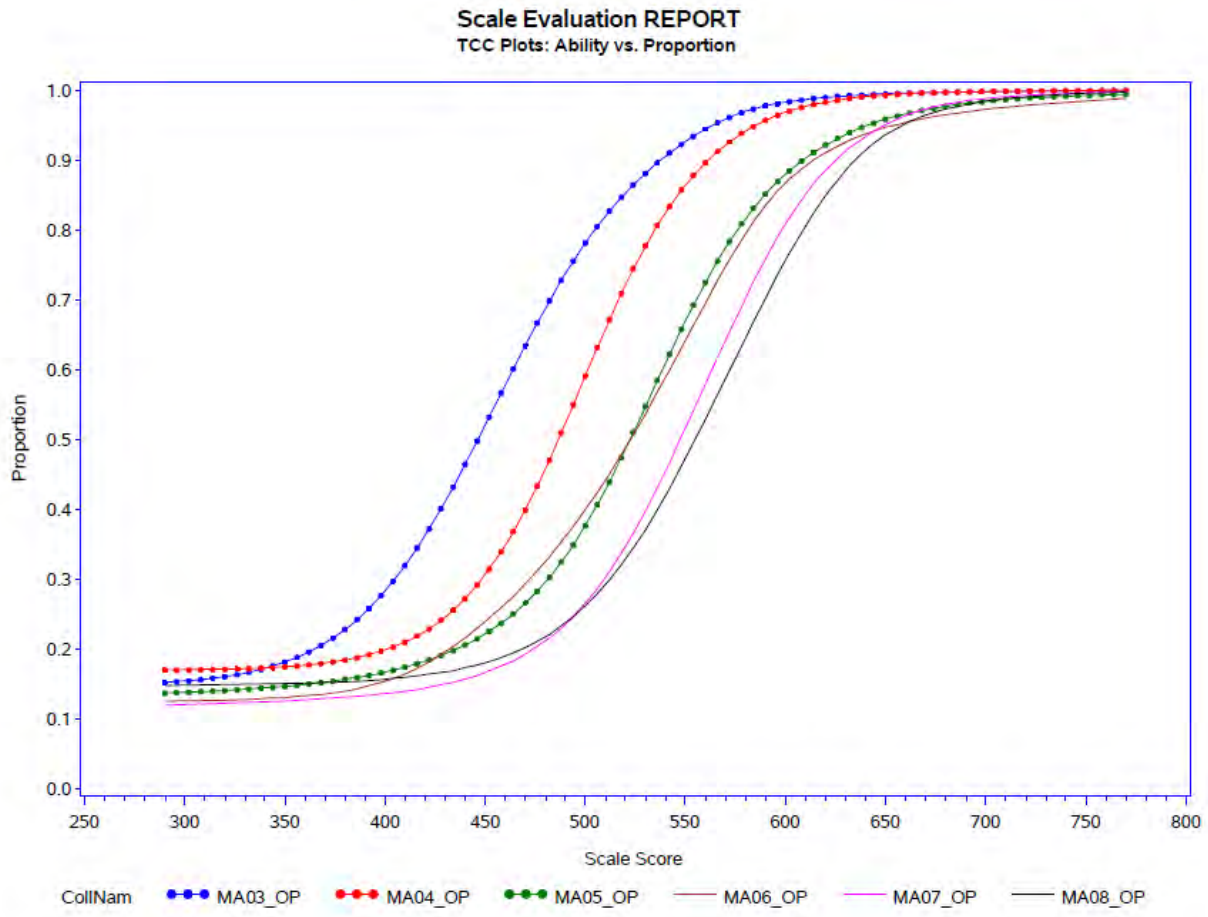

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Figure C.6: Standard Error Curves: Mathematics

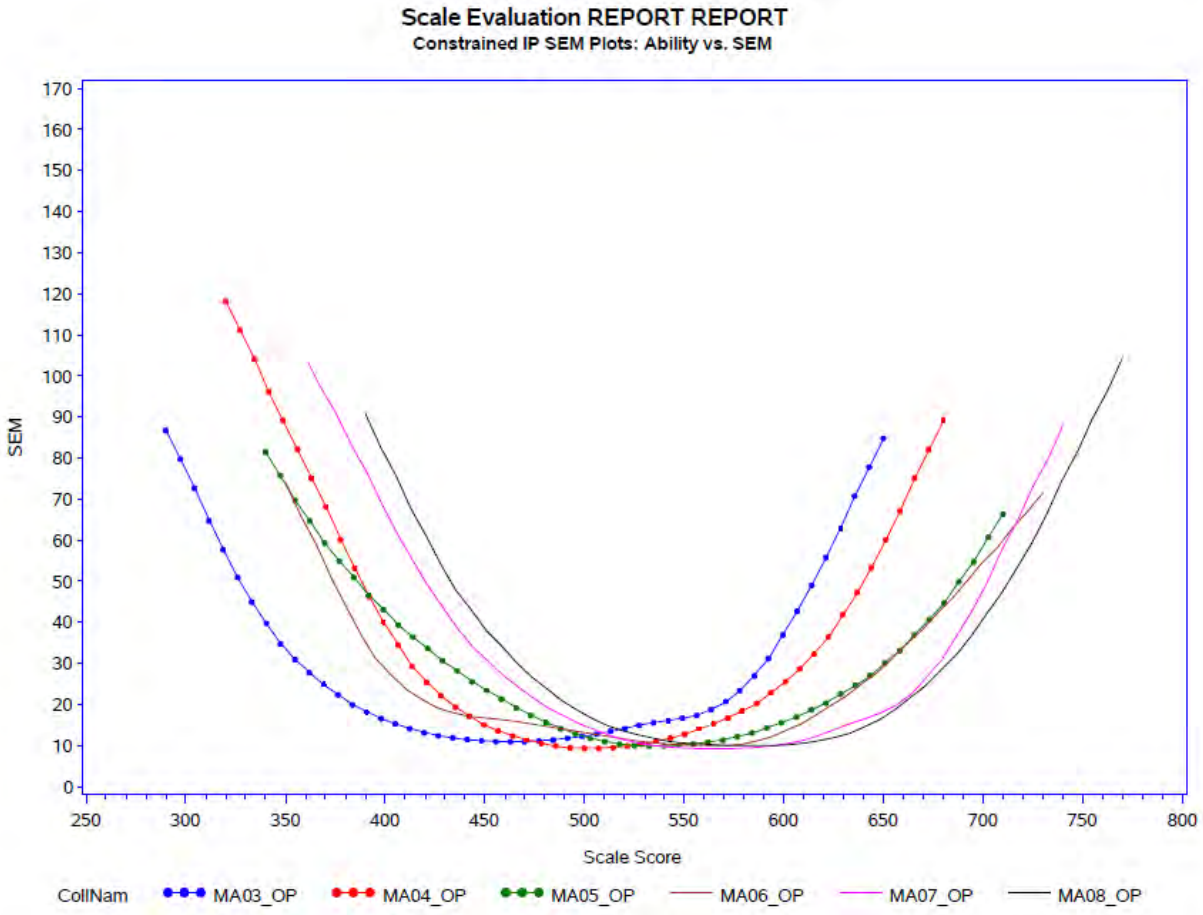

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Figure C.7: Test Characteristic Curves: Science

