



**2021-2022 LEAP 2025 Grades 3-8  
Operational Technical Report  
English Language Arts and Mathematics**

Submitted to the  
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## Executive Summary

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This report is a technical summary of the 2022 administration of the Louisiana Educational Assessment Program (LEAP 2025) in English language arts (ELA) and mathematics for grades 3 through 8. The LEAP 2025 summative assessments in ELA and mathematics are administered in grades 3 through 8 and high school. These tests are designed to measure students' readiness for the next grade or course of study and proficiency in ELA and mathematics. The ELA and mathematics test forms were developed by Data Recognition Corporation (DRC) test development staff using the New Meridian item bank as well as items from the Louisiana Department of Education's own item bank. Items taken from these banks were on pre-established item response theory (IRT) scales. This section provides a summary of the 2022 operational technical report.

### E.1 Overview of This Report

This technical report documents the major activities of the testing cycle and provides details that confirm that the processes and procedures applied in the LEAP 2025 assessments adhered to appropriate professional standards and practices of educational assessment. Ultimately, this report serves to document evidence that valid inferences about Louisiana student performance in ELA and mathematics can be derived from the LEAP 2025 assessments. An overview of major activities documented within this report is provided below.

The Louisiana Department of Education and Data Recognition Corporation implemented rigorous quality control procedures throughout the test development, administration, scoring, analyses, and reporting processes for the LEAP 2025 assessments. The system and procedures for monitoring, maintaining, and improving the quality of state assessment system is described in each section of the technical report as an integral part of the activities.

#### *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 intended uses of the LEAP 2025 test scores, and Chapter 2 discusses some of those uses.

#### *Test Content Development (Chapter 3)*

Chapter 3 of the technical report provides a summary of the test development activities that occurred in order to create the spring 2022 operational test forms. This includes quality control of Item Development, the Item Bank, and the Item Review process.

#### *Test Administration (Chapter 4)*

Chapter 4 of the technical report describes the processes implemented and the information disseminated to help ensure standardized test administration procedures and, thus, uniform test administration conditions for students. This includes quality control process including, but not limited to, LDOE site visits, review rounds of materials, Security Checklists, and Test Security Measures (Data Forensics Analysis, Response-Change Analysis, Web Monitoring, and Plagiarism Detection).

#### *Constructed-Response and Technology-Enhanced Scoring (Chapter 5)*

Chapter 5 of the technical report describes the processes used to score constructed-response and technology-enhanced items. The quality control measures in this section included the recruitment and interview process, security, training process, including the material development, and qualifying procedures. This chapter discusses how scorers are trained and the measures used to ensure consistency among scorers.

Finally, this chapter presents the results of the inter-rater reliability studies. Inter-rater reliability studies long with validity and reader monitoring are additional quality control processes of scoring.

### *Operational Data Analyses (Chapter 6)*

Chapter 6 of the technical report includes a detailed description of the operational data analyses and quality control of the 2022 LEAP 2025 assessments, which include the following major parts: the classical item analysis; calibration, scaling, and linking using IRT models; and student scoring.

### *Test Results (Chapter 7)*

Chapter 7 of the technical report contains information on the results of the spring 2022 LEAP 2025 assessments. Detailed summary statistics based on scale scores and information about achievement levels are also provided. Finally, this chapter presents information on the score reports sent to school systems.

### *Performance-Level Setting (Chapter 8)*

Chapter 8 of the technical report briefly discusses performance-level setting. It provides a brief overview of the quality-controlled procedures for performance-level setting and derivation of the cut scores used to classify students into achievement levels for ELA and mathematics.

### *Evidence of Construct-Related Reliability (Chapter 9)*

Chapter 9 of the technical report provides evidence of the system and procedures for monitoring, maintaining, and improving the quality, reliability and validity of the LEAP 2025 test scores. This chapter provides detailed evidence of the reliability of the tests and information on the decision consistency of the cut scores. It also provides evidence of construct validity for the LEAP 2025 test scores.

### *Fairness (Chapter 10)*

Chapter 10 of the technical report discusses fairness and how the LEAP 2025 assessments are constructed, with quality control procedures in place, to be fair to all Louisiana students. This chapter summarizes the results of the differential item functioning (DIF) analysis. It also discusses the results of an impact analysis designed to determine whether large differences exist with the test results of different demographic groups in Louisiana. The results of the administration mode study are also summarized.

## E.2 Administration

In the spring of 2022, Louisiana administered the LEAP 2025 summative assessments in ELA and mathematics to students in grades 3–8. A paper-based test (PBT) option was administered in grade 3, and the computer-based test (CBT) was administered in grades 3–8. The CBTs were administered from April 25 to May 25, 2022. The PBTs were administered from April 27 to 29, 2022. Test administration is discussed in Chapter 4 of this report.

A total of 104 school systems and 32 charter schools administered the ELA and mathematics LEAP 2025 tests in grades 3–8. Table E.1 shows participation rates based on census data. For the purposes of this report, participation rate is defined as the percentage of students who earned a valid scale score given the total number of students who were expected to take the test. The “Accountable” column shows the total number of students who were expected to take the test by grade and content area. The “Percentage Reportable” column shows the percentage of students who received a scale score on the LEAP 2025 by grade and content area. Further analysis of participation rates is provided in Chapter 7 of this report. The results presented in Table E.1 and Chapter 7 are presented as evidence of reliability and validity of the scores from the LEAP 2025 assessments and should not be used for state accountability purposes.



**Table E.1 Participation Rates: All Students Participating in 2022 LEAP 2025 Grades 3-8**

| Grade | Accountable in ELA | Percentage Reportable in ELA | Accountable in Mathematics | Percentage Reportable in Mathematics* |
|-------|--------------------|------------------------------|----------------------------|---------------------------------------|
| 3     | ≥49,540            | 99.57%                       | ≥49,850                    | 99.60%                                |
| 4     | ≥48,950            | 99.70%                       | ≥48,950                    | 99.73%                                |
| 5     | ≥49,040            | 99.69%                       | ≥49,050                    | 99.70%                                |
| 6     | ≥49,580            | 99.50%                       | ≥49,590                    | 99.52%                                |
| 7     | ≥46,290            | 99.30%                       | ≥51,320                    | 99.38%                                |
| 8     | ≥51,210            | 99.17%                       | ≥51,220                    | 99.19%                                |

\*Students in grade 8 who were enrolled in Algebra I had the option of taking the LEAP 2025 Algebra I assessment instead of the LEAP 2025 Grade 8 Mathematics test.

### E.3 Student Performance

Tables E.2 and E.3 present the percentage of students in 2022 who were classified in each of the achievement levels for ELA and mathematics.

**Table E.2 Percentage of Students Classified in Achievement Levels Using 2022 Census Data: English Language Arts**

| Grade | Unsatisfactory | Approaching Basic | Basic | Mastery | Advanced |
|-------|----------------|-------------------|-------|---------|----------|
| 3     | 21.9           | 18.9              | 21.2  | 33.6    | 4.4      |
| 4     | 13.6           | 17.9              | 24.5  | 34.1    | 10.0     |
| 5     | 10.2           | 20.0              | 29.9  | 36.2    | 3.6      |
| 6     | 12.1           | 21.6              | 28.5  | 31.3    | 6.5      |
| 7     | 14.7           | 16.6              | 24.0  | 30.6    | 14.0     |
| 8     | 12.4           | 18.2              | 22.9  | 35.7    | 10.8     |

**Table E.3 Percentage of Students Classified in Achievement Levels Using 2022 Census Data: Mathematics**

| Grade | Unsatisfactory | Approaching Basic | Basic | Mastery | Advanced |
|-------|----------------|-------------------|-------|---------|----------|
| 3     | 13.9           | 21.8              | 27.3  | 32.5    | 4.5      |
| 4     | 14.8           | 24.6              | 24.3  | 32.6    | 3.7      |
| 5     | 13.4           | 28.0              | 29.2  | 24.8    | 4.6      |
| 6     | 18.0           | 27.4              | 27.4  | 23.9    | 3.3      |
| 7     | 13.4           | 29.7              | 32.8  | 21.3    | 2.7      |
| 8     | 23.5           | 27.7              | 25.2  | 21.5    | 2.1      |

More information on student performance may be found in Chapter 7 of this report.

### E.4 Validity and Test Scores

Most sections of this technical report are designed to provide validity evidence to support the intended uses of the LEAP 2025 test scores. Chapter 2 discusses the intended uses of the LEAP 2025 test scores. Chapter 3

discusses the test development process used to create the LEAP 2025 tests, which is important to the content-related validity of the LEAP 2025 test scores. Chapter 4 presents information on test administration. Chapter 5 discusses the scoring process and the results of the inter-rater reliability studies. Chapter 6 presents the test scaling and linking procedures, student scoring methodology, and the results of other operational data analyses. Chapter 7 reviews the results of the 2022 administration and gives an overview of the score reports that were electronically delivered to the school systems for distribution to schools and parents. Chapter 8 highlights the procedures for performance-level setting implemented by Partnership for Assessment of Readiness for College and Careers (PARCC), which were used because PARCC's standards and achievement levels were used for the LEAP 2025. Chapter 9 discusses reliability and construct-related validity. Chapter 10 gives an overview of the statistical processes used to evaluate bias to ensure fairness of the LEAP 2025 for all examinees.

## Chapter 1: Introduction

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The LEAP 2025 assessment system is designed to measure students' knowledge of ELA, mathematics, science, and social studies. This report provides a technical overview of the LEAP 2025 ELA and mathematics assessments administered in grades 3 through 8 in the spring of 2022 and presents evidence for the validity of the 2022 LEAP 2025 ELA and mathematics assessment scores.

This chapter describes the background, purpose, and design of the LEAP 2025 assessments.

### 1.1 Background

In 2010, the Board of Elementary and Secondary Education (BESE) approved the Common Core State Standards (CCSS) in ELA and mathematics. After adopting the CCSS, Louisiana became a governing member of PARCC, a group of states working to develop high-quality assessments that measure the full range of the CCSS.

To prepare for the PARCC assessments and help ease the transition to the new standards, the Louisiana Department of Education (LDOE) incrementally revised the LEAP and *i*LEAP ELA and mathematics assessments in grades 3 through 8 and administered transitional tests during the 2012–2013 and 2013–2014 school years.

In the 2014–2015 school year, students in grades 3–8, except those qualifying for the LEAP Alternate Assessment, Level 1 (LAA 1), took the PARCC assessments for ELA and mathematics, which included two components: the performance-based assessment (PBA), which was administered in March, and the end-of-year assessment (EOY), which was administered in May.

As a result of a legislative agreement reached during the summer of 2015, and to maintain comparability to the 2015 assessments, the LEAP ELA and mathematics assessments in grades 3–8 for the 2015–2016 school year consisted of items taken from both the PARCC assessments (no more than 49.9%) and DRC's College and Career Readiness item bank.

In March 2016, BESE approved the Louisiana Student Standards in ELA and mathematics. In the 2016–2017, 2017–2018, 2018–2019, 2020–2021, and 2021–2022 school years, students in grades 3–8, except those qualifying for an alternate assessment for students with the most significant cognitive disabilities (the LAA 1 in 2016–2017 or LEAP Connect in subsequent years), were administered forms for ELA and mathematics that consisted of New Meridian (formerly PARCC) assessment items while developing some Louisiana-owned items to enhance the New Meridian item bank. This allowed for the continued comparability to forms administered in the 2014–2015 and 2015–2016 school years. Louisiana received approval from the federal and state governments to waive the requirement to administer the spring 2020 assessment due to school facilities closing in March 2020 due to COVID-19.

The information that follows describes the technical aspects of the 2022 LEAP 2025 ELA and mathematics assessments and provides information about how to read and interpret the data.

### 1.2 Purpose of the LEAP 2025

The BESE and the LDOE are committed to ensuring that every student is on track to be successful in either postsecondary education or the workforce through their comprehensive plan [Believe to Achieve](#). The LEAP 2025 supports this vision by measuring the full range of student performance and providing information for educators and parents about student readiness for college and careers.

### 1.3 Design of the LEAP 2025

Students in grades 3–8 were administered computer-based tests (CBTs) in both ELA and mathematics; some school systems opted to administer paper-based tests (PBTs) to students in grade 3. All mathematics assessments were translated into Spanish forms. Additionally, a braille form was available for each grade and content area. The braille form was based on the PBT in grade 3 and was based on the CBT in grades 4–8. Online tools allowed students to magnify assessment items, as needed, and students with visual impairments could also take large-print versions of the PBTs. See Chapter 3, Section 3.4 for more information about the accommodations and designated supports available for students taking the LEAP 2025.

The 2022 LEAP 2025 test blueprints and test design for ELA and mathematics are based on the ELA <https://resources.newmeridiancorp.org/ela-test-design/> and mathematics <https://resources.newmeridiancorp.org/math-test-design/> blueprints of New Meridian’s full forms. The 2022 LEAP 2025 test blueprints and test design for ELA and mathematics differ from the New Meridian blueprints and design in order to reduce testing time while maintaining full coverage and including a variety of standards.

The 2022 LEAP 2025 ELA blueprints kept a similar design as the design of New Meridian’s full form, which includes both performance-based tasks and stand-alone passage sets, and a higher percentage of reading points to writing points. However, to address concerns about overtesting, only two of the three types of performance tasks—Research Simulation Task and Literary Analysis Task or Narrative Writing Task—are included on each of the grade-level tests. All three task types are represented across grades 3–8, which allows Louisiana flexibility in the choice of the tasks administered for each grade from year to year and encourages teachers to focus equally on all three writing types. Besides having two (instead of three) performance tasks, the 2022 LEAP 2025 Spring ELA blueprints are also different with respect to testing time and percentage of reading and writing points. Since the choice of Literary Analysis Task or Narrative Writing Task is determined during the forms construction process, alternative blueprints—one with a Literary Analysis Task and a Research Simulation Task and the other with a Research Simulation Task and a Narrative Writing Task—were created for each grade’s assessment.

The passages chosen for the 2022 LEAP 2025 ELA assessments contain a variety of texts of different genres with a balance of authors by gender and ethnicity. The assessments also contain texts that appeal to a diverse student population. Chosen passages are authentic and contain a variety of different types of text that cover a range of text complexities, Readily Accessible (RA), Moderately Complex (MOD), and Very Complex (VC). They are rich in content, engaging, high-quality, and challenging. Additionally, paired passages, which allow a mix of text complexities and sometimes types of texts—both informational and literary—are selected with careful consideration of the purpose of the standards that require the use of more than one text. This combination of criteria during passage selection allows students to demonstrate their ability to read and comprehend a range of grade-appropriate texts and topics and helps to ensure as much coverage of standards as possible.

The LEAP 2025 ELA assessments focus on an integrated approach to reading and writing that reflects instruction in an effective ELA classroom and measures students’ ability to understand what they read and express that understanding in writing. This means careful, close reading of complex grade-level literary and informational texts; a full range of texts from across the disciplines, including science, social studies, and the arts; tasks that integrate key ELA skills by asking students to read texts, answer reading and vocabulary questions about the texts, and then write using evidence from what they have read; questions worth answering, ordered in a way that builds meaning; a focus on students citing evidence from texts when answering questions about a specific passage or when writing about a set of related passages; and a focus on words that matter most in texts, are essential to understanding a particular text, and include context that allows students to determine literal and figurative meanings.

The LDOE has finalized an ELA test design that takes into account several key considerations:

- Since testing time continues to be a significant factor in test design decisions, it was determined that two of the three task types will be used in each form.
- The test must include opportunities for students to write about both literary and informational texts; therefore, each test includes a Research Simulation Task and either a Literary Analysis Task (LAT) or a Narrative Writing Task (NWT). By having both blueprints available for each course each administration and selecting forms based on using the best of the tasks in each form rather than following a pre-specified plan for alternating LAT/NWT forms, both of the literary task types maintain their place in the curriculum.
- The passages associated with each task and the standalone passage sets used across a form represent a range of text complexities, depending on the course and test design.
- Although the items are dependent on the topic and complexity of the passages, the goal is to include a range of DOK levels, with more DOK 2 than DOK 3 items across a form. Item complexity is also dependent on other factors, such as item type and language complexity.
- The third session also includes a field test slot to allow for embedded field testing of one passage set per form, which provides opportunities for field testing with all students without increasing testing time. In fact, the testing time for LEAP 2025 including the field test positions is less than the testing time for the PARCC form. All students that are administered the ELA assessment take field test items. The field test positions contain placeholder items when field testing is not being conducted.

The 2022 LEAP 2025 mathematics blueprints kept a similar design as those of New Meridian’s full form, with a few notable exceptions:

- In grades 3-5, the LEAP 2025 blueprints make use of three sessions with a total testing time of 235 minutes, instead of four sessions with a total testing time of 240 minutes.
  - In grade 3, the difference in items is a reduction of 1 Type II item worth 4 points and an increase of 2 Type I items worth 1 point with a corresponding decrease of 1 Type I item worth 2 points. Therefore, the total number of items is the same across both designs, but LEAP 2025 has 4 fewer points.
  - In grades 4 and 5, there is a bigger difference, as LEAP 2025 uses the same test design for grades 3-5, so the increase in type I 1-point items is 8 with a decrease in 4 2-point items in addition to the reduction of 1 Type II item worth 4 points.
- In grades 6-8, both assessment designs have three sessions and a total testing time of 240 minutes. However, New Meridian uses three sessions of equal testing time with 80 minutes each, while LEAP 2025 has a shorter non-calculator session 1 (60 minutes) followed by two 90-minute calculator sections. New Meridian has a split session in grade 7 mathematics for session 1 in which the non-calculator and calculator sections are split within the same session/unit. In grades 6 and 8, the entire first session/unit is designated as non-calculator. The LEAP 2025 test design has consistency across grades 6-8 in testing time per session and has either non-calculator or calculator as the designation for the entire session for ease of administration.
  - In grades 6 and 7, the LEAP 2025 design uses 8 more type I items worth 1 point, 2 fewer type I items worth 2 points, and 1 fewer type I item worth 4 points. (LEAP 2025 does not use any type I items worth 4 points.) Grades 6-8 use the same number of type II and III items in both test designs.

- LEAP 2025 uses the same test design for grade 8, so there are 8 more type I items worth 1 point and 2 fewer type I items worth 4 points (but the same number of type I items worth 2 points).

The LEAP 2025 mathematics assessments focus on testing the Louisiana Student Standards for Mathematics (LSSM) according to the components of rigor reflected in high-quality mathematics instructional tasks that

- require students to demonstrate understanding of mathematical reasoning in mathematical and applied contexts;
- assess accurate, efficient, and flexible application of procedures and algorithms;
- rely on application of procedural skill and fluency to solve complex problems; and
- require students to demonstrate mathematical reasoning and modeling in real-world contexts.

The LSSM support students to become mathematically proficient by focusing on three components of rigor: conceptual understanding, procedural skill and fluency, and application.

- Conceptual understanding refers to understanding mathematical concepts, operations, and relations. It is more than knowing isolated facts and methods. Students should be able to make sense of why a mathematical idea is important and the kinds of contexts in which it is useful. It also allows students to connect prior knowledge to new ideas and concepts.
- Procedural skill and fluency is the ability to apply procedures accurately, efficiently, and flexibly. It requires speed and accuracy in calculation while giving students opportunities to practice basic skills. Students' ability to solve more complex application tasks is dependent on procedural skill and fluency.
- Application provides a valuable context for learning and the opportunity to solve problems in a relevant and a meaningful way. It is through real-world application that students learn to select an efficient method to find a solution, determine whether the solution(s) makes sense by reasoning, and develop critical thinking skills.

Each item on the LEAP 2025 mathematics assessment is referred to as a task and is identified by one of three types: Type I, Type II, or Type III. The tasks on the LEAP 2025 mathematics test are aligned directly to the LSSM for all reporting categories.

- **Type I** tasks, designed to assess conceptual understanding, fluency, and application, are aligned to the major, additional, and supporting content for each grade. Some Type I tasks may be further aligned to LEAP 2025 evidence statements for the Major Content and Additional & Supporting reporting categories and allow for the testing of more than one of the student standards on a single task.
- **Type II** tasks are designed to assess student reasoning ability of selected major content for the grade or the previous grade in applied contexts.
- **Type III** tasks are designed to assess student modeling ability of selected content for the grade or the previous grade in applied contexts. Type II and III tasks are further aligned to LEAP 2025 evidence statements for the Expressing Mathematical Reasoning and Modeling & Application reporting categories.

Each of the three task types is aligned to one of four reporting categories: Major Content, Additional & Supporting Content, Expressing Mathematical Reasoning, or Modeling & Application. Each task type is designed to align with at least one of the Louisiana Student Standards for Mathematical Practice (MP).

Additional details about the design of the ELA and mathematics assessments can be found in Chapter 3.

## Chapter 2: The Uses of Test Scores

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Validity is the central component of any analysis of the LEAP 2025 assessments. The following excerpt is from the *Standards for Educational and Psychological Testing* (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 use of the test scores. Validity evidence that supports the uses of the LEAP 2025 test scores is provided in this technical report. This chapter examines some possible uses of the LEAP 2025 test scores. However, this technical report cannot anticipate all possible interpretations and uses of the LEAP 2025 test scores.

### 2.1 Uses of Test Scores

To understand whether a test score is being used properly, one must understand the purpose of the test. The intended uses of the LEAP 2025 test scores include the following:

- evaluating students' overall proficiency of the Louisiana Student Standards
- identifying students' general strengths and weaknesses
- evaluating programs at the school, school system, and/or state level
- informing stakeholders, including students, teachers, school administrators, school system administrators, LDOE staff members, parents, and the public, of the status of students' progress toward meeting college and career readiness standards

This technical report refers to the uses of the test-level scores (i.e., scale scores and achievement levels), category-level scores and achievement-level classifications, and subcategory-level scores and achievement-level classifications.

### 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 and achievement levels indicate, in varying ways, a student's achievement in ELA or mathematics. Test-level scores are reported at four reporting levels: the state, the school system, the school, and the student.

The LEAP 2025 high school ELA and mathematics test forms were developed by DRC's test development staff using New Meridian's item bank as well as items from the Louisiana Department of Education's own item bank. Items taken from these banks were on pre-established item response theory (IRT) scales for ELA and mathematics and were reviewed and approved for use by LDOE content experts and committees of Louisiana educators. Braille forms and Spanish translations of mathematics forms were also developed. See Chapter 3, "Test Content Development," for additional details about the processes used to develop these test forms.

The following sections discuss two types of test-level scores that are reported that indicate a student's achievement on the LEAP 2025 assessments: the scale score and its associated level of achievement.

## 2.3 Scale Scores

A scale score indicates a student's total performance for each content area on the LEAP 2025 assessments. The overall scale score for a content area quantifies the achievement being measured by the ELA or mathematics assessments. In other words, the scale score represents the student's level of achievement, where higher scale scores indicate higher levels of achievement on the test and lower scale scores indicate lower levels of achievement. For all LEAP 2025 test forms, the lowest obtainable scale score (LOSS) is 650 and the highest obtainable scale score (HOSS) is 850.

Scale scores are derived from raw scores (i.e., the number of items answered correctly). Raw scores depend on the items in a particular form of a test and can only be interpreted in terms of that particular set of test questions. This does not allow year-to-year or form-to-form comparison. Scale scores are more meaningful than raw scores because they maintain their meaning year-to-year, thus allowing comparisons of different test forms across the entire range of the ability scale.

## 2.4 Levels of Achievement

A student's performance on the ELA or mathematics LEAP 2025 assessments is reported in one of five levels of achievement: *Advanced*, *Mastery*, *Basic*, *Approaching Basic*, or *Unsatisfactory*. The cut scores for the ELA and mathematics achievement levels were established by PARCC using the Evidence-Based Standard Setting (EBSS) method (Beimers, Way, McClarty, & Miles, 2012) for the PARCC Performance-Level Setting (PLS) process. Details regarding the PLS process can be found in the [Performance Level Setting Technical Report](#) (Pearson, 2015).

Descriptions of each level of achievement in terms of what a student should know and be able to do are provided with the LEAP 2025 *Interpretive Guide* (see Chapter 7).

## 2.5 Use of Test-Level Scores

The LEAP 2025 scale scores and achievement levels provide summary evidence of student performance in ELA or mathematics relative to the Louisiana Student Standards. Classroom teachers may use these scores as evidence of student achievement in these content areas. At the aggregate level, school system 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 and achievement levels are valid and reliable indicators of what students know, understand, and are able to do relative to the Louisiana Student Standards in ELA and mathematics.

## 2.6 Category- and Subcategory-Level Subscores

A student's performance on the ELA categories (i.e., reading and writing) is reported by one of three ratings: *Strong*, *Moderate*, or *Weak*. Additionally, performance on the subcategories is reported at the student level for ELA and mathematics. ELA has three subcategories for reading and two subcategories for writing, as described in Table 3.1, *ELA Categories and Subcategories*. Mathematics has four reporting categories: Major Content, Additional & Supporting Content, Expressing Mathematical Reasoning, or Modeling & Application., as described in Table 3.8, *Overview of LEAP 2025 Mathematics Task Types and Reporting Categories*. Reporting categories are further broken down into subcategories, which vary by grade level. Subcategory performance is reported in one of three ratings: *Strong*, *Moderate*, or *Weak*.

Although the performance ratings are determined only by the items included within a category or subcategory, the level of knowledge and ability needed to demonstrate a performance rating is connected to the level of knowledge and ability required by the content-level assessments; a *Strong* rating requires similar knowledge and ability as the Mastery or Advanced achievement levels, a *Moderate* rating requires similar



knowledge and ability as the Basic achievement level, and a *Weak* rating requires similar knowledge and ability as the Unsatisfactory and Approaching Basic achievement levels.

## 2.7 Use of the Reporting Category- and Subcategory-Level Ratings

The purpose of reporting category- or subcategory-level performance ratings on LEAP 2025 assessments is to show, for each student, the relationship between the overall achievement being measured and the skills in each of the areas defined by the categories and subcategories. These ratings for individual students are best corroborated by other evidence, such as grades, teacher feedback, and scores on other tests. Chapter 3 of this technical report provides evidence of content validity that supports the use of the category- or subcategory-level performance ratings. Chapter 9 of this technical report provides evidence of construct-related validity that further supports the use of these performance ratings.

## Chapter 3: Test Content Development

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Content-related validity in achievement tests is evidenced by a correspondence between test content and the range of knowledge and skills that compose the construct the assessment is designed to measure, i.e., the ELA or mathematics Louisiana Student Standards. 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 learners and students with disabilities, and through alignment studies performed by independent groups. This chapter provides a detailed discussion of the test development process. In particular, it shows how rigorous procedures were followed to construct tests that reflect the full range of content that the 2022 LEAP 2025 assessments were expected to cover.

This chapter is particularly relevant to the following sections of the *Standards for Educational and Psychological Testing* (American Educational Research Association [AERA], American Psychological Association [APA], & National Council on Measurement in Education [NCME], 2014): Standards 4.0, 4.1, and 4.7. It also addresses Standards 3.1, 3.2, 3.9, and 4.12, which are discussed in pertinent sections of this chapter.

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).

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 2022 LEAP 2025 test specifications consisted of a test blueprint and a test design for each grade and content area. The 2022 blueprints and test designs were closely aligned to blueprints of New Meridian's full forms. The specific content area and grade-level test blueprints for the 2022 LEAP 2025 ELA assessments for grades 3–8 were designed with the goal for all students to read, understand, and express understanding of complex, grade-level texts. The specific content area and grade-level test blueprints for the 2022 LEAP 2025 mathematics assessments for grades 3–8 were designed with the goal of supporting students to become mathematically proficient by focusing on three components of rigor: conceptual understanding, procedural skill and fluency, and application. The 2022 LEAP 2025 ELA and mathematics assessments for grades 3–8 provide questions that have been reviewed by Louisiana educators to ensure their alignment to the Louisiana Student Standards and appropriateness for Louisiana students, measure the full range of student performance, and inform educators and parents about student readiness in ELA and mathematics and whether students are “on track” for college and careers. For ELA and mathematics, the 2022 LEAP 2025 assessments for grades 3–8 use the same reporting categories that were used in spring 2019 and 2021. Subcategories in mathematics were introduced for spring 2018 in response to requests from school systems. In ELA, the type and/or number of reading literary and informational passage sets changed from the 2017 LEAP 2025 assessments to the 2018 LEAP 2025 ELA assessments to reflect a similar change made in the PARCC blueprints. This change was continued for the 2021 and 2022 LEAP 2025 ELA assessments.

To construct the assessments after the test blueprints and test designs were approved, the LDOE and DRC collaborated to use items, aligned to the Louisiana Student Standards, from the New Meridian and Louisiana-

owned item banks. DRC contracted with New Meridian and was provided access to the entire bank of items and passage sets that could potentially be used on operational forms. The acquired items and passages and the Louisiana-owned items and passage sets make up the available item pool for the 2022 LEAP 2025 forms construction. The LDOE and DRC confirmed that all items selected for use on the LEAP 2025 forms were appropriate for use on Louisiana assessments by convening committees of Louisiana educators who reviewed and approved items from the item banks prior to form selection. This process is followed annually to ensure the monitoring, maintenance, and improvement of a quality item bank to use during form selection.

The ELA and mathematics LEAP 2025 assessments for grades 3–8 were developed based on the requirements of “RFP #678PUR-LEAP 2025 English Language Arts and Mathematics Assessment System” as follows:

The assessments shall be

- aligned to the ELA and mathematics Louisiana Student Standards;
- designed to be accessible for use by the widest possible range of students, including, but not limited to, students with disabilities and students with limited English proficiency [English Learners];
- constructed to yield valid and reliable test results;
- constructed to report student performance using achievement level policy definitions and reporting categories that are comparable to a significant number of other states and, for grades 3 through 8 assessments, to Louisiana’s 2015–2018 assessments;
- constructed to use Louisiana’s grades 3 through 8 ELA and mathematics assessments as the baseline scale<sup>1</sup> to report test results for grades 3 through 8 students;
- developed to limit the amount of testing time required and to be in compliance with state law regarding testing time;
- developed and reviewed with Louisiana educators;
- non-computer adaptive;
- used in assessing students’ readiness to successfully transition to postsecondary education and the workplace; and
- administered, scored, and reported through a separate administration contract in both paper- and computer-based formats.

The products of the above requirements are dual-mode assessments—paper-based tests (PBTs) and computer-based tests (CBTs)—comprised of New Meridian and Louisiana-owned items aligned to the Louisiana Student Standards. Louisiana had access to the complete New Meridian item bank for forms administered in spring 2022. For grade 3, the contract with New Meridian provided for the use of enough items and passage sets, which had been approved during Item Alignment Reviews, combined with additional items and passage sets developed specifically for Louisiana, to create one complete operational test form for each content area and grade that can be administered in a dual-mode testing environment (i.e., PBT and CBT). For grades 4–8, Louisiana selected one CBT form per grade from the content that was reviewed during Item Alignment Reviews in addition to items and passage sets developed specifically for Louisiana. These items and passage sets became the available item pool used to construct the 2022 forms. DRC and LDOE content experts scrutinized each final blueprint to ensure optimal content coverage and prudent use of time and resources. In general, the blueprints represent content sampling proportions that reflect intended

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<sup>1</sup> In the spring of 2016 and 2017, PARCC item parameters were used to place the LEAP 2025 assessments on the PARCC scale. In the spring of 2018, PARCC items that had been previously administered in Louisiana were available, so the item parameters generated from Louisiana students were used to create the LEAP 2025 scale. The LEAP 2025 scale is comparable to the PARCC scale. Future LEAP 2025 assessments will be linked to the spring 2018 LEAP 2025 scale, which is considered the baseline.

emphasis in instruction and mastery at each grade level and are comparable to New Meridian’s test blueprints. The test specifications provide the numbers of items by reporting category, assessment focus, or item type, and they demonstrate the desired proportions within test delivery and available item pool constraints. These specifications can be found in the 2021-2022 *LEAP 2025 Grades 3-8 English Language Arts and Mathematics Assessment Frameworks*. All assessments were fixed forms, which means that all students who received the same form were administered the same set of items, as the forms were not adaptive.

### 3.1 Defining the Specific Test Blueprint

The specific content area and grade-level test blueprints were designed based on two primary factors: (1) the content requirements of the Louisiana Student Standards and (2) the reporting needs of the assessments.