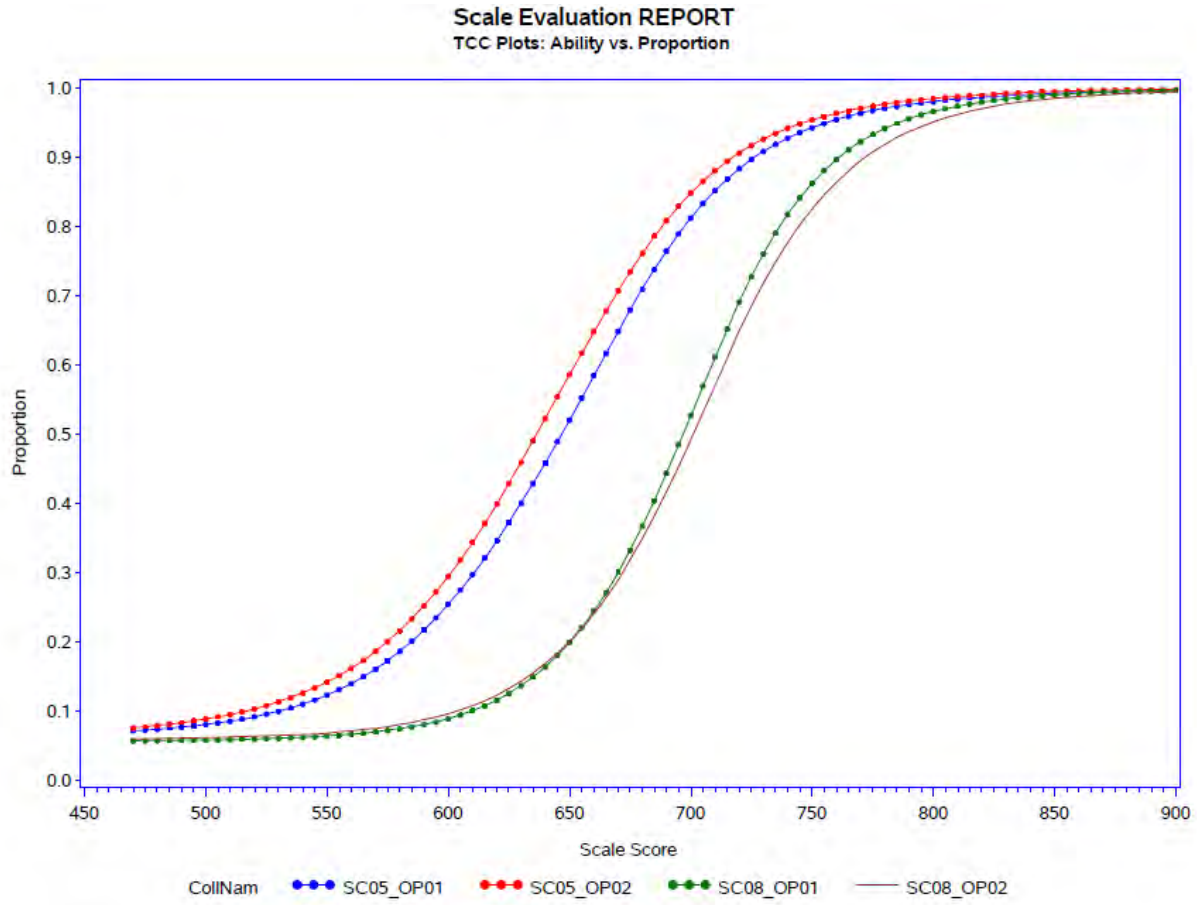

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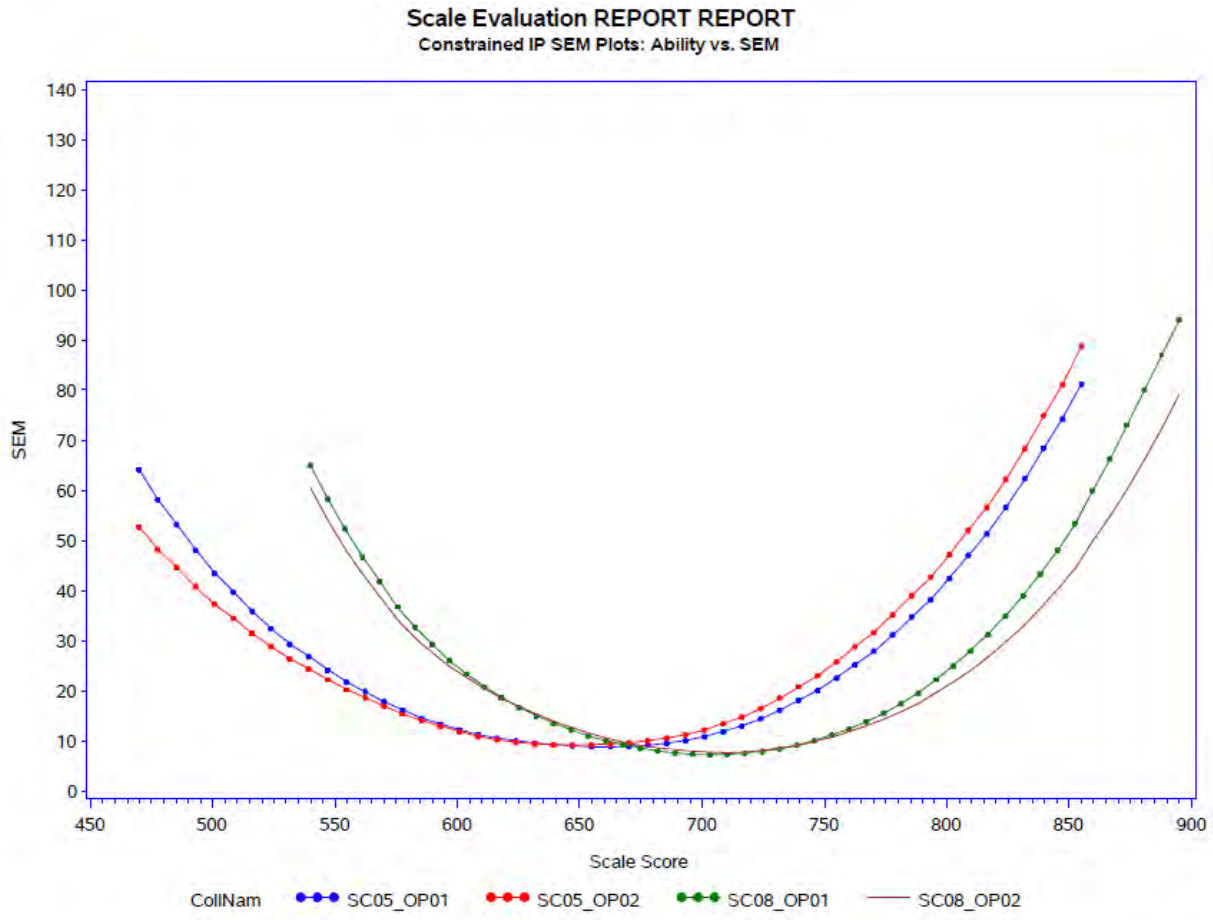
Figure C.8: Standard Error Curves: Science



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Appendix D: MAP Guide to Interpreting Results

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Missouri Assessment Program Grade-Level Assessments

Guide to Interpreting Results

Summative Assessments

English Language Arts, Mathematics, and Science

April 2017

TABLE OF CONTENTS

INTRODUCTION **1**
Educational Assessment: A Primary Tool 1

ASSESSMENT TERMS AND TYPES OF SCORES **3**
MAP Scale Score 3
Achievement Levels 3
Lowest Obtainable Scale Score and Level Not Determined 3
Standard Error of Measurement 3
English Language Arts, Reporting Achievement-Level Descriptors 4
Mathematics, Reporting Achievement-Level Descriptors 10
Science, Abbreviated Achievement-Level Descriptors 13

SAMPLE REPORTS **14**
Individual Student Report (ISR) 14
Student Label 16

NOTICE OF NON-DISCRIMINATION **17**

This guide has been prepared by Data Recognition Corporation (DRC) to provide an overview for interpreting reports generated from the Missouri Assessment Program (MAP). It is intended to help educators apply MAP data to the needs of individual students and the district as a whole.

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INTRODUCTION

Educational Assessment: A Primary Tool

Assessment, or testing, fulfills a vital role in today's educational environment. Assessment results often are a major force in shaping public perceptions about the capabilities of our students and the quality of our schools. As a primary tool for educators and policymakers, assessment is used for many important purposes. Educators use assessment results to help improve teaching and learning and to evaluate programs and schools. Policy decisions are often based, in part, on assessment data. Because of its important role, educational assessment is used in every school, district, and state. It is vital to innovation, higher standards, and educational excellence.

Originally developed in response to Missouri's Outstanding Schools Act of 1993, the **Missouri Assessment Program (MAP)** encompasses several statewide assessments that meet state and federal statutory requirements. **MAP Grade-Level Assessments** are administered to students in grades 3 through 8 to determine their progress toward the Show-Me Standards/Missouri Learning Standards. As directed by the Outstanding Schools Act, the Show-Me Standards were developed by the Missouri Department of Elementary and Secondary Education (DESE), in cooperation with teachers, school administrators, parents, and business professionals throughout the state, to identify the knowledge, skills, and competencies that Missouri students should acquire prior to graduating from high school. For a more detailed explanation of the Show-Me Standards, refer to the DESE website (http://dese.mo.gov/show-me-standards). The Missouri Learning Standards articulate the Show-Me Standards in each content area across the grade levels. MAP Grade-Level Assessment items are aligned with the Missouri Learning Standards, which are available on the DESE website (http://dese.mo.gov/college-career-readiness/curriculum/missouri-learning-standards).

The spring 2017 Grade-Level MAP includes the following required assessments:

English Language Arts (ELA)—Grades 3–8

Mathematics—Grades 3–8

Science—Grades 5 and 8

The ELA assessments for students in grades 3, 4, 6, and 7 required approximately 1½ to 3 hours of test administration time. The ELA assessments for students in grades 5 and 8 required approximately 3–5 hours. The Mathematics assessments for students in grades 3–5 required approximately 1½ to 2 hours of test administration time. The Mathematics assessments for students in grades 6–8 required approximately 1½ to 2 hours. In addition, students in grades 5 and 8 took a Science assessment that required an additional 2 to 2½ hours of test administration. All assessments were administered online, unless students required a Braille, Large Print, or paper/pencil form as an accommodation.

For all grade levels (3 through 8), the MAP Grade-Level Assessments in ELA and Mathematics include multiple item types. **Selected-response items** (also known as multiple-choice) present students with a question followed by three or more response options. **Short-text items** require students to type an appropriate response. **Technology-enhanced items** use innovative technology to allow students to demonstrate their knowledge in ways that are not possible using paper/pencil assessments. For example, the items may require students to drag and drop data into a table, click on "hot spots" within a graphic, or indicate their response on a grid. Short-text items are scored by trained readers using specific criteria. Trained readers are always humans, not machines. Some technology-enhanced items (for example, matching interaction) are machine scorable. Others are scored by trained human readers.

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The ELA assessments in grades 5 and 8 also include a **writing prompt**. Writing prompts are a special type of performance event in which a student demonstrates their proficiency at writing. The ELA writing prompt is scored by trained human readers using a 10-point rubric that evaluates purpose and organization, evidence and elaboration, and conventions. Additional information on the rubrics for the writing process can be found on the DESE website (http://dese.mo.gov/college-career-readiness/curriculum/english-language-arts/ela-assessment-resources).

The MAP Grade-Level Assessments in Science include selected-response items, as well as **constructed-response items**, which require students to supply their answer (similar to short-text items), and **performance events**. Science performance events require students to provide an extended response, and require students to apply their knowledge and understanding in real-life situations. Science constructed-response items and performance events are scored by trained human readers using established scoring criteria.

The Department uses the information obtained through MAP to monitor the progress of Missouri's students toward meeting the Missouri Learning Standards in order to inform the public and the state legislature about student performance and to help make informed decisions about educational issues. The information obtained through MAP provides the academic performance data that drive student services throughout the state. The **MAP Grade-Level Assessment reports** provide useful information for determining the performance of individual students, as well as student performance at the classroom, building, and district levels.

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ASSESSMENT TERMS AND TYPES OF SCORES

Familiarity with the testing terms and the types of scores used in the MAP reports and other components will help you interpret test information accurately and efficiently.

MAP Scale Score

Data Recognition Corporation (DRC), the MAP Grade-Level Assessments testing vendor, uses the student's correct responses to derive a MAP scale score. The scale score describes achievement on a continuum that in most cases spans the complete range of grades 3–8. These scores range in value from 470 to 895 for Science, from 230–820 for English Language Arts and from 290–770 for Mathematics.

Achievement Levels

Student performance can be reported in terms of four performance, or achievement, levels that describe a pathway to proficiency and college and career readiness. Each achievement level represents standards of performance for each assessed content area (English Language Arts, Mathematics, and Science). Panels drawn from education, business, and professional communities determined the achievement standards. Achievement-level scores provide a description of what students can do in terms of the content and skills assessed, as described in the Missouri Learning Standards.

Lowest Obtainable Scale Score and Level Not Determined

Within each grade level and content area, a Lowest Obtainable Scale Score (LOSS) is established for students whose scores are below the level expected by guessing. Students with certain accommodations that impact the construct being assessed (e.g., read-aloud of ELA passages for students in grades 3–5) also receive a LOSS.

A student may receive "Level Not Determined" (LND) instead of a MAP scale score. Students who receive LND are not assigned to an achievement level. Students may receive LND for the following reason:

- A student is absent for all testing sessions for a particular content area.

Standard Error of Measurement

No test provides a perfect measure of a student's ability. This situation is expected because all tests have a known Standard Error of Measurement (SEM). The SEM reports the amount of variability that can be expected in a student's test score due to the inherent imprecision of the test. The SEM for the MAP test will be reported in the 2017 MAP Technical Report.

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ACHIEVEMENT-LEVEL DESCRIPTORS

English Language Arts, Reporting Achievement-Level Descriptors

Grade 3

Below Basic

Students performing at the Below Basic level on the Missouri Assessment Program demonstrate a minimal command of the skills and processes identified in the Missouri Learning Standards. They demonstrate these skills inconsistently and/or incorrectly in reading processes responding to literary and informational texts, and in writing. Students performing at the Below Basic level use few strategies to comprehend and interpret texts, demonstrate little understanding of literary forms, and apply few strategies for accessing information. They demonstrate little or no ability to organize and/or develop writing, or exhibit little command of the conventions of standard English.

MAP score range: 230–415

Basic

Students performing at the Basic level on the Missouri Assessment Program demonstrate a partial or uneven command of the skills and processes identified in the Missouri Learning Standards. They demonstrate these skills inconsistently in reading processes responding to both literary and informational texts, and in writing. In addition to demonstrating, understanding, and applying the skills at the Below Basic level, students performing at the Basic level use some strategies to comprehend and interpret a variety of texts, demonstrate a partial understanding of literary forms, and inconsistently apply some strategies for accessing and summarizing information. They demonstrate an inconsistent ability to organize and/or develop writing and exhibit an inconsistent command of the conventions of standard English.

MAP score range: 416–446

Proficient

Students performing at the Proficient level on the Missouri Assessment Program demonstrate an adequate command of the skills and processes identified in the Missouri Learning Standards. They demonstrate these skills consistently and competently in reading processes in responding to literary and informational text, and in writing. In addition to demonstrating, understanding, and applying the skills at the Basic level, students performing at the Proficient level use a range of strategies to comprehend and interpret a variety of texts, demonstrate an understanding of literary forms, and apply strategies for accessing and summarizing information. They demonstrate an adequate ability to organize and develop writing and exhibit a competent command of the conventions of standard English.

MAP score range: 447–501

Advanced

Students performing at the Advanced level on the Missouri Assessment Program consistently demonstrate a thorough command of the skills and processes identified in the Missouri Learning Standards. They demonstrate these skills consistently and skillfully in reading processes in responding to literary and informational text, and in writing efficiently. In addition to demonstrating, understanding, and applying the skills at the Proficient level, students performing at the Advanced level use a wide range of strategies to comprehend and interpret a variety of texts, demonstrate a complete and thorough understanding of literary forms, and skillfully apply a wide range of different strategies for accessing and summarizing information. They demonstrate an effective and thorough ability to organize and develop writing and exhibit an adequate command of the conventions of standard English.

MAP score range: 502–730

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Grade 4

Below Basic

Students performing at the Below Basic level on the Missouri Assessment Program demonstrate a minimal command of the skills and processes identified in the Missouri Learning Standards. They demonstrate these skills inconsistently and/or incorrectly in reading processes responding to literary and informational texts, and in writing. Students performing at the Below Basic level use few strategies to comprehend and interpret texts, demonstrate little understanding of literary forms, and apply few strategies for accessing information. They demonstrate little or no ability to organize and/or develop writing, or exhibit little command of the conventions of standard English.

MAP score range: 240–435

Basic

Students performing at the Basic level on the Missouri Assessment Program demonstrate a partial or uneven command of the skills and processes identified in the Missouri Learning Standards. They demonstrate these skills inconsistently in reading processes responding to both literary and informational texts, and in writing. In addition to demonstrating, understanding, and applying the skills at the Below Basic level, students performing at the Basic level use some strategies to comprehend and interpret a variety of texts, demonstrate a partial understanding of literary forms, and inconsistently apply some strategies for accessing and summarizing information. They demonstrate an inconsistent ability to organize and/or develop writing and exhibit an inconsistent command the conventions of standard English.

MAP score range: 436–472

Proficient

Students performing at the Proficient level on the Missouri Assessment Program demonstrate an adequate command of the skills and processes identified in the Missouri Learning Standards. They demonstrate these skills consistently and competently in reading processes in responding to literary and informational text, and in writing. In addition to demonstrating, understanding, and applying the skills at the Basic level, students performing at the Proficient level use a range of strategies to comprehend and interpret a variety of texts, demonstrate an understanding of literary forms, and apply strategies for accessing and summarizing information. They demonstrate an adequate ability to organize and develop writing and exhibit a competent command of the conventions of standard English.

MAP score range: 473–525

Advanced

Students performing at the Advanced level on the Missouri Assessment Program consistently demonstrate a thorough command of the skills and processes identified in the Missouri Learning Standards. They demonstrate these skills consistently and skillfully in reading processes in responding to literary and informational text, and in writing efficiently. In addition to demonstrating, understanding, and applying the skills at the Proficient level, students performing at the Advanced level use a wide range of strategies to comprehend and interpret a variety of texts, demonstrate a complete and thorough understanding of literary forms, and consistently apply a wide range of different strategies for accessing and summarizing information. They demonstrate an effective and thorough ability to organize and develop writing and exhibit an adequate command of the conventions of standard English.