### 3.2 English Language Arts Test Blueprints and Test Designs

The ELA test was administered during a CBT testing window (April 25-May 25, 2022) and during a PBT testing window (April 27-April 29, 2022). Only two of the three types of performance tasks—Research Simulation Task, Literary Analysis Task, and Narrative Writing Task—were included on each of the Louisiana grade-level tests; however, all three types were represented across grades 3 through 8. This allows Louisiana to rotate the tasks given for each grade from administration to administration and encourages educators to focus on all three performance task types. As the choice of Literary Analysis Task or Narrative Writing Task would be made during the forms construction process, alternative blueprints—one with a Literary Analysis Task and a Research Simulation Task and the other with a Research Simulation Task and a Narrative Writing Task—were created for each grade. During forms construction, the Narrative Writing Task was selected for grades 4 and 6 and the Literary Analysis Task was selected for grades 3, 5, 7, and 8, based on item performance and the quality of the available passage sets for each performance task.

Student performance on the LEAP 2025 ELA assessments is reported by category and subcategory as outlined in the following table.

**Table 3.1 ELA Categories and Subcategories**

| Category       | Subcategory                               | Subcategory Description  |
|----------------|---|--|
| <b>Reading</b> | Reading Literary Text                     | Students read and demonstrate comprehension of grade-level fiction, drama, and poetry.   |
|                | Reading Informational Text                | Students read and demonstrate comprehension of grade-level nonfiction, including texts about history, science, art, and music. |
|                | Reading Vocabulary                        | Students use context to determine the meaning of words and phrases in grade-level texts.                                       |
| <b>Writing</b> | Written Expression                        | Students use details from provided texts to compose well-developed, organized, clear writing.                                  |
|                | Knowledge and Use of Language Conventions | Students use the rules of Standard English (grammar, mechanics, and usage) to compose writing.                                 |

These reporting categories provide parents and educators with valuable information about

- overall student performance, including readiness to continue further study in English language arts;

- student performance broken down by subcategory which may help identify when students need additional support or more challenging work in reading and writing; and
- how well schools and school systems help students achieve expectations.

The session testing times shown in the ELA test blueprints (see Tables 3.2 through 3.6) are based on New Meridian testing times proportioned to be comparable based on the passage type being tested. The passage set that comes after the Narrative Writing Task is designed to balance the reading load between the Literary Analysis Task and the Narrative Writing Task. It is also designed to provide consistent timing in sessions 1 and 2.

**Table 3.2 Grade 3 English Language Arts Test Blueprint and Test Design**

| Session        | Content                     | Number of Passages | Categories/ Subcategories                               | Number of Two-Point SR Items | Number of Points from Two-Point SR Items | Number of PCR Items | Number of Points from PCR Items | Total Items | Total Points   | Assessable ELA Student Standards (by subcategory)           | Testing Time (minutes) |
|----------------|-----------------------------|--------------------|---|------------------------------|--|---------------------|---------------------------------|-------------|--|---|------------------------|
| 1              | Literary Analysis Task      | 2                  | Reading: Reading Literary Text/Reading Vocabulary*      | 6                            | 12                                       | 1                   | 3                               | 6           | 15   | RL standards 1-3, 5-10; vocabulary standards RL.4, L.4, L.5 | 75                     |
|                |                             |                    | Writing: Written Expression                             | 0                            | 0  |                     | 9                               | 9           | Writing standards W.1-2, 10  |   |                        |
|                |                             |                    | Writing: Knowledge and Use of Language Conventions      | 0                            | 0  |                     | 3                               | 3           | Convention standards L.1, 2, plus language skills from previous grades |   |                        |
|                | Totals                      | 2                  |   | 6                            | 12                                       | 1                   | 15                              | 7           | 27   |   |                        |
| 2              | Research Simulation Task    | 2                  | Reading: Reading Informational Text/Reading Vocabulary* | 6                            | 12                                       | 1                   | 3                               | 6           | 15   | RI Standards 1-3, 5-10; vocabulary standards RI.4, L.4, L.5 | 75                     |
|                |                             |                    | Writing: Written Expression                             | 0                            | 0  |                     | 9                               | 9           | Writing standards W.1-2, 7-8, 10                                       |   |                        |
|                |                             |                    | Writing: Knowledge and Use of Language Conventions      | 0                            | 0  |                     | 3                               | 3           | Convention standards L.1, 2, plus language skills from previous grades |   |                        |
|                | Totals                      | 2                  |   | 6                            | 12                                       | 1                   | 15                              | 7           | 27   |   |                        |
| 3              | Reading Literary Texts      | 2                  | Reading: Reading Literary Text/Reading Vocabulary*      | 8                            | 16                                       | 0                   | 0                               | 8           | 16   | RL Standards 1-3, 5-10; vocabulary standards RL.4, L.4, L.5 | 60**                   |
|                | Reading Informational Texts |                    | Reading: Reading Informational Text/Reading Vocabulary* |                              |  |                     |                                 |             |  | RI standards 1-3, 5-10; vocabulary standards RI.4, L.4, L.5 |                        |
|                | Totals                      | 2                  |   | 8                            | 16                                       | 0                   | 0                               | 8           | 16   |   |                        |
| Grade 3 Totals |                             | 6                  | Reading: Reading Literary Text/Reading Vocab*           | 20                           | 40                                       | 2                   | 3                               | 20          | 46   | 46  | 210                    |
|                |                             |                    | Reading: Reading Informational Text/Reading Vocab*      |                              |  |                     | 3                               |             |  |   |                        |
|                |                             |                    | Writing: Written Expression                             | 0                            | 0  |                     | 18                              | 18          |  |   |                        |
|                |                             |                    | Writing: Knowledge and Use of Language Conventions      | 0                            | 0  |                     | 6                               |             | 2  | 6   |                        |
|                |                             |                    | Total   | 20                           | 40                                       |                     | 2                               | 30          | 22   | 70  |                        |

\*Reading vocabulary items must constitute at least eight points on the test.

\*\*The time in session 3 allows for an additional passage set that is being field tested.

As described in section 1.3, the passages associated with each task and the standalone passage sets used across a form should represent a range of text complexities as appropriate for the grade level and test design.

**Table 3.3 Grade 4 English Language Arts Test Blueprint and Test Design**

| Session        | Content                                | Number of Passages | Categories/ Subcategories   | Number of Two-Point SR Items | Number of Points from Two-Point SR Items | Number of PCR Items | Number of Points from PCR Items | Total Items | Total Points   | Assessable ELA Student Standards (by subcategory)                      | Testing Time (minutes) |
|----------------|--|--------------------|---|------------------------------|--|---------------------|---------------------------------|-------------|--|--|------------------------|
| 1              | Research Simulation Task               | 3                  | Reading: Reading Informational Text/Reading Vocabulary*                         | 8                            | 16                                       | 1                   | 4                               | 8           | 20   | RI Standards 1-3, 5-10; vocabulary standards RI.4, L.4, L.5            | 90                     |
|                |  |                    | Writing: Written Expression   | 0                            | 0  |                     | 12                              |             |  |  |                        |
|                |  |                    | Writing: Knowledge and Use of Language Conventions                              | 0                            | 0  |                     | 3                               | 3           | Convention standards L.1, 2, plus language skills from previous grades |  |                        |
|                | Totals                                 | 3                  |   | 10                           | 20                                       | 1                   | 19                              | 11          | 39   |  |                        |
| 2              | Narrative Writing Task                 | 1                  | Reading: Reading Informational Text/ Reading Vocabulary*                        | 4                            | 8  | 1                   | 0                               | 4           | 8  | RL standards 1-3, 5-10; vocabulary standards RL.4, L.4, L.5            | 90                     |
|                |  |                    | Writing: Written Expression   | 0                            | 0  |                     | 9                               |             |  |  |                        |
|                |  |                    | Writing: Knowledge and Use of Language Conventions                              | 0                            | 0  |                     | 3                               | 1           | 3  | Convention standards L.1, 2, plus language skills from previous grades |                        |
|                | Reading Literary / Informational Texts | 1-2                | Reading: Reading Informational Text/Reading Literature Text/Reading Vocabulary* | 6                            | 12                                       | 0                   | 0                               | 6           | 12   |  |                        |
|                | Totals                                 | 2-3                |   | 10                           | 20                                       | 1                   | 12                              | 11          | 32   |  |                        |
| 3              | Reading Literary Texts                 | 2                  | Reading: Reading Literary Text/Reading Vocabulary*                              | 8                            | 16                                       | 0                   | 0                               | 8           | 16   | RL Standards 1-3, 5-10; vocabulary standards RL.4, L.4, L.5            | 60**                   |
|                | Reading Informational Texts            |                    | Reading: Reading Informational Text/Reading Vocab*                              |                              |  |                     |                                 |             |  |  |                        |
|                | Totals                                 | 2                  |   | 8                            | 16                                       | 0                   | 0                               | 8           | 16   |  |                        |
| Grade 4 Totals |  | 7-8                | Reading: Reading Literary Text/Reading Vocab*                                   | 26                           | 52                                       | 2                   | 0                               | 26          | 56   | 56   | 240                    |
|                |  |                    | Reading: Reading Informational Text/Reading Vocab*                              |                              |  |                     | 4                               |             |  |  |                        |
|                |  |                    | Writing: Written Expression   | 0                            | 0  |                     | 21                              | 21          |  |  |                        |
|                |  |                    | Writing: Knowledge and Use of Language Conventions                              | 0                            | 0  |                     | 6                               |             | 2  | 6  |                        |
|                |  |                    | Total   | 26                           | 52                                       |                     | 2                               | 31          | 28   | 83   |                        |

\*Reading vocabulary items must constitute at least eight points on the test.

\*\*The time in session 3 allows for an additional passage set that is being field tested.

As described in section 1.3, the passages associated with each task and the standalone passage sets used across a form should represent a range of text complexities as appropriate for the grade level and test design.

**Table 3.4 Grade 5 English Language Arts Test Blueprint and Test Design**

| Session        | Content   | Number of Passages | Categories/ Subcategories                                | Number of Two-Point SR Items | Number of Points from Two-Point SR Items | Number of PCR Items | Number of Points from PCR Items | Total Items   | Total Points   | Assessable ELA Student Standards (by subcategory)              | Testing Time (minutes) |
|----------------|---|--------------------|--|------------------------------|--|---------------------|---------------------------------|---|--|--|------------------------|
| 1              | Literary Analysis Task  | 2                  | Reading: Reading Literary Text/Reading Vocabulary*       | 6                            | 12                                       | 1                   | 4                               | 6   | 16   | RL Standards 1-3, 5-10; vocabulary standards RL.4, L.4, L.5    | 90                     |
|                |   |                    | Writing: Written Expression                              | 0                            | 0  |                     | 12                              | 12  | Writing standards W.1-2, 4, 9, 10,                                     |  |                        |
|                |   |                    | Writing: Knowledge and Use of Language Conventions       | 0                            | 0  |                     | 3                               | 3   | Convention standards L.1, 2, plus language skills from previous grades |  |                        |
|                | Reading (Reading Literary Text/Reading Informational Text/Reading Vocabulary) | 4                  | 8  | 0                            | 0  | 4                   | 8                               | RL Standards 1-3, 5-10; RI standards 1-3, 5-10; vocabulary standards RL.4, RI.4, L.4, L.5 |  |  |                        |
| Totals         | 3   |                    | 10   | 20                           | 1  | 19                  | 11                              | 39  |  |  |                        |
| 2              | Research Simulation Task  | 3                  | Reading: Reading Informational Text/ Reading Vocabulary* | 8                            | 16                                       | 1                   | 4                               | 8   | 20   | RI standards 1-3, 5-10; vocabulary standards RI.4, L.4, L.5    | 90                     |
|                |   |                    | Writing: Written Expression                              | 0                            | 0  |                     | 12                              | 12  | Writing standards W.1-2, 4, 7- 10,                                     |  |                        |
|                |   |                    | Writing: Knowledge and Use of Language Conventions       | 0                            | 0  |                     | 3                               | 3   | Convention standards L.1, 2, plus language skills from previous grades |  |                        |
|                | Totals  | 3                  |  | 8                            | 16                                       | 1                   | 19                              | 9   | 35   |  |                        |
| 3              | Reading Informational Texts   | 1-2                | Reading: Reading Informational Text/Reading Vocab*       | 6                            | 12                                       | 0                   | 0                               | 6   | 12   | RI standards 1-3, 5, 7-10; vocabulary standards RI.4, L.4, L.5 | 60**                   |
|                | Totals  | 1-2                |  | 6                            | 12                                       | 0                   | 0                               | 6   | 12   |  |                        |
| Grade 5 Totals |   | 7-8                | Reading: Reading Literary Text/Reading Vocab*            | 10                           | 20                                       | 2                   | 4                               | 10  | 24   | 56   | 240                    |
|                |   |                    | Reading: Reading Informational Text/Reading Vocab*       | 14                           | 28                                       |                     | 4                               | 14  | 32   |  |                        |
|                |   |                    | Writing: Written Expression                              | 0                            | 0  |                     | 24                              | 24  | 30   |  |                        |
|                |   |                    | Writing: Knowledge and Use of Language Conventions       | 0                            | 0  |                     | 6                               | 6   |  |  |                        |
|                |   |                    | Total  | 24                           | 48                                       |                     | 2                               | 38  | 26   | 86   |                        |

\*Reading vocabulary items must constitute at least eight points on the test.

\*\*The time in session 3 allows for an additional passage set that is being field tested.

As described in section 1.3, the passages associated with each task and the standalone passage sets used across a form should represent a range of text complexities as appropriate for the grade level and test design.



Table 3.5 Grade 6 English Language Arts Test Blueprint and Test Design

| Session        | Content                                | Number of Passages | Categories/ Subcategories   | Number of Two-Point SR Items | Number of Points from Two-Point SR Items | Number of PCR Items | Number of Points from PCR Items | Total Items | Total Points   | Assessable ELA Student Standards (by subcategory)   | Testing Time (minutes) |
|----------------|--|--------------------|---|------------------------------|--|---------------------|---------------------------------|-------------|--|---|------------------------|
| 1              | Research Simulation Task               | 3                  | Reading: Reading Informational Text/Reading Vocabulary*                       | 8                            | 16                                       | 1                   | 4                               | 8           | 20   | RI standards 1-3, 5-10; vocabulary standards RI.4, L.4, L.5                               | 90                     |
|                |  |                    | Writing: Written Expression   | 0                            | 0  |                     | 12                              | 12          | Writing standards W.1-2, 4, 7-10,                                      |   |                        |
|                |  |                    | Writing: Knowledge and Use of Language Conventions                            | 0                            | 0  |                     | 3                               | 3           | Convention standards L.1, 2, plus language skills from previous grades |   |                        |
|                | Totals                                 | 3                  |   | 8                            | 16                                       | 1                   | 19                              | 9           | 35   |   |                        |
| 2              | Narrative Writing Task                 | 1                  | Reading: Reading Literary Text/Reading Vocabulary*                            | 4                            | 8  | 1                   | 0                               | 4           | 8  | RL Standards 1-3, 5-10; vocabulary standards RL.4, L.4, L.5                               | 90                     |
|                |  |                    | Writing: Written Expression   | 0                            | 0  |                     | 12                              | 12          | Writing standards W.3, 4, 10   |   |                        |
|                |  |                    | Writing: Knowledge and Use of Language Conventions                            | 0                            | 0  |                     | 3                               | 3           | Convention standards L.1, 2, plus language skills from previous grades |   |                        |
|                | Reading Literary / Informational Texts | 1-2                | Reading (Reading Literary Text/Reading Informational Text/Reading Vocabulary) | 6                            | 12                                       | 0                   | 0                               | 6           | 12   | RL Standards 1-3, 5-10; RI standards 1-3, 5-10; vocabulary standards RL.4, RI.4, L.4, L.5 |                        |
| Totals         | 2-3                                    |                    | 10  | 20                           | 1  | 15                  | 11                              | 35          |  |   |                        |
| 3              | Reading Literary Texts                 | 2                  | Reading: Reading Literary Text/Reading Vocabulary*                            | 10                           | 20                                       | 0                   | 0                               | 10          | 20   | RL Standards 1-3, 5-10; vocabulary standards RL.4, L.4, L.5                               | 80**                   |
|                | Reading Informational Texts            |                    | Reading: Reading Informational Text/Reading Vocab*                            |                              |  | 0                   | 0                               |             |  | RI.1-3, 5, 7-10; vocabulary standards RI.4, L.4, L.5                                      |                        |
|                | Totals                                 | 2                  |   | 10                           | 20                                       | 0                   | 0                               | 10          | 20   |   |                        |
| Grade 6 Totals |  | 7-8                | Reading: Reading Literary Text/Reading Vocab*                                 | 28                           | 56                                       | 2                   | 0                               | 28          | 60   | 60  | 260                    |
|                |  |                    | Reading: Reading Informational Text/Reading Vocab*                            |                              |  |                     | 4                               |             |  |   |                        |
|                |  |                    | Writing: Written Expression   | 0                            | 0  |                     | 24                              | 24          |  |   |                        |
|                |  |                    | Writing: Knowledge and Use of Language Conventions                            | 0                            | 0  |                     | 6                               | 6           | 30   |   |                        |
|                |  |                    | Total   | 28                           | 56                                       |                     | 2                               | 34          | 30   | 90  |                        |

\*Reading vocabulary items must constitute at least eight points on the test.

\*\*The time in session 3 allows for an additional passage set that is being field tested.

As described in section 1.3, the passages associated with each task and the standalone passage sets used across a form should represent a range of text complexities as appropriate for the grade level and test design.

**Table 3.6 Grades 7 and 8 English Language Arts Test Blueprint and Test Design**

| Session               | Content   | Number of Passages | Categories/<br>Subcategories                            | Number of Two-Point SR Items | Number of Points from Two-Point SR Items | Number of PCR Items | Number of Points from PCR Items | Total Items   | Total Points   | Assessable ELA Student Standards (by subcategory)              | Testing Time (minutes) |
|-----------------------|---|--------------------|---|------------------------------|--|---------------------|---------------------------------|---|--|--|------------------------|
| 1                     | Literary Analysis Task  | 2                  | Reading: Reading Literary Text/Reading Vocabulary*      | 6                            | 12                                       | 1                   | 4                               | 6   | 16   | RL Standards 1-3, 5-10; vocabulary standards RL.4, L.4, L.5    | 90                     |
|                       |   |                    | Writing: Written Expression                             | 0                            | 0  |                     | 12                              | 12  | Writing standards W.1-2, 4, 9, 10,                                     |  |                        |
|                       |   |                    | Writing: Knowledge and Use of Language Conventions      | 0                            | 0  |                     | 3                               | 3   | Convention standards L.1, 2, plus language skills from previous grades |  |                        |
|                       | Reading (Reading Literary Text/Reading Informational Text/Reading Vocabulary) | 4                  | 8   | 0                            | 0  | 4                   | 8                               | RL Standards 1-3, 5-10; RI standards 1-3, 5-10; vocabulary standards RL.4, RI.4, L.4, L.5 |  |  |                        |
| Totals                | 3   |                    | 10  | 20                           | 1  | 19                  | 11                              | 39  |  |  |                        |
| 2                     | Research Simulation Task  | 3                  | Reading: Reading Informational Text/Reading Vocabulary* | 8                            | 16                                       | 1                   | 4                               | 8   | 20   | RI standards 1-3, 5-10; vocabulary standards RI.4, L.4, L.5    | 90                     |
|                       |   |                    | Writing: Written Expression                             | 0                            | 0  |                     | 12                              | 12  | Writing standards W.1-2, 4, 7-10,                                      |  |                        |
|                       |   |                    | Writing: Knowledge and Use of Language Conventions      | 0                            | 0  |                     | 3                               | 3   | Convention standards L.1, 2, plus language skills from previous grades |  |                        |
|                       | Totals  | 3                  |   | 8                            | 16                                       | 1                   | 19                              | 9   | 35   |  |                        |
| 3                     | Reading Literary Texts  | 2                  | Reading: Reading Literary Text/Reading Vocabulary*      | 10                           | 20                                       | 0                   | 0                               | 10  | 20   | RL Standards 1-3, 5-10; vocabulary standards RL.4, L.4, L.5    | 80**                   |
|                       | Reading Informational Texts   |                    | Reading: Reading Informational Text/Reading Vocab*      |                              |  | 0                   | 0                               |   |  | RI standards 1-3, 5, 7-10; vocabulary standards RI.4, L.4, L.5 |                        |
|                       | Totals  | 2                  |   | 10                           | 20                                       | 0                   | 0                               | 10  | 20   |  |                        |
| Grades 7 and 8 Totals |   | 8                  | Reading: Reading Literary Text/Reading Vocab*           | 28                           | 56                                       | 2                   | 4                               | 28  | 64   | 64   | 260                    |
|                       |   |                    | Reading: Reading Informational Text/Reading Vocab*      |                              |  |                     | 4                               |   |  |  |                        |
|                       |   |                    | Writing: Written Expression                             | 0                            | 0  |                     | 24                              | 2   | 24   |  |                        |
|                       |   |                    | Writing: Knowledge and Use of Language Conventions      | 0                            | 0  |                     | 6                               |   |  | 6  |                        |
|                       |   |                    | Total   | 28                           | 56                                       |                     | 2                               | 38  | 30   | 94   |                        |

\*Reading vocabulary items must constitute at least eight points on the test.

\*\*The time in session 3 allows for an additional passage set that is being field tested.

As described in section 1.3, the passages associated with each task and the standalone passage sets used across a form should represent a range of text complexities as appropriate for the grade level and test design.

The LEAP 2025 ELA assessments consist of tasks and reading passage sets. The tasks are described below.

- **Narrative Writing Task**
  - This task asks students to read a literary text, answer a set of selected-response questions about the text, and create a narrative related to the text (e.g., finish the story, retell the story in another narrative form or from a different point of view).
  - This task focuses on students' ability to use narrative elements (e.g., dialogue, description) when writing.
- **Literary Analysis Task**
  - This task provides students with an opportunity to show their understanding of literature. It asks students to read two literary texts, answer a set of selected-response questions about the texts, and write an extended response that compares and/or explains key ideas or elements in the texts (e.g., central idea/message, contribution of illustrations, characterization).
  - This task focuses on students' ability to read complex text closely and asks them to carefully consider literature worthy of close study.
- **Research Simulation Task**
  - This task mirrors the research process by presenting three texts on a given topic. Students answer a set of selected-response questions about the texts and then write an extended response about some aspect of the related texts (e.g., relationship between a series of events, ideas, or concepts; comparison/contrast of key details; presentation of information).
  - This task requires students to synthesize information from related informational resources.

The following item types were included in the 2022 LEAP 2025 ELA assessments:

- **Selected-Response Items:**
  - Evidence-based selected response—EBSR: This item type consists of two parts; one part asks students to show their understanding of a text, and the other part asks students to identify evidence to support that understanding. The evidence supports a generalization, conclusion, or inference. This type of item is designed to provide students opportunities to make explicit the evidence that supports their close analysis of a specific text.
  - Multiple select – MS: This item type requires students to select more than one correct answer and may appear as a one-part question or as part of an EBSR item. This type of item allows for the assessment of students' ability to identify multiple pieces of evidence to support a claim.
  - Technology enhanced – TE: This item type allows measurement of learning that may not be sufficiently measured by traditional multiple-choice items: ordering of ideas within a summary; ordering of steps in a process; sorting, classifying, and categorizing ideas; matching of two themes/ideas to their unique evidence, etc. The technology offers students additional ways to show understanding that parallels the classroom instructional techniques teachers use to determine whether students are able to comprehend grade-level, complex text. TE Items may involve any of the following:
    - Highlighting text: requires a student to select text-based answer(s) from within a larger text

- Drag and drop: requires a student to move draggable elements (e.g., words, phrases, or sentences) into one or more drop boxes (e.g., cells within a table or part[s] of a diagram)
- Drop-down menu: requires a student to select from one or more drop-down menus to complete a phrase or sentence
- Match interaction table: requires a student to select a checkbox in each row from two or more columns to classify statements presented in each row
- Prose constructed response – PCR: This item type appears at the end of each of the tasks and asks students to create an extended, complete written response. It elicits evidence that students have understood a text or texts they have read and can communicate that understanding well, both in terms of written expression and in terms of knowledge and use of language conventions.

A variety of item types allows for the measurement of the full range of student performance. To ensure a range of item complexity beyond the DOK level, the list below includes some of the key elements that are considered when creating items or new passage sets and selecting items for a passage set and across a form:

- The item type that best addresses the standards the item measures (e.g., standard RI.2 at some grade levels requires students to identify two main ideas, so an MS or TE item should be used when measuring this standard fully; a TEI should be using when measuring the ordering required in an RL.2 summary item.)
- A variety of items to assess more complex standards across a passage set and form (e.g., RL.6 at grades 6-8 includes point of view and purpose, which would require separate items to assess the standard fully. See the [Grades 3-11 Reading and Writing Evidence Statements](#) for more information about how each standard should be assessed.)
- The reading load and other demands of an item, which include the number of correct answers required and number of distractors for EBSR and MS items and number of interactions and distractors for TE items

All items and tasks are clearly aligned to specific standards. Most include a primary standard, as well as standard 1, which requires evidence to support the primary standard. The PCRs align to several standards since they measure reading and/or writing skills are articulated in the RST/LAT and NWT grade-level rubrics.

The following table details the number of items and points by session and item type for each of the PBT (grade 3) and CBT (grades 3–8) forms.

**Table 3.7 Distribution of ELA Items and Points by Session and Item Type**

|                            | Sub | Gr  | Session                                   | EBSR         |             | MS           |             | TE           |             | PCR          |             | Total No. of Pts. |
|----------------------------|-----|---|---|--------------|-------------|--------------|-------------|--------------|-------------|--------------|-------------|-------------------|
|                            |     |   |   | No. of Items | No. of Pts. | No. of Items | No. of Pts. | No. of Items | No. of Pts. | No. of Items | No. of Pts. |                   |
| Paper - Based              | ELA | 3   | 1. Literary Analysis Task                 | 6            | 12          |              |             |              |             | 1            | 15          | 70                |
|                            |     |   | 2. Research Simulation Task               | 6            | 12          |              |             |              |             | 1            | 15          |                   |
|                            |     |   | 3. Reading Literary/ Informational Texts  | 6            | 12          | 2            | 4           |              |             |              |             |                   |
| Computer-Based Tests (CBT) | ELA | 3   | 1. Literary Analysis Task                 | 5            | 10          |              |             | 1            | 2           | 1            | 15          | 70                |
|                            |     |   | 2. Research Simulation Task               | 4            | 8           |              |             | 2            | 4           | 1            | 15          |                   |
|                            |     |   | 3. Reading Literary/ Informational Texts  | 5            | 10          | 1            | 2           | 2            | 4           |              |             |                   |
|                            | ELA | 4   | 1. Research Simulation Task               | 5            | 10          | 1            | 2           | 2            | 4           | 1            | 19          | 83                |
|                            |     |   | 2. Narrative Writing Task/Reading Passage | 9            | 18          |              |             | 1            | 2           | 1            | 12          |                   |
|                            |     |   | 3. Reading Literary/ Informational Texts  | 5            | 10          | 1            | 2           | 2            | 4           |              |             |                   |
|                            | ELA | 5   | 1. Literary Analysis Task/Reading Passage | 5            | 10          | 2            | 4           | 3            | 6           | 1            | 19          | 86                |
|                            |     |   | 2. Research Simulation Task               | 5            | 10          | 1            | 2           | 2            | 4           | 1            | 19          |                   |
|                            |     |   | 3. Reading Literary/ Informational Texts  | 4            | 8           | 1            | 2           | 1            | 2           |              |             |                   |
|                            | ELA | 6   | 1. Research Simulation Task               | 5            | 10          | 1            | 2           | 2            | 4           | 1            | 19          | 90                |
|                            |     |   | 2. Narrative Writing Task/Reading Passage | 5            | 10          | 3            | 6           | 2            | 4           | 1            | 15          |                   |
|                            |     |   | 3. Reading Literary/ Informational Texts  | 6            | 12          | 3            | 6           | 1            | 2           |              |             |                   |
|                            | ELA | 7   | 1. Literary Analysis Task/Reading Passage | 6            | 12          | 1            | 2           | 3            | 6           | 1            | 19          | 94                |
|                            |     |   | 2. Research Simulation Task               | 5            | 10          | 1            | 2           | 2            | 4           | 1            | 19          |                   |
|                            |     |   | 3. Reading Literary/ Informational Texts  | 5            | 10          | 3            | 6           | 2            | 4           |              |             |                   |
| ELA                        | 8   | 1. Literary Analysis Task/Reading Passage | 5   | 10           | 3           | 6            | 2           | 4            | 1           | 19           | 94          |                   |
|                            |     | 2. Research Simulation Task               | 5   | 10           | 1           | 2            | 2           | 4            | 1           | 19           |             |                   |
|                            |     | 3. Reading Literary/ Informational Texts  | 6   | 12           |             |              | 4           | 8            |             |              |             |                   |

### 3.3 Mathematics Test Blueprints and Test Designs

The mathematics assessments were administered during a CBT testing window (April 25-May 25, 2022) or during a PBT testing window (April 27-April 29, 2022). Each test session included the four mathematics reporting categories, using the three mathematics task types (see Table 3.8).

Each item on the LEAP 2025 mathematics assessment is referred to as a task and is identified by one of three types: Type I, Type II, and Type III. As shown in the following table, each task type is aligned to one or two of four reporting categories: Major Content, Additional & Supporting Content, Expressing Mathematical Reasoning, or Modeling & Application. Each task type is designed to align with at least one of the [Standards for Mathematical Practice](#) (MP).

**Table 3.8 Overview of LEAP 2025 Mathematics Task Types and Reporting Categories**

| Task Type | Description  | Reporting Categories   | Mathematical Practice(s)  |
|-----------|--|--|---|
| Type I    | Conceptual understanding, fluency, and application   | <i>Major Content:</i> solve problems involving the <u>major content</u> for the grade level.<br><br><i>Additional &amp; Supporting Content:</i> solve problems involving the <u>additional and supporting content</u> for the grade level. | Can involve any or all practices  |
| Type II   | Written arguments/justifications, critique of reasoning, or precision in mathematical statements | <i>Expressing Mathematical Reasoning:</i> express mathematical <u>reasoning</u> by constructing mathematical arguments and critiques.  | Primarily MP.3 and MP.6 but may also involve any of the other practices |
| Type III  | Modeling/application in a real-world context or scenario   | <i>Modeling &amp; Application:</i> solve real-world problems engaging particularly in the <u>modeling</u> practice.  | Primarily MP.4 but may also involve any of the other practices          |

These reporting categories provide parents and educators with valuable information about

- overall student performance, including readiness to continue further study in mathematics;
- student performance broken down by mathematics subcategory, which may help identify when students need additional support or more challenging work; and
- how well schools and school systems help students achieve higher expectations.

Table 3.9 provides the distribution of operational points by reporting category, by grade.

**Table 3.9 Distribution of Points by Reporting Category—Mathematics**

| Reporting Category                | Grade     |           |           |           |           |           |
|-----------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
|                                   | 3         | 4         | 5         | 6         | 7         | 8         |
| Major Content                     | 30        | 30        | 30        | 30        | 30        | 30        |
| Additional & Supporting Content   | 10        | 10        | 10        | 10        | 10        | 10        |
| Expressing Mathematical Reasoning | 10        | 10        | 10        | 14        | 14        | 14        |
| Modeling & Application            | 12        | 12        | 12        | 12        | 12        | 12        |
| <b>Total</b>                      | <b>62</b> | <b>62</b> | <b>62</b> | <b>66</b> | <b>66</b> | <b>66</b> |

The Major Content areas for mathematics are broken into subcategories by grade as follows:

**Table 3.10 Major Content Subcategories by Grade**

| Grade | Major Content Subcategory  |
|-------|--|
| 3     | <ul style="list-style-type: none"> <li>• Products and Quotients/Solve Multiplication and Division Problems</li> <li>• Solve Problems with Any Operation</li> <li>• Fractions as Numbers and Equivalence</li> <li>• Solve Time, Area, Measurement, and Estimation Problems</li> </ul>                     |
| 4     | <ul style="list-style-type: none"> <li>• Compare and Solve Problems with Fractions</li> <li>• Solve Multi-step Problems</li> <li>• Multiplicative Comparison and Place Value</li> </ul>  |
| 5     | <ul style="list-style-type: none"> <li>• Operations with Decimals/Read, Write, and Compare Decimals</li> <li>• Solve Fraction Problems</li> <li>• Interpret Fractions, Place Value, and Scaling</li> <li>• Recognize, Represent, and Determine Volume/Multiply and Divide Whole Numbers</li> </ul>       |
| 6     | <ul style="list-style-type: none"> <li>• Rational Numbers/Multiply and Divide Fractions</li> <li>• Ratio and Rate</li> <li>• Expressions, Inequalities, and Equations</li> </ul>   |
| 7     | <ul style="list-style-type: none"> <li>• Analyze Proportional Relationships and Solve Problems</li> <li>• Operations with Rational Numbers</li> <li>• Expressions, Inequalities, and Equations</li> </ul>  |
| 8     | <ul style="list-style-type: none"> <li>• Radicals, Integer Exponents, and Scientific Notation</li> <li>• Proportional Relationships, Linear Equations, and Functions</li> <li>• Solving Linear Equations/Systems of Linear Equations</li> <li>• Congruence and Similarity/Pythagorean Theorem</li> </ul> |

The resulting 2022 LEAP 2025 mathematics test blueprints are shown in Tables 3.11–3.16.

**Table 3.11 Grade 3 Mathematics Test Blueprint**

| Reporting Category                | Task Types         |           |           |                     |          |           | Assessable Content  |
|-----------------------------------|--------------------|-----------|-----------|---------------------|----------|-----------|---|
|                                   | Type I             |           | Type II   |                     | Type III |           |   |
|                                   | Tasks              | Points    | Tasks     | Points              | Tasks    | Points    |   |
| Major Content                     | 27–30              | 30        |           |                     |          |           | Louisiana Student Standards for Mathematics (LSSM):<br><br>3.OA.A.1-4, 3.OA.B.6,<br><br>3.OA.C.7, 3.OA.D.8,<br><br>3.NF.A.1-3, 3.MD.A.1-2,<br><br>3.MD.C.5-7<br><br>LEAP 2025 Evidence Statements: LEAP.I.3.1-4 |
| Additional & Supporting Content   | 7–10               | 10        |           |                     |          |           | LSSM:<br><br>3.NBT.A.1-3, 3.MD.B.3-4,<br><br>3.MD.D.8, 3.MD.E.9,<br>3.G.A.1-2<br><br>LEAP 2025 Evidence Statements: LEAP.I.3.5-6  |
| Expressing Mathematical Reasoning |                    |           | 3         | 10                  |          |           | LEAP 2025 Evidence Statements: LEAP.II.3.1-8  |
| Modeling & Application            |                    |           |           |                     | 3        | 12        | LEAP 2025 Evidence Statements: LEAP.III.3.1-2   |
| <b>TOTAL</b>                      | <b>37</b>          | <b>40</b> | <b>3</b>  | <b>10</b>           | <b>3</b> | <b>12</b> |   |
|                                   | <b>TOTAL TASKS</b> |           | <b>43</b> | <b>TOTAL POINTS</b> |          | <b>62</b> |   |



Table 3.12 Grade 4 Mathematics Test Blueprint

| Reporting Category                | Task Types         |           |           |                     |          |           | Assessable Content   |
|-----------------------------------|--------------------|-----------|-----------|---------------------|----------|-----------|--|
|                                   | Type I             |           | Type II   |                     | Type III |           |  |
|                                   | Tasks              | Points    | Tasks     | Points              | Tasks    | Points    |  |
| Major Content                     | 27–30              | 30        |           |                     |          |           | LSSM:<br>4.OA.A.1-3, 4.NBT.A.1-3<br>4.NBT.B.4-6, 4.NF.A.1-2,<br>4.NF.B.3-4, 4.NF.C.5-7<br><br>LEAP 2025 Evidence Statements:<br><br>LEAP.I.4.1-8 |
| Additional & Supporting Content   | 7–10               | 10        |           |                     |          |           | LSSM:<br>4.OA.B.4, 4.OA.C.5,<br>4.MD.A.1-3, 4.MD.B.4,<br>4.MD.C.5-7, 4.MD.D.8,<br>4.G.A.1-3  |
| Expressing Mathematical Reasoning |                    |           | 3         | 10                  |          |           | LEAP 2025 Evidence Statements: LEAP.II.4.1-7   |
| Modeling & Application            |                    |           |           |                     | 3        | 12        | LEAP 2025 Evidence Statements: LEAP.III.4.1-2  |
| <b>TOTAL</b>                      | <b>37</b>          | <b>40</b> | <b>3</b>  | <b>10</b>           | <b>3</b> | <b>12</b> |  |
|                                   | <b>TOTAL TASKS</b> |           | <b>43</b> | <b>TOTAL POINTS</b> |          | <b>62</b> |  |

Table 3.13 Grade 5 Mathematics Test Blueprint

| Reporting Category                | Task Types         |           |           |                     |          |           | Assessable Content   |
|-----------------------------------|--------------------|-----------|-----------|---------------------|----------|-----------|--|
|                                   | Type I             |           | Type II   |                     | Type III |           |  |
|                                   | Tasks              | Points    | Tasks     | Points              | Tasks    | Points    |  |
| Major Content                     | 27–30              | 30        |           |                     |          |           | LSSM:<br>5.NBT.A.1-4, 5.NBT.B.5-7<br>5.NF.A.1-2, 5.NF.B.3-7<br>5.MD.C.3-5<br>LEAP 2025 Evidence Statements: LEAP.I.5.1-2 |
| Additional & Supporting Content   | 7–10               | 10        |           |                     |          |           | LSSM:<br>5.OA.A.1-2, 5.OA.B.3<br>5.MD.A.1, 5.MD.B.2<br>5.G.A.1-2, 5.G.B.3-4  |
| Expressing Mathematical Reasoning |                    |           | 3         | 10                  |          |           | LEAP 2025 Evidence Statements: LEAP.II.5.1-9   |
| Modeling & Application            |                    |           |           |                     | 3        | 12        | LEAP 2025 Evidence Statements: LEAP.III.5.1-2  |
| <b>TOTAL</b>                      | <b>37</b>          | <b>40</b> | <b>3</b>  | <b>10</b>           | <b>3</b> | <b>12</b> |  |
|                                   | <b>TOTAL TASKS</b> |           | <b>43</b> | <b>TOTAL POINTS</b> |          | <b>62</b> |  |

Table 3.14 Grade 6 Mathematics Test Blueprint

| Reporting Category                | Task Types         |           |           |                     |          |           | Assessable Content  |
|-----------------------------------|--------------------|-----------|-----------|---------------------|----------|-----------|---|
|                                   | Type I             |           | Type II   |                     | Type III |           |   |
|                                   | Tasks              | Points    | Tasks     | Points              | Tasks    | Points    |   |
| Major Content                     | 26–30              | 30        |           |                     |          |           | LSSM:<br>6.RP.A.1-3, 6.NS.A.1,<br>6.NS.C.5-8, 6.EE.A.1-2,4,<br>6.EE.B.5-8, 6.EE.C.9 |
| Additional & Supporting Content   | 6–10               | 10        |           |                     |          |           | LSSM:<br>6.NS.B.2-4, 6.G.A.1-4,<br>6.SP.A.1-3, 6.SP.B.4-5                           |
| Expressing Mathematical Reasoning |                    |           | 4         | 14                  |          |           | LEAP 2025 Evidence Statements: LEAP.II.6.1-9  |
| Modeling & Application            |                    |           |           |                     | 3        | 12        | LEAP 2025 Evidence Statements: LEAP.III.6.1-3                                       |
| <b>TOTAL</b>                      | <b>36</b>          | <b>40</b> | <b>4</b>  | <b>14</b>           | <b>3</b> | <b>12</b> |   |
|                                   | <b>TOTAL TASKS</b> |           | <b>43</b> | <b>TOTAL POINTS</b> |          | <b>66</b> |   |

Table 3.15 Grade 7 Mathematics Test Blueprint

| Reporting Category                | Task Types         |           |           |                     |          |           | Assessable Content  |
|-----------------------------------|--------------------|-----------|-----------|---------------------|----------|-----------|---|
|                                   | Type I             |           | Type II   |                     | Type III |           |   |
|                                   | Tasks              | Points    | Tasks     | Points              | Tasks    | Points    |   |
| Major Content                     | 26–30              | 30        |           |                     |          |           | LSSM:<br>7.RP.A.1-3, 7.NS.A.1-3,<br>7.EE.A.1-2, 7.EE.B.3-4              |
| Additional & Supporting Content   | 6–10               | 10        |           |                     |          |           | LSSM:<br>7.G.A.1-3, 7.G.B.4-6,<br>7.SP.A.1-2, 7.SP.B.3-4,<br>7.SP.C.5-8 |
| Expressing Mathematical Reasoning |                    |           | 4         | 14                  |          |           | LEAP 2025 Evidence Statements:<br>LEAP.II.7.1-7                         |
| Modeling & Application            |                    |           |           |                     | 3        | 12        | LEAP 2025 Evidence Statements:<br>LEAP.III.7.1-4                        |
| <b>TOTAL</b>                      | <b>36</b>          | <b>40</b> | <b>4</b>  | <b>14</b>           | <b>3</b> | <b>12</b> |   |
|                                   | <b>TOTAL TASKS</b> |           | <b>43</b> | <b>TOTAL POINTS</b> |          | <b>66</b> |   |

**Table 3.16 Grade 8 Mathematics Test Blueprint**

| Reporting Category                | Task Types         |        |           |                     |          |           | Assessable Content   |
|-----------------------------------|--------------------|--------|-----------|---------------------|----------|-----------|--|
|                                   | Type I             |        | Type II   |                     | Type III |           |  |
|                                   | Tasks              | Points | Tasks     | Points              | Tasks    | Points    |  |
| Major Content                     | 25-30              | 30     |           |                     |          |           | LSSM:<br>8.EE.A.1-4, 8.EE.B.5-6<br>8.EE.C.7-8, 8.F.A.1-3<br>8.G.A.1-4, 8.G.B.7-8 |
| Additional & Supporting Content   | 5-10               | 10     |           |                     |          |           | LSSM:<br>8.F.B.4-5, 8.G.C.9<br>8.SP.A.1-4, 8.NS.A.1-2                            |
| Expressing Mathematical Reasoning |                    |        | 4         | 14                  |          |           | LEAP 2025 Evidence Statements:<br>LEAP.II.8.1-5                                  |
| Modeling & Application            |                    |        |           |                     | 3        | 12        | LEAP 2025 Evidence Statements:<br>LEAP.III.8.1-4                                 |
| TOTAL                             | 35                 | 40     | 4         | 14                  | 3        | 12        |  |
|                                   | <b>TOTAL TASKS</b> |        | <b>42</b> | <b>TOTAL POINTS</b> |          | <b>66</b> |  |

Unlike the ELA test blueprints, which were organized by test sessions one through three, the mathematics test blueprints were organized by reporting categories, so it was necessary to define the general structure of the test forms by test session. The design goal was to have balanced test sessions with a variety of task types and equivalent testing times. For all forms in grades 3–5, students were prohibited from using calculators, except for those students with a documented calculator accommodation. For session one of the mathematics test in grades 6–8, students are prohibited from using calculators, except those students with a documented calculator accommodation. Calculators were allowed to be used by all students in grades 6–8 in sessions two and three. The general test structures (see Tables 3.17–3.22) guided test form sequencing and design. The LEAP 2025 [Calculator Policy](#) provided the basis for calculator designation of tasks and items.

Table 3.17 General Mathematics Test Structure—Grade 3

| Reporting Category                | Test Session               |           |                            |           |                            |           | TOTAL<br>(Operational Only) |           |
|-----------------------------------|----------------------------|-----------|----------------------------|-----------|----------------------------|-----------|-----------------------------|-----------|
|                                   | Session 1<br>No Calculator |           | Session 2<br>No Calculator |           | Session 3<br>No Calculator |           |                             |           |
|                                   | Tasks                      | Points    | Tasks                      | Points    | Tasks                      | Points    | Tasks                       | Points    |
| Major Content                     | 9–10                       | 10        | 8–10                       | 10        | 10                         | 10        | 27–30                       | 30        |
| Additional & Supporting Content   | 3–4                        | 4         | 2–4                        | 4         | 2                          | 2         | 7–10                        | 10        |
| Expressing Mathematical Reasoning | 1                          | 4         | 1                          | 3         | 1                          | 3         | 3                           | 10        |
| Modeling & Application            | 1                          | 3         | 1                          | 3         | 1                          | 6         | 3                           | 12        |
| <b>TOTAL (Operational Only)</b>   | <b>15</b>                  | <b>21</b> | <b>14</b>                  | <b>20</b> | <b>14</b>                  | <b>21</b> | <b>43</b>                   | <b>62</b> |
| <b>Test Duration (minutes)*</b>   | <b>75</b>                  |           | <b>85</b>                  |           | <b>75</b>                  |           | <b>235</b>                  |           |

\*The testing time includes items that are being field tested.

Table 3.18 General Mathematics Test Structure—Grade 4

| Reporting Category                | Test Session               |           |                            |           |                            |           | TOTAL<br>(Operational Only) |           |
|-----------------------------------|----------------------------|-----------|----------------------------|-----------|----------------------------|-----------|-----------------------------|-----------|
|                                   | Session 1<br>No Calculator |           | Session 2<br>No Calculator |           | Session 3<br>No Calculator |           |                             |           |
|                                   | Tasks                      | Points    | Tasks                      | Points    | Tasks                      | Points    | Tasks                       | Points    |
| Major Content                     | 9–10                       | 10        | 8–10                       | 10        | 10                         | 10        | 27–30                       | 30        |
| Additional & Supporting Content   | 3–4                        | 4         | 2–4                        | 4         | 2                          | 2         | 7–10                        | 10        |
| Expressing Mathematical Reasoning | 1                          | 4         | 1                          | 3         | 1                          | 3         | 3                           | 10        |
| Modeling & Application            | 1                          | 3         | 1                          | 3         | 1                          | 6         | 3                           | 12        |
| <b>TOTAL (Operational Only)</b>   | <b>15</b>                  | <b>21</b> | <b>14</b>                  | <b>20</b> | <b>14</b>                  | <b>21</b> | <b>43</b>                   | <b>62</b> |
| <b>Test Duration (minutes)*</b>   | <b>75</b>                  |           | <b>85</b>                  |           | <b>75</b>                  |           | <b>235</b>                  |           |

\*The testing time includes items that are being field tested.

Table 3.19 General Mathematics Test Structure—Grade 5

| Reporting Category                | Test Session            |           |                         |           |                         |           | TOTAL (Operational Only) |           |
|-----------------------------------|-------------------------|-----------|-------------------------|-----------|-------------------------|-----------|--------------------------|-----------|
|                                   | Session 1 No Calculator |           | Session 2 No Calculator |           | Session 3 No Calculator |           | Tasks                    | Points    |
|                                   | Tasks                   | Points    | Tasks                   | Points    | Tasks                   | Points    |                          |           |
| Major Content                     | 9–10                    | 10        | 8–10                    | 10        | 10                      | 10        | 27–30                    | 30        |
| Additional & Supporting Content   | 3–4                     | 4         | 2–4                     | 4         | 2                       | 2         | 7–10                     | 10        |
| Expressing Mathematical Reasoning | 1                       | 4         | 1                       | 3         | 1                       | 3         | 3                        | 10        |
| Modeling & Application            | 1                       | 3         | 1                       | 3         | 1                       | 6         | 3                        | 12        |
| <b>TOTAL (Operational Only)</b>   | <b>15</b>               | <b>21</b> | <b>14</b>               | <b>20</b> | <b>14</b>               | <b>21</b> | <b>43</b>                | <b>62</b> |
| <b>Test Duration (minutes)*</b>   | <b>75</b>               |           | <b>85</b>               |           | <b>75</b>               |           | <b>235</b>               |           |

\*The testing time includes items that are being field tested.

Table 3.20 General Mathematics Test Structure—Grade 6

| Reporting Category                | Test Session            |           |                      |           |                      |           | TOTAL (Operational Only) |           |
|-----------------------------------|-------------------------|-----------|----------------------|-----------|----------------------|-----------|--------------------------|-----------|
|                                   | Session 1 No Calculator |           | Session 2 Calculator |           | Session 3 Calculator |           | Tasks                    | Points    |
|                                   | Tasks                   | Points    | Tasks                | Points    | Tasks                | Points    |                          |           |
| Major Content                     | 10–12                   | 12        | 6–8                  | 8         | 8–10                 | 10        | 26–30                    | 30        |
| Additional & Supporting Content   | 6–8                     | 8         | 1–2                  | 2         | 0                    | 0         | 6–10                     | 10        |
| Expressing Mathematical Reasoning | 0                       | 0         | 2                    | 7         | 2                    | 7         | 4                        | 14        |
| Modeling & Application            | 0                       | 0         | 2                    | 9         | 1                    | 3         | 3                        | 12        |
| <b>TOTAL (Operational Only)</b>   | <b>16–20</b>            | <b>20</b> | <b>12–13</b>         | <b>26</b> | <b>11–13</b>         | <b>20</b> | <b>43</b>                | <b>66</b> |
| <b>Test Duration (minutes)*</b>   | <b>60</b>               |           | <b>90</b>            |           | <b>90</b>            |           | <b>240</b>               |           |

\*The testing time includes items that are being field tested.

Table 3.21 General Mathematics Test Structure—Grade 7

| Reporting Category                | Test Session               |           |                         |           |                         |           | TOTAL<br>(Operational Only) |           |
|-----------------------------------|----------------------------|-----------|-------------------------|-----------|-------------------------|-----------|-----------------------------|-----------|
|                                   | Session 1<br>No Calculator |           | Session 2<br>Calculator |           | Session 3<br>Calculator |           |                             |           |
|                                   | Tasks                      | Points    | Tasks                   | Points    | Tasks                   | Points    | Tasks                       | Points    |
| Major Content                     | 16–20                      | 20        | 3–5                     | 5         | 3–5                     | 5         | 26–30                       | 30        |
| Additional & Supporting Content   | 0                          | 0         | 3–5                     | 5         | 3–5                     | 5         | 6–10                        | 10        |
| Expressing Mathematical Reasoning | 0                          | 0         | 2                       | 7         | 2                       | 7         | 4                           | 14        |
| Modeling & Application            | 0                          | 0         | 2                       | 9         | 1                       | 3         | 3                           | 12        |
| <b>TOTAL (Operational Only)</b>   | <b>16–20</b>               | <b>20</b> | <b>12-13</b>            | <b>26</b> | <b>11–13</b>            | <b>20</b> | <b>43</b>                   | <b>66</b> |
| <b>Test Duration (minutes)*</b>   | <b>60</b>                  |           | <b>90</b>               |           | <b>90</b>               |           | <b>240</b>                  |           |

\*The testing time includes items that are being field tested.

Table 3.22 General Mathematics Test Structure—Grade 8

| Reporting Category                | Test Session               |           |                         |           |                         |           | TOTAL<br>(Operational Only) |           |
|-----------------------------------|----------------------------|-----------|-------------------------|-----------|-------------------------|-----------|-----------------------------|-----------|
|                                   | Session 1<br>No Calculator |           | Session 2<br>Calculator |           | Session 3<br>Calculator |           |                             |           |
|                                   | Tasks                      | Points    | Tasks                   | Points    | Tasks                   | Points    | Tasks                       | Points    |
| Major Content                     | 13–18                      | 18        | 3–6                     | 6         | 4–6                     | 6         | 25–30                       | 30        |
| Additional & Supporting Content   | 2–4                        | 4         | 2–3                     | 3         | 2–3                     | 3         | 5–10                        | 10        |
| Expressing Mathematical Reasoning | 0                          | 0         | 2                       | 7         | 2                       | 7         | 4                           | 14        |
| Modeling & Application            | 0                          | 0         | 2                       | 9         | 1                       | 3         | 3                           | 12        |
| <b>TOTAL (Operational Only)</b>   | <b>15–20</b>               | <b>22</b> | <b>10–13</b>            | <b>25</b> | <b>10–12</b>            | <b>19</b> | <b>42</b>                   | <b>66</b> |
| <b>Test Duration (minutes)*</b>   | <b>60</b>                  |           | <b>90</b>               |           | <b>90</b>               |           | <b>240</b>                  |           |

\*The testing time includes items that are being field tested.



The following item types were used in the 2022 LEAP 2025 mathematics assessments:

- Multiple choice: This item type requires students to select one correct answer from four answer choices. It may appear as a one-part question, as part of a two-part question, or as a part of a constructed-response item. The multiple choice items are worth one point.
- Multiple select: This item type requires students to select more than one correct answer from more than four answer choices. It may appear as a one-part question, as part of a two-part question, or as a part of a constructed-response item. The multiple select items are worth one point. Students must choose all correct answers and no incorrect answer to receive credit.
- Short answer: This item type requires students to enter a numeric response by typing from the keyboard; it allows a decimal and numbers for grades 3–8 and a negative sign for grades 6–8. It may appear as a one-part question, as part of a two-part question, or as a part of a constructed-response item. The short answer items are worth one point. Unless specified in the question, a student will earn credit for an answer that is equivalent to the correct numerical answer and proper rounding may be required.
- Keypad input: This item type requires students to enter a mathematical response using a customized pallet of numbers, operations, variables, and/or mathematical symbols; allows all rational and irrational numbers as well as expressions and equations; and scores all equivalent responses as correct unless noted otherwise. This item type may appear as a one-part question, as part of a two-part question, or as a part of a constructed-response item.
- Constructed response: This item type requires students to respond to an open-ended question which must be typed into a response box; students may use the equation builder tool (specific to the grade or grade span) to insert mathematical characters. This item type can be a single- or multi-part item. Constructed-response items ask students to write explanations or justifications, model a process, and/or solve real-world, multi-step contextual problems. A student may receive partial or full credit on constructed-response items, and maximum point values will vary by constructed-response task. Maximum values for constructed-response items are 3, 4, or 6 points.
- Technology enhanced: This item type uses technology to capture student responses. Technology-enhanced items may appear as a one-part question, as part of a two-part question, or as a part of a constructed-response item. The technology-enhanced items are worth one point. Technology-enhanced items may involve any of the following:
  - Bar graph: requires students to complete a bar graph or histogram by raising/lowering each bar to a value
  - Drag and drop: requires students to move draggable elements into one or more drop boxes
  - Dropdown menu: requires students to select from one or more dropdown menus to complete a sentence, phrase, or expression/equation/inequality
  - Hot spot: requires students to select one or more responses by choosing selectable areas on the screen

- Match interaction table: requires students to select a checkbox in each row from two or more columns
- Graph input: requires students to enter a response on a coordinate grid
- Number line input: requires a student to enter a response on a number line
- Line plot: requires students to complete a line plot with “X” as the input

A variety of item types allows for the measurement of the full range of student performance.

The following table details the number of items by point value and task type as well as the number of points per task type for each of the PBT (grades 3 and 4) and CBT (grades 3–8) forms.

**Table 3.23 Distribution of Mathematics Tasks and Points by Task Type**

|                    | Content Area | Grade | Type I     |            |        | Type II    |            |        | Type III   |            |        | Total Points |
|--------------------|--------------|-------|------------|------------|--------|------------|------------|--------|------------|------------|--------|--------------|
|                    |              |       | 1 pt Tasks | 2 pt Tasks | Points | 3 pt Tasks | 4 pt Tasks | Points | 3 pt Tasks | 6 pt Tasks | Points |              |
| Paper-Pencil (PBT) | Math         | 3     | 34         | 3          | 40     | 2          | 1          | 10     | 2          | 1          | 12     | 62           |
| Online (CBT)       | Math         | 3     | 34         | 3          | 40     | 2          | 1          | 10     | 2          | 1          | 12     | 62           |
|                    | Math         | 4     | 34         | 3          | 40     | 2          | 1          | 10     | 2          | 1          | 12     | 62           |
|                    | Math         | 5     | 34         | 3          | 40     | 2          | 1          | 10     | 2          | 1          | 12     | 62           |
|                    | Math         | 6     | 32         | 4          | 40     | 2          | 2          | 14     | 2          | 1          | 12     | 66           |
|                    | Math         | 7     | 32         | 4          | 40     | 2          | 2          | 14     | 2          | 1          | 12     | 66           |
|                    | Math         | 8     | 30         | 5          | 40     | 2          | 2          | 14     | 2          | 1          | 12     | 66           |

### 3.4 Item Development and Selection

The processes of item development and selection are discussed in this section in compliance with the *Standards*.

Standard 4.7 states the following:

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

The items used in the 2022 LEAP 2025 ELA and mathematics assessments came from New Meridian’s and Louisiana-owned item banks.

The items selected for use on the 2022 LEAP forms were used to equate to the LEAP 2025 scale. Operational forms were selected based on LEAP 2025 test blueprint specifications, which were supported by statistical data from New Meridian operational testing.

### 3.5 Considerations of Test Fairness in Item Development

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).

Bias and sensitivity guidelines used to develop the New Meridian and Louisiana-owned items help ensure the assessments are fair for all groups of test takers, despite differences in characteristics that include, but are not limited to, disability status, ethnic group, race, gender, regional background, native language, religion, sexual orientation, and socioeconomic status. DRC relied strongly on the bias and sensitivity guidelines in the development of the assessments, particularly in item selection and review. To be included in the assessments, items had to comply with the bias and sensitivity guidelines and be approved by Louisiana educators involved in the Louisiana alignment and item review meetings.

### 3.6 New Meridian Item Reviews

As part of New Meridian’s ongoing item development practices, several educator committees had already been convened to conduct rigorous reviews of every passage and item developed for the New Meridian assessment system prior to the items becoming a part of the item bank that included items and passages available for selection on Louisiana forms. These reviews include

- text reviews of all passages (during which participants review and edit passages independently and then discuss content and bias concerns as a grade-level group),
- item reviews (during which committees review and edit items for adherence to PARCC foundational documents, basic principles of universal design, accessibility guidelines, selected metadata fields, and a style guide),
- bias and sensitivity reviews (during which educators and community members review items and tasks to confirm the absence of issues relating to bias, fairness, and sensitivity to ensure that items and tasks do not unfairly advantage or disadvantage any student subgroup over another subgroup),
- editorial reviews (during which the review committee completes a copy edit review and records member comments), and
- data reviews (during which educators evaluate item-level statistics to determine eligibility of items and tasks to move forward to the operational assessments).

Additional information on New Meridian’s item review processes and procedures can be found at the [New Meridian Resource Center](#). Only items that have been approved by expert reviewers during text reviews (ELA only), item reviews, bias and sensitivity reviews, and editorial reviews are moved forward for field testing. Of the field tested items, only those determined to have acceptable statistics, either by having acceptable item parameters according to the data review flagging criteria or by being approved by expert reviewers during data review, are eligible for review by Louisiana educators for potential use on an operational assessment. These processes follow the criteria set forth by the *Standards*.

Standard 3.1 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).

Standard 3.2 states the following:

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).

Independent studies of New Meridian passages and items have found that the content being licensed assesses the skills that matter most and is rigorous, aligned to standards, and accessible to students with disabilities and English learners. For more information on the studies performed, refer to New Meridian’s website: <https://resources.newmeridiancorp.org/research/>.

## 3.7 Louisiana Item Development and Item Review

### 3.7.1 Mathematics Item Development

To determine the mathematics item development needs for field-testing in the Spring 2022 administration, the LDOE determined the count of items needed per grade and then DRC content experts analyzed the item pool to determine the number of type I, type II, or type III items and the evidence statements/standards based on that analysis. DRC content experts reviewed standards coverage on the previous year’s test by looking at the number and types of items used to cover each content standard, the difficulty range, the level of cognitive complexity covered by each content standard, and the topic/material presented in items (to ensure a variety of engaging topics are included). DRC determined gaps or holes in coverage, based on these criteria, to create an item development plan for the number and types of items to be newly developed for possible field-testing in spring 2022. DRC presented the item development plan to LDOE content experts, who then provided feedback to DRC. DRC and the LDOE collaborated to finalize the item development plan. DRC contracted with content experts to have items written. Item writers participated in item writing training with DRC and the LDOE prior to developing items. The training included:

- an overview of the assessable content and task types,
- a description of the type I, type II, and type III items,
- an explanation of how to use the standards and evidence statements when writing items,
- examples of type I, type II, and type III items,
- a discussion that covered item writing guidelines
- examples of items with issues,
- training on security and confidentiality, and
- training on universal design and bias, fairness, and sensitivity

These items were reviewed by the LDOE and revised by DRC. Once items were approved by the LDOE, they became part of the set of items that were taken to item content and bias reviews with Louisiana educators.

At the mathematics item content and bias reviews, committees met to provide feedback on the alignment and appropriateness of items. Louisiana educators reviewed items for alignment to content standards; grade appropriateness; issues of bias, fairness, and sensitivity; and difficulty and cognitive complexity (including determining whether the difficulty and cognitive complexity were appropriate for each item and whether the items available represented a range of difficulty and cognitive complexity). For a detailed description of the process followed during the item content and bias reviews, see Appendix B. Louisiana educators edited items as needed to ensure they were appropriate for use on Louisiana assessments, which allowed the items to move forward for possible field-testing. Any items deemed inappropriate were rejected if educators were not able to revise those items. Items that successfully passed through the content and bias reviews were then placed on a test form in a field test position, and data was collected on each field test item. Once field-testing was complete, the items were taken to range-finding, where committees of Louisiana educators reviewed Louisiana student responses to assign true scores to responses that would be used in training materials for the scoring of items. The field-tested constructed response items were then scored, and the data were analyzed by DRC psychometricians.

### 3.8 Guidelines on Bias, Fairness, and Sensitivity

Item writers and content and bias committee members were provided with guidelines on bias, fairness, and sensitivity issues as they pertain to testing. The information included definitions of bias and sensitivity, examples of different types of bias, and topics of concern, which were specific to given content areas. Writers were also provided with sample items that contained bias, fairness, and sensitivity issues and examples of how to revise items and graphics to ensure universal design is applied. The writers were also given information on accessibility and accommodations, including information on how to address language, visual elements, and design issues when considering students in special populations (e.g., students with disabilities and English Learners).

#### **Types of Bias:**

- **Stereotyping**
  - may result when an image is formed by relating certain characteristics to ALL members of a group and may include physical characteristics, intellectual characteristics, emotions, careers, activities, and domestic or social roles
- **Gender Bias**
  - may result when people of any gender are unnecessarily presented in stereotypical activities, occupations, and/or situations or are unnecessarily presented as having stereotypical emotions or characteristics
- **Regionalism**
  - may result from the inclusion of terms that are not commonly used nationwide or within a particular region of the state in which the test will be given
- **Ethnic or Cultural Bias**
  - may result from the inclusion of terms, concepts, or situations that are demeaning and/or offensive to a particular ethnic group or culture
- **Socioeconomic or Class Bias**
  - may result from the inclusion of activities, possessions, or ideas that may not be common to all students

- Religious Bias
  - may result from the inclusion of terms, concepts, or situations that are demeaning and/or offensive to a particular religious group
- Ageism
  - may result from the inclusion of terms, concepts, or situations that are demeaning and/or offensive to elders or to older persons (defined as people older than the reference group) and may also involve issues of bias with other age groups, including teenagers and young children, or even with the age of the reference group itself, where the grade (age) of a student is depicted negatively
- Bias against Persons with Disabilities
  - may result from the inclusion of terms, concepts, or situations that are demeaning and/or offensive to persons with disabilities

### 3.8.1 Louisiana Item Alignment Review

Independent of New Meridian reviews, DRC conducts the Louisiana Item Alignment Reviews, during which Louisiana educators review items and passage sets for alignment to the Louisiana Student Standards and for appropriateness of the items and tasks for students in Louisiana, including being free of issues of bias, fairness, and sensitivity.

DRC, with guidance from the LDOE, conducted the Louisiana Item Alignment Review in July 2019 with committees of Louisiana educators. Grade-level committees met for two to three days to provide feedback on the alignment and appropriateness of items that made up the New Meridian item bank. To the extent possible, each committee included educators from different parts of Louisiana, who represent all Louisiana students (e.g., special education, English learners, students with disabilities, etc.). Committee members were also representative of the diverse demographics of the state.