MAP score range: 526–740

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Grade 5

Below Basic

Students performing at the Below Basic level on the Missouri Assessment Program demonstrate a minimal command of the skills and processes identified in the Missouri Learning Standards. They demonstrate these skills inconsistently and/or incorrectly in reading processes responding to literary and informational texts, and in writing. Students performing at the Below Basic level use few strategies to comprehend and interpret texts, demonstrate little understanding of literary forms, and apply few strategies for accessing information. They demonstrate little or no ability to organize and/or develop writing, or exhibit little command of the conventions of standard English.

MAP score range: 250–448

Basic

Students performing at the Basic level on the Missouri Assessment Program demonstrate a partial or uneven command of the skills and processes identified in the Missouri Learning Standards. They demonstrate these skills inconsistently in reading processes responding to both literary and informational texts, and in writing. In addition to demonstrating, understanding, and applying the skills at the Below Basic level, students performing at the Basic level use some strategies to comprehend and interpret a variety of texts, demonstrate a partial understanding of literary forms, and inconsistently apply some strategies for accessing and summarizing information. They demonstrate an inconsistent ability to organize and/or develop writing and exhibit an inconsistent command the conventions of standard English.

MAP score range: 449–487

Proficient

Students performing at the Proficient level on the Missouri Assessment Program demonstrate an adequate command of the skills and processes identified in the Missouri Learning Standards. They demonstrate these skills consistently and competently in reading processes in responding to literary and informational text, and in writing. In addition to demonstrating, understanding, and applying the skills at the Basic level, students performing at the Proficient level use a range of strategies to comprehend and interpret a variety of texts, demonstrate an understanding of literary forms, and apply strategies for accessing and summarizing information. They demonstrate an adequate ability to organize and develop writing and exhibit a competent command of the conventions of standard English.

MAP score range: 488–540

Advanced

Students performing at the Advanced level on the Missouri Assessment Program consistently demonstrate a thorough command of the skills and processes identified in the Missouri Learning Standards. They demonstrate these skills consistently and skillfully in reading processes in responding to literary and informational text, and in writing efficiently. In addition to demonstrating, understanding, and applying the skills at the Proficient level, students performing at the Advanced level use a wide range of strategies to comprehend and interpret a variety of texts, demonstrate a thorough understanding of literary forms, and consistently apply a wide range of different strategies for accessing and summarizing information. They demonstrate an effective and thorough ability to organize and develop writing and exhibit an adequate command of the conventions of standard English.

MAP score range: 541–780

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Grade 6

Below Basic

Students performing at the Below Basic level on the Missouri Assessment Program demonstrate a minimal command of the skills and processes identified in the Missouri Learning Standards. They demonstrate these skills inconsistently and/or incorrectly in reading processes responding to literary and informational texts, and in writing. Students performing at the Below Basic level use few strategies to comprehend and interpret texts, demonstrate little understanding of literary forms, and apply few strategies for accessing information. They demonstrate little or no ability to organize and/or develop writing, or exhibit little command of the conventions of standard English.

MAP score range: 260–467

Basic

Students performing at the Basic level on the Missouri Assessment Program demonstrate a partial or uneven command of the skills and processes identified in the Missouri Learning Standards. They demonstrate these skills inconsistently in reading processes responding to both literary and informational texts, and in writing. In addition to demonstrating, understanding, and applying the skills at the Below Basic level, students performing at the Basic level use some strategies to comprehend and interpret a variety of texts, demonstrate a partial understanding of literary forms, and inconsistently apply few strategies for accessing and summarizing information. They demonstrate an inconsistent ability to organize and/or develop writing and exhibit an inconsistent command of the conventions of standard English.

MAP score range: 468–498

Proficient

Students performing at the Proficient level on the Missouri Assessment Program demonstrate an adequate command of the skills and processes identified in the Missouri Learning Standards. They demonstrate these skills consistently and competently in reading processes in responding to literary and informational text, and in writing. In addition to demonstrating, understanding, and applying the skills at the Basic level, students performing at the Proficient level use a range of strategies to comprehend and interpret a variety of texts, demonstrate an understanding of literary forms, and apply strategies for accessing and summarizing information. They demonstrate an adequate ability to organize and develop writing and exhibit a competent command of the conventions of standard English.

MAP score range: 499–549

Advanced

Students performing at the Advanced level on the Missouri Assessment Program consistently demonstrate a thorough command of the skills and processes identified in the Missouri Learning Standards. They demonstrate these skills consistently and skillfully in reading processes in responding to literary and informational text, and in writing efficiently. In addition to demonstrating, understanding, and applying the skills at the Proficient level, students performing at the Advanced level use a wide range of strategies to comprehend and interpret a variety of texts, demonstrate a complete and thorough understanding of literary forms, and consistently apply a wide range of different strategies for accessing and summarizing information. They demonstrate an effective and thorough ability to organize and develop writing and exhibit an adequate command of the conventions of standard English.

MAP score range: 550–790

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Grade 7

Below Basic

Students performing at the Below Basic level on the Missouri Assessment Program demonstrate a minimal command of the skills and processes identified in the Missouri Learning Standards. They demonstrate these skills inconsistently and/or incorrectly in reading processes responding to literary and informational texts, and in writing. Students performing at the Below Basic level use few strategies to comprehend and interpret texts, demonstrate little understanding of literary forms, and apply few strategies for accessing information. They demonstrate little or no ability to organize and/or develop writing, or exhibit little command of the conventions of standard English.

MAP score range: 280–475

Basic

Students performing at the Basic level on the Missouri Assessment Program demonstrate a partial or uneven command of the skills and processes identified in the Missouri Learning Standards. They demonstrate these skills inconsistently in reading processes responding to both literary and informational texts, and in writing. In addition to demonstrating, understanding, and applying the skills at the Below Basic level, students performing at the Basic level use some strategies to comprehend and interpret a variety of texts, demonstrate a partial understanding of literary forms, and inconsistently apply few strategies for accessing and summarizing information. They demonstrate an inconsistent ability to organize and/or develop writing and exhibit an inconsistent command the conventions of standard English.

MAP score range: 476–505

Proficient

Students performing at the Proficient level on the Missouri Assessment Program demonstrate an adequate command of the skills and processes identified in the Missouri Learning Standards. They demonstrate these skills consistently and competently in reading processes in responding to literary and informational text, and in writing. In addition to demonstrating, understanding, and applying the skills at the Basic level, students performing at the Proficient level use a range of strategies to comprehend and interpret a variety of texts, demonstrate an understanding of literary forms, and apply strategies for accessing and summarizing information. They demonstrate an adequate ability to organize and develop writing and exhibit a competent command of the conventions of standard English.

MAP score range: 506–562

Advanced

Students performing at the Advanced level on the Missouri Assessment Program consistently demonstrate a thorough command of the skills and processes identified in the Missouri Learning Standards. They demonstrate these skills consistently and skillfully in reading processes in responding to literary and informational text, and in writing efficiently. In addition to demonstrating, understanding, and applying the skills at the Proficient level, students performing at the Advanced level use a wide range of strategies to comprehend and interpret a variety of texts, demonstrate a thorough understanding of literary forms, and consistently apply a wide range of different strategies for accessing and summarizing information. They demonstrate an effective and thorough ability to organize and develop writing and exhibit an adequate command of the conventions of standard English.

MAP score range: 563–810

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Grade 8

Below Basic

Students performing at the Below Basic level on the Missouri Assessment Program demonstrate a minimal command of the skills and processes identified in the Missouri Learning Standards. They demonstrate these skills inconsistently and/or incorrectly in reading processes responding to literary and informational texts, and in writing. Students performing at the Below Basic level use few strategies to comprehend and interpret texts, demonstrate little understanding of literary forms, and apply few strategies for accessing information. They demonstrate little or no ability to organize and/or develop writing, or exhibit little command of the conventions of standard English.

MAP score range: 290–485

Basic

Students performing at the Basic level on the Missouri Assessment Program demonstrate a partial or uneven command of the skills and processes identified in the Missouri Learning Standards. They demonstrate these skills inconsistently in reading processes responding to both literary and informational texts, and in writing. In addition to demonstrating, understanding, and applying the skills at the Below Basic level, students performing at the Basic level use some strategies to comprehend and interpret a variety of texts, demonstrate a partial understanding of literary forms, and inconsistently apply few strategies for accessing and summarizing information. They demonstrate an inconsistent ability to organize and/or develop writing, and exhibit an inconsistent command of the conventions of standard English.