As described in the preceding sections, items presented at these reviews went through a rigorous review process before and after the items were field-tested by New Meridian to ensure quality and appropriateness. Items were selected for inclusion in the form selection pool, imported into IDEAS (DRC's item banking system), and formatted for use on Louisiana test forms. They were placed on mock test forms to allow them to be reviewed as students would see them. Louisiana educators reviewed these items to confirm they were acceptable for use on a Louisiana assessment. Educators reviewed items individually to verify that each item aligned to the Louisiana Student Standard(s) for that item prior to discussing the items as a group. In addition, educators reviewed item keys and discussed the difficulty and cognitive complexity of each item and task. The groups came to a consensus regarding the status of each item: Accepted with Current Alignment, Accepted with Realignment, or Rejected. Items that were accepted were determined to appropriately measure the intended standard(s) and be free of issues of bias, fairness, or sensitivity that could impact student responses to the item.

## 3.9 Operational Test Selection

Operational item selection for the 2022 administration took place from June through September 2019 by LDOE and DRC. The New Meridian and Louisiana item pools were used to select fixed LEAP 2025 ELA and mathematics forms.

The LEAP 2025 assessments were given in two modalities: computer-based test (CBT) or paper-based test (PBT). For both ELA and mathematics, students in grades 3 through 8 took the CBTs; some school systems elected to administer the PBTs to students in grade 3. For ELA, the dual-mode forms were identical except for

a small quantity (four to five items) of technology-enhanced items (TE) in each CBT. Items used on PBTs as replacements for the TE items were evidence-based selected-response items that addressed the same content standards and were of similar rigor as the TE items, when possible. For mathematics, short-answer (SA) items were reformatted as gridded-response (GR) items for use on PBTs.

### 3.9.1 Item and Passage Selection Process and Criteria

The item and passage selection process used for forms construction was a content-focused, collaborative process between the LDOE and DRC ELA and mathematics content specialists, and it was followed by a psychometric evaluation of each selection. The critical psychometric consideration, other than individual item performance, was the degree to which the selected items reflected the 2022 LEAP 2025 targets, which were supposed to match the Spring 2019 LEAP 2025 operational forms. Although the item pool was limited, items that were determined to be very difficult (i.e., IRT difficulty parameter  $b > 2.0$ ) and/or not discriminating (i.e., IRT discrimination parameter  $a < 0.3$ ) were avoided when possible.

#### *Selection Guidelines*

- Using the pool of items, content-area assessment specialists select ELA passage sets and tasks that consist of quality texts displaying diversity in topics and authors and mathematics tasks that match the blueprint. The sets and/or tasks include items that cover a range of Louisiana Student Standards and/or Evidence Statements and address the appropriate reporting categories and subcategories.
- Content-area assessment specialists and research analysts verify that each item meets psychometric guidelines for excellence as available item-performance data allows.
- Forms include adequate content coverage, as required by the detailed test blueprint.
- Each form contains an anchor set that includes passages/items from previous operational administrations. The anchor set, which is representative of the blueprint, ensures comparability between the 2019 form and the 2022 form. The remaining sets or tasks selected for a form complete the blueprint requirements.
- No item in a form should “clue” (or provide the answer to) another item on that same form.
- Clang association should be avoided. Clang is when a distractor can be associated with a stem word by sound rather than meaning (e.g., rhyming, alliteration).
- Passage sets in ELA forms should be diverse.
- Forms should be diverse, including a variety of text types, including texts that appeal to a diverse student population.
- Forms should include a wide range of topics and a variety of questions.
- Correct answer distributions should follow best practice (no more than 3 keys of the same answer option in a row).
- Forms **must not** contain any items that have been released to the public.

### 3.9.2 Review of the ELA Items and Forms

DRC and LDOE ELA content specialists and members of educator committees verified that the items were in compliance with the guidelines provided by LDOE, including alignment to the content standards and appropriateness for Louisiana students. Because establishing content validity is one of the most important

aspects in the legal defensibility of a test, the alignment of the items to the content standards must be reviewed and verified at every stage of the test development process. As a result, it is essential that an item selected for a form link directly to the content standard(s) that it purports to measure. The ELA content specialists also verified all items against their designated content codes and metadata, both to evaluate the correctness of the coding and to ensure that the given item measures what it purports to measure.

In addition, the ELA content specialists reviewed each item for item quality, ensuring that the items were in compliance with industry guidelines for clarity, style, accuracy, and appropriateness for Louisiana students. While there are many published guidelines for reviewing assessment items, the following list serves to summarize the major considerations content specialists followed when reviewing items to ensure the items conformed to item quality standards for good, reliable, and fair test questions.

### ***Guidelines for Reviewing Items Selected for Forms***

|  |
|--|
| <i>A good item should</i>  |
| <ul style="list-style-type: none"> <li>• have only one clear, correct answer and contain answer choices that are reasonably parallel in length and structure (multiple choice);</li> <li>• have only the indicated number of correct answers and contain answer choices that are reasonably parallel in length and structure (multiple select);</li> </ul>   |
| <ul style="list-style-type: none"> <li>• have a correctly assigned content code (i.e., item map);</li> <li>• measure one main idea or standard, unless the item is a complex item, such as a prose constructed-response (PCR) item;</li> <li>• measure the objective or content standard it is designed to measure;</li> <li>• be at the appropriate level of rigor;</li> <li>• be simple, direct, and free of ambiguity;</li> <li>• make use of vocabulary and sentence structure that is appropriate for the grade level assessed;</li> <li>• be based on content that is accurate and current;</li> <li>• when appropriate, contain stimulus material that is clear and concise and provides all the information needed;</li> <li>• when appropriate, contain graphics that are clearly labeled;</li> <li>• contain answer choices that are plausible and reasonable in terms of the requirements of the question, as well as a student’s level of knowledge;</li> <li>• contain distractors that relate to the question in the same way and can be supported by a rationale;</li> <li>• reflect current teaching and learning practices for the content area; and</li> <li>• be free from bias.</li> </ul> |

### 3.9.3 Review of the Mathematics Items and Forms

DRC and LDOE mathematics content specialists also ensured the items were in compliance with the guidelines provided by LDOE, including alignment to the content standards and appropriateness for Louisiana students. Since establishing content validity is one of the most important aspects in the legal defensibility of a



test, the alignment of the items to the content standards must be reviewed and verified at every stage of the test development process. As a result, it is essential that an item selected for a form link directly to the content standard(s) that it purports to measure. The mathematics content specialists also verified all items against their designated content codes and metadata, both to evaluate the accuracy of the coding and to ensure that the given item measures what it purports to measure.

In addition, the mathematics content specialists reviewed each item for item quality, ensuring that the test items are in compliance with industry guidelines for clarity, style, accuracy, and appropriateness for Louisiana students. While there were many published guidelines for reviewing assessment items, the list below serves to summarize the major considerations mathematics content specialists followed when reviewing items to ensure they conformed to item quality standards for good, reliable, and fair test questions.

### *Guidelines for Reviewing Items Selected for Forms*

A good item should

- contain answer choices that are reasonably parallel in length and structure;
- have the appropriate number of correct answer(s) based on item type:
  - only one clear, correct answer for a multiple-choice (MC) item
  - only the indicated number of correct answers for a multiple select (MS) item;
- have a correctly assigned content code (i.e., item map);
- measure one content standard or evidence statement;
- measure the content standard or evidence statement it is designed to measure;
- be at the appropriate level of rigor;
- be simple, direct, and free of ambiguity;
- make use of vocabulary and sentence structure that is appropriate for the grade level assessed;
- be based on content that is accurate and current;
- when appropriate, contain stimulus material that is clear and concise and provides all the necessary information;
- when appropriate, contain graphics that are clearly labeled;
- contain answer choices that are plausible and reasonable in terms of the requirements of the question and the student’s level of knowledge;
- contain distractors that relate to the question in the same way and can be supported by a rationale;
- reflect current teaching and learning practices in the content area; and
- be free of gender, ethnic, racial, cultural, socioeconomic, regional, and other forms of bias.

### 3.9.4 Item-Selection Options for Special Cases

While every effort is made to select a test form that meets all psychometric guidelines for excellence, it may not be possible to comply with all the psychometric criteria for item/form difficulty due to item pool limitations. In these cases, critical psychometric guidelines are followed while allowing some tolerance on

less critical item-selection guidelines. The tolerance of meeting target characteristics, the relative exposure of previously used operational items, and other considerations (e.g., content coverage) may possibly be affected in such cases.

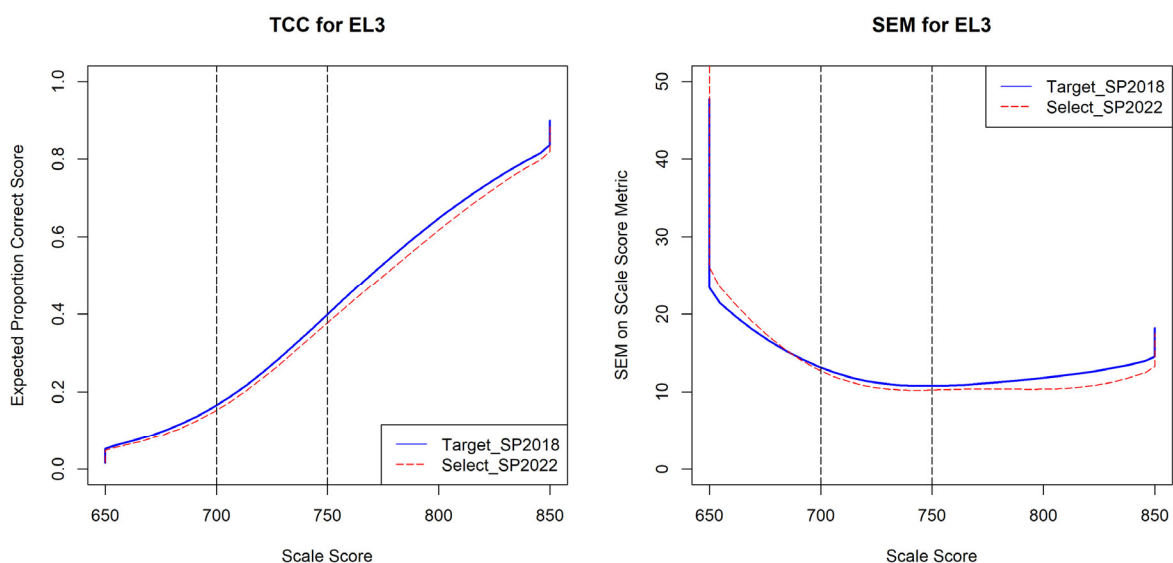
### 3.9.5 Psychometric Review

The psychometric evaluation of each selection was centered on reviewing the New Meridian items with operational item parameters.

#### Selecting Targets

The spring 2018 LEAP 2025 operational form was selected to be the target form in 2022 LEAP 2025 form construction. The rationale for the choice of the targets was that each 2018 LEAP 2025 form should be on the PARCC scale and be closely comparable to PARCC assessments. Figures 3.1 through 3.6 for ELA and Figures 3.7 through 3.12 for mathematics show the test characteristic curves (TCCs) and standard errors of measurement (SEMs) of the final forms compared to those of the target forms. The left line graph displays the TCC of the target form and the selected 2022 form, summarizing the expected proportion of the maximum raw score needed to achieve the raw score. The right line graph displays the SEM of the scale score of the target form and the selected 2022 form. This summarizes the amount of measurement error surrounding a scale score.

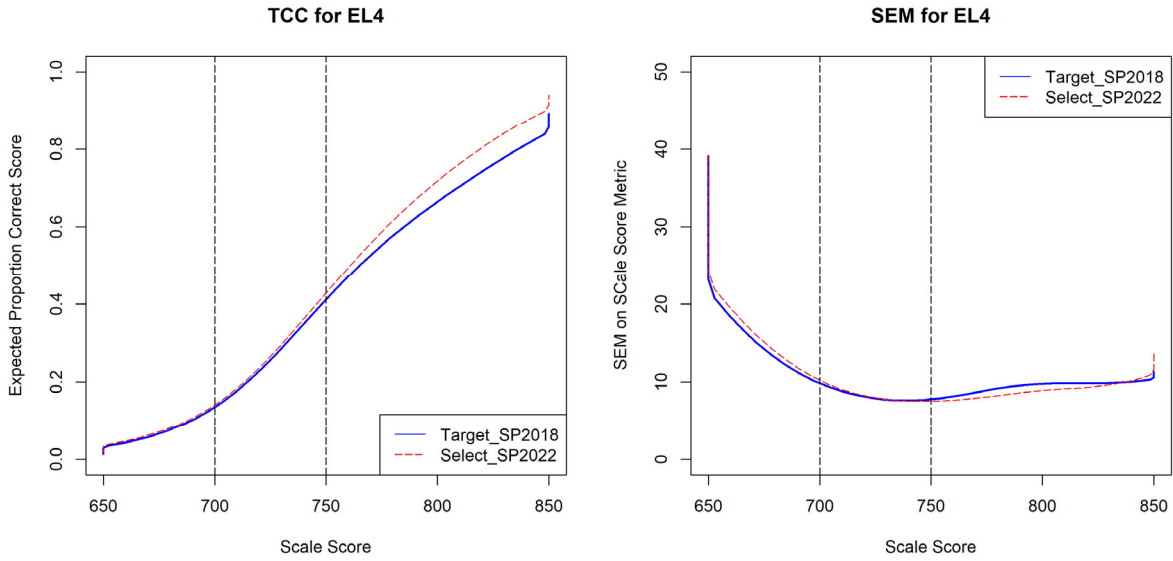
**Figure 3.1 2022 ELA Form Evaluation—Grade 3**



**NOTE:**

- *Target\_SP2018 is the 2018 LEAP 2025 intact test form.*
- *Select\_SP2022 is the selected 2012 LEAP 2025 test form.*

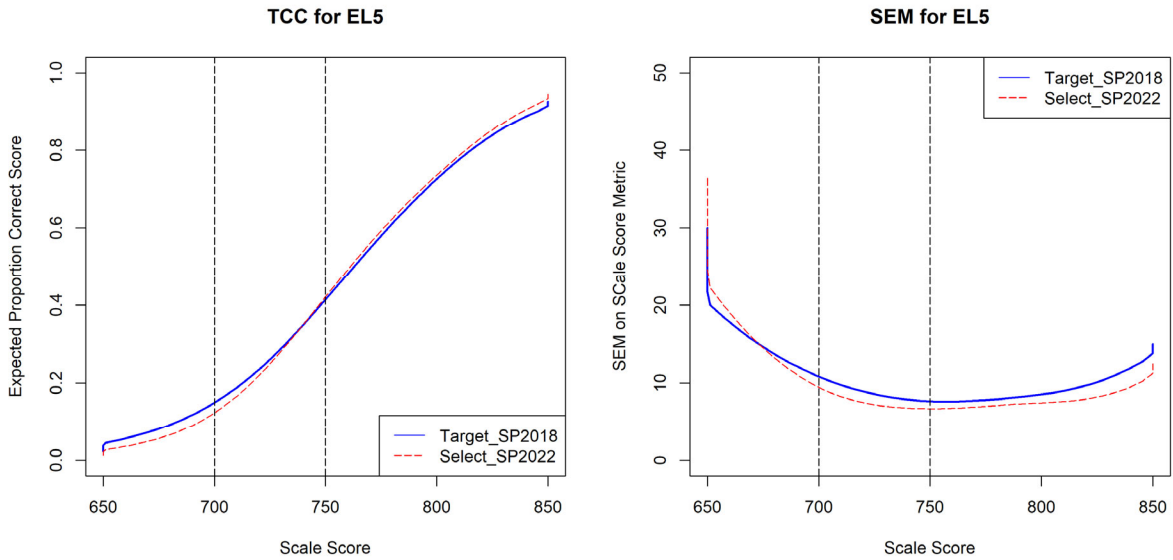
**Figure 3.2 2022 ELA Form Evaluation—Grade 4**



**NOTE:**

- *Target\_SP2018 is the 2018 LEAP 2025 intact test form.*
- *Select\_SP2022 is the selected 2012 LEAP 2025 test form.*

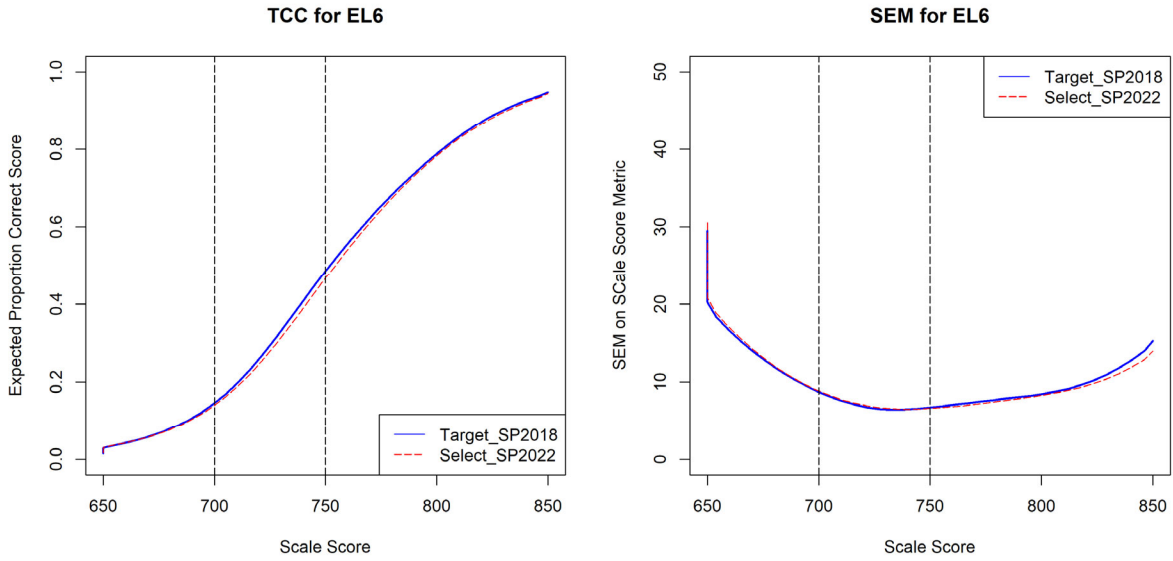
**Figure 3.3 2022 ELA Form Evaluation—Grade 5**



**NOTE:**

- *Target\_SP2018 is the 2018 LEAP 2025 intact test form.*
- *Select\_SP2022 is the selected 2012 LEAP 2025 test form.*

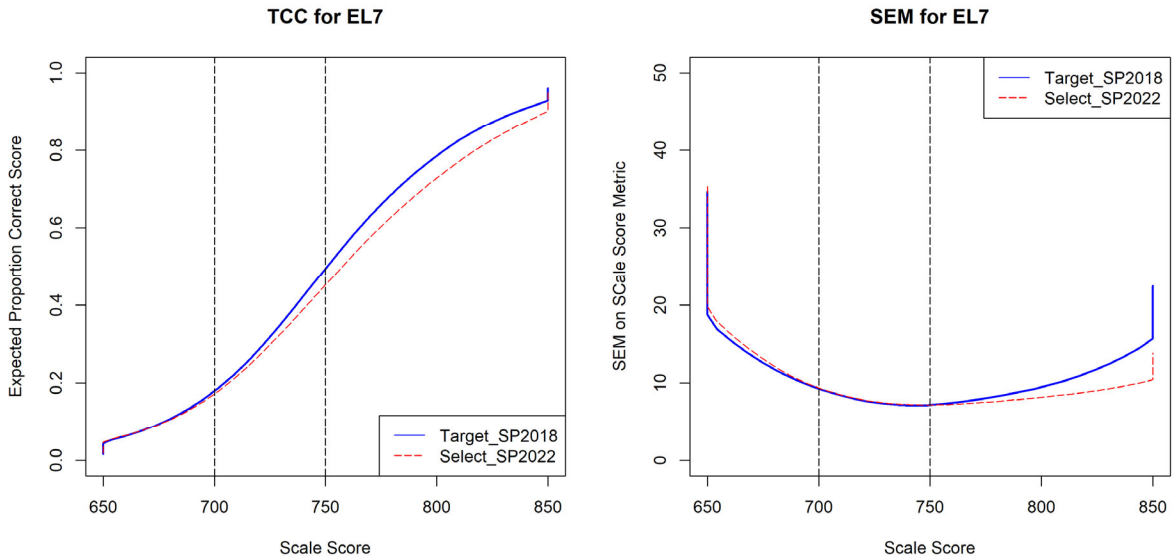
**Figure 3.4 2022 ELA Form Evaluation—Grade 6**



**NOTE:**

- *Target\_SP2018 is the 2018 LEAP 2025 intact test form.*
- *Select\_SP2022 is the selected 2012 LEAP 2025 test form.*

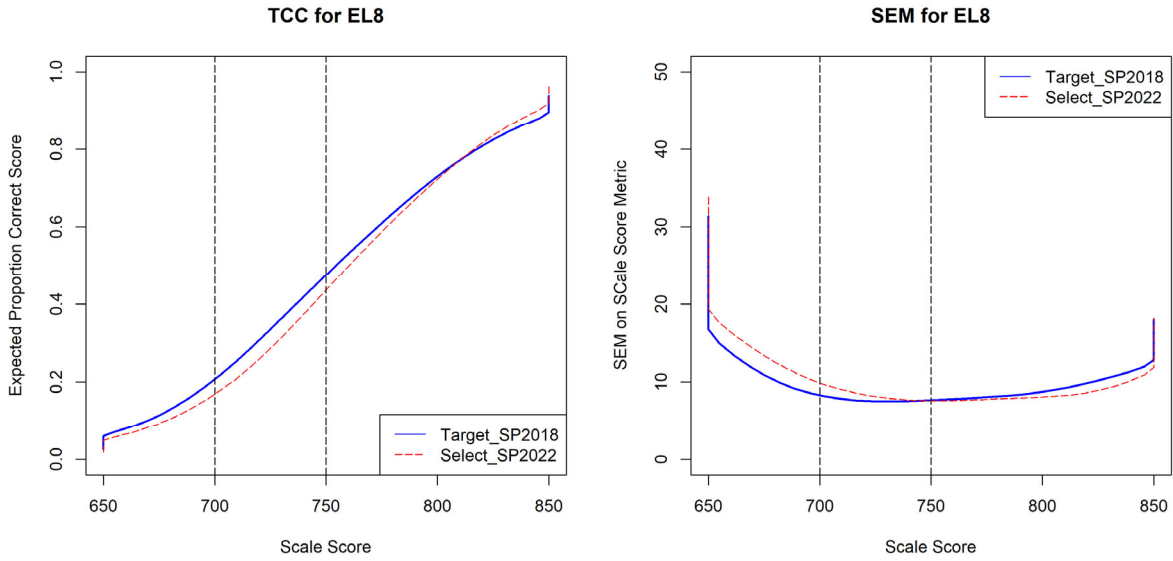
**Figure 3.5 2022 ELA Form Evaluation—Grade 7**



**NOTE:**

- *Target\_SP2018 is the 2018 LEAP 2025 intact test form.*
- *Select\_SP2022 is the selected 2012 LEAP 2025 test form.*

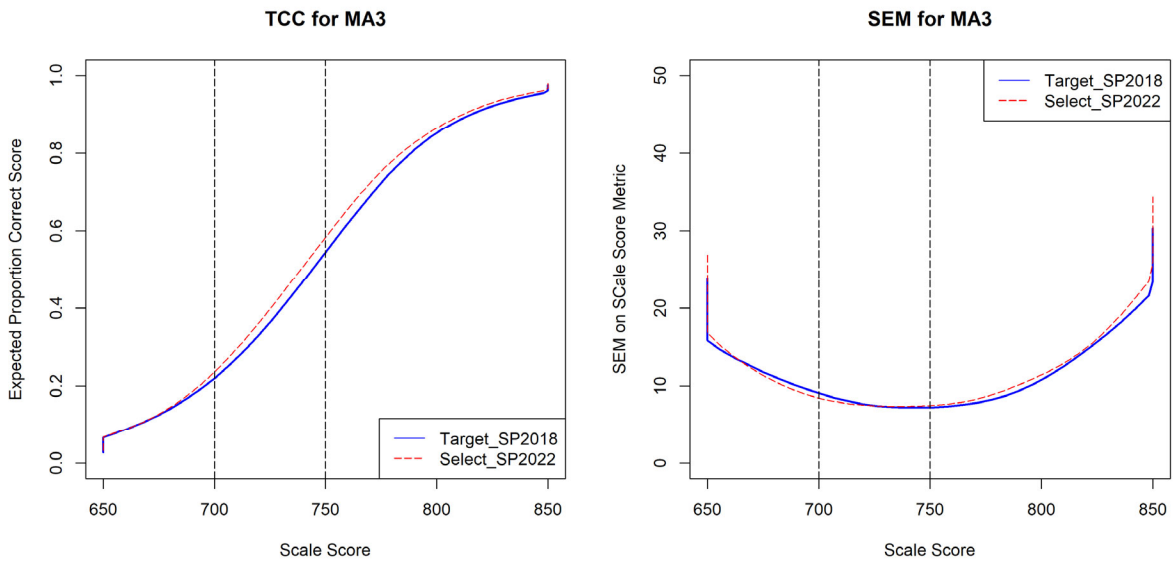
**Figure 3.6 2022 ELA Form Evaluation—Grade 8**



**NOTE:**

- *Target\_SP2018 is the 2018 LEAP 2025 intact test form.*
- *Select\_SP2022 is the selected 2012 LEAP 2025 test form.*

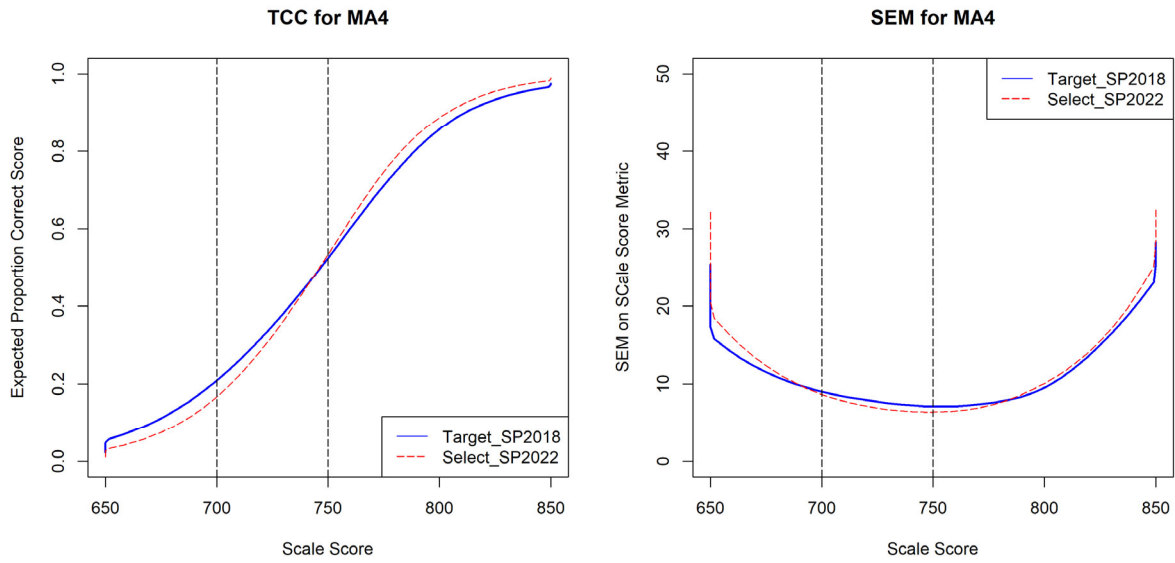
**Figure 3.7 2022 Mathematics Form Evaluation—Grade 3**



**NOTE:**

- *Target\_SP2018 is the 2018 LEAP 2025 intact test form.*
- *Select\_SP2022 is the selected 2012 LEAP 2025 test form.*

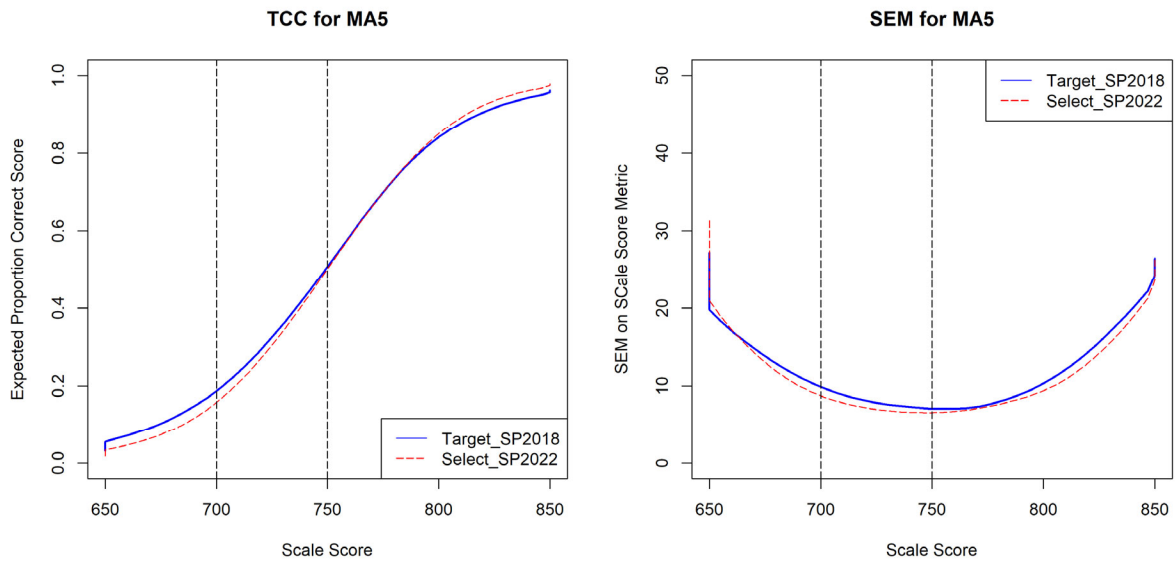
**Figure 3.8 2022 Mathematics Form Evaluation—Grade 4**



**NOTE:**

- *Target\_SP2018 is the 2018 LEAP 2025 intact test form.*
- *Select\_SP2022 is the selected 2012 LEAP 2025 test form.*

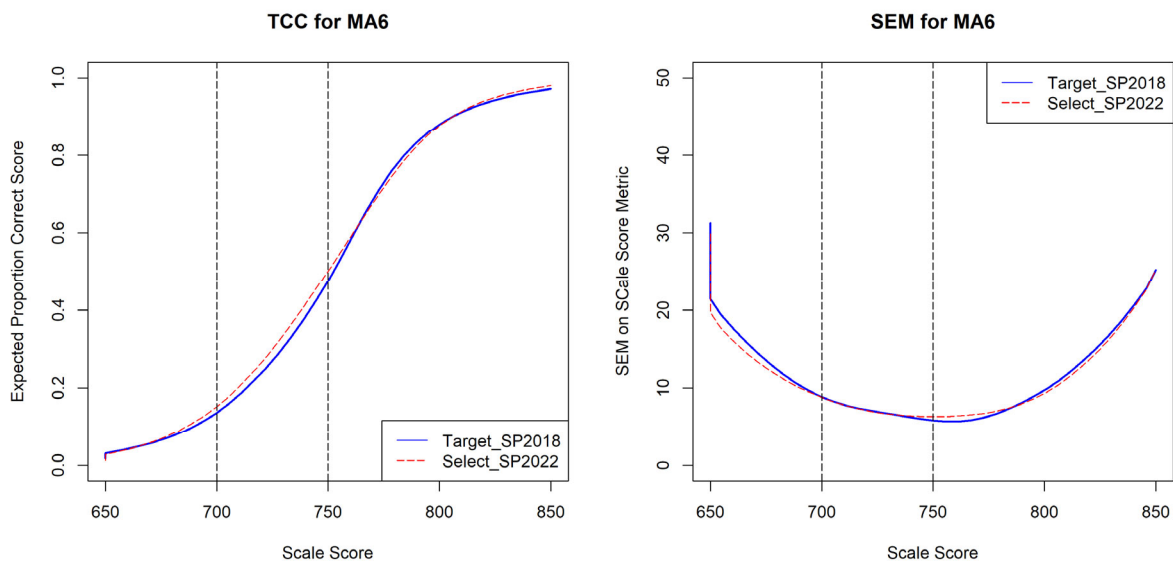
**Figure 3.9 2022 Mathematics Form Evaluation—Grade 5**



**NOTE:**

- *Target\_SP2018 is the 2018 LEAP 2025 intact test form.*
- *Select\_SP2022 is the selected 2012 LEAP 2025 test form.*

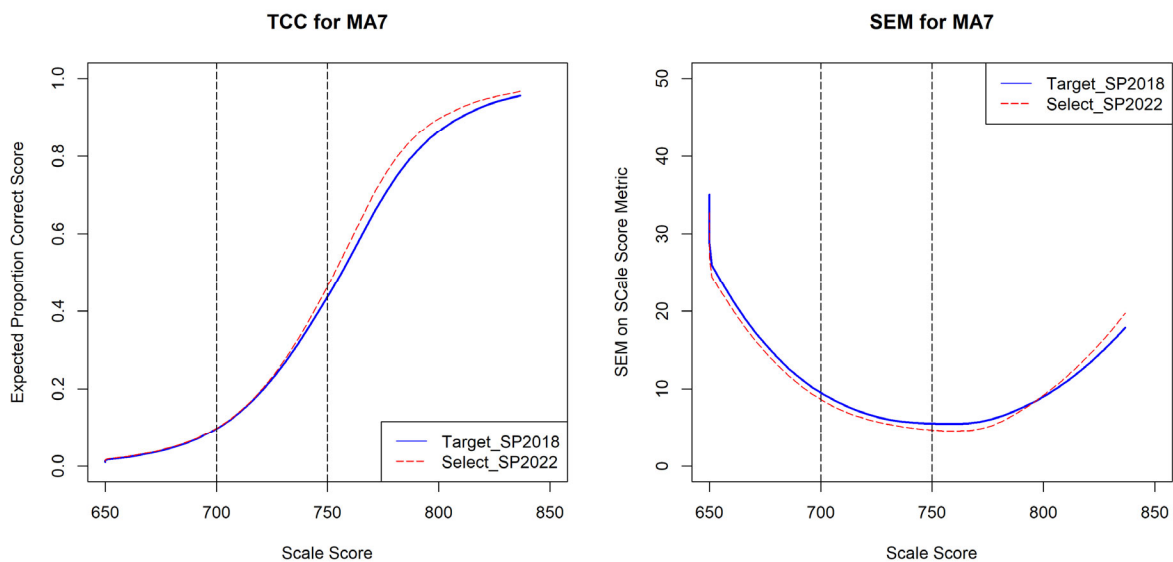
Figure 3.10 2022 Mathematics Form Evaluation—Grade 6



## NOTE:

- *Target\_SP2018 is the 2018 LEAP 2025 intact test form.*
- *Select\_SP2022 is the selected 2012 LEAP 2025 test form.*

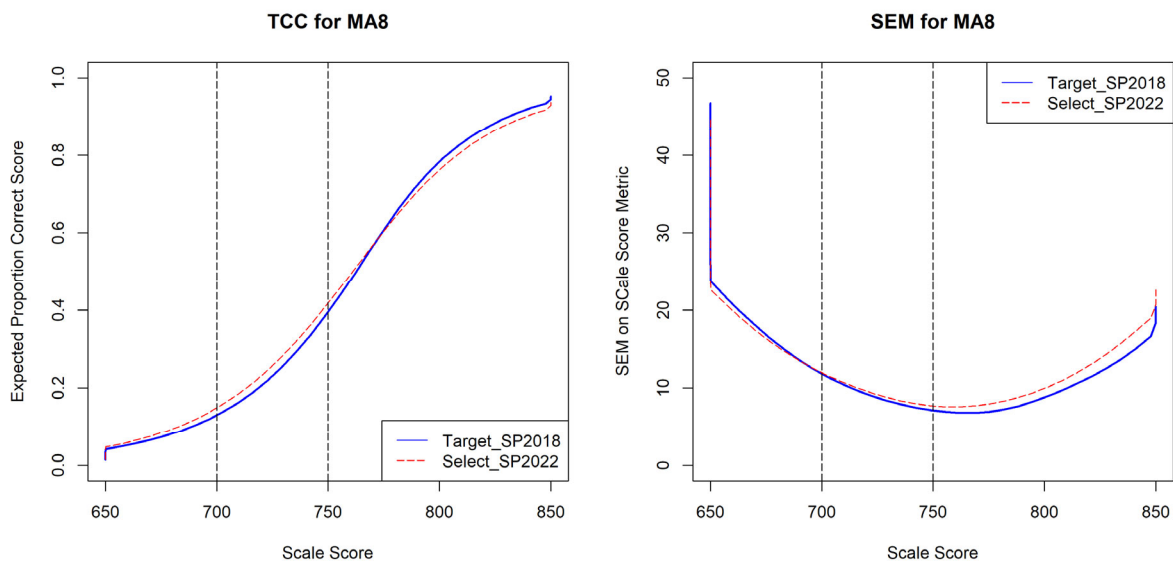
Figure 3.11 2022 Mathematics Form Evaluation—Grade 7



## NOTE:

- *Target\_SP2018 is the 2018 LEAP 2025 intact test form.*
- *Select\_SP2022 is the selected 2012 LEAP 2025 test form.*

**Figure 3.12 2022 Mathematics Form Evaluation—Grade 8**



**NOTE:**

- *Target\_SP2018 is the 2018 LEAP 2025 intact test form.*
- *Select\_SP2022 is the selected 2012 LEAP 2025 test form.*

## Selecting Anchors

Anchor sets used in the common item nonequivalent group design underwent considerable scrutiny due to the generally accepted guideline that the anchor set should mirror the total (or reference) test in terms of content and item characteristics. One of the critical psychometric considerations for an anchor set is the extent to which the TCC and SEM of the anchor set aligns to that of the total test.

### 3.10 Universal Design

Grade-level assessments that follow universal design guidelines allow participation of the widest possible range of students, resulting in more valid inferences about students' performances. Such assessments may reduce the need for accommodations by reducing or eliminating access barriers associated with the tests themselves. Table 3.25 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 describes how the elements of universal design were addressed in the construction of the test forms administered in 2022 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).

Universal design requires that grade-level assessments measure the performance of students with a wide range of abilities and skills, ensuring that students with diverse learning needs receive opportunities to demonstrate competence on the same content. To ensure that students can access the tests, the LEAP 2025 assessments include simple, clear, and intuitive instructions and procedures; maximum readability and comprehensibility; and maximum legibility. The online test specifications define how directions and test



items are formatted online, including the spacing between an item stem and answer choices, and other page elements (such as online tools and Help files) to ensure consistent, clean visual appearance of CBTs. Test directions at the beginning of each test session were 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 while being comparable to the requirements followed by PARCC and New Meridian.

**Table 3.24 Elements of Universal Design**

| Element  | Explanation   |
|--|---|
| Inclusive Assessment Population                          | Tests designed for state, school system, 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 (e.g., all items can be in braille form).  |
| Simple, Clear, and Intuitive Instructions and Procedures | All instructions and procedures are simple, clear, and presented in understandable language.  |
| Maximum Readability and Comprehensibility                | A variety of 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.   |

### 3.11 Accommodations and Designated Supports

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).

Students with IEPs, 504 plans, and English learners (ELs) may be provided test administration accommodations as documented on their accommodation plan. More information on accommodations can be found in Section 4.3.2 of Chapter 4. Accommodation code definitions can be found in the *Paper-Based Test Administration Manual*.

Accommodated print forms were developed in grades 5–8 of ELA and mathematics for those students who were unable to participate in an online administration. For a detailed description of the process used to develop the accommodated print forms and how to modify technology-enhanced items for use in an accommodated print form, see Appendix A, *Accommodated Print Form Creation*.

Braille and large-print test forms were constructed for each grade and content area to enable students with visual impairments to participate in the LEAP 2025 assessments. Braille and large-print forms for grade 3 of ELA and mathematics were based on the standard-print forms. Braille forms for grades 4–8 of ELA and mathematics were based on the accommodated print forms. There are no large-print versions of the grades 4–8 accommodated print forms. Instead, students needing a large-print version in grades 4–8 use larger-sized monitors and/or the magnification features of the online testing system. All online test content has been developed to scale in relation to the available area on larger monitors while maintaining the correct aspect ratio. Specific recommendations on how to transcribe items into braille were provided by the braille publisher to produce the braille version of the LEAP 2025 assessments and the test administrator’s notes that accompany the braille forms. The goal was to maximize the number of items on the braille forms that could be transcribed into braille.

The following assessment features were available to all students and do not require any documentation either prior to or during the assessment:

- blank scratch paper and graph paper
- calculators (to be used in the calculator section only)
- color overlay
- contrasting colors/reverse colors
- directions in native language
- equation builder
- bookmark
- general administration directions clarified
- general administration directions read aloud and repeated as necessary
- general masking
- headphones
- highlighters
- line guides
- magnifiers/variable zoom
- measurement tools
- redirection of student to the test
- specialized furniture or equipment
- sticky note/notepad
- strikethrough
- and writing/formatting tools (for ELA constructed response items only).

Accessibility features were available for all students with the particular need documented in their Individualized Education Programs (IEPs), Individual Accommodation Plans (IAPs), English Learner (EL) plans, or Personal Needs Profiles (PNPs). The following accessibility features were available: individual testing, small group testing, student reads assessment aloud to himself or herself, adaptive and specialized equipment or furniture, and math read aloud (text-to-speech or human reader).

Accommodations were available for students who have an IEP, IAP, or EL plan, including: braille test materials, calculation device and math tools for non-calculator sections of mathematics assessments, transferred answers, recorded answers, large print test materials (mathematics Spanish), mathematics Spanish read aloud, translated mathematics test, test read aloud (text-to-speech, Kurzweil, recorded audio file). For details on how these assessment and accessibility features and accommodations should be used with PBTs and CBTs, see the [LEAP 2025 Accommodations and Accessibility Features User Guide](#).

For a detailed description of the process used to develop the Spanish translation forms of the mathematics tests, see Appendix B, “Forms Development Process for Spanish Translations Forms.”

### 3.12 Item and Task Specifications

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 item and task specifications are designed to ensure that the assessment items measure the assessment’s claims. The purpose of the item and task specifications is to define the characteristics of the items and tasks that will provide the evidence to support one or more claims. To do this, the item and task specifications delineate the types of evidence, or targets, that should be elicited for each reporting category within a grade level. Then, the specifications provide explicit guidance on how to write items to elicit the desired evidence.

The item and task specifications provide guidance on how to measure the targets (i.e., standards) first found in the content specifications and guidelines on how to create the items that are specific to each assessment target and reporting category. In ELA and mathematics, item specifications describe the knowledge, skills, and processes being measured by each item type aligned to particular standards.

These item specifications were developed for each grade and standard to delineate the expectations of knowledge and skill to be included on test questions. In addition, the ELA and mathematics item and stimulus specifications provide guidance on determining the appropriateness of task and stimulus materials (i.e., the materials that a student must refer to when working on a test question). The stimulus specifications also provide information on the characteristics of stimuli or activities that should be avoided because they are not important to the knowledge, skill, or process being measured. This underscores DRC’s efforts to select items that are accessible to the widest range of students possible; in other words, 2022 LEAP 2025 items were selected according to the elements of universal design.

### 3.13 Summary

In summary, the overall purpose of this chapter is to explicate the procedures used in the development of the forms administered during the spring 2022 LEAP 2025 administration. The efforts by the LDOE and DRC in developing the LEAP 2025 assessments are in alignment with multiple best practices of the test industry but, in particular, 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 (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 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 (67).

**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 (85).

**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) (85).

**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).

**Standard 4.12** Test developers should document the extent to which the content domain of a test represents the domain defined in the test specifications (89).

## Chapter 4: Test Administration

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Chapter 4 of the technical report describes the processes implemented and the information disseminated to help ensure standardized test administration procedures and, thus, uniform test administration conditions for students. According to the *Standards for Educational and Psychological Testing* (American Educational Research Association [AERA], American Psychological Association [APA], & National Council on Measurement in Education [NCME], 2014), “The usefulness and interpretability of test scores require that a test be administered and scored according to the test developer’s instructions” (111). This chapter examines how test administration procedures implemented for the 2022 Louisiana Education Assessment Program (LEAP 2025) strengthen and support the intended score interpretations and reduce construct-irrelevant variance that could threaten the validity of score interpretations.

Chapter 4 demonstrates how the LEAP 2025 assessments adhere to AERA, APA, & NCME (2014) Standards 4.15, 6.1, 6.2, 6.3, 6.4, 6.6, and 6.7. Each standard will be explicated within the relevant section of this chapter.

To ensure that the LEAP 2025 assessments are administered in accordance with the department’s mandates, the LDOE takes a primary role in communicating with and training school system personnel. The development of the assessments is a collaborative effort between the LDOE and DRC. The LDOE conveys to school systems the purpose of the assessments and the importance of test administration being consistent with test industry standards. The tests and administration standards must also meet the State Board of Elementary and Secondary Education policies and the mandates of both state and federal legislation.

To accomplish these goals, the LDOE provides train-the-trainer opportunities for school system test coordinators, who, in turn, administer test-administration training to schools within their school systems. The LDOE conducts quality assurance visits during testing to ensure that school systems adhere to the standardized administration of the tests.

The district test coordinators are responsible for the schools within their school systems. They disseminate information to each school, offer assistance with test administration, and serve as liaisons between the LDOE and their school systems. The LDOE also provides assistance with and interpretation of assessment data and test results.

Ancillary materials for the LEAP 2025 test administration contribute to the body of evidence of the validity of score interpretation. This section examines how the test materials address the standards related to test administration procedures.

For the spring 2022 administration of the LEAP 2025 assessments, DRC produced the following administration manuals: *LEAP 2025 Grade 3 Paper-Based Test Administration Manual* and *LEAP 2025 Grades 3 – 8 Computer-Based Test Administration Manual* (TAMs). DRC also produced the following Test Coordinator Manuals: *LEAP 2025 Computer-Based Testing Test Coordinator Manual* and *LEAP 2025 Paper-Based Testing Test Coordinator Manual* (TCMs). LDOE assessment administration and development staff review these manuals, provide feedback, and give final approval. The TCMs include ELA, mathematics, social studies, and science in grades 3 through 8. They provide detailed instructions for district and school test coordinators’ on distributing and collecting test materials and for returning them to DRC.

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  - 9.6. Request Additional Test Materials and Bar-code Labels
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  - 11.8. Used and Unused Consumable Test Booklets (Defined)
  - 11.9. Coding Responsibilities of Principals—Before Testing
  - 11.10. Coding Responsibilities of Principals—Before and After Testing
  - 11.11. Coding Responsibilities of Principals—After Testing
12. Directions for Returning Test Materials to the DTC
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  - 11.6. Student Tutorials
12. Void Notification

The TAMs are specific to grades, content areas, and modes of administration (i.e., online or paper). They provide detailed instructions for administering the LEAP 2025 assessments. The manuals include instructions for test security, test administrator responsibilities, test preparation, administration of tests (i.e., online or paper), and post-test procedures. Information included in the TAMs is listed below.

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  - 15.1. Reading Directions to Students
16. LEAP 2025: Grades 3-8 English Language Arts (All Sessions)
17. LEAP 2025: Grades 3-8 Mathematics (All Sessions)

18. LEAP 2025: Grades 3-8 Science (Sessions 1-2)
19. LEAP 2025: Grades 5-8 Science (Session 3 Select Schools Only)
20. LEAP 2025: Grades 3-8 Social Studies (Grades 3-4 Sessions 1-2, Grades 5-8 Sessions 1-3)
21. LEAP 2025: Grades 5-8 Social Studies Session 4 Select Schools Only
22. Post-test Procedures
  - 22.1. Test Administrator Post-Administration Oath of Security and Confidentiality Statement
  - 22.2. Returning Test Materials to the School Test Coordinator
23. Index

The *Standards* contain multiple references that are relevant to test administration. Information in the TAMs addresses these standards.

The directions for test administration found in the manual address Standard 4.15, which states:

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 LEAP 2025 Test Administration Manuals provide instructions for activities conducted before, during, and after testing 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 manuals describe the following: general rules of paper and online testing; assessment duration, timing, and sequencing information; and the materials required for testing.

Furthermore, the standardized procedures addressed in the test administration manual need to be followed, as the *Standards* state in 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).

It was essential that the LEAP 2025 was administered according to the prescribed test administration manual to ensure the usefulness and interpretability of test scores and to minimize sources of construct-irrelevant variance. It should be noted that adhering to the test schedule is also a critical component. The test administration manuals include instructions for scheduling the test within the state testing window. The test administration manual also contains the schedule for timing each test session. The test timing schedule is presented in Table 4.1.

**Standard 6.3** Changes or disruptions to standardized test administration procedures or scoring should be documented and reported to the test user (115).

The LDOE test administration staff reports on testing concerns that describe a wide range of improper activities that may occur during testing, including the following: copying and reviewing test questions with students; cueing students during testing, verbally or with written materials on the classroom walls; cueing students nonverbally, such as by tapping 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 with the exception of those students with the read-aloud accommodation; 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 accommodation

plan; allowing accommodations for students who do not have an accommodation plan; or defining terms on the test.

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

Test administration manuals outline the steps that teachers should take to prepare classroom environment testing for administering the LEAP 2025 assessments. These steps include the following:

- Determine the layout of the classroom environment.
- 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 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 test administration manuals present instructions for post-test activities to ensure that online tests are submitted, and printed test materials are handled properly to maintain the integrity of student information and test scores. Detailed instructions guide test examiners in submitting all online test records. For students who were administered a large-print or braille test form, examiners are instructed to transcribe students' responses from the large-print test or braille test form into a consumable test booklet for grades 3 and 4, and the online testing system (INSIGHT) for grades 5 through 8, exactly as the responses appear in the original form.

**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 test security are so noted. Detailed information about test security procedures is presented under "Test Security" in the test administration manuals.

## 4.1 Return Material Forms and Guidelines

The *Test Coordinator Manual* instructs test coordinators on how to organize, pack, and return testing materials to DRC for secure inventory purposes. The LDOE assessment administration and development staff have opportunities to review these materials, provide feedback, and give final approval. The purpose of the instructions is to ensure the secure test materials are properly accounted for and organized appropriately for return shipment.

## 4.2 Security Checklists

As soon as printed test materials are received by a school system, the district test coordinator confirms the receipt and count of the school system materials and completes the Receipt Notice in DRC INSIGHT Portal (eDIRECT) to confirm all school system materials have been received. The district test coordinator then packages the tests to be sent to schools. Upon returning secure test materials to DRC, district test coordinators are required to complete and submit a materials accountability form that details the number of consumable test booklets or secure accommodated test materials returned. This materials accountability

form also requires that school systems document nonstandard situations, including lost, damaged, destroyed, extra, or missing test books. This form ensures all materials are accounted for. Any material not accounted for on this form is placed on a missing materials list which is used by DRC and the LDOE to follow up with all districts to ensure security of all materials. A sample accountability form is shown in Figure 4.1.

Figure 4.1 Sample Accountability Form

Administration  District  School

Enter Counts | Summary | Status Report

Accountability Form Data for District 999 has been completed. You may continue making changes through the end of the accountability form window.

Reference the *Instructional Text* below for the reasons for any return material discrepancies.

[Instructions](#)

This form may be updated throughout the testing window, but it MUST be completed by the end of the testing window when all materials have been returned to Data Recognition Corporation. All secure materials received from Data Recognition Corporation should be included in the box counts provided in the "Returned to DRC" column. Any secure documents (test booklets, answer documents, or consumable test booklets) soiled with bodily fluids must be listed in the "Record reasons for discrepancies here:" field to ensure they are not reported as missing materials. Always provide both the security barcode number AND the date the document was destroyed.

| Accountability Form for <input type="text"/>            |   | Exact Number of Boxes Shipped to DRC |
|---|---|--------------------------------------|
| Science and ELA/Math Test Materials                     |   |                                      |
| Pickup 1:<br>UPS Ground Service (automatic pickup date) | <b>SCORABLE MATERIALS:</b>  | <input type="text" value="5"/>       |
|   | Used Science answer documents   |                                      |
|   | Used ELA and Math consumable test booklets  |                                      |
| Pickup 2:<br>UPS Ground Service (automatic pickup date) | <b>SCORABLE MATERIALS:</b>  | <input type="text"/>                 |
|   | Used Science makeup answer documents  |                                      |
|   | Used ELA/Math makeup consumable test booklets   |                                      |
|   | Used Science answer documents and ELA/Math consumable test booklets for home study program students |                                      |
|   | Used ELA/Math consumable test booklets for nonpublic school students                                |                                      |
|   | Accountability-coded answer documents and consumable test booklets                                  |                                      |
|   | <b>NONSCORABLE MATERIALS:</b>   |                                      |
| All unused Science answer documents                     |   |                                      |
| All unused ELA/Math consumable test booklets            |   |                                      |
| Pickup 3:<br>Assessment Distribution Services (ADS)     | <b>NONSCORABLE MATERIALS:</b>   | <input type="text"/>                 |
|   | All unused bar-code labels for Science and ELA/Math   |                                      |
|   | All used and unused Science test booklets, including large print and braille                        |                                      |
| All ELA and Math large print and braille test booklets  |   |                                      |

| Accountability Form for <input type="text"/>              |  | Exact Number of Boxes Shipped to DRC |
|---|--|--------------------------------------|
| Social Studies Test Materials                             |  |                                      |
| Pickup 1:<br>UPS Ground Service (automatic pickup date)   | <b>SCORABLE AND NONSCORABLE MATERIALS:</b>               | <input type="text"/>                 |
|   | All used consumable test booklets                        |                                      |
|   | All used consumable test booklets for homestudy students |                                      |
|   | All unused consumable test booklets                      |                                      |
| All used and unused large-print and braille test booklets |  |                                      |

Record reasons for discrepancies here:

Enter Counts Summary Status Report

[Instructions](#)

Previously entered accountability form data will display. The accountability form summary information can be printed by clicking the **Print** button.  
 Note: The accountability form summary information is view only and cannot be edited.

| Summary for District [REDACTED]                                    |   |                                      |
|--|---|--------------------------------------|
| Science and ELA/Math Test Materials                                |   | Exact Number of Boxes Shipped to DRC |
| Pickup 1: [REDACTED]<br>UPS Ground Service (automatic pickup date) | <b>SCORABLE MATERIALS:</b>  | 5                                    |
|  | Used Science answer documents   |                                      |
|  | Used ELA and Math consumable test booklets  |                                      |
| Pickup 2: [REDACTED]<br>UPS Ground Service (automatic pickup date) | <b>SCORABLE MATERIALS:</b>  |                                      |
|  | Used Science makeup answer documents  |                                      |
|  | Used ELA/Math makeup consumable test booklets   |                                      |
|  | Used Science answer documents and ELA/Math consumable test booklets for home study program students |                                      |
|  | Used ELA/Math consumable test booklets for nonpublic school students                                |                                      |
|  | Accountability-coded answer documents and consumable test booklets                                  |                                      |
|  | <b>NONSCORABLE MATERIALS:</b>   |                                      |
| Pickup 3: [REDACTED]<br>Assessment Distribution Services (ADS)     | <b>NONSCORABLE MATERIALS:</b>   |                                      |
|  | All unused Science answer documents   |                                      |
|  | All unused ELA/Math consumable test booklets  |                                      |
|  | All unused bar-code labels for Science and ELA/Math   |                                      |
|  | All used and unused Science test booklets, including large print and braille                        |                                      |
|  | All ELA and Math large print and braille test booklets  |                                      |

| Summary for District [REDACTED]                                    |   |                                      |
|--|---|--------------------------------------|
| Social Studies Test Materials                                      |   | Exact Number of Boxes Shipped to DRC |
| Pickup 1: [REDACTED]<br>UPS Ground Service (automatic pickup date) | <b>SCORABLE AND NONSCORABLE MATERIALS:</b>                |                                      |
|  | All used consumable test booklets                         |                                      |
|  | All used consumable test booklets for homestudy students  |                                      |
|  | All unused consumable test booklets                       |                                      |
|  | All used and unused large-print and braille test booklets |                                      |

Record reasons for discrepancies here:

**Print**

Enter Counts | Summary | Status Report

[Instructions](#)

The progress status of the accountability form is displayed at the district level. Use this key to evaluate the status for your site:

- Not Started – District has not completed data entry
- Completed – District has completed data entry

The accountability form status can be exported to Excel by clicking the **Export to Excel** button.

[Click here](#) to access a report of Users that clicked the Complete button and their information.

| Overall Status for District |           |
|-----------------------------|-----------|
| District                    | Status    |
|                             | Completed |

[Export to Excel](#)

### 4.3 Interpretive Guides

An understanding of what test scores mean and how to interpret score reports is essential to making valid interpretations of the test scores. The *Interpretive Guide* is written for Louisiana teachers and administrators who receive the LEAP 2025 score reports. More details about the guide can be found in Chapter 7.

### 4.4 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 LEAP 2025 assessments. Test security procedures are discussed throughout the Test Coordinator Manuals and Test Administration Manuals.

Test coordinators and administrators 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 administrators and the school test coordinator). During testing sessions, the test administrators are directly responsible for the security of the LEAP 2025 assessments and must account for all test materials and supervise the test administration at all times.

### 4.5 Data Forensic Analyses

Due to the importance of the LEAP 2025 assessment, it is prudent to ensure that the results from the assessments are based on effective instruction and true student achievement. While there are many ways to achieve meaningful understanding of student knowledge via test scores, there are also ways to obtain higher test scores that are not related to actual learning. To assist ensuring that assessment results are valid, data forensic analyses are conducted to help separate meaningful gains from spurious gains. It is important to note that although the results may be used to identify potential problems within a school, the identification of a problem is not an accusation of misconduct.

Multiple methods were incorporated into the forensic analysis. The following methods were applied:

- Response Change Analysis
- Score Fluctuation Analysis
- Web Monitoring
- Plagiarism Detection

### 4.5.1 Response Change Analysis

Students make changes to answer choices when taking the LEAP 2025, and this is expected behavior. Unfortunately, changing student answers is also an opportunity for school personnel to improve classroom performance and, therefore, the response change analysis focuses on identifying school- and test-administrator level response-change patterns that are statistically improbable when compared to the expected pattern at the state level.

### 4.5.2 Score Fluctuation Analysis

It is anticipated that performance on the LEAP 2025 will improve over time from legitimate sources such as changes in the curriculum and improvement in instruction. However, large and unexpected score changes may be a sign of testing impropriety. The LDOE applied an approach where the state's level of change in performance from one year to the next is compared to a schools' and test administrators' change in performance during the same time frame. Schools and test administrators were identified when the level of change was statistically unexpected.

### 4.5.3 Web Monitoring

LEAP 2025 operational test content should not appear outside the boundaries of the forms administered. To protect Louisiana test content, the internet is monitored for postings which contain, or appear to contain, potentially exposed and/or copied LDOE test content. When test content is verified, steps are taken so that the infringing content is removed quickly.

### 4.5.4 Plagiarism Detection

The LDOE monitors for two different plagiarism situations: copying from student to student and copying from an outside source, such as Wikipedia or another internet sources. Instances of plagiarism are identified regardless if an item is scored by human scorers or artificial intelligence. Alerts are set to identify responses that may indicate the possibility of teacher interference, plagiarism, or disturbing content (e.g., possible physical or emotional abuse, suicidal ideation, threats of harm to themselves or others, etc.). Alerted responses are given additional review so the appropriate response can be taken.

## 4.6 Test Administration

The 2022 assessments were administered to students within the state testing window of April 25 through May 25, 2022. The paper testing window was April 27 through 29, 2022. Each session of the assessment within each content area of the LEAP 2025 assessments was required to be administered in one block of time.

### 4.6.1 Time

All sessions of the ELA and mathematics LEAP 2025 assessments were timed. Only students with an extended time accommodation were permitted to exceed the established time limits of any given session. The timing schedule of the LEAP 2025 assessments is presented in Table 4.1.

**Table 4.1 LEAP 2025 Administration Schedule Timing Guidelines by Session (Time in Minutes)**

| Grade | Session | English Language Arts | Mathematics |
|-------|---------|-----------------------|-------------|
| 3     | 1       | 75                    | 75          |
|       | 2       | 75                    | 85          |
|       | 3       | 60                    | 75          |
| 4     | 1       | 90                    | 75          |
|       | 2       | 90                    | 85          |
|       | 3       | 60                    | 75          |
| 5     | 1       | 90                    | 75          |
|       | 2       | 90                    | 85          |
|       | 3       | 60                    | 75          |
| 6     | 1       | 90                    | 60          |
|       | 2       | 90                    | 90          |
|       | 3       | 80                    | 90          |
| 7     | 1       | 90                    | 60          |
|       | 2       | 90                    | 90          |
|       | 3       | 80                    | 90          |
| 8     | 1       | 90                    | 60          |
|       | 2       | 90                    | 90          |
|       | 3       | 80                    | 90          |

For the CBT administrations, data is available of how much time test takers took for each item. These time-on-items were summed and average time on test were calculated for each grade and subject and summarized in Table 4.2 (ELA) and Table 4.3 (Mathematics). The tables report the at the session level and summarize the number of students included in this analysis, the average number of items the students were administered (operational and field test), the average amount of minutes spent across all items, and the standard deviation. There are extreme test times on both ends (some are very small, and some are very large), therefore, the median is included as it is less influenced by these extremes. In this circumstance, it is a more useful description of expected values than the mean. The test times are smaller than the session-level time guidelines in Table 4.1. This indicates that test takers should have sufficient time to complete their tests.



**Table 4.2 LEAP 2025 Time on Test for the Spring 2022 Administration (Time in Minutes): ELA**

| <b>ELA Grade</b> | <b>Session</b> | <b>Number of Students</b> | <b>Number of Items</b> | <b>Test Mean</b> | <b>Test SD</b> | <b>Median</b> |
|------------------|----------------|---------------------------|------------------------|------------------|----------------|---------------|
| 3                | 1              | ≥15,690                   | 6.99                   | 46.31            | 19.76          | 44.25         |
|                  | 2              | ≥15,730                   | 6.99                   | 41.19            | 19.10          | 39.22         |
|                  | 3              | ≥15,720                   | 13.95                  | 35.43            | 14.58          | 34.23         |
| 4                | 1              | ≥46,800                   | 8.99                   | 54.73            | 20.95          | 53.05         |
|                  | 2              | ≥47,350                   | 10.99                  | 42.47            | 18.29          | 39.56         |
|                  | 3              | ≥47,830                   | 13.98                  | 35.51            | 14.28          | 34.03         |
| 5                | 1              | ≥46,920                   | 10.95                  | 63.69            | 23.25          | 63.22         |
|                  | 2              | ≥47,380                   | 8.99                   | 52.16            | 20.67          | 51.00         |
|                  | 3              | ≥47,860                   | 11.98                  | 34.25            | 12.90          | 32.73         |
| 6                | 1              | ≥47,250                   | 8.98                   | 63.05            | 23.47          | 63.11         |
|                  | 2              | ≥47,890                   | 10.98                  | 47.98            | 17.65          | 46.02         |
|                  | 3              | ≥47,910                   | 15.97                  | 43.27            | 15.79          | 41.79         |
| 7                | 1              | ≥44,150                   | 10.98                  | 53.82            | 19.18          | 52.00         |
|                  | 2              | ≥44,710                   | 8.99                   | 55.64            | 21.19          | 55.09         |
|                  | 3              | ≥44,770                   | 15.97                  | 42.16            | 15.22          | 40.66         |
| 8                | 1              | ≥48,640                   | 10.97                  | 64.71            | 20.98          | 64.71         |
|                  | 2              | ≥49,230                   | 8.99                   | 58.17            | 21.32          | 57.73         |
|                  | 3              | ≥49,570                   | 15.97                  | 41.21            | 15.05          | 39.52         |

**Table 4.3 LEAP 2025 Time on Test for the Spring 2022 Administration (Time in Minutes): Mathematics**

| Mathematics Grade | Session | Number of Students | Number of Items | Test Mean | Test SD | Median |
|-------------------|---------|--------------------|-----------------|-----------|---------|--------|
| 3                 | 1       | ≥15,610            | 17.96           | 46.10     | 17.54   | 44.26  |
|                   | 2       | ≥15,690            | 14.98           | 37.29     | 16.86   | 34.47  |
|                   | 3       | ≥15,720            | 15.97           | 39.28     | 16.41   | 37.18  |
| 4                 | 1       | ≥47,450            | 17.96           | 47.14     | 16.58   | 45.55  |
|                   | 2       | ≥47,620            | 14.98           | 41.93     | 18.12   | 39.46  |
|                   | 3       | ≥47,810            | 15.98           | 46.05     | 17.18   | 44.67  |
| 5                 | 1       | ≥47,450            | 17.96           | 49.64     | 17.06   | 48.27  |
|                   | 2       | ≥47,690            | 14.98           | 48.96     | 18.60   | 47.44  |
|                   | 3       | ≥47,960            | 15.97           | 43.49     | 16.28   | 41.89  |
| 6                 | 1       | ≥48,090            | 20.92           | 39.95     | 12.89   | 38.84  |
|                   | 2       | ≥47,690            | 14.98           | 57.58     | 20.76   | 56.47  |
|                   | 3       | ≥48,070            | 12.99           | 41.61     | 16.42   | 39.54  |
| 7                 | 1       | ≥49,620            | 20.88           | 44.19     | 14.00   | 44.15  |
|                   | 2       | ≥49,460            | 14.98           | 59.58     | 19.73   | 59.24  |
|                   | 3       | ≥49,660            | 12.98           | 50.99     | 19.14   | 49.76  |
| 8                 | 1       | ≥43,720            | 21.92           | 44.21     | 14.59   | 44.03  |
|                   | 2       | ≥43,680            | 13.98           | 60.91     | 20.58   | 61.08  |
|                   | 3       | ≥43,750            | 11.98           | 52.77     | 19.18   | 51.49  |

#### 4.6.2 Accommodations

Accommodations are allowed on the LEAP 2025 assessments. Accommodations may be used by a student who qualifies under the Individual with Disabilities Act (IDEA), has an IEP or a Section 504 plan of the Americans with Disabilities Act, or identifies as an English learner (EL). 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 Standard 6.2 states:

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 LEAP 2025 *Test Administration Manual* contains the list of universal tools, designated supports, and accommodations permissible for the LEAP 2025 assessments. Further guidance can be found in the [LEAP 2025 Accommodations and Accessibility Features User Guide](#).