MAP score range: 486–517

Proficient

Students performing at the Proficient level on the Missouri Assessment Program demonstrate an adequate command of the skills and processes identified in the Missouri Learning Standards. They demonstrate these skills consistently and competently in reading processes in responding to literary and informational text, and in writing. In addition to demonstrating, understanding, and applying the skills at the Basic level, students performing at the Proficient level use a range of strategies to comprehend and interpret a variety of texts, demonstrate an understanding of literary forms, and apply strategies for accessing and summarizing information. They demonstrate an adequate ability to organize and develop writing and exhibit a competent command of the conventions of standard English.

MAP score range: 518–569

Advanced

Students performing at the Advanced level on the Missouri Assessment Program consistently demonstrate a thorough command of the skills and processes identified in the Missouri Learning Standards. They demonstrate these skills consistently and skillfully in reading processes in responding to literary and informational text, and in writing efficiently. In addition to demonstrating, understanding, and applying the skills at the Proficient level, students performing at the Advanced level use a wide range of strategies to comprehend and interpret a variety of texts, demonstrate a thorough understanding of literary forms, and consistently apply a wide range of different strategies for accessing and summarizing information. They demonstrate an effective and thorough ability to organize and develop writing and exhibit an adequate command of the conventions of standard English.

MAP score range: 570–820

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Mathematics, Reporting Achievement-Level Descriptors

Grade 3

Below Basic

Students do not yet demonstrate proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in content expectations. These students need substantial academic support to be prepared for the next grade level or course and to be on track for *college and career readiness*.

MAP score range: 290–414

Basic

Students demonstrate partial proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in content expectations. These students need additional academic support to ensure success in the next grade level or course and to be on track for *college and career readiness*.

MAP score range: 415–456

Proficient

Students demonstrate proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in content expectations. These students are prepared for the next grade level or course and are on track for *college and career readiness*.

MAP score range: 457–494

Advanced

Students demonstrate advanced proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in content expectations. These students are well prepared for the next grade level or course and are well prepared for *college and career readiness*.

MAP score range: 495–650

Grade 4

Below Basic

Students do not yet demonstrate proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in content expectations. These students need substantial academic support to be prepared for the next grade level or course and to be on track for *college and career readiness*.

MAP score range: 320–437

Basic

Students demonstrate partial proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in content expectations. These students need additional academic support to ensure success in the next grade level or course and to be on track for *college and career readiness*.

MAP score range: 438–485

Proficient

Students demonstrate proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in content expectations. These students are prepared for the next grade level or course and are on track for *college and career readiness*.

MAP score range: 486–520

Advanced

Students demonstrate advanced proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in content expectations. These students are well prepared for the next grade level or course and are well prepared for *college and career readiness*.

MAP score range: 521–680

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Grade 5

Below Basic

Students do not yet demonstrate proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in content expectations. These students need substantial academic support to be prepared for the next grade level or course and to be on track for *college and career readiness*.

MAP score range: 340–462

Basic

Students demonstrate partial proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in content expectations. These students need additional academic support to ensure success in the next grade level or course and to be on track for *college and career readiness*.

MAP score range: 463–507

Proficient

Students demonstrate proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in content expectations. These students are prepared for the next grade level or course and are on track for *college and career readiness*.

MAP score range: 508–543

Advanced

Students demonstrate advanced proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in content expectations. These students are well prepared for the next grade level or course and are well prepared for *college and career readiness*.

MAP score range: 544–710

Grade 6

Below Basic

Students do not yet demonstrate proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in content expectations. These students need substantial academic support to be prepared for the next grade level or course and to be on track for *college and career readiness*.

MAP score range: 350–469

Basic

Students demonstrate partial proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in content expectations. These students need additional academic support to ensure success in the next grade level or course and to be on track for *college and career readiness*.

MAP score range: 470–517

Proficient

Students demonstrate proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in content expectations. These students are prepared for the next grade level or course and are on track for *college and career readiness*.

MAP score range: 518–554

Advanced

Students demonstrate advanced proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in content expectations. These students are well prepared for the next grade level or course and are well prepared for *college and career readiness*.

MAP score range: 555–730

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Grade 7

Below Basic

Students do not yet demonstrate proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in content expectations. These students need substantial academic support to be prepared for the next grade level or course and to be on track for *college and career readiness*.

MAP score range: 360–481

Basic

Students demonstrate partial proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in content expectations. These students need additional academic support to ensure success in the next grade level or course and to be on track for *college and career readiness*.

MAP score range: 482–527

Proficient

Students demonstrate proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in content expectations. These students are prepared for the next grade level or course and are on track for *college and career readiness*.

MAP score range: 528–563

Advanced

Students demonstrate advanced proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in content expectations. These students are well prepared for the next grade level or course and are well prepared for *college and career readiness*.

MAP score range: 564–740

Grade 8

Below Basic

Students do not yet demonstrate proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in content expectations. These students need substantial academic support to be prepared for the next grade level or course and to be on track for *college and career readiness*.

MAP score range: 390–495

Basic

Students demonstrate partial proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in content expectations. These students need additional academic support to ensure success in the next grade level or course and to be on track for *college and career readiness*.

MAP score range: 496–543

Proficient

Students demonstrate proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in content expectations. These students are prepared for the next grade level or course and are on track for *college and career readiness*.

MAP score range: 544–571

Advanced

Students demonstrate advanced proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in content expectations. These students are well prepared for the next grade level or course and are well prepared for *college and career readiness*.

MAP score range: 572–770

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Science, Abbreviated Achievement-Level Descriptors

Grade 5

Below Basic

Students identify the relationship between mass and force; classify bodies of water; identify weather instruments and their uses; identify characteristics of the solar system; compare amounts/measurements given in a simple format; identify appropriate tools for simple scientific measurements; identify how technological advances may be helpful to humans.

MAP score range: 470–625

Basic

Students explain the relationship between mass and force; describe how specialized body structures help animals survive; match environments to the plants and animals they support; identify environmental problems and find solutions; determine the appropriate scientific tool and its function in an investigation; determine how technological advances address problems and enhance life.

MAP score range: 626–668

Proficient

Students describe changes in properties of matter; identify uses of simple machines; explain how work is done; identify forces of magnetism; describe the motion of objects; identify plant parts and their functions; classify vertebrates and invertebrates; classify producers, consumers, or decomposers; predict changes in food chains; identify the effects of human activities on other organisms; describe the Sun as a source of light and heat, or the moon as a reflector of light; explain the day/night cycle; interpret data; distinguish between man-made and natural objects; apply problem solving skills to a situation.

MAP score range: 669–691

Advanced

Students identify energy transformations; predict the effect of heat energy on water; diagram a complete electrical circuit; predict how simple machines affect the force needed to do work; describe the effects of weathering and erosion on Earth's surface; describe relationships in weather data; explain how the Sun's position and the length and position of shadows relate to the time of day; interpret and apply knowledge from a data table; identify appropriate steps and tools in an investigation.

MAP score range: 692–855

Grade 8

Below Basic

Students identify simple terms related to matter and energy; demonstrate beginning understanding of properties of light and how it travels; identify structures of plants and animals needed for survival; identify levels of organization in multicellular organisms; read simple graphs and make simple data comparisons.

MAP score range: 540–670

Basic

Students identify an example of a force; demonstrate simple understanding of how traits are passed from one generation to the next; have a basic understanding of climate; identify a simple hypothesis; recognize a trend in a data table; demonstrate some awareness of how various factors influence and are influenced by science and technology.

MAP score range: 671–702

Proficient

Students classify types of motion; calculate the speed of an object; demonstrate simple understanding of life processes; classify and/or show relationships between organisms; explain how adaptations help organisms survive; explain how species are affected by environmental change; understand and describe a food web; explain rock and fossil evidence of changes in the Earth; explain how Earth's systems interact; draw conclusions from tables or graphs; demonstrate basic understanding of the solar system; recognize the need for, and calculate, averages; use appropriate tools and methods to collect data; describe tools and discoveries that advance scientific knowledge.

MAP score range: 703–734

Advanced

Students explain the physical and chemical properties of matter; apply knowledge of energy and energy transfer; demonstrate understanding of physical and chemical processes of organisms; evaluate the effects of balanced and unbalanced forces; predict the impact of environmental change in ecosystems; justify how adaptations help organisms survive; demonstrate understanding of the water cycle; compare and contrast weather and climate; explain the cause of seasons on Earth; demonstrate understanding of the solar system; apply the concept of light years; apply awareness of the influence of science and technology in society.

MAP score range: 735–895

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SAMPLE REPORTS

Individual Student Report (ISR)

The Individual Student Report (ISR) provides information about performance on the MAP Grade-Level Assessments, describing results in terms of four levels of achievement in a content area. This information may be used for instructional planning, as a point of reference during a parent/teacher conference, and for permanent record keeping. Other sources of information, such as classroom performance, should be used along with this report when determining the student's areas of strength or need.

Achievement-level scores describe what students can do in terms of the content and skills assessed by the MAP. Because the English Language Arts and Mathematics Missouri Learning Standards are grounded in expectations for college and career readiness, the MAP Grade-Level Assessments are designed to measure each student's progress toward meeting those expectations. Teachers, students, and parents/guardians can use this information, in addition to how the student performs in the classroom, to determine what skills and abilities need to be acquired to enable the student to progress to higher achievement levels. A student in the Proficient or Advanced level has met the standard. Students in the Below Basic and Basic levels have typically mastered skills described for their levels, but need to work on skills in higher levels.

The following page contains a sample Individual Student Report.

❶ ***Student Report for:*** This area of the report is reserved for the name and biographical data of the student taking the assessment.

❷ ***How did your child perform?*** This is your child's scale score. The scale score is also printed in the left column under "Overview of Performance."

❸ ***Your child's achievement level is Proficient.*** Achievement levels (whether Advanced, Proficient, Basic, or Below Basic) are based on the test score ranges listed beneath each achievement level shown in the right column.

❹ ***Overview of Performance.*** The **Scale Score** is derived from student responses to assessment items. It summarizes the overall level of performance attained by your child for a particular content area.

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Sample Individual Student Report

Missouri Grade-Level Assessment Program

2017 Individual Student Report

1 Student Report for:

Name: WEBBER, PEGGY
Student ID: 1234567890
Birthdate: MM/DD/YYYY
Grade: Grade 5
School: SALEM ELEM
District: S. CENTRAL DISTRICT

2 How did your child perform in English Language Arts?

Your child received a score of 599.

One way to measure performance is by achievement levels, which are based on scale score. Achievement levels describe what your child's score means.

3 Your child's achievement level is Advanced.

What does a level of "Advanced" mean?

Students performing at the Advanced level on the Missouri Assessment Program consistently demonstrate a thorough command of the skills and processes identified in the Missouri Learning Standards. They demonstrate these skills consistently and skillfully in reading processes in responding to literary and informational text, and in writing efficiently. In addition to demonstrating, understanding, and applying the skills at the Proficient level, students perform at the Advanced level use a wide range of strategies to comprehend and interpret a variety of texts, demonstrate a complete and thorough understanding of literary forms, and consistently apply a wide range of different strategies for accessing and summarizing information. They demonstrate an effective and thorough ability to organize and develop writing and exhibit an adequate command of the conventions of standard English.

Advanced
Scores of 541 and above demonstrate a thorough understanding of the content at this grade level.

Proficient
Scores at 488–540 demonstrate an understanding of the content expected at this grade level.

Basic
Scores at 449–487 demonstrate a partial understanding of the content expected at this grade level.

Below Basic
Scores at 448 and below do not demonstrate an understanding of the content expected at this grade level.

4 Overview of Performance

Scale Score: 559

This report provides information about achievement on the Missouri Assessment Program (MAP).

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A single exam can provide only limited information. You should confirm your child's strengths and needs in these topics by reviewing classroom work, standards-based assessments and your child's progress reports during the year.

For more resources, go to:
http://dese.mo.gov/college-career-readiness-assessment

DATA RECOGNITION CORPORATION DRC

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Student Label

MISSOURI ASSESSEMENT PROGRAM		**Content Area**	**English Language Arts**
SAMPLE, STUDENT1 ❶		Achievement Level	**Proficient** ❷
Grade:	**Grade 5**	MAP Scale Score	**505** ❸
Test Date:	**04/04/2017**		
DOB:	**01/01/2003**		
MOSIS State ID:	**1234567890**		
			02/22/2017

Above is a sample of the MAP student label. The student label is designed so that each student's test results can be placed in the student's permanent record. A label is provided for every student who participated in the spring 2017 administration of the MAP. Each label has a self-adhesive backing so that it can be peeled from the sheet and placed in the student's cumulative school record. The label presents a snapshot of the student's results on the MAP. Separate labels are generated for each grade and content area; thus, a student will have multiple labels—one for each of the content areas administered within a grade.

❶ ***Student Demographic Information.*** The left side of the label lists the name and biographical data of the student taking the assessment.

❷ ***Achievement Level.*** This is the student's Achievement Level (Advanced, Proficient, Basic, or Below Basic).

❸ ***Scale Score.*** This is the student's Scale Score for the content area listed at the top of the label.

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It is the policy of the Missouri Department of Elementary and Secondary Education not to discriminate on the basis of race, color, religion, gender, national origin, age, or disability in its programs or employment practices as required by Title VI and VII of the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, Section 504 of the Rehabilitation Act of 1973, the Age Discrimination Act of 1975, and Title II of the Americans with Disabilities Act of 1990.

Inquiries related to Department employment practices may be directed to the Jefferson State Office Building, Human Resources Director, 8th Floor, 205 Jefferson Street, P.O. Box 480, Jefferson City, MO 65102-0480; telephone number (573) 751-9619 or TYY (800) 735-2966. Inquiries related to Department programs and to the location of services, activities, and facilities that are accessible by persons with disabilities may be directed to the Jefferson State Office Building, Office of the General Counsel, Coordinator–Civil Rights Compliance (Title VI/Title IX/504/ADA/Age Act), 6th Floor, 205 Jefferson Street, P.O. Box 480, Jefferson City, MO 65102-0480; telephone number (573) 526-4757 or TYY (800) 735-2966, email civilrights@dese.mo.gov.

Anyone attending a meeting of the State Board of Education who requires auxiliary aids or services should request such services by contacting the Executive Assistant to the State Board of Education, Jefferson State Office Building, 205 Jefferson Street, Jefferson City, MO 65102-0480; telephone number (573) 751-4446 or TTY (800) 735-2966.

Inquiries or concerns regarding civil rights compliance by school districts or charter schools should be directed to the local school district or charter school Title IX/non-discrimination coordinator. Inquiries and complaints may also be directed to the Office for Civil Rights, Kansas City Office, U.S. Department of Education, 8930 Ward Parkway, Suite 2037, Kansas City, MO 64114; telephone number (816) 268-0550; FAX (816) 823-1404; TDD (877) 521-2172.

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Appendix E: MAP GRF Layout

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MO MAP GLA Spring 2017 GRF Layout					
Start	**End**	**Len**	**Field**	**Valid Values**	**Comments/Description**
			Hierarchical Information		
1	2	2	StateCode	MO	Missouri
3	15	13	Test type	MAPSMTSPR2017	Represents the assessment the student will be taking. MAPSMTSPR2017 is MAP Grade-Level Assessment spring Summative
16	43	28	District Name	A-Z, a-z, 0-9, “&”, “#”, “:”, “;”, “(”, “)”, “ " ”, “ ' ”, “-”, "@", embedded space	Data will come from Node file, not Precode file.
44	49	6	DistCd	0-9; DESE-Assigned Unique 6 digit code representing the district in which the school is located. Include leading zeroes, when applicable.	Tested District Code.
50	77	28	School Name	A-Z, a-z, 0-9, “&”, “#”, “:”, “;”, “(”, “)”, “ " ”, “ ' ”, “-”, "@", embedded space	Data will come from Node file, not Precode file.
78	81	4	ScCd	0-9; Four digit school code	Tested School Code
82	83	2	Grade	03 - 08; Must include 2 characters (leading zeroes when applicable).	Grade level as of the time data is being submitted.
84	113	30	City	A-Z, a-z, 0-9 Alphanumeric characters, embedded space	This is the "SHIP_TO_CITY" in Node file.
114	117	4	Current School Year	YYYY	2017
118	167	50	Blank for Future Use	Filler	Reserved for future use
			Student BIO Information		
168	179	12	Record ID (unique system-generated ID)	0-9	A unique number per student record. The Record ID number shall be unique by student record and unique within an administration year.
180	189	10	DRC Student ID (Unique System-generated)	0-9	Unique record number per student. This is a DRC internal number that uniquely identifies each student within an administration in a given contract year.