Visually impaired students may be provided braille forms for any assessment and large print forms for the PBT.

Tables 4.2 through 4.5 summarize the numbers of reportable students receiving accommodations by accommodation type for the 2022 LEAP 2025. Accommodation assignment guidance is provided in the LEAP 2025 Accommodations and Accessibility User Guide. Accommodations are grouped into four sections: special education accommodation, English learner status accommodation, Section 504 status accommodation, and online accommodation. The analyses are based on census data and the number includes only those students

who received accommodations and received a scale score on the ELA or mathematics LEAP 2025 assessments. The percentage represents the percentage of the census population receiving that accommodation. The students who are included in the “No Accommodation” category are students who are eligible for an accommodation but have indicated that none was used.

**Table 4.2 Number and Percentage of Students Receiving Special Education Accommodations by Accommodation Type, as Bubbled on the Test Booklet**

| Special Education Accommodation Type |                                       |                       |            |             |            |
|--------------------------------------|---------------------------------------|-----------------------|------------|-------------|------------|
|                                      |                                       | English Language Arts |            | Mathematics |            |
| Grade                                | Accommodation                         | Number                | Percentage | Number      | Percentage |
| 3                                    | No Accommodation                      | ≥1,330                | 4.02%      | ≥1,340      | 4.04%      |
| 3                                    | Braille                               | <50                   | NR         | <50         | NR         |
| 3                                    | Large Print                           | <50                   | NR         | <50         | NR         |
| 3                                    | Answers Recorded                      | ≥580                  | 1.77%      | ≥580        | 1.77%      |
| 3                                    | Extended Time                         | ≥3,220                | 9.7%       | ≥3,220      | 9.7%       |
| 3                                    | Transferred Answers                   | ≥130                  | 0.4%       | ≥130        | 0.4%       |
| 3                                    | Individual/Small Group Administration | ≥3,080                | 9.28%      | ≥3,050      | 9.2%       |
| 3                                    | Tests Read Aloud                      | ≥2,340                | 7.04%      | ≥2,550      | 7.7%       |

**Table 4.3 Number and Percentage of Students Receiving English Learner Accommodations by Accommodation Type, as Bubbled on the Test Booklet**

| English Learner Accommodation Type |  |                       |            |             |            |
|------------------------------------|--|-----------------------|------------|-------------|------------|
|                                    |  | English Language Arts |            | Mathematics |            |
| Grade                              | Accommodation                                      | Number                | Percentage | Number      | Percentage |
| 3                                  | No Accommodation                                   | ≥150                  | 0.48%      | ≥140        | 0.42%      |
| 3                                  | Extended Time                                      | ≥1,130                | 3.42%      | ≥1,140      | 3.44%      |
| 3                                  | Individual/Small Group Administration              | ≥730                  | 2.2%       | ≥740        | 2.23%      |
| 3                                  | English/Native Language Word-to-Word Dictionary    | ≥180                  | 0.54%      | ≥180        | 0.55%      |
| 3                                  | Test Administered by ESL Teacher                   | <50                   | NR         | <50         | NR         |
| 3                                  | Directions Read Aloud/Clarified in Native Language | <50                   | NR         | <50         | NR         |

**Table 4.4 Number and Percentage of Students Receiving Section 504 Status by Accommodation Type, as Bubbled on the Test Booklet**

| Section 504 Status Accommodation Type |                                       |                       |            |             |            |
|---------------------------------------|---------------------------------------|-----------------------|------------|-------------|------------|
|                                       |                                       | English Language Arts |            | Mathematics |            |
| Grade                                 | Accommodation                         | Number                | Percentage | Number      | Percentage |
| 3                                     | No Accommodation                      | ≥210                  | 0.64%      | ≥190        | 0.6%       |
| 3                                     | Large Print                           | <50                   | NR         | <50         | NR         |
| 3                                     | Answers Recorded                      | ≥80                   | 0.25%      | ≥80         | 0.25%      |
| 3                                     | Extended Time                         | ≥2,280                | 6.88%      | ≥2,300      | 6.93%      |
| 3                                     | Transferred Answers                   | <50                   | NR         | <50         | NR         |
| 3                                     | Individual/Small Group Administration | ≥1,840                | 5.55%      | ≥1,850      | 5.57%      |
| 3                                     | Tests Read Aloud                      | ≥880                  | 2.65%      | ≥1,100      | 3.31%      |

**Table 4.5 Number and Percentage of Students Receiving Online Accommodations by Accommodation Type, as valued in DRC INSIGHT Portal (eDIRECT)**

| Online Accommodation Type |   |                       |            |             |            |
|---------------------------|---|-----------------------|------------|-------------|------------|
| Grade                     | Accommodation                           | English Language Arts |            | Mathematics |            |
|                           |   | Number                | Percentage | Number      | Percentage |
| 3                         | Text-to-Speech                          | ≥1,110                | 6.92%      | ≥3,280      | 20.39%     |
| 3                         | Human Read Aloud                        | ≥560                  | 3.52%      | ≥910        | 5.69%      |
| 3                         | Native Language Word-to-Word Dictionary | ≥280                  | 1.75%      | ≥270        | 1.72%      |
| 3                         | Directions in Native Language           | ≥160                  | 1.04%      | ≥140        | 0.88%      |
| 3                         | Transferred Answers                     | ≥80                   | 0.55%      | ≥90         | 0.57%      |
| 3                         | Answers Recorded                        | ≥240                  | 1.50%      | ≥240        | 1.53%      |
| 3                         | Extended Time                           | ≥3,640                | 22.59%     | ≥3,610      | 22.45%     |
| 3                         | Individual/Small Group Administration   | ≥2,710                | 16.83%     | ≥2,700      | 16.82%     |
| 3                         | Accommodated Paper                      | <50                   | NR         | <50         | NR         |
| 3                         | Braille                                 | <50                   | NR         | <50         | NR         |
| 3                         | Communication Assistance Scripts        | <50                   | NR         | <50         | NR         |
| 4                         | Text-to-Speech                          | ≥4,410                | 9.01%      | ≥7,750      | 15.86%     |
| 4                         | Human Read Aloud                        | ≥2,560                | 5.24%      | ≥3,330      | 6.83%      |
| 4                         | Native Language Word-to-Word Dictionary | ≥500                  | 1.03%      | ≥430        | 0.90%      |
| 4                         | Directions in Native Language           | ≥170                  | 0.35%      | ≥110        | 0.23%      |
| 4                         | Transferred Answers                     | ≥260                  | 0.54%      | ≥250        | 0.53%      |
| 4                         | Answers Recorded                        | ≥830                  | 1.71%      | ≥830        | 1.71%      |
| 4                         | Extended Time                           | ≥10,960               | 22.39%     | ≥10,910     | 22.35%     |
| 4                         | Individual/Small Group Administration   | ≥8,810                | 18.00%     | ≥8,820      | 18.07%     |
| 4                         | Accommodated Paper                      | <50                   | NR         | <50         | NR         |
| 4                         | Braille                                 | <50                   | NR         | <50         | NR         |
| 4                         | Communication Assistance Scripts        | <50                   | NR         | <50         | NR         |
| 5                         | Text-to-Speech                          | ≥4,780                | 9.77%      | ≥7,940      | 16.27%     |
| 5                         | Human Read Aloud                        | ≥2,470                | 5.05%      | ≥3,190      | 6.55%      |
| 5                         | Native Language Word-to-Word Dictionary | ≥500                  | 1.04%      | ≥460        | 0.96%      |
| 5                         | Directions in Native Language           | ≥140                  | 0.30%      | ≥100        | 0.22%      |
| 5                         | Transferred Answers                     | ≥260                  | 0.53%      | ≥250        | 0.53%      |
| 5                         | Answers Recorded                        | ≥670                  | 1.38%      | ≥670        | 1.38%      |
| 5                         | Extended Time                           | ≥11,370               | 23.22%     | ≥11,360     | 23.27%     |
| 5                         | Individual/Small Group Administration   | ≥8,990                | 18.36%     | ≥9,000      | 18.44%     |
| 5                         | Accommodated Paper                      | <50                   | NR         | <50         | NR         |
| 5                         | Braille                                 | <50                   | NR         | <50         | NR         |
| 5                         | Communication Assistance Scripts        | <50                   | NR         | <50         | NR         |

| Online Accommodation Type |   |                       |            |             |            |
|---------------------------|---|-----------------------|------------|-------------|------------|
|                           |   | English Language Arts |            | Mathematics |            |
| Grade                     | Accommodation                           | Number                | Percentage | Number      | Percentage |
| 6                         | Text-to-Speech                          | ≥4,850                | 9.82%      | ≥7,600      | 15.44%     |
| 6                         | Human Read Aloud                        | ≥2,000                | 4.05%      | ≥2,500      | 5.09%      |
| 6                         | Native Language Word-to-Word Dictionary | ≥820                  | 1.67%      | ≥740        | 1.52%      |
| 6                         | Directions in Native Language           | ≥150                  | 0.32%      | ≥100        | 0.20%      |
| 6                         | Transferred Answers                     | ≥170                  | 0.35%      | ≥170        | 0.35%      |
| 6                         | Answers Recorded                        | ≥370                  | 0.75%      | ≥360        | 0.75%      |
| 6                         | Extended Time                           | ≥11,440               | 23.15%     | ≥11,380     | 23.11%     |
| 6                         | Individual/Small Group Administration   | ≥7,990                | 16.16%     | ≥7,980      | 16.20%     |
| 6                         | Accommodated Paper                      | <50                   | NR         | <50         | NR         |
| 6                         | Braille                                 | <50                   | NR         | <50         | NR         |
| 6                         | Communication Assistance Scripts        | <50                   | NR         | <50         | NR         |
| 7                         | Text-to-Speech                          | ≥4,410                | 9.53%      | ≥7,580      | 14.89%     |
| 7                         | Human Read Aloud                        | ≥1,590                | 3.43%      | ≥2,150      | 4.23%      |
| 7                         | Native Language Word-to-Word Dictionary | ≥860                  | 1.87%      | ≥770        | 1.52%      |
| 7                         | Directions in Native Language           | ≥150                  | 0.34%      | ≥80         | 0.17%      |
| 7                         | Transferred Answers                     | ≥120                  | 0.28%      | ≥130        | 0.27%      |
| 7                         | Answers Recorded                        | ≥230                  | 0.50%      | ≥260        | 0.51%      |
| 7                         | Extended Time                           | ≥10,510               | 22.68%     | ≥11,550     | 22.66%     |
| 7                         | Individual/Small Group Administration   | ≥7,040                | 15.20%     | ≥7,690      | 15.09%     |
| 7                         | Accommodated Paper                      | <50                   | NR         | <50         | NR         |
| 7                         | Braille                                 | <50                   | NR         | <50         | NR         |
| 7                         | Communication Assistance Scripts        | <50                   | NR         | <50         | NR         |
| 8                         | Text-to-Speech                          | ≥4,690                | 9.24%      | ≥6,950      | 15.50%     |
| 8                         | Human Read Aloud                        | ≥1,590                | 3.13%      | ≥1,980      | 4.43%      |
| 8                         | Native Language Word-to-Word Dictionary | ≥880                  | 1.75%      | ≥770        | 1.72%      |
| 8                         | Directions in Native Language           | ≥170                  | 0.33%      | ≥90         | 0.20%      |
| 8                         | Transferred Answers                     | ≥90                   | 0.19%      | ≥90         | 0.22%      |
| 8                         | Answers Recorded                        | ≥150                  | 0.31%      | ≥150        | 0.34%      |
| 8                         | Extended Time                           | ≥10,960               | 21.57%     | ≥10,600     | 23.64%     |
| 8                         | Individual/Small Group Administration   | ≥7,070                | 13.93%     | ≥6,860      | 15.30%     |
| 8                         | Accommodated Paper                      | <50                   | NR         | <50         | NR         |
| 8                         | Braille                                 | <50                   | NR         | <50         | NR         |
| 8                         | Communication Assistance Scripts        | <50                   | NR         | <50         | NR         |

## 4.7 Summary

In summary, the overall purpose of each of the test administration trainings and the ancillary materials is to keep school systems informed about policies and procedures related to testing in general and the LEAP 2025 program in particular. The information imparted is clearly related to standardizing the administration of the LEAP 2025, maintaining the security of the assessment, allowing access to the assessments for special populations by clearly delineating appropriate accommodations, and maintaining integrity of the scores. These communication and training efforts by the LDOE and the ancillary information developed by DRC address multiple best practices of the testing industry but, in particular, are related to the following 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).

**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).

**Standard 6.3** Changes or disruptions to standardized test administration procedures or scoring should be documented and reported to the test user (115).

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

**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).

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

## Chapter 5: Scoring of Constructed-Response and Technology-Enhanced Items

In this chapter, the scoring process used for the 2022 LEAP 2025 ELA and mathematics assessment is described, with a particular focus on the handscoring of constructed-response items and the automated scoring of technology-enhanced items. At the end of this section, the results of the inter-rater reliability for the handscoring of the LEAP 2025 constructed-response items are presented.

Chapter 5 adheres to the American Educational Research Association, American Psychological Association, & National Council on Measurement in Education (AERA, APA, & NCME, 2014) Standards 4.18, 4.20, 6.8, and 6.9. Each standard is 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 procedures used for scoring the LEAP 2025 ELA and mathematics constructed-response items and technology-enhanced 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 Constructed-Response Item Scoring Process

Constructed-response items were scored by human raters who were trained by DRC. Handscoring and Artificial Intelligence (AI) processing rules are detailed in Appendix C. Seven ELA items across grades 4-8 ELA (noted in the table below) were scored by an AI engine, Pearson's Intelligent Essay Assessor (IEA), using scoring models previously developed by Pearson. Second reads of 10% of these responses were completed by human scorers; handscoring supervisors also reviewed the responses that IEA was not able to score.

**Table 5.1 Constructed-Response Scoring**

| Subject and Grade | Handscoring Only | AI Scoring | AI Vendor |
|-------------------|------------------|------------|-----------|
| ELA grade 3       | Q7, Q14          | N/A        |           |
| ELA grade 4       | Q9               | Q14        | Pearson   |
| ELA grade 5       | Q20              | Q7         | Pearson   |
| ELA grade 6       | Q14              | Q9         | Pearson   |
| ELA grade 7       | N/A              | Q7, Q20    | Pearson   |
| ELA grade 8       | N/A              | Q7, Q20    | Pearson   |
| Math grades 3-8   | All CRs          | N/A        |           |



### 5.1.1 Selection of Scoring Evaluators

Standard 4.20 states 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).

The following sections explain how scorers were selected and trained for the LEAP 2025 ELA and mathematics handscoring process. Section 5.1.3 describes how the scorers were monitored throughout the handscoring process.

#### ***The Recruitment and Interview Process***

DRC strives to develop a highly qualified, experienced core of evaluators to appropriately maintain the integrity of all projects.

All readers hired by DRC to score 2022 LEAP 2025 ELA and mathematics test responses had at least a four-year college degree. DRC has a human resources director dedicated solely to recruiting and retaining the handscoring staff. Applications for reader positions are screened by the handscoring project manager, the human resources director, or recruiting staff to create a large pool of potential readers. In the screening process, preference is given to candidates with previous experience scoring large-scale assessments and with degrees emphasizing the appropriate content areas. At the personal interview, reader candidates are asked to demonstrate their proficiency in writing by responding to a DRC writing topic and their proficiency in mathematics by solving word problems with correct work shown. These steps result in a highly qualified and diverse workforce. DRC personnel files for readers and team leaders include evaluations for each project completed. DRC uses these evaluations to place individuals on projects that best fit their professional backgrounds, their college degrees, and their performances on similar projects at DRC. Once placed, all readers go through rigorous training and qualifying procedures specific to the project on which they are placed. Any scorer who does not complete this training and demonstrate the ability to apply the scoring criteria by qualifying at the end of the process is not allowed to score live student responses.

### 5.1.2 Security

Whether training and scoring are conducted within a DRC facility or done remotely, security is essential to our handscoring process. When users log into DRC's secure, web-based scoring application, ScoreBoard, they are required to read and accept our security policy before they are allowed to access any project. For each project, scorers are also required to read and sign non-disclosure agreements, and during training emphasis is always given to what security means, the importance of maintaining security, and how this is accomplished.

Readers only have access to student responses they are qualified to score. Each scorer is assigned a unique username and password to access DRC's imaging system and must qualify before viewing any live student responses. DRC maintains full control of who may access the system and which item each scorer may score. No demographic data is available to scorers at any time.

### 5.1.3 Handscoring Training Process

Standard 6.9 specifies:

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***

DRC scoring supervisors trained scorers using training materials from two sources.

1. PARCC-approved training materials provided by New Meridian for ELA and math. These materials include the following:
  - Passages, prompts, and associated stimuli
  - Rubrics
  - Anchor sets
  - Practice sets
  - Qualifying sets (for prototype items only)
  
2. Math training materials developed by DRC in conjunction with and approved by the LDOE. These materials were made for use with DRC-developed math items according to processes described in DRC’s response to the LDOE’s “REQUEST FOR PROPOSALS For LEAP 2025 Assessment Administration (RFP #: 815200-20150723001)”.
  - Prompts
  - Rubrics
  - Anchor sets
  - Practice sets
  - Qualifying sets (for all DRC-developed items)

#### ***Training and Qualifying Procedures***

Handscoring involves training and qualifying team leaders and evaluators, monitoring scoring accuracy and production, and ensuring security of both the test materials and the scoring facilities. The LDOE visits the scoring centers to review training materials and oversee the training process. An explanation of the training and qualification procedures follows.

DRC used the PARCC-approved mathematics and ELA training and qualifying materials to score two categories of items: “prototype” items and “abbreviated” items. Note that, like the PARCC “prototype” items for math, full sets of training and qualifying materials were also developed for all DRC-developed math items. The training and qualifying procedures DRC used for these items was the same process outlined below for PARCC-approved “prototype” math items.

#### ***Prototype Items***

23 items across 3-8 mathematics included in the 2022 Louisiana forms were prototype items, meaning they had a full set of associated training materials, including anchor set, practice sets, and qualifying sets. DRC started the training process with a review of the item, rubric, and anchor set, followed by the scoring and

discussion of practice sets and qualifying sets. Once this process was completed, qualified readers started scoring live student responses for that item.

### **Abbreviated Items**

Abbreviated items required a two-step training and qualifying process. First, scorers trained and qualified as described above using PARCC-approved materials for an associated prototype item that was similar to the abbreviated one they would be scoring on the Louisiana form.<sup>2</sup> Readers who did not qualify on the prototype item training were not allowed to continue the training.

After qualifying on the associated prototype item training, readers received additional item-specific training on the abbreviated item they were going to score. This consisted of an item-specific anchor set and two item-specific practice sets. After completing the abbreviated item training, the readers could begin scoring live student responses for the abbreviated item.

The following tables detail the composition of the training materials provided by Pearson for mathematics and ELA.

**Table 5.2 Mathematics Training Set Composition**

| <b>Set Type</b>   | <b>Prototype Item Training</b>   | <b>Abbreviated Item Training</b>   | <b>Annotated</b> |
|---|--|--|------------------|
| Anchor Set  | 3 responses per score point (Composite items had 3 responses per composite score.) | 3 responses per score point (Composite items had 3 responses per composite score.) | Yes              |
| Practice Set 1  | 10 responses representing the range of responses                                   | 10 responses representing the range of responses                                   | Yes              |
| Practice Set 2  | 10 responses representing the range of responses                                   | 10 responses representing the range of responses                                   | Yes              |
| Qualifying Set 1  | 10 responses comparable to the anchor set responses                                |  | No               |
| Qualifying Set 2  | 10 responses comparable to the anchor set responses                                |  | No               |
| Qualifying Set 3  | 10 responses comparable to the anchor set responses                                |  | No               |
| *For DRC-developed math items, examples of responses at the top score points may not have been present in some anchor, training, and qualifying sets as there were few or no examples found during rangefinding or subsequent field test scoring. In such cases, DRC Scoring Directors identified examples of these scores during live scoring to supplement reader training. |  |  |                  |

<sup>2</sup> Item associations were determined by PARCC/Pearson with the understanding that aspects of training are generalizable across similar items. For mathematics, the determination of prototype versus abbreviated items was made by PARCC and Pearson based on similar item types and by evidence statements. For ELA items, this determination by PARCC and Pearson was based on grade and task type.

**Table 5.3 ELA Training Set Composition**

| Set Type          | Prototype Item Training   | Abbreviated Item Training   | Annotated |
|-------------------|---|---|-----------|
| Anchor Set*       | 3 responses per score point   | 16 responses per item:<br>Anchor Sets for abbreviated RST and LAT item training included scores for the combined trait Reading Comprehension and Written Expression (RCWE).<br>Anchor Sets for abbreviated NWT item training included scores for Written Expression (WE). | Yes       |
| Practice Set 1    | 5 responses representing the range of responses for the Reading Comprehension and Written Expression (RCWE) trait (for LAT and RST items)<br>the Written Expression trait (for NWT items) | 10 responses representing the range of responses for the trait appropriate to the task type   | Yes       |
| Practice Set 2    | 5 responses representing the range of responses for the Knowledge and Use of Language Conventions trait   | 10 responses representing the range of responses for the conventions trait  | Yes       |
| Practice Set 3    | 10 responses representing the range of responses for both traits appropriate to the task type   |   | Yes       |
| Practice Set 4    | 10 responses representing the range of responses for both traits appropriate to the task type   |   | Yes       |
| Qualifying Set 1  | 10 responses comparable to the anchor set responses (included both traits appropriate to the task type)   |   | No        |
| Qualifying Set 2  | 10 responses comparable to the anchor set responses (included both traits appropriate to the task type)   |   | No        |
| Qualifying Set 3  | 10 responses comparable to the anchor set responses (included both traits appropriate to the task type)   |   | No        |
| Direct Copy Set** | 3-5 responses composed entirely or partially of text copied from passage or passages (included both traits appropriate to the task type)  | 3-5 responses composed entirely or partially of text copied from passage or passages (included both traits appropriate to the task type)  | Yes       |

\*For the ELA Knowledge and Use of Language Conventions trait, there were two mixed-prompt anchor sets per grade level (one for the narrative task and the other for the literary analysis and research simulation tasks). In addition to the mixed-prompt anchor set, depending on the task, the practice sets for prototype and abbreviated items required readers to practice scoring the Knowledge and Use of Language Conventions trait along with the Reading Comprehension and Written Expression trait (for LAT and RST items) or with the Written Expression trait (NWT). Readers were also required to qualify on the Knowledge and Use of Language Conventions trait during each prototype item qualifying session.

\*\*These PARCC-approved sets provided additional annotated sample responses explaining the scoring rationale for responses composed entirely or partially of text copied from the source passage(s) associated with an item. DRC scoring supervisors reviewed these item-specific sets with the readers prior to scoring the associated item.

Some items selected for use on the spring 2022 administration were previously only field tested by PARCC. Consequently, the abbreviated training materials available for use with these items were abridged versions of typical abbreviated sets of materials. They consisted of:

- An Anchor Set (for ELA, some have annotations and some lack examples of the top scores)
- One Practice Set of 5 responses (scored but not annotated in the case of ELA)
- Approximately 10 validity responses

Since these materials were somewhat limited compared to typical abbreviated materials (the main difference being a lack of formal written annotations and fewer practice responses), DRC bolstered the training by using the PARCC-approved field test validity responses provided by New Meridian as additional practice responses. DRC Scoring Directors then pulled additional responses from operational Louisiana student responses to use as validity responses during the scoring window. The Scoring Directors also found examples of higher-scoring responses that might be missing from the field test anchors. The validity and additional exemplar responses, along with the DRC Scoring Directors' notes for all papers used during the training of the abbreviated field-test only items, were submitted to the LDOE for approval. It is important to note that readers still had to qualify via standard qualification procedures on the prototype items for all items by first going through full training with the appropriate prototype Anchor Set, Practice Sets 1-4, and Qualifying Sets 1-3 (as well as the Conventions sets).

### **Qualifying Standards**

DRC followed the same qualification standards that Pearson used for PARCC. A description of these PARCC qualifying standards follows.

Scorers demonstrated their ability to apply the scoring criteria by qualifying (i.e., scoring with acceptable agreement with true scores on qualifying sets). After each qualifying set was scored, the DRC scoring director responsible for training led the scorers in a discussion of the set.

Any scorer who did not qualify by the end of the qualifying process for an item was not allowed to score live student responses.

**Table 5.4 Mathematics Qualifying Standards**

|                      | <b>Perfect Agreement</b> | <b>Perfect Plus Adjacent Agreement</b> |
|----------------------|--------------------------|--|
| 0, 1, 2 Rubric       | 80% on two of three sets | 96% on two of three sets               |
| 0, 1, 2, 3 Rubric    | 70% on two of three sets | 96% on two of three sets               |
| 0, 1, 2, 3, 4 Rubric | 70% on two of three sets | 95% on two of three sets               |

**Table 5.5 Mathematics Qualifying Standards (Composite Items)\***

| <b>Composite (multipart) Items</b> | <b>Perfect Agreement</b> | <b>Perfect Plus Adjacent Agreement</b> |
|------------------------------------|--------------------------|--|
| 0, 1 Rubric                        | 90% on two of three sets | 100% on two of three sets              |
| 0, 1, 2 Rubric                     | 80% on two of three sets | 96% on two of three sets               |
| 0, 1, 2, 3 Rubric                  | 70% on two of three sets | 96% on two of three sets               |
| 0, 1, 2, 3, 4 Rubric               | 70% on two of three sets | 95% on two of three sets               |

*\*For mathematics composite items, the appropriate qualifying standard had to be achieved on each part of the item. For example, if an item had Part A with a top score of 1, Part B with a top score of 2, and Part C with a top score of 3, a scorer/supervisor would need to achieve 90% perfect agreement on Part A, 80% perfect agreement on Part B, and 70% perfect agreement on Part C, with no more than one nonadjacent score per part across all three qualifying sets.*

**Table 5.6 ELA Qualifying Standards**

| Perfect Agreement  | Perfect Plus Adjacent Agreement                              |
|--|--|
| 70% average for both traits on two of three qualifying sets  | 96% across the three qualifying sets combined on both traits |
| 70% on each trait at least once across three qualifying sets |  |

ELA readers were required to meet all three of the qualifications listed in Table 5.6. Perfect plus adjacent agreement of 96% means that out of the entire pool of scores that a reader gave across the three qualifying sets for an item, no more than 4% of those scores could be nonadjacent. In other words, no more than 2 of the 60 applied scores could be nonadjacent (3 sets x 10 responses/set x 2 traits = 60 applied scores).

### 5.1.4 Monitoring the Scoring Process

Standard 6.8 states:

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).

Section 5.1.4 explains the monitoring procedures that DRC uses to ensure that handscoring evaluators follow established scoring criteria while items are being scored. Detailed scoring rubrics, which specify the criteria for scoring, are available for handscoring evaluators for all constructed-response items.

#### ***Reader Monitoring Procedures***

Throughout the handscoring process, DRC project managers, scoring directors, and team leaders reviewed the statistics that were generated on a daily basis. DRC used one team leader for every 10 to 12 readers, which was the same ratio that Pearson used for PARCC. If scoring concerns were apparent among individual scorers, team leaders dealt with those issues on an individual basis. If a scorer appeared to need clarification of the scoring rules, DRC supervisors typically monitored one out of five of the scorer’s readings, making adjustments to that ratio as needed. If a supervisor disagreed with a reader’s scores during monitoring, they provided retraining in the form of direct feedback to the reader, using rubric language and applicable training responses.

#### ***Validity Sets and Inter-Rater Reliability***

In addition to the feedback that supervisors provided to readers during regular read-behinds and the continuous monitoring of inter-rater reliability and score point distributions, DRC also conducted validity scoring. Validity responses were inserted among the live student responses.

The validity responses were added to DRC’s image handscoring system prior to the beginning of scoring. Validity reports compared readers’ scores to pre-determined scores and were used to help detect potential room drift and individual scorer drift. This data was used to make decisions regarding the retraining and/or release of scorers, as well as the rescoring of responses.

Approximately 10% of all live student responses were scored by a second reader to establish inter-rater reliability statistics for all constructed-response items. This procedure is called a “double-blind read” because the second reader does not know the first reader’s score. DRC monitored inter-rater reliability based on the responses that were scored by two readers. If a scorer fell below the expected rate of agreement, the team

leader or scoring director retrained the scorer. If a scorer failed to improve after retraining and feedback, DRC removed the scorer from the project. In this situation, DRC removed all scores assigned by the scorer in question. The responses were then reassigned and rescored.

To monitor inter-rater reliability, DRC produced scoring summary reports on a daily basis. DRC’s scoring summary reports display exact, adjacent, and nonadjacent agreement rates for each reader. These rates are calculated based on responses that are scored by two readers, and their definitions are included below.

- **Percentage Exact (%EX)**—total number of responses by reader where scores are the same, divided by the number of responses that were scored twice
- **Percentage Adjacent (%AD)**—total number of responses by reader where scores are one point apart, divided by the number of responses that were scored twice
- **Percentage Nonadjacent (%NA)**—total number of responses by reader where scores are more than one score point apart, divided by the number of responses that were scored twice

The following table provided by Pearson shows the expectations for validity and inter-rater reliability:

**Table 5.7 Expectations for Validity and Inter-Rater Reliability**

| <b>Agreement Rate Requirements for Validity and Inter-Rater Reliability</b> |   |                          |                                     |
|---|---|--------------------------|-------------------------------------|
| <b>Content Area</b>   | <b>Score Point Range</b>                              | <b>Perfect Agreement</b> | <b>Perfect Agreement + Adjacent</b> |
| Mathematics   | 0–1   | 90%                      | 100%                                |
| Mathematics   | 0–2   | 80%                      | 95%                                 |
| Mathematics   | 0–3   | 70%                      | 95%                                 |
| Mathematics   | 0–4   | 65%                      | 95%                                 |
| ELA   | Multi-trait 0–3 or 0–4<br>(varies by grade and trait) | 65% (each trait)         | 96% (each trait)                    |

Each reader was required to maintain a level of exact agreement on validity responses and on inter-rater reliability as shown under “Perfect Agreement” in the table above. Additionally, readers were required to maintain an acceptably low rate of nonadjacent agreement. To monitor this, DRC summed each reader’s exact and adjacent agreement rates and required each reader to maintain the levels shown under “Perfect Agreement + Adjacent” in the table above.

### **Calibration Sets**

Pearson provided DRC with PARCC-approved calibration responses for all operational items that came from the PARCC item pool. DRC pulled calibration responses for DRC-developed math items as well as additional responses for items from PARCC. DRC used these sets to perform calibration across the entire scorer population for an item if trends were detected (e.g., low agreement between certain score points if a certain type of response was missing from initial training). These calibrations were designed to help refocus scorers on how to properly use the scoring guidelines. They were selected to help illustrate particular points and familiarize scorers with the types of responses commonly seen during operational scoring. After readers scored a calibration set, the scoring director reviewed it with the readers, using rubric language and scoring concepts exemplified by the anchor responses to explain the reasoning behind each response’s score.

### ***Reports and Reader Feedback***

Reader performance and intervention information were recorded in reader feedback logs. These logs tracked information about actions taken with individual readers to ensure scoring consistency in regard to reliability, score point distribution, and validity performance. In addition to the reader feedback logs, DRC provided the LDOE with handscoring quality control reports for review throughout the scoring window. Further detail about these reports can be found in Appendix C.

## 5.2 Inter-Rater Reliability

A minimum of 10% of the constructed responses in ELA and mathematics were scored independently by a second reader. This was the case regardless of whether the first reader was human or AI. The statistics for inter-rater reliability were calculated for all items at all grades. To determine the reliability of scoring, the percentage of perfect agreement and adjacent agreement between the first and second scores was examined.

A total of 51 operational items were scored by human readers across all grades and both content areas. The inter-rater reliability rates and the total numbers of reads are shown in Table 5.8 for ELA items, Table 5.9 for operational mathematics items, and Table 5.10 for Spanish mathematics items.

As shown in Table 5.8, raters demonstrated at least 99% perfect and adjacent agreement for all ELA handscored items. As shown in Table 5.9 raters demonstrated at least 98% perfect and adjacent agreement for mathematics items. As shown in Table 5.10, raters demonstrated 100% perfect and adjacent agreement for Spanish mathematics items.



Table 5.8 Inter-Rater Agreement, English Language Arts Items

| Grade      | Task Type                | Question | Trait  | Total Reads | Read 2x | Inter-Rater Reliability % |    |         |
|------------|--------------------------|----------|--|-------------|---------|---------------------------|----|---------|
|            |                          |          |  |             |         | EX                        | AD | EX + AD |
| 3<br>(PBT) | Literary Analysis        | 7        | Reading Comprehension and Written Expression | ≥39,220     | ≥7,510  | 81                        | 19 | 100     |
|            |                          |          | Knowledge and Use of Language Conventions    | ≥39,220     | ≥7,510  | 77                        | 23 | 100     |
|            | Research Simulation      | 14       | Reading Comprehension and Written Expression | ≥39,410     | ≥7,880  | 79                        | 21 | 100     |
|            |                          |          | Knowledge and Use of Language Conventions    | ≥39,410     | ≥7,880  | 77                        | 23 | 100     |
| 3<br>(CBT) | Literary Analysis (AI)   | 7        | Reading Comprehension and Written Expression | ≥18,770     | ≥5,380  | 83                        | 17 | 100     |
|            |                          |          | Knowledge and Use of Language Conventions    | ≥18,770     | ≥5,380  | 84                        | 16 | 100     |
|            | Research Simulation (AI) | 14       | Reading Comprehension and Written Expression | ≥20,850     | ≥9,510  | 90                        | 10 | 100     |
|            |                          |          | Knowledge and Use of Language Conventions    | ≥20,850     | ≥9,510  | 90                        | 10 | 100     |
| 4          | Research Simulation      | 9        | Reading Comprehension and Written Expression | ≥54,150     | ≥10,470 | 83                        | 17 | 100     |
|            |                          |          | Knowledge and Use of Language Conventions    | ≥54,150     | ≥10,470 | 81                        | 19 | 100     |
|            | Narrative Writing (AI)   | 14       | Reading Comprehension and Written Expression | ≥56,420     | ≥14,820 | 85                        | 15 | 100     |
|            |                          |          | Knowledge and Use of Language Conventions    | ≥56,420     | ≥14,820 | 80                        | 20 | 100     |
| 5          | Literary Analysis (AI)   | 7        | Reading Comprehension and Written Expression | ≥55,180     | ≥12,290 | 82                        | 18 | 100     |
|            |                          |          | Knowledge and Use of Language Conventions    | ≥55,180     | ≥12,290 | 80                        | 20 | 100     |
|            | Research Simulation      | 20       | Reading Comprehension and Written Expression | ≥54,320     | ≥10,510 | 81                        | 18 | 99*     |
|            |                          |          | Knowledge and Use of Language Conventions    | ≥54,320     | ≥10,510 | 81                        | 18 | 99*     |
| 6          | Research Simulation (AI) | 9        | Reading Comprehension and Written Expression | ≥56,040     | ≥13,200 | 80                        | 20 | 100     |
|            |                          |          | Knowledge and Use of Language Conventions    | ≥56,040     | ≥13,200 | 81                        | 19 | 100     |
|            | Narrative Writing        | 14       | Written Expression                           | ≥54,890     | ≥11,100 | 78                        | 22 | 100     |
|            |                          |          | Knowledge and Use of Language Conventions    | ≥54,890     | ≥11,100 | 81                        | 19 | 100     |
| 7          | Literary Analysis (AI)   | 7        | Reading Comprehension and Written Expression | ≥52,250     | ≥12,070 | 83                        | 17 | 100     |
|            |                          |          | Knowledge and Use of Language Conventions    | ≥52,250     | ≥12,070 | 80                        | 20 | 100     |
|            | Research Simulation (AI) | 20       | Written Expression                           | ≥52,460     | ≥12,560 | 80                        | 20 | 100     |
|            |                          |          | Knowledge and Use of Language Conventions    | ≥52,460     | ≥12,560 | 80                        | 20 | 100     |

| Grade | Task Type                | Question | Trait  | Total Reads | Read 2x | Inter-Rater Reliability % |    |         |
|-------|--------------------------|----------|--|-------------|---------|---------------------------|----|---------|
|       |                          |          |  |             |         | EX                        | AD | EX + AD |
| 8     | Literary Analysis (AI)   | 7        | Reading Comprehension and Written Expression | ≥57,400     | ≥13,360 | 85                        | 15 | 100     |
|       |                          |          | Knowledge and Use of Language Conventions    | ≥57,400     | ≥13,360 | 83                        | 17 | 100     |
|       | Research Simulation (AI) | 20       | Reading Comprehension and Written Expression | ≥57,760     | ≥14,160 | 86                        | 14 | 100     |
|       |                          |          | Knowledge and Use of Language Conventions    | ≥57,760     | ≥14,160 | 85                        | 15 | 100     |

*\*Total Exact (EX) + Adjacent (AD) + Non-adjacent (na) does not add up to 100% due to rounding*

Table 5.9 Inter-Rater Agreement, Mathematics Items

| Grade        | Question | Part(s)**    | Total Reads | Read 2x | Inter-Rater Reliability % |               |                |
|--------------|----------|--------------|-------------|---------|---------------------------|---------------|----------------|
|              |          |              |             |         | EX                        | AD            | EX + AD        |
| 3            | 17       | Part A       | ≥57,050     | ≥11,300 | 87                        | 13            | 100            |
|              |          | Part B       | ≥57,050     | ≥11,300 | 88                        | 11            | 99             |
|              | 18       | Part A       | ≥56,750     | ≥11,350 | 98                        | 2             | 100            |
|              |          | Part B       | ≥56,750     | ≥11,350 | 95                        | 5             | 100            |
|              | 32       | N/A          | ≥57,330     | ≥11,760 | 95                        | 4             | 99<br>(N/A=0)  |
|              | 33       | Part B (CBT) | ≥17,640     | ≥3,220  | 97                        | 3             | 100            |
|              |          | Part B (PBT) | ≥39,120     | ≥7,360  | 97                        | 3             | 100            |
|              | 48       | Part A       | ≥57,170     | ≥11,400 | 96                        | 4             | 100            |
|              |          | Part B       | ≥57,170     | ≥11,400 | 98                        | 2             | 100            |
|              | 49       | Part B (CBT) | ≥39,130     | ≥7,370  | 93                        | 6             | 99<br>(N/A=0)  |
|              |          | Part C (CBT) | ≥39,130     | ≥7,370  | 94                        | 5             | 99             |
|              |          | Part B (PBT) | ≥17,720     | ≥3,230  | 93                        | 6             | 99             |
| Part C (PBT) |          | ≥17,720      | ≥3,230      | 92      | 7                         | 99<br>(N/A=0) |                |
| 4            | 17       | Part A       | ≥53,810     | ≥10,050 | 90                        | 9             | 99<br>(N/A=0)  |
|              |          | Part B       | ≥53,810     | ≥10,050 | 89                        | 10            | 99             |
|              | 18       | N/A          | ≥53,320     | ≥10,700 | 95                        | 5             | 100            |
|              | 28       | N/A          | ≥54,090     | ≥11,040 | 90                        | 10            | 100            |
|              | 33       | N/A          | ≥53,930     | ≥11,390 | 90                        | 9             | 99<br>(N/A=0)  |
|              | 48       | Part A       | ≥53,970     | ≥10,540 | 92                        | 8             | 100            |
|              |          | Part B       | ≥53,970     | ≥10,540 | 94                        | 6             | 100<br>(N/A=1) |
|              | 49       | Part A       | ≥53,840     | ≥10,640 | 95                        | 5             | 100            |
|              |          | Part B       | ≥53,840     | ≥10,640 | 98                        | 2             | 100            |
| Part C       |          | ≥53,840      | ≥10,640     | 97      | 3                         | 100           |                |
| 5            | 17       | N/A          | ≥53,460     | ≥10,120 | 79                        | 19            | 2              |
|              | 18       | Part B       | ≥53,210     | ≥9,660  | 95                        | 5             | 100            |
|              | 32       | Part A       | ≥53,890     | ≥10,350 | 94                        | 6             | 100            |
|              |          | Part B       | ≥53,890     | ≥10,350 | 97                        | 3             | 100            |
|              | 33       | N/A          | ≥53,560     | ≥10,480 | 90                        | 9             | 99             |
|              | 48       | Part B       | ≥53,990     | ≥9,900  | 94                        | 6             | 100            |
|              | 49       | Part B       | ≥53,740     | ≥9,850  | 99                        | 1             | 100            |
|              |          | Part C       | ≥53,740     | ≥9,850  | 95                        | 5             | 100            |
| Part D       |          | ≥53,740      | ≥9,850      | 94      | 6                         | 100           |                |

\*Total Exact (EX) + Adjacent (AD) + Non-adjacent (na) does not add up to 100% due to rounding

\*\*N/A if an item does not have multiple parts

Table 5.10 Inter-Rater Agreement, Mathematics Items, continued

| Grade  | Question | Part(s)** | Total Reads | Read 2x | Inter-Rater Reliability % |     |               |
|--------|----------|-----------|-------------|---------|---------------------------|-----|---------------|
|        |          |           |             |         | EX                        | AD  | EX + AD       |
| 6      | 30       | N/A       | ≥54,430     | ≥11,340 | 86                        | 14  | 100           |
|        | 34       | Part A    | ≥54,040     | ≥11,050 | 93                        | 7   | 100           |
|        |          | Part B    | ≥54,040     | ≥11,050 | 97                        | 3   | 100           |
|        | 35       | Part A    | ≥53,550     | ≥9,760  | 100                       | 0   | 100           |
|        |          | Part B    | ≥53,550     | ≥9,760  | 100                       | 0   | 100           |
|        |          | Part C    | ≥53,550     | ≥9,760  | 90                        | 8   | 98<br>(N/A=2) |
|        | 36       | N/A       | ≥53,240     | ≥11,500 | 94                        | 6   | 100           |
|        | 47       | Part A    | ≥54,450     | ≥9,910  | 100                       | 0   | 100           |
|        |          | Part B    | ≥54,450     | ≥9,910  | 91                        | 9   | 100           |
|        | 48       | Part A    | ≥54,440     | ≥9,920  | 100                       | 0   | 100           |
| Part B |          | ≥54,440   | ≥9,920      | 100     | 0                         | 100 |               |
| Part C |          | ≥54,440   | ≥9,920      | 94      | 6                         | 100 |               |
| 49     | N/A      | ≥54,580   | ≥11,430     | 92      | 8                         | 100 |               |
| 7      | 29       | Part A    | ≥56,160     | ≥10,230 | 100                       | 0   | 100           |
|        |          | Part B    | ≥56,160     | ≥10,230 | 100                       | 0   | 100           |
|        |          | Part C    | ≥56,160     | ≥10,230 | 96                        | 4   | 100           |
|        |          | Part D    | ≥56,160     | ≥10,230 | 95                        | 5   | 100           |
|        | 33       | Part A    | ≥56,040     | ≥10,190 | 100                       | 0   | 100           |
|        |          | Part B    | ≥56,040     | ≥10,190 | 96                        | 4   | 100           |
|        | 35       | Part A    | ≥55,930     | ≥9,990  | 100                       | 0   | 100           |
|        |          | Part B    | ≥55,930     | ≥9,990  | 94                        | 6   | 100           |
|        | 36       | Part A    | ≥54,690     | ≥9,990  | 91                        | 9   | 100           |
|        |          | Part B    | ≥54,690     | ≥9,990  | 100                       | 0   | 100           |
|        | 47       | N/A       | ≥55,340     | ≥11,860 | 96                        | 3   | 100           |
|        | 48       | Part A    | ≥55,780     | ≥10,930 | 90                        | 10  | 100           |
| Part B |          | ≥55,780   | ≥10,930     | 93      | 7                         | 100 |               |
| 49     | N/A      | ≥55,460   | ≥11,170     | 95      | 5                         | 100 |               |

| Grade  | Question | Part(s)** | Total Reads | Read 2x | Inter-Rater Reliability % |     |               |
|--------|----------|-----------|-------------|---------|---------------------------|-----|---------------|
|        |          |           |             |         | EX                        | AD  | EX + AD       |
| 8      | 28       | N/A       | ≥48,880     | ≥10,350 | 88                        | 10  | 98<br>(N/A=2) |
|        | 34       | N/A       | ≥49,230     | ≥11,000 | 93                        | 6   | 99<br>(N/A=1) |
|        | 35       | Part A    | ≥48,940     | ≥8,900  | 100                       | 0   | 100           |
|        |          | Part B    | ≥48,940     | ≥8,900  | 91                        | 7   | 98<br>(N/A=2) |
|        | 36       | N/A       | ≥48,830     | ≥11,840 | 97                        | 3   | 100           |
|        | 42       | Part A    | ≥49,360     | ≥8,980  | 100                       | 0   | 100           |
|        |          | Part B    | ≥49,360     | ≥8,980  | 92                        | 8   | 100           |
|        | 46       | Part A    | ≥49,430     | ≥11,120 | 94                        | 6   | 100           |
|        |          | Part B    | ≥49,430     | ≥11,120 | 91                        | 9   | 100           |
|        | 48       | Part A    | ≥49,380     | ≥8,970  | 100                       | 0   | 100           |
|        |          | Part B    | ≥49,380     | ≥8,970  | 96                        | 4   | 100           |
| Part C |          | ≥49,380   | ≥8,970      | 96      | 4                         | 100 |               |

\*Total Exact (EX) + Adjacent (AD) + Non-adjacent (na) does not add up to 100% due to rounding

\*\*N/A if an item does not have multiple parts

Table 5.11 Inter-Rater Agreement, Spanish Mathematics Items

| Grade        | Question     | Part(s)**    | Total Reads | Read 2x | Inter-Rater Reliability % |     |         |
|--------------|--------------|--------------|-------------|---------|---------------------------|-----|---------|
|              |              |              |             |         | EX                        | AD  | EX + AD |
| 3            | 17           | Part A       | ≥100        | ≥40     | 95                        | 5   | 100     |
|              |              | Part B       | ≥100        | ≥40     | 100                       | 0   | 100     |
|              | 18           | Part A       | ≥110        | ≥40     | 100                       | 0   | 100     |
|              |              | Part B       | ≥110        | ≥40     | 100                       | 0   | 100     |
|              | 32           | N/A          | ≥100        | ≥40     | 100                       | 0   | 100     |
|              | 33           | Part B (CBT) | ≥60         | ≥10     | 100                       | 0   | 100     |
|              |              | Part B (PBT) | ≥30         | ≥10     | 100                       | 0   | 100     |
|              | 48           | Part A       | ≥100        | ≥30     | 100                       | 0   | 100     |
|              |              | Part B       | ≥100        | ≥30     | 100                       | 0   | 100     |
|              | 49           | Part B (CBT) | ≥60         | ≥10     | 100                       | 0   | 100     |
| Part C (CBT) |              | ≥60          | ≥10         | 100     | 0                         | 100 |         |
| 49           | Part B (PBT) | ≥30          | <10         | NR      | NR                        | NR  |         |
|              | Part C (PBT) | ≥30          | <10         | NR      | NR                        | NR  |         |
| 4            | 17           | Part A       | ≥100        | <10     | NR                        | NR  | NR      |
|              |              | Part B       | ≥100        | <10     | NR                        | NR  | NR      |
|              | 18           | N/A          | ≥120        | ≥30     | 94                        | 6   | 100     |
|              | 32           | N/A          | ≥120        | ≥40     | 100                       | 0   | 100     |
|              | 33           | N/A          | ≥110        | ≥20     | 100                       | 0   | 100     |
|              | 48           | Part A       | ≥110        | ≥20     | 92                        | 8   | 100     |
|              |              | Part B       | ≥110        | ≥20     | 100                       | 0   | 100     |
|              | 49           | Part A       | ≥120        | ≥30     | 100                       | 0   | 100     |
|              |              | Part B       | ≥120        | ≥30     | 100                       | 0   | 100     |
| Part C       |              | ≥120         | ≥30         | 93      | 7                         | 100 |         |
| 5            | 17           | N/A          | ≥70         | ≥10     | 100                       | 0   | 100     |
|              | 18           | Part A       | ≥80         | ≥40     | 100                       | 0   | 100     |
|              |              | Part B       | ≥80         | ≥40     | 100                       | 0   | 100     |
|              | 32           | Part A       | ≥70         | ≥10     | 86                        | 14  | 100     |
|              |              | Part B       | ≥70         | ≥10     | 100                       | 0   | 100     |
|              | 33           | N/A          | ≥70         | ≥10     | 100                       | 0   | 100     |
|              | 48           | Part A       | ≥70         | ≥10     | 100                       | 0   | 100     |
|              |              | Part B       | ≥70         | ≥10     | 100                       | 0   | 100     |
|              | 49           | Part A       | ≥70         | ≥10     | 100                       | 0   | 100     |
|              |              | Part B       | ≥70         | ≥10     | 100                       | 0   | 100     |
| Part C       |              | ≥70          | ≥10         | 100     | 0                         | 100 |         |
| Part D       |              | ≥70          | ≥10         | 100     | 0                         | 100 |         |

\*Total Exact (EX) + Adjacent (AD) does not add up to 100% due to rounding

\*\*N/A if an item does not have multiple parts

Table 5.12 Inter-Rater Agreement, Spanish Mathematics Items, continued

| Grade  | Question | Part(s)** | Total Reads | Read 2x | Inter-Rater Reliability % |     |         |
|--------|----------|-----------|-------------|---------|---------------------------|-----|---------|
|        |          |           |             |         | EX                        | AD  | EX + AD |
| 6      | 30       | N/A       | ≥130        | ≥40     | 95                        | 5   | 100     |
|        | 34       | Part A    | ≥130        | ≥40     | 100                       | 0   | 100     |
|        |          | Part B    | ≥130        | ≥40     | 100                       | 0   | 100     |
|        | 35       | Part A    | ≥130        | ≥20     | 100                       | 0   | 100     |
|        |          | Part B    | ≥130        | ≥20     | 100                       | 0   | 100     |
|        |          | Part C    | ≥130        | ≥20     | 100                       | 0   | 100     |
|        | 36       | N/A       | ≥140        | ≥40     | 100                       | 0   | 100     |
|        | 47       | Part A    | ≥130        | ≥20     | 100                       | 0   | 100     |
|        |          | Part B    | ≥130        | ≥20     | 100                       | 0   | 100     |
|        | 48       | Part A    | ≥130        | ≥20     | 100                       | 0   | 100     |
| Part B |          | ≥130      | ≥20         | 100     | 0                         | 100 |         |
| Part C |          | ≥130      | ≥20         | 100     | 0                         | 100 |         |
| 49     | N/A      | ≥140      | ≥40         | 100     | 0                         | 100 |         |
| 7      | 35       | Part A    | ≥140        | ≥20     | 100                       | 0   | 100     |
|        |          | Part B    | ≥140        | ≥20     | 100                       | 0   | 100     |
|        | 36       | Part A    | ≥130        | ≥20     | 100                       | 0   | 100     |
|        |          | Part B    | ≥130        | ≥20     | 100                       | 0   | 100     |
|        | 47       | N/A       | ≥150        | ≥50     | 100                       | 0   | 100     |
| 49     | N/A      | ≥140      | ≥40         | 100     | 0                         | 100 |         |
| 8      | 28       | N/A       | ≥140        | ≥30     | 100                       | 0   | 100     |
|        | 34       | N/A       | ≥140        | ≥50     | 100                       | 0   | 100     |
|        | 35       | Part A    | ≥140        | ≥30     | 100                       | 0   | 100     |
|        |          | Part B    | ≥140        | ≥30     | 100                       | 0   | 100     |
|        | 36       | N/A       | ≥130        | ≥30     | 100                       | 0   | 100     |
|        | 42       | Part A    | ≥140        | ≥20     | 100                       | 0   | 100     |
|        |          | Part B    | ≥140        | ≥20     | 100                       | 0   | 100     |
|        | 46       | Part A    | ≥140        | ≥40     | 100                       | 0   | 100     |
|        |          | Part B    | ≥140        | ≥40     | 100                       | 0   | 100     |
|        | 48       | Part A    | ≥140        | ≥20     | 100                       | 0   | 100     |
| Part B |          | ≥140      | ≥20         | 100     | 0                         | 100 |         |
| Part C |          | ≥140      | ≥20         | 100     | 0                         | 100 |         |

\*Total Exact (EX) + Adjacent (AD) does not add up to 100% due to rounding

\*\*N/A if an item does not have multiple parts

Table 5.13 Inter-Rater Agreement, Mathematics Field Test Items

| Grade   | Question | Part(s)* | Total Reads | Read 2x | Inter-Rater Reliability % |     |         |
|---------|----------|----------|-------------|---------|---------------------------|-----|---------|
|         |          |          |             |         | EX                        | AD  | EX + AD |
| 3       | 1075007  | N/A      | ≥1,660      | ≥320    | 88                        | 12  | 100     |
|         | 1075014  | N/A      | ≥1,650      | ≥310    | 79                        | 21  | 100     |
|         | 1075033  | Part A   | ≥1,760      | ≥330    | 92                        | 8   | 100     |
|         |          | Part B   | ≥1,760      | ≥330    | 95                        | 5   | 100     |
| 1104450 | N/A      | ≥1,770   | ≥340        | 93      | 7                         | 100 |         |
| 4       | 1075172  | Part A   | ≥1,750      | ≥340    | 94                        | 6   | 100     |
|         |          | Part B   | ≥1,750      | ≥340    | 89                        | 11  | 100     |
|         | 1075173  | Part A   | ≥1,760      | ≥340    | 92                        | 8   | 100     |
|         |          | Part B   | ≥1,760      | ≥340    | 92                        | 8   | 100     |
|         | 1075441  | Part A   | ≥1,760      | ≥340    | 90                        | 10  | 100     |
|         |          | Part B   | ≥1,760      | ≥340    | 84                        | 16  | 100     |
|         |          | Part C   | ≥1,760      | ≥340    | 80                        | 20  | 100     |
|         | 900168   | Part A   | ≥1,760      | ≥350    | 98                        | 2   | 100     |
|         |          | Part B   | ≥1,760      | ≥350    | 93                        | 7   | 100     |
|         | 900674   | Part A   | ≥1,760      | ≥350    | 92                        | 8   | 100     |
|         |          | Part B   | ≥1,760      | ≥350    | 88                        | 12  | 100     |
|         | 900675   | Part A   | ≥1,760      | ≥340    | 88                        | 12  | 100     |
|         |          | Part B   | ≥1,760      | ≥340    | 98                        | 2   | 100     |
|         | 902749   | Part A   | ≥1,760      | ≥350    | 94                        | 6   | 100     |
| Part B  |          | ≥1,760   | ≥350        | 98      | 2                         | 100 |         |
| 5       | 1075324  | N/A      | ≥1,650      | ≥330    | 86                        | 14  | 100     |
|         | 1075325  | Part A   | ≥1,740      | ≥340    | 84                        | 16  | 100     |
|         |          | Part B   | ≥1,740      | ≥340    | 94                        | 6   | 100     |
|         | 1075860  | Part A   | ≥1,750      | ≥360    | 85                        | 15  | 100     |
|         |          | Part B   | ≥1,750      | ≥360    | 84                        | 16  | 100     |
|         | 1075861  | N/A      | ≥1,660      | ≥350    | 89                        | 11  | 100     |
|         | 1075935  | Part A   | ≥1,760      | ≥350    | 85                        | 15  | 100     |
|         |          | Part B   | ≥1,760      | ≥350    | 85                        | 15  | 100     |
|         | 1075936  | Part A   | ≥1,750      | ≥330    | 92                        | 8   | 100     |
|         |          | Part B   | ≥1,750      | ≥330    | 86                        | 14  | 100     |
|         | 1075937  | N/A      | ≥1,640      | ≥320    | 84                        | 16  | 100     |
| 1075938 | Part A   | ≥1,750   | ≥340        | 96      | 4                         | 100 |         |
|         | Part B   | ≥1,750   | ≥340        | 90      | 10                        | 100 |         |
| 1075939 | Part A   | ≥1,760   | ≥360        | 93      | 7                         | 100 |         |
|         | Part B   | ≥1,760   | ≥360        | 91      | 9                         | 100 |         |
| 6       | 1075679  | N/A      | ≥1,630      | ≥330    | 93                        | 7   | 100     |
|         | 1075881  | Part A   | ≥1,760      | ≥340    | 95                        | 5   | 100     |
|         |          | Part B   | ≥1,760      | ≥340    | 96                        | 4   | 100     |
|         | 1075960  | Part A   | ≥1,750      | ≥360    | 87                        | 13  | 100     |
|         |          | Part B   | ≥1,750      | ≥360    | 92                        | 8   | 100     |
|         | 1075961  | Part A   | ≥1,760      | ≥370    | 98                        | 2   | 100     |
|         |          | Part B   | ≥1,760      | ≥370    | 91                        | 9   | 100     |
|         | 1076108  | Part A   | ≥1,770      | ≥360    | 96                        | 4   | 100     |
| Part B  |          | ≥1,770   | ≥360        | 98      | 2                         | 100 |         |
| 902990  | N/A      | ≥1,640   | ≥360        | 95      | 5                         | 100 |         |



| Grade   | Question | Part(s)* | Total Reads | Read 2x | Inter-Rater Reliability % |     |                |
|---------|----------|----------|-------------|---------|---------------------------|-----|----------------|
|         |          |          |             |         | EX                        | AD  | EX + AD        |
| 7       | 1024438  | Part A   | ≥1,770      | ≥370    | 91                        | 9   | 100            |
|         |          | Part B   | ≥1,770      | ≥370    | 99                        | 1   | 100            |
|         | 1024466  | Part A   | ≥1,760      | ≥360    | 96                        | 4   | 100            |
|         |          | Part B   | ≥1,760      | ≥360    | 97                        | 2   | 99<br>(N/A=1)  |
|         |          | Part C   | ≥1,760      | ≥360    | 97                        | 3   | 100            |
|         | 1024551  | N/A      | ≥1,640      | ≥340    | 87                        | 12  | 99<br>(N/A=1)  |
|         | 1025138  | Part A   | ≥1,760      | ≥370    | 93                        | 7   | 100            |
|         |          | Part B   | ≥1,760      | ≥370    | 99                        | 1   | 100<br>(N/A=1) |
| 1025162 | N/A      | ≥1,650   | ≥350        | 94      | 6                         | 100 |                |
| 8       | 1022873  | Part A   | ≥1,750      | ≥410    | 94                        | 6   | 100            |
|         |          | Part B   | ≥1,750      | ≥410    | 100                       | 0   | 100            |
|         | 1022924  | Part A   | ≥1,760      | ≥330    | 100                       | 0   | 100            |
|         |          | Part B   | ≥1,760      | ≥330    | 100                       | 0   | 100            |
|         |          | Part C   | ≥1,760      | ≥330    | 99                        | 1   | 100            |
|         |          | Part D   | ≥1,760      | ≥330    | 98                        | 2   | 100            |
|         | 1023318  | N/A      | ≥1,610      | ≥380    | 89                        | 10  | 99<br>(N/A=1)  |
|         | 1023323  | Part A   | ≥1,730      | ≥360    | 93                        | 7   | 100            |
|         |          | Part B   | ≥1,730      | ≥360    | 94                        | 6   | 100            |
|         |          | Part C   | ≥1,730      | ≥360    | 93                        | 7   | 100            |
|         | 1023362  | Part A   | ≥1,730      | ≥330    | 100                       | 0   | 100            |
|         |          | Part B   | ≥1,730      | ≥330    | 98                        | 2   | 100            |
|         | 1075368  | Part A   | ≥1,760      | ≥330    | 100                       | 0   | 100            |
|         |          | Part B   | ≥1,760      | ≥330    | 90                        | 10  | 100            |
|         | 1075650  | Part A   | ≥1,750      | ≥380    | 95                        | 5   | 100            |
|         |          | Part B   | ≥1,750      | ≥380    | 95                        | 5   | 100            |
|         | 1075651  | N/A      | ≥1,600      | ≥400    | 99                        | 1   | 100            |
|         | 899330   | Part A   | ≥1,730      | ≥380    | 99                        | 1   | 100            |
| Part B  |          | ≥1,730   | ≥380        | 87      | 13                        | 100 |                |
| 900475  | Part A   | ≥1,740   | ≥320        | 100     | 0                         | 100 |                |
|         | Part B   | ≥1,740   | ≥320        | 83      | 17                        | 100 |                |
| 900476  | Part A   | ≥1,730   | ≥320        | 100     | 0                         | 100 |                |
|         | Part B   | ≥1,730   | ≥320        | 91      | 9                         | 100 |                |

### *Technology-Enhanced Item Scoring Process*

All technology-enhanced items, as well as EBSR, MPSR, and SA items, were processed through DRC's autoscoring engine and scored according to the assigned scoring rules as established during content creation by PARCC or DRC as applicable in conjunction with the LDOE. DRC ensured that all rubrics and scoring rules were verified for accuracy before scoring any technology-enhanced items. DRC established an adjudication process for technology-enhanced items and short-answer responses to verify that correct answers were identified. DRC's technology-enhanced scoring process included the following procedures:

- A scoring rubric was created for each technology-enhanced item. The rubric described the one and only correct answer for dichotomously scored items (i.e., items scored as either right or wrong). If partial credit was possible, the rubric described in detail the type of response that could receive credit for each score point.
- The information from the scoring rubric was entered into the scoring system within the item banking system so that the truth resided in one place along with the item image and other metadata. This scoring information included details that varied by item type. For example, for a drag-and-drop item, the information included which objects are to be placed in each 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 for that response.
- 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. The scoring process was then rerun. This checking and modification process continued until no other issues were found.
- As a final check, a final report was generated that showed all student responses, their frequencies, and their received scores.

In the case of braille and large-print test forms, student responses to items were transcribed into the online system by a test administrator.

### 5.3 Multiple-Choice and Multiple-Select Item Scoring Process

Responses to multiple-choice and multiple-select items were captured during the CBT administration and during scanning of the PBT answer documents. In the case of braille and large-print test forms, student responses to these items were transcribed into the online system by a test administrator.

### 5.4 Summary

The information presented in this chapter summarizes the scoring procedures for different types of items and the steps taken by DRC to ensure accuracy in the autoscoring and handscoring processes. The inter-rater reliability statistics presented in Section 5.4 demonstrate that the items were scored reliably. These efforts by DRC address multiple best practices of the testing industry but are particularly related to 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 (91).

**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 (92).

**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 (118).

**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 (118).

## Chapter 6: Operational Data Analyses

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This chapter of the LEAP 2025 technical report describes the analyses that were conducted on the operational data. These include a classical item analysis and examination of the raw scores and an item response theory (IRT) analysis involving calibrating, scaling, and linking.