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MO MAP GLA Spring 2017 GRF Layout					
Start	**End**	**Len**	**Field**	**Valid Values**	**Comments/Description**
190	209	20	Local Student ID	0-9; blank	
210	219	10	StateID	0-9; blank	MOSIS ID - State assigned student identifier. See http://dese.mo.gov/MOSIS for more information.
220	279	60	Last Name	Legal last name. Supported Characters : A-Z, a-z, 0-9, "-", "_", " ' ", ".", space	Student Last Name
280	339	60	First Name	Legal first name Supported Characters : A-Z, a-z, 0-9, "-", "_", " ' ", ".", space	Student First Name
340	399	60	Middle Name	Legal middle name Supported Characters : A-Z, a-z, 0-9, "-", "_", " ' ", ".", space	Student Middle Name
400	409	10	Suffix	Legal name suffix. E.g. Jr, Sr Supported Characters : A-Z, a-z, 0-9, "-", "_", " ' ", ".", space	
410	419	10	Birth Date	mmddyyyy Month = Jan = ‘01’, Feb = ‘02’, Mar = ‘03’, Apr = ’04’, May = ‘05’, June = ‘06’, July = ‘07’, Aug = ‘08’, Sept = ‘09’, Oct = ‘10’,Nov = ’11’, Dec = ‘12’ Day = 01 to 31 Year = Each position: 0-9	
420	420	1	Gender	F = Female, M = Male	
421	421	1	RaceEthnicity	A = Asian B = Black H = Hispanic I = Indian (American Indian or Alaskan Native) W = White P = Native Hawaiian or Other Pacific Islander M = Multi-Racial	
422	422	1	Filler	blank	Reserved for future use

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MO MAP GLA Spring 2017 GRF Layout					
Start	**End**	**Len**	**Field**	**Valid Values**	**Comments/Description**
423	423	1	Filler	blank	Reserved for future use
424	424	1	State Use 1	Y if marked, Blank if not marked.	Will be blank for all; not currently used.
425	425	1	State Use 2	Y if marked, Blank if not marked.	Will be blank for all; not currently used.
426	426	1	State Use 3	Y if marked, Blank if not marked.	Will be blank for all; not currently used.
427	427	1	State Use 4	Y if marked, Blank if not marked.	Will be blank for all; not currently used.
428	428	1	State Use 5	Y if marked, Blank if not marked.	Will be blank for all; not currently used.
429	429	1	State Use 6	Y if marked, Blank if not marked.	Will be blank for all; not currently used.
430	430	1	State Use 7	Y if marked, Blank if not marked.	Will be blank for all; not currently used.
431	431	1	State Use 8	Y if marked, Blank if not marked.	Will be blank for all; not currently used.
432	432	1	State Use 9	Y if marked, Blank if not marked.	Will be blank for all; not currently used.
433	433	1	State Use 10	Y if marked, Blank if not marked.	Will be blank for all; not currently used.
434	435	2	Period	01-10, blank	From the Precode File.
			CONTENT AREA INFORMATON		
436	437	2	Content Code	01 = English Language Arts, 02 = Mathematics, 03 = Science	
438	443	6	Content Form	IDEAS six-digit Form ID, blank	Form is at the Content level.
444	503	60	ExaminerFirstName	Supported Characters : A-Z, a-z, 0-9, "-", "_", " ' ", ".", space	From the Test Session Name in eDIRECT.
504	563	60	ExaminerLastName	Supported Characters : A-Z, a-z, 0-9, "-", "_", " ' ", ".", space	From the Test Session Name in eDIRECT.
564	633	70	ExaminerEmail	Up to 70 characters, valid email format (xxx@xxx.xxx), Blank if no email included.	
634	648	15	Content Export Date Time	YYYYMMDDHHMMSS (24 Hr Time Frame in GMT Format)	(24 HOUR FORMAT - IF MORE THAN ONE REORD IN OUR PROCESSING WE KEEP THE LATEST RECEIVED RECORD) **NOTE: The first 14 positions will have the DateTime**

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MO MAP GLA Spring 2017 GRF Layout					
Start	**End**	**Len**	**Field**	**Valid Values**	**Comments/Description**
					stamp, starting at position 634, and the very last position in the field (15) is blank.
649	658	10	Test Date (MMDDCCYY)	MMDDCCYY	This date is the generic first date of the testing window.
659	659	1	Precode Flag	Y = yes, blank = no	Only set to "Y" if the student comes in on a precode file. Blank if student was manually entered.
660	709	50	Filler	blank	Reserved for future use
			Accommodations and Universal Tools		
710	710	1	Accommodation Braille (A012)	Blank = Not Indicated Y = Indicated	Content Areas = ELA, Math, Science. Grades = 3-8. Code A012 refers to Braille administered via Paper format
711	711	1	Accommodation Large Print (A021)	Blank = Not Indicated Y = Indicated	Content Areas = ELA, Math, Science Grades = 3-8. Paper format only
712	712	1	Filler	blank	Reserved for future use
713	713	1	Accommodation Sign Language (A052)	Blank = Not Indicated Y = Indicated	Content Areas = ELA, Math, Science Grades = 3-8
714	714	1	Accommodation Paper Based Assessment (A102)	Blank = Not Indicated Y = Indicated	Content Areas = ELA, Math, Science Grades = 3-8
715	715	1	Accommodation Specialized Calculator (For Calculator Allowed Items Only) (A396)	Blank = Not Indicated Y = Indicated	Content Area = Math only Grades = 3-8
716	716	1	Accommodation Alternate Response Options (A441)	Blank = Not Indicated Y = Indicated	Content Areas = ELA, Math, Science Grades = 3-8
717	717	1	Universal Tool Bilingual Dictionary (S431)	Blank= Not Indicated Y = Indicated	Content Area = ELA, Math, Science Grades = 3-8
718	718	1	Filler	blank	Reserved for future use
719	719	1	Filler	blank	Reserved for future use
720	720	1	Universal Tool Color Contrast - Paper (S102)	Blank = Not Indicated Y = Indicated	Content Areas = ELA, Math, Science Grades = 3-8

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MO MAP GLA Spring 2017 GRF Layout					
Start	**End**	**Len**	**Field**	**Valid Values**	**Comments/Description**
721	721	1	Universal Tool Color Overlay (S103)	Blank = Not Indicated Y = Indicated	Content Areas = ELA, Math, Science Grades = 3-8. Paper
722	722	1	Universal Tool Magnification - Assistive Technology (S105)	Blank = Not Indicated Y = Indicated	Content Areas = ELA, Math, Science Grades = 3-8
723	723	1	Filler	blank	Reserved for future use
724	724	1	Universal Tool Masking - Paper (S107)	Blank = Not Indicated Y = Indicated	Content Areas = ELA, Math, Science Grades = 3-8
725	725	1	Universal Tool Read-Aloud (For all items in any subject, Not Including ELA Reading Passages) - Text-To-Speech (S041)	Blank = Not Indicated Y = Indicated	Content Areas = ELA, Math, Science Grades = 3-8
726	726	1	Universal Tool Read-Aloud (For all items in any subject,-Not Including ELA Reading Passages) - Assistive Technology (S042)	Blank = Not Indicated Y = Indicated	Content Areas = ELA, Math, Science Grades = 3-8
727	727	1	Universal Tool Read-Aloud (For all items in any subject,-Not Including ELA Reading Passages) - Native Language (S111)	Blank = Not Indicated Y = Indicated	Content Areas = ELA, Math, Science Grades = 3-8
728	728	1	Universal Tool Scribe (S351)	Blank = Not Indicated Y = Indicated	Content Areas = ELA, Math, Science Grades = 3-8
729	729	1	Universal Tool Separate Setting (S501)	Blank = Not Indicated Y = Indicated	Content Areas = ELA, Math, Science Grades = 3-8
730	730	1	Universal Tool Translation (S109)	Blank = Not Indicated Y = Indicated	Content Areas = ELA, Math, Science Grades = 3-8
731	731	1	Accommodation Read Aloud (ELA Reading Passages) - Text-To-Speech **(GRADES 6-8)** (A043)	Blank = Not Indicated Y = Indicated	Content Area = ELA only Grades = 6-8
732	732	1	Accommodation Read Aloud (ELA Reading Passages) - Text-To-Speech **(GRADES 3-5 ONLY)** (A040) ****INVALIDATION ELA****	Blank = Not Indicated Y = Indicated	Content Area = ELA only Grades = 3-5

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MO MAP GLA Spring 2017 GRF Layout					
Start	**End**	**Len**	**Field**	**Valid Values**	**Comments/Description**
733	733	1	Accommodation Read-Aloud (ELA Reading Passages) - Human Reader (**GRADES 3-5 ONLY**) (A041) ****INVALIDATION ELA****	Blank = Not Indicated Y = Indicated	Content Area = ELA only Grades = 3-5
734	734	1	Accommodation Read-Aloud (ELA Reading Passages) - Assistive Technology (**GRADES 3-5 ONLY**) (A042) ****INVALIDATION ELA****	Blank = Not Indicated Y = Indicated	Content Area = ELA only Grades = 3-5
735	735	1	Accommodation Read-Aloud (ELA Reading Passages) - Native Language (**GRADES 3-5 ONLY**) (A111) ****INVALIDATION ELA****	Blank = Not Indicated Y = Indicated	Content Area = ELA only Grades = 3-5
736	736	1	Universal Tool Read-Aloud (For all items in any subject, Not Including ELA Reading Passages) - Human Reader (S043)	Blank = Not Indicated Y = Indicated	Content Areas = ELA, Math, Science Grades = 3-8
737	737	1	Accommodation Read-Aloud (ELA Reading Passages) - Assistive Technology (**GRADES 6-8**) (A044)	Blank = Not Indicated Y = Indicated	Content Area = ELA only Grades = 6-8
738	738	1	Accommodation Read-Aloud (ELA Reading Passages) - Human Reader (**GRADES 6-8**) (A045)	Blank = Not Indicated Y = Indicated	Content Area = ELA only Grades = 6-8
739	739	1	Accommodation Read-Aloud (ELA Reading Passages) - Native Language (**GRADES 6-8**) (A112)	Blank = Not Indicated Y = Indicated	Content Area = ELA only Grades = 6-8
740	740	1	Accommodation Read-Aloud (ELA Reading Passages -Blind Students (A046)	Blank = Not Indicated Y = Indicated	Content Area = ELA only Grades = 6-8

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MO MAP GLA Spring 2017 GRF Layout					
Start	**End**	**Len**	**Field**	**Valid Values**	**Comments/Description**
741	741	1	Accommodation Speech-To-Text - Assistive Technology (A352)	Blank = Not Indicated Y = Indicated	Content Areas = ELA, Math, Science Grades = 3-8
742	742	1	Accommodation Abacus (A391)	Blank = Not Indicated Y = Indicated	Content Areas = Math, Science only Grades = 3-8
743	743	1	Accommodation Calculator (For Non-Calculator Allowed Items Only) **(GRADE 3 ONLY)** (A392) ****INVALIDATION MATH****	Blank = Not Indicated Y = Indicated	Content Area = Math only Grade = 3
744	744	1	Accommodation Calculator (For Non-Calculator Allowed Items Only) **(GRADES 4-8)** (A393)	Blank = Not Indicated Y = Indicated	Content Area = Math only Grades = 4-8
745	745	1	Accommodation Multiplication Table **(GRADE 3 ONLY)** (A394) **** INVALIDATION MATH****	Blank = Not Indicated Y = Indicated	Content Area = Math only Grade = 3
746	746	1	Accommodation Multiplication Table **(GRADES 4-8)** (A395)	Blank = Not Indicated Y = Indicated	Content Area = Math, Science only Grades = 4-8
747	747	1	Universal Tool Non-Accommodation Paper Based Assessment (S112)	Blank = Not Indicated Y = Indicated	Content Areas = ELA, Math, Science Grades = 3-8
748	767	20	Filler	blank	Reserved for future use
			Teacher Invalidations		
768	768	1	Teacher Invalidation	Blank = No Invalidation marked Y = Invalidated	"Teacher Invalidation" are populated from eDIRECT. When invalidation is marked this will invalidate the content area for all sessions.
			Absent		
769	769	1	Absent	Blank = Not Marked, Y = Marked	Absent populated from eDIRECT
770	818	49	Blank for Future Use	Filler	Blank for future use
			Item Responses		

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MO MAP GLA Spring 2017 GRF Layout					
Start	**End**	**Len**	**Field**	**Valid Values**	**Comments/Description**
819	839	21	Content Area Title	"English Language Arts", "Mathematics", "Science"	
840	939	100	Item Responses for Session 1	0-9, ABCDE, blank	For all Item Response Strings, Item sequence in string = item sequence in test map For MC item responses: Correct = A, B, C, D; Incorrect = 1, 2, 3, 4; Omit/blank = 0 All other item types will be represented with a numeric score value or a condition code.
940	1039	100	Item Responses for Session 2	0-9, ABCDE, blank	
1040	1139	100	Item Responses for Session 3	0-9, ABCDE, blank	
1140	1239	100	Item Responses for Session 4	0-10, ABCDE, blank	Total score for writing prompt (WP) item.
			Item Scores		
1240	1242	3	Total Raw Score	0-100, blank	Raw Score for MC Items + Raw Score for CR Items (including WP) + Raw Score for TE Items
1243	1243	1	Completion Criteria	N = not met, Y = met	(Completion Criteria Met = Valid Attempt)
1244	1247	4	Percent Correct	0.0 - 100, blank	Whole Number plus one decimal position (99.9). Percent Correct = Total Raw Score / Total Raw Score Possible. Report to the tenth. No decimal point for 100. Rounding rules: round up from anything half-way between tenths (for example, 22.25 rounds to 22.3)
1248	1251	4	Scale Score	0000-9999, blank	

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MO MAP GLA Spring 2017 GRF Layout					
Start	**End**	**Len**	**Field**	**Valid Values**	**Comments/Description**
1252	1252	1	Content Achievement Level	Values 0, 2-5 0 = if Absent or No Valid Attempt (Level Not Determined) 2 = Below Basic or Invalidated Test 3 = Basic 4 = Proficient 5 = Advanced.	
1253	1282	30	Blank for Future Use	Filler	Reserved for future use
			MLS Score Data		
1283	1286	4	Strand #1	1	For all strands, Strand_Code from mapping.
1287	1290	4	Strand #1 Pts. Earned	0.0 - 100, blank	For all strands, Strand # Pts. Earned = Raw Score for the strand/ Total Raw Score Possible for the strand.
1291	1294	4	Strand #2	2	
1295	1298	4	Strand #2 Pts. Earned	0.0 - 100, blank	
1299	1302	4	Strand #3	3	
1303	1306	4	Strand #3 Pts. Earned	0.0 - 100, blank	
1307	1310	4	Strand #4	4	
1311	1314	4	Strand #4 Pts. Earned	0.0 - 100, blank	
1315	1318	4	Strand #5	5, blank	
1319	1322	4	Strand #5 Pts. Earned	0.0 - 100, blank	
1323	1326	4	Strand #6	6, blank	
1327	1330	4	Strand #6 Pts. Earned	0.0 - 100, blank	
1331	1334	4	Strand #7	7, blank	
1335	1338	4	Strand #7 Pts. Earned	0.0 - 100, blank	
1339	1342	4	Strand #8	8, blank	
1343	1346	4	Strand #8 Pts. Earned	0.0 - 100, blank	
1347	1350	4	Content Category #1	#.#, blank	For all content categories, Content Category_Code from mapping.

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MO MAP GLA Spring 2017 GRF Layout					
Start	**End**	**Len**	**Field**	**Valid Values**	**Comments/Description**
1351	1354	4	Content Category #1 Pts. Earned	0.0 - 100, blank	For all content categories, Content Category # Pts. Earned = Raw Score for the content category/ Total Raw Score Possible for the content category.
1355	1358	4	Content Category #2	#.#, blank	
1359	1362	4	Content Category #2 Pts. Earned	0.0 - 100, blank	
1363	1366	4	Content Category #3	#.#, blank	
1367	1370	4	Content Category #3 Pts. Earned	0.0 - 100, blank	
1371	1374	4	Content Category #4	#.#, blank	
1375	1378	4	Content Category #4 Pts. Earned	0.0 - 100, blank	
1379	1382	4	Content Category #5	#.#, blank	
1383	1386	4	Content Category #5 Pts. Earned	0.0 - 100, blank	
1387	1390	4	Content Category #6	#.#, blank	
1391	1394	4	Content Category #6 Pts. Earned	0.0 - 100, blank	
1395	1398	4	Content Category #7	#.#, blank	
1399	1402	4	Content Category #7 Pts. Earned	0.0 - 100, blank	
1403	1406	4	Content Category #8	#.#, blank	
1407	1410	4	Content Category #8 Pts. Earned	0.0 - 100, blank	
1411	1414	4	Content Category #9	#.#, blank	
1415	1418	4	Content Category #9 Pts. Earned	0.0 - 100, blank	
1419	1422	4	Content Category #10	#.#, blank	
1423	1426	4	Content Category #10 Pts. Earned	0.0 - 100, blank	
1427	1430	4	Content Category #11	#.#, blank	

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MO MAP GLA Spring 2017 GRF Layout					
Start	**End**	**Len**	**Field**	**Valid Values**	**Comments/Description**
1431	1434	4	Content Category #11 Pts. Earned	0.0 - 100, blank	
1435	1438	4	Content Category #12	#.#, blank	
1439	1442	4	Content Category #12 Pts. Earned	0.0 - 100, blank	
1443	1446	4	Content Category #13	#.#, blank	
1447	1450	4	Content Category #13 Pts. Earned	0.0 - 100, blank	
1451	1454	4	Content Category #14	#.#, blank	
1455	1458	4	Content Category #14 Pts. Earned	0.0 - 100, blank	

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