This section presents the classical item statistics, including aggregate raw score statistics and individual item-level statistics. Next, this section discusses the IRT models used for calibrating the data and addresses the purpose of data calibration and scaling for each content area is addressed. The calibration samples are presented next, followed by the data calibration results, including the model-data fit for the Louisiana data. If the IRT models fit the empirical item response distributions for the population about which generalizations are to be made (i.e., Louisiana students), then the claim that the scores are valid indicators of an underlying ability is strengthened. The lowest obtainable scale score (LOSS) and highest obtainable scale score (HOSS) for the LEAP 2025 tests are also presented.

Chapter 6 demonstrates how LEAP 2025 assessments adhere to American Educational Research Association, American Psychological Association, & National Council on Measurement in Education (AERA, APA, & NCME, 2014) Standards 1.8, 4.14, 5.2, 5.13, 5.15, and 7.2. Each standard is explicated within the appropriate section of this chapter. Standard 7.2 provides general guidance that is relevant to this chapter. It states the following:

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

For all 2022 LEAP 2025 analyses, the Louisiana student population was used. In Section 6.3, the characteristics of calibration samples, such as subgroups, are discussed. Chapter 3 presents the test specifications. Information regarding reported data is discussed in detail in Chapter 7.

In this section, summary test statistics for each form, grade, and content area of LEAP 2025 are presented. These statistics are followed by item-level statistics for each grade and content area of LEAP 2025. These statistics were produced using census data, after removing data from test takers who were administered the Spanish language and Braille versions of the test forms.

### 6.1 Test-Level Statistics

Table 6.1 presents the number of items, score points, mean and standard deviation of the raw scores, and average form difficulty for each test form at each grade level of the ELA and mathematics assessments, respectively. Form difficulty for an examinee was calculated by dividing the raw score of the student by total score points of the test.

As can be seen in the table, average form difficulty for ELA ranged from 0.31 to 0.43. Average form difficulty for mathematics ranged from 0.28 to 0.52. In general, the 2022 LEAP 2025 tests were relatively difficult tests across all subjects and grades. For ELA, the grade 3 computer-based test (CBT) was the most difficult, with 0.31 average form difficulty, and the grade 7 was the easiest, with 0.43 average form difficulty. For mathematics, the grade 8 test was the most difficult, with 0.28 average form difficulty, and the grade 3 paper-based test (PBT) test was the easiest, with 0.52 average form difficulty.

**Table 6.1 LEAP 2025 Means and Standard Deviations for Raw Scores and Form Difficulty**

| Content     | Grade | Mode | Total Items | Total Points | Mean Raw Score<br>(Std. Dev.) | Average Form Difficulty<br>(Std. Dev.) |
|-------------|-------|------|-------------|--------------|-------------------------------|--|
| ELA         | 3     | CBT  | 26          | 70           | 21.21 (12.67)                 | 0.31 (0.13)                            |
|             | 3     | PBT  | 26          | 70           | 23.84 (12.20)                 | 0.34 (0.18)                            |
|             | 4     | CBT  | 31          | 83           | 30.47 (15.87)                 | 0.37 (0.14)                            |
|             | 5     | CBT  | 30          | 86           | 33.44 (16.92)                 | 0.39 (0.13)                            |
|             | 6     | CBT  | 33          | 90           | 34.19 (17.92)                 | 0.38 (0.12)                            |
|             | 7     | CBT  | 34          | 94           | 40.08 (19.45)                 | 0.43 (0.13)                            |
|             | 8     | CBT  | 34          | 94           | 39.10 (18.59)                 | 0.42 (0.11)                            |
| Mathematics | 3     | CBT  | 42          | 61           | 27.71 (13.12)                 | 0.46 (0.20)                            |
|             | 3     | PBT  | 42          | 61           | 31.20 (13.74)                 | 0.52 (0.18)                            |
|             | 4     | CBT  | 43          | 62           | 26.86 (14.32)                 | 0.44 (0.19)                            |
|             | 5     | CBT  | 43          | 62           | 24.06 (13.10)                 | 0.39 (0.19)                            |
|             | 6     | CBT  | 43          | 66           | 24.71 (14.14)                 | 0.38 (0.19)                            |
|             | 7     | CBT  | 43          | 66           | 20.97 (14.44)                 | 0.32 (0.15)                            |
|             | 8     | CBT  | 41          | 65           | 18.10 (11.86)                 | 0.28 (0.14)                            |

Table 6.2 presents the number of items, mean and standard deviation of the item  $p$ -values, and item-total correlations (i.e., item discrimination values) for each test form at each grade level of the ELA and mathematics assessments, respectively.

The mean  $p$ -value is the average of all item  $p$ -values of a specific grade and content area. The mean item-total correlation ( $R_{it}$ ) is the average of all item point-biserial correlations of a specific grade and content area. The  $p$ -value and item-total correlation are explained in the next section.

**Table 6.2 LEAP 2025 Means, Standard Deviations for  $p$ -Values, Item-Total Correlation ( $R_{it}$ )**

| Content     | Grade | Mode | N of Items | Item $p$ -Value |           |      |      | Item-Total Correlation |           |      |      |
|-------------|-------|------|------------|-----------------|-----------|------|------|------------------------|-----------|------|------|
|             |       |      |            | Mean            | Std. Dev. | Min. | Max  | Mean                   | Std. Dev. | Min. | Max  |
| ELA         | 3     | CBT  | 26         | 0.35            | 0.12      | 0.17 | 0.63 | 0.46                   | 0.12      | 0.26 | 0.65 |
|             | 3     | PBT  | 26         | 0.40            | 0.18      | 0.19 | 0.78 | 0.43                   | 0.10      | 0.27 | 0.60 |
|             | 4     | CBT  | 31         | 0.41            | 0.14      | 0.22 | 0.69 | 0.46                   | 0.12      | 0.23 | 0.65 |
|             | 5     | CBT  | 30         | 0.43            | 0.14      | 0.21 | 0.76 | 0.50                   | 0.13      | 0.20 | 0.70 |
|             | 6     | CBT  | 33         | 0.43            | 0.11      | 0.16 | 0.63 | 0.49                   | 0.11      | 0.28 | 0.68 |
|             | 7     | CBT  | 34         | 0.47            | 0.13      | 0.26 | 0.78 | 0.50                   | 0.13      | 0.28 | 0.75 |
|             | 8     | CBT  | 34         | 0.45            | 0.12      | 0.17 | 0.66 | 0.47                   | 0.13      | 0.24 | 0.75 |
| Mathematics | 3     | CBT  | 42         | 0.53            | 0.20      | 0.15 | 0.94 | 0.49                   | 0.12      | 0.15 | 0.74 |
|             | 3     | PBT  | 42         | 0.58            | 0.18      | 0.22 | 0.96 | 0.49                   | 0.12      | 0.22 | 0.77 |
|             | 4     | CBT  | 43         | 0.50            | 0.18      | 0.14 | 0.82 | 0.53                   | 0.10      | 0.30 | 0.72 |
|             | 5     | CBT  | 43         | 0.45            | 0.19      | 0.13 | 0.85 | 0.50                   | 0.11      | 0.28 | 0.69 |
|             | 6     | CBT  | 43         | 0.44            | 0.18      | 0.11 | 0.77 | 0.50                   | 0.10      | 0.32 | 0.76 |
|             | 7     | CBT  | 43         | 0.35            | 0.17      | 0.12 | 0.81 | 0.51                   | 0.13      | 0.23 | 0.76 |
|             | 8     | CBT  | 41         | 0.32            | 0.14      | 0.13 | 0.71 | 0.46                   | 0.11      | 0.21 | 0.65 |

## 6.2 Item-Level Statistics

Tables 6.3–6.9 present the item statistics for each operational item included in regular test forms organized by grade for ELA. Tables 6.10–6.16 show the item statistics for each item included in regular test forms organized by grade for mathematics. The tables include administration mode, item number,  $p$ -value, item-total correlation ( $R_{it}$ ), omit rates, total N, adjusted N (adjusted N excludes items with multiple responses [PBT only], omitted responses, responses that were not scored, or responses that received a non-score code), and the percentage at each score point, if applicable, for each item by grade and content area. The  $p$ -value and item-total correlations calculations used the adjusted N to determine the values. The rest of the statistics in the table are based on the total N.

### ***p*-Value**

The  $p$ -value is a measure of item difficulty. For a multiple-choice (MC) item, the  $p$ -value is calculated by dividing the number of students who correctly responded to an item by the total number of students who attempted the item. The value is reported as a proportion. For a non-MC item, the  $p$ -value is calculated by dividing the average score for the item by the maximum points possible. This value is also reported as a proportion.

In terms of  $p$ -values, test scores tend to be more precise when their average  $p$ -values are between the mid-0.50s and the low 0.70s. However, it is important to select items on the basis of content rather than on purely statistical criteria when building a criterion-referenced test. As shown in Table 6.2, the average  $p$ -values associated with the ELA forms range from 0.35 in the grade 3 CBT form to 0.47 in grade 7. The average  $p$ -values associated with the mathematics forms range from 0.32 in grade 8 CBT to 0.53 in grade 3 PBT.

It is important that one examines the range of  $p$ -values, not just the average  $p$ -value, to determine whether a test measures well. It is desirable for a 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 students of all levels of achievement, not just students in the center of the distribution. Having a range of  $p$ -values also helps to

prevent floor and/or 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 0.17 to 0.78 (see Tables 6.3–6.9) across all grade levels. The  $p$ -values on the mathematics forms range from 0.11 to 0.96 (see Tables 6.10–6.16). Such a broad range of  $p$ -values, which indicates the items measure well throughout the range of skill levels at a given grade, supports the accuracy of the LEAP 2025 test scores.

### ***Item-Total Correlations***

An item-total correlation is the correlation between an item score and the total test score, where the item score is not included in the total score. It indicates how well an item differentiates students across all levels of achievement. In general, items with correlations below 0.20 are said to be poorly discriminating. The majority of the items in the LEAP 2025 had item-total 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. In general, an item is said to have a high omit rate if more than 5% of students failed to respond to the item. Evidence of speededness is considered a threat to validity because student test scores may not reflect their ability. Additionally, content validity may be threatened because the items that were not completed are needed to fulfill content blueprint specifications (Lu & Sireci, 2007).

This examination of omit rates complies with Standard 4.14 of the *Standards*. This standard is concerned with the speededness of a test and states the following:

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 in this section will show that, overall, student test scores are not adversely affected by the rate at which the students complete the test. In general, students have ample time to complete all sections of the test and there is not a threat to construct or content validity.

The results presented in Tables 6.3–6.16 show that the omit rates for most of the items on the LEAP 2025 regular forms are less than 5%, suggesting that the majority of students were able to complete the test in the prescribed amount of time. There are very few items with an omit rate higher than 5%, and the omit rates for the last items in the tests do not exceed 3%. These omit rates indicate that 97% of the students completed the test. Lu & Sireci (2007) report that the Education Testing Service has used an approach where a test was considered unspeeded if at least 80% of the examinees reach the last item and all testers reach at least 75% of the items. The reported omit rates fall within these ranges.

**Table 6.3 Operational Item Statistics—English Language Arts Grade 3 CBT Administration**

| ELA Grade 3 Computer-Based Test Administration |           |         |         |         |      |           |        |        |        |        |
|--|-----------|---------|---------|---------|------|-----------|--------|--------|--------|--------|
| Item ID  | Item Type | Total N | Adj. N  | p-Value | Pbis | Omit Rate | % at 0 | % at 1 | % at 2 | % at 3 |
| 982074   | ESR       | ≥16,210 | ≥16,190 | 0.63    | 0.47 | 0.08      | 30.51  | 11.94  | 57.47  |        |
| 982121   | TE        | ≥16,210 | ≥16,000 | 0.49    | 0.50 | 1.30      | 39.92  | 20.91  | 37.87  |        |
| 982112   | ESR       | ≥16,210 | ≥16,160 | 0.34    | 0.42 | 0.30      | 54.86  | 22.46  | 22.38  |        |
| 982109   | ESR       | ≥16,210 | ≥16,170 | 0.52    | 0.58 | 0.25      | 37.03  | 21.34  | 41.38  |        |
| 982123   | ESR       | ≥16,210 | ≥16,150 | 0.58    | 0.53 | 0.34      | 37.45  | 8.06   | 54.15  |        |
| 982078   | ESR       | ≥16,210 | ≥16,150 | 0.28    | 0.27 | 0.35      | 62.58  | 18.12  | 18.95  |        |
| 98207902                                       | CR        | ≥16,210 | ≥15,670 | 0.22    | 0.65 | 1.10      | 47.13  | 37.88  | 9.75   | 1.96   |
| 98207903                                       | CR        | ≥16,210 | ≥15,670 | 0.28    | 0.64 | 1.10      | 36.86  | 39.62  | 18.38  | 1.85   |
| 915222   | ESR       | ≥16,210 | ≥16,190 | 0.42    | 0.50 | 0.08      | 41.90  | 31.66  | 26.36  |        |
| 915224   | ESR       | ≥16,210 | ≥16,170 | 0.38    | 0.29 | 0.20      | 54.11  | 15.68  | 30.00  |        |
| 915228   | TE        | ≥16,210 | ≥16,170 | 0.32    | 0.42 | 0.23      | 50.49  | 33.76  | 15.52  |        |
| 915230   | ESR       | ≥16,210 | ≥16,170 | 0.44    | 0.36 | 0.21      | 42.99  | 26.09  | 30.72  |        |
| 915220   | TE        | ≥16,210 | ≥16,060 | 0.33    | 0.46 | 0.90      | 40.21  | 52.19  | 6.70   |        |
| 915219   | ESR       | ≥16,210 | ≥16,170 | 0.31    | 0.26 | 0.23      | 59.54  | 18.42  | 21.80  |        |
| 91522702                                       | CR        | ≥16,210 | ≥15,620 | 0.17    | 0.57 | 0.98      | 53.18  | 38.59  | 4.46   | 0.15   |
| 91522703                                       | CR        | ≥16,210 | ≥15,620 | 0.18    | 0.59 | 0.98      | 56.89  | 27.58  | 11.27  | 0.64   |
| 995132   | ESR       | ≥16,210 | ≥16,180 | 0.38    | 0.44 | 0.14      | 56.43  | 10.50  | 32.93  |        |
| 995135   | TE        | ≥16,210 | ≥16,160 | 0.35    | 0.51 | 0.29      | 47.64  | 34.04  | 18.04  |        |
| 995141   | ESR       | ≥16,210 | ≥16,150 | 0.24    | 0.28 | 0.36      | 62.61  | 27.20  | 9.84   |        |
| 995133   | ESR       | ≥16,210 | ≥16,160 | 0.32    | 0.38 | 0.28      | 59.73  | 16.09  | 23.90  |        |
| 915910   | ESR       | ≥16,210 | ≥16,020 | 0.29    | 0.36 | 1.13      | 60.62  | 18.18  | 20.08  |        |
| 915902   | TE        | ≥16,210 | ≥16,000 | 0.50    | 0.37 | 1.30      | 41.14  | 16.12  | 41.43  |        |
| 915908   | MS        | ≥16,210 | ≥15,980 | 0.26    | 0.47 | 1.41      | 58.31  | 28.74  | 11.54  |        |
| 915905   | ESR       | ≥16,210 | ≥15,940 | 0.35    | 0.42 | 1.62      | 53.37  | 21.69  | 23.32  |        |



Table 6.4 Operational Item Statistics—English Language Arts Grade 3 PBT Administration

| ELA Grade 3 Paper-Based Test Administration |           |         |         |         |      |           |        |        |        |        |
|---|-----------|---------|---------|---------|------|-----------|--------|--------|--------|--------|
| Item ID                                     | Item Type | Total N | Adj. N  | p-Value | Pbis | Omit Rate | % at 0 | % at 1 | % at 2 | % at 3 |
| 982074                                      | ESR       | ≥33,260 | ≥33,160 | 0.73    | 0.45 | 0.30      | 22.52  | 9.74   | 67.44  |        |
| 982110                                      | ESR       | ≥33,260 | ≥33,130 | 0.71    | 0.44 | 0.38      | 23.57  | 11.36  | 64.70  |        |
| 982112                                      | ESR       | ≥33,260 | ≥33,110 | 0.38    | 0.44 | 0.44      | 50.59  | 21.37  | 27.60  |        |
| 982109                                      | ESR       | ≥33,260 | ≥33,120 | 0.62    | 0.60 | 0.42      | 29.89  | 16.78  | 52.91  |        |
| 982123                                      | ESR       | ≥33,260 | ≥33,070 | 0.78    | 0.50 | 0.57      | 17.72  | 7.87   | 73.84  |        |
| 982078                                      | ESR       | ≥33,260 | ≥33,060 | 0.32    | 0.27 | 0.59      | 58.64  | 18.09  | 22.68  |        |
| 982079P2                                    | CR        | ≥33,260 | ≥32,710 | 0.19    | 0.52 | 1.07      | 53.22  | 33.69  | 10.55  | 0.90   |
| 982079P3                                    | CR        | ≥33,260 | ≥32,710 | 0.27    | 0.56 | 1.07      | 37.62  | 44.10  | 15.46  | 1.18   |
| 915222                                      | ESR       | ≥33,260 | ≥33,150 | 0.51    | 0.50 | 0.30      | 34.90  | 28.88  | 35.92  |        |
| 915224                                      | ESR       | ≥33,260 | ≥33,120 | 0.43    | 0.29 | 0.39      | 47.54  | 17.62  | 34.44  |        |
| 915225                                      | ESR       | ≥33,260 | ≥33,050 | 0.26    | 0.31 | 0.63      | 66.37  | 13.40  | 19.60  |        |
| 915230                                      | ESR       | ≥33,260 | ≥33,110 | 0.50    | 0.37 | 0.42      | 37.25  | 24.44  | 37.88  |        |
| 915229                                      | ESR       | ≥33,260 | ≥33,020 | 0.24    | 0.31 | 0.72      | 70.50  | 10.06  | 18.72  |        |
| 915219                                      | ESR       | ≥33,260 | ≥32,980 | 0.37    | 0.30 | 0.81      | 53.82  | 18.12  | 27.24  |        |
| 915227P2                                    | CR        | ≥33,260 | ≥32,470 | 0.19    | 0.49 | 1.16      | 51.93  | 37.17  | 8.08   | 0.47   |
| 915227P3                                    | CR        | ≥33,260 | ≥32,470 | 0.21    | 0.50 | 1.16      | 49.19  | 37.13  | 10.32  | 1.01   |
| 995132                                      | ESR       | ≥33,260 | ≥32,970 | 0.46    | 0.47 | 0.87      | 48.16  | 9.82   | 41.15  |        |
| 995134                                      | MS        | ≥33,260 | ≥32,940 | 0.46    | 0.51 | 0.94      | 35.41  | 36.87  | 26.78  |        |
| 995141                                      | ESR       | ≥33,260 | ≥32,960 | 0.25    | 0.29 | 0.88      | 60.70  | 27.58  | 10.84  |        |
| 995133                                      | ESR       | ≥33,260 | ≥32,950 | 0.34    | 0.37 | 0.93      | 57.03  | 15.79  | 26.26  |        |
| 915910                                      | ESR       | ≥33,260 | ≥32,530 | 0.34    | 0.39 | 2.19      | 57.39  | 14.49  | 25.93  |        |
| 915909                                      | ESR       | ≥33,260 | ≥32,460 | 0.64    | 0.32 | 2.39      | 29.71  | 10.07  | 57.83  |        |
| 915908                                      | MS        | ≥33,260 | ≥32,370 | 0.32    | 0.48 | 2.65      | 50.77  | 31.69  | 14.89  |        |
| 915905                                      | ESR       | ≥33,260 | ≥32,050 | 0.40    | 0.44 | 3.64      | 48.74  | 17.28  | 30.34  |        |

Table 6.5 Operational Item Statistics—English Language Arts Grade 4 CBT Administration

| ELA Grade 4 Computer-Based Test Administration |           |         |         |         |      |           |        |        |        |        |        |
|--|-----------|---------|---------|---------|------|-----------|--------|--------|--------|--------|--------|
| Item ID  | Item Type | Total N | Adj. N  | p-Value | Pbis | Omit Rate | % at 0 | % at 1 | % at 2 | % at 3 | % at 4 |
| 982220   | ESR       | ≥49,110 | ≥49,090 | 0.53    | 0.48 | 0.04      | 22.76  | 48.98  | 28.22  |        |        |
| 982222   | ESR       | ≥49,110 | ≥49,030 | 0.40    | 0.35 | 0.15      | 53.75  | 12.25  | 33.85  |        |        |
| 982223   | TE        | ≥49,110 | ≥49,040 | 0.41    | 0.53 | 0.15      | 38.15  | 41.82  | 19.88  |        |        |
| 982225   | ESR       | ≥49,110 | ≥49,050 | 0.49    | 0.53 | 0.12      | 40.88  | 20.37  | 38.63  |        |        |
| 982227   | TE        | ≥49,110 | ≥49,000 | 0.24    | 0.42 | 0.23      | 70.12  | 11.00  | 18.66  |        |        |
| 982230   | MS        | ≥49,110 | ≥49,020 | 0.35    | 0.49 | 0.18      | 48.45  | 33.56  | 17.81  |        |        |
| 982228   | ESR       | ≥49,110 | ≥49,000 | 0.47    | 0.48 | 0.23      | 49.07  | 6.66   | 44.04  |        |        |
| 982229   | ESR       | ≥49,110 | ≥49,010 | 0.67    | 0.47 | 0.21      | 27.91  | 9.59   | 62.30  |        |        |
| 98223302                                       | CR        | ≥49,110 | ≥48,490 | 0.25    | 0.65 | 0.56      | 29.36  | 44.22  | 20.20  | 4.24   | 0.71   |
| 98223303                                       | CR        | ≥49,110 | ≥48,490 | 0.33    | 0.65 | 0.56      | 29.79  | 43.86  | 20.13  | 4.95   |        |
| 982190   | ESR       | ≥49,110 | ≥49,100 | 0.69    | 0.54 | 0.01      | 25.19  | 10.84  | 63.95  |        |        |
| 982196   | ESR       | ≥49,110 | ≥49,060 | 0.61    | 0.45 | 0.09      | 36.94  | 4.40   | 58.57  |        |        |
| 982191   | ESR       | ≥49,110 | ≥49,080 | 0.57    | 0.51 | 0.07      | 39.93  | 6.36   | 53.64  |        |        |
| 982189   | TE        | ≥49,110 | ≥49,040 | 0.37    | 0.44 | 0.13      | 48.82  | 28.05  | 23.00  |        |        |
| 98219202                                       | CR        | ≥49,110 | ≥48,470 | 0.24    | 0.63 | 0.33      | 49.98  | 28.67  | 17.90  | 2.14   |        |
| 98219203                                       | CR        | ≥49,110 | ≥48,470 | 0.30    | 0.62 | 0.33      | 32.35  | 46.97  | 16.56  | 2.83   |        |
| 1029306  | ESR       | ≥49,110 | ≥49,040 | 0.39    | 0.33 | 0.14      | 56.89  | 7.58   | 35.39  |        |        |
| 1029303  | ESR       | ≥49,110 | ≥49,060 | 0.64    | 0.56 | 0.09      | 28.05  | 16.32  | 55.54  |        |        |
| 1029304  | ESR       | ≥49,110 | ≥49,070 | 0.33    | 0.37 | 0.08      | 59.79  | 14.59  | 25.53  |        |        |
| 1029305  | ESR       | ≥49,110 | ≥49,060 | 0.22    | 0.34 | 0.10      | 74.21  | 7.10   | 18.59  |        |        |
| 1029307  | ESR       | ≥49,110 | ≥49,030 | 0.53    | 0.54 | 0.15      | 38.88  | 16.76  | 44.20  |        |        |
| 1029302  | ESR       | ≥49,110 | ≥49,050 | 0.51    | 0.50 | 0.11      | 42.24  | 13.94  | 43.71  |        |        |
| 913592   | ESR       | ≥49,110 | ≥49,100 | 0.47    | 0.40 | 0.02      | 43.76  | 17.80  | 38.43  |        |        |
| 913594   | TE        | ≥49,110 | ≥48,970 | 0.40    | 0.38 | 0.28      | 37.45  | 44.59  | 17.68  |        |        |
| 998347   | ESR       | ≥49,110 | ≥49,030 | 0.24    | 0.33 | 0.15      | 67.96  | 15.55  | 16.33  |        |        |
| 913595   | ESR       | ≥49,110 | ≥49,050 | 0.36    | 0.31 | 0.12      | 58.19  | 12.26  | 29.43  |        |        |
| 917806   | ESR       | ≥49,110 | ≥48,930 | 0.40    | 0.36 | 0.36      | 49.72  | 19.97  | 29.95  |        |        |
| 932684   | TE        | ≥49,110 | ≥48,910 | 0.45    | 0.40 | 0.41      | 40.11  | 29.94  | 29.54  |        |        |
| 932676   | ESR       | ≥49,110 | ≥48,860 | 0.26    | 0.27 | 0.50      | 68.47  | 9.87   | 21.15  |        |        |
| 917811   | MS        | ≥49,110 | ≥48,840 | 0.25    | 0.23 | 0.54      | 62.51  | 24.56  | 12.39  |        |        |

Table 6.6 Operational Item Statistics—English Language Arts Grade 5 CBT Administration

| ELA Grade 5 Computer-Based Test Administration |           |         |         |         |      |           |        |        |        |        |        |
|--|-----------|---------|---------|---------|------|-----------|--------|--------|--------|--------|--------|
| Item ID  | Item Type | Total N | Adj. N  | p-Value | Pbis | Omit Rate | % at 0 | % at 1 | % at 2 | % at 3 | % at 4 |
| 980751   | ESR       | ≥49,180 | ≥49,130 | 0.41    | 0.36 | 0.10      | 46.05  | 24.86  | 29.00  |        |        |
| 980793   | ESR       | ≥49,180 | ≥49,140 | 0.76    | 0.49 | 0.08      | 21.11  | 5.15   | 73.66  |        |        |
| 980797   | ESR       | ≥49,180 | ≥49,090 | 0.44    | 0.37 | 0.18      | 46.64  | 17.54  | 35.64  |        |        |
| 980796   | MS        | ≥49,180 | ≥49,090 | 0.42    | 0.51 | 0.19      | 45.34  | 25.91  | 28.56  |        |        |
| 980754   | TE        | ≥49,180 | ≥49,020 | 0.41    | 0.45 | 0.33      | 49.92  | 17.09  | 32.66  |        |        |
| 980752   | TE        | ≥49,180 | ≥49,120 | 0.61    | 0.49 | 0.13      | 9.22   | 59.08  | 31.57  |        |        |
| 98075502                                       | CR        | ≥49,180 | ≥48,620 | 0.34    | 0.70 | 0.49      | 22.99  | 30.24  | 35.42  | 9.44   | 0.77   |
| 98075503                                       | CR        | ≥49,180 | ≥48,620 | 0.45    | 0.69 | 0.49      | 22.95  | 29.23  | 35.27  | 11.41  |        |
| 932836   | ESR       | ≥49,180 | ≥48,550 | 0.52    | 0.39 | 1.28      | 28.01  | 39.32  | 31.39  |        |        |
| 932839   | ESR       | ≥49,180 | ≥48,460 | 0.55    | 0.58 | 1.47      | 38.63  | 11.53  | 48.38  |        |        |
| 932840   | MS        | ≥49,180 | ≥48,350 | 0.45    | 0.61 | 1.69      | 42.17  | 24.65  | 31.49  |        |        |
| 932837   | TE        | ≥49,180 | ≥48,190 | 0.46    | 0.62 | 2.01      | 41.43  | 23.50  | 33.06  |        |        |
| 915501   | ESR       | ≥49,180 | ≥49,170 | 0.50    | 0.43 | 0.03      | 35.22  | 29.73  | 35.03  |        |        |
| 915500   | ESR       | ≥49,180 | ≥49,130 | 0.63    | 0.47 | 0.11      | 33.95  | 6.24   | 59.70  |        |        |
| 915507   | ESR       | ≥49,180 | ≥49,140 | 0.44    | 0.45 | 0.08      | 50.48  | 11.31  | 38.12  |        |        |
| 915497   | ESR       | ≥49,180 | ≥49,140 | 0.76    | 0.51 | 0.08      | 19.37  | 9.66   | 70.89  |        |        |
| 915499   | ESR       | ≥49,180 | ≥49,150 | 0.49    | 0.51 | 0.06      | 43.93  | 14.23  | 41.78  |        |        |
| 915511   | TE        | ≥49,180 | ≥49,120 | 0.27    | 0.20 | 0.12      | 73.01  | 0.01   | 26.87  |        |        |
| 915512   | TE        | ≥49,180 | ≥49,120 | 0.45    | 0.56 | 0.12      | 36.13  | 37.55  | 26.21  |        |        |
| 915508   | MS        | ≥49,180 | ≥49,140 | 0.29    | 0.40 | 0.09      | 58.85  | 24.34  | 16.72  |        |        |
| 91551002                                       | CR        | ≥49,180 | ≥48,620 | 0.23    | 0.70 | 0.40      | 32.23  | 42.82  | 21.60  | 2.11   | 0.09   |
| 91551003                                       | CR        | ≥49,180 | ≥48,620 | 0.32    | 0.69 | 0.40      | 31.88  | 42.58  | 21.95  | 2.44   |        |
| 916596   | ESR       | ≥49,180 | ≥49,140 | 0.47    | 0.44 | 0.09      | 38.15  | 29.87  | 31.89  |        |        |
| 958951   | ESR       | ≥49,180 | ≥49,130 | 0.37    | 0.41 | 0.10      | 57.29  | 10.80  | 31.81  |        |        |
| 916588   | ESR       | ≥49,180 | ≥49,110 | 0.42    | 0.47 | 0.15      | 53.36  | 8.38   | 38.11  |        |        |
| 916578   | TE        | ≥49,180 | ≥49,080 | 0.38    | 0.42 | 0.20      | 39.33  | 45.79  | 14.68  |        |        |
| 916594   | ESR       | ≥49,180 | ≥49,070 | 0.41    | 0.41 | 0.22      | 47.58  | 21.67  | 30.53  |        |        |
| 916590   | MS        | ≥49,180 | ≥49,080 | 0.21    | 0.33 | 0.22      | 68.17  | 20.99  | 10.63  |        |        |

Table 6.7 Operational Item Statistics—English Language Arts Grade 6 CBT Administration

| ELA Grade 6 Computer-Based Test Administration |           |         |         |         |      |           |        |        |        |        |        |
|--|-----------|---------|---------|---------|------|-----------|--------|--------|--------|--------|--------|
| Item ID  | Item Type | Total N | Adj. N  | p-Value | Pbis | Omit Rate | % at 0 | % at 1 | % at 2 | % at 3 | % at 4 |
| 913709   | ESR       | ≥49,620 | ≥49,580 | 0.47    | 0.43 | 0.08      | 41.13  | 23.56  | 35.23  |        |        |
| 913708   | ESR       | ≥49,620 | ≥49,530 | 0.59    | 0.48 | 0.17      | 34.45  | 12.76  | 52.62  |        |        |
| 913710   | ESR       | ≥49,620 | ≥49,560 | 0.43    | 0.41 | 0.11      | 46.18  | 21.86  | 31.86  |        |        |
| 913711   | TE        | ≥49,620 | ≥49,490 | 0.41    | 0.32 | 0.26      | 32.84  | 52.56  | 14.34  |        |        |
| 980309   | ESR       | ≥49,620 | ≥49,570 | 0.50    | 0.43 | 0.10      | 45.05  | 10.53  | 44.32  |        |        |
| 913712   | TE        | ≥49,620 | ≥49,370 | 0.59    | 0.64 | 0.51      | 33.52  | 15.31  | 50.66  |        |        |
| 913713   | MS        | ≥49,620 | ≥49,460 | 0.34    | 0.44 | 0.31      | 52.62  | 25.62  | 21.45  |        |        |
| 913714   | ESR       | ≥49,620 | ≥49,430 | 0.46    | 0.53 | 0.39      | 44.83  | 18.34  | 36.45  |        |        |
| 91371502                                       | CR        | ≥49,620 | ≥48,900 | 0.33    | 0.68 | 0.65      | 23.30  | 30.82  | 34.28  | 8.97   | 1.18   |
| 91371503                                       | CR        | ≥49,620 | ≥48,900 | 0.46    | 0.68 | 0.65      | 24.15  | 27.40  | 33.08  | 13.93  |        |
| 980268   | ESR       | ≥49,620 | ≥49,600 | 0.53    | 0.40 | 0.03      | 21.60  | 50.95  | 27.43  |        |        |
| 980277   | MS        | ≥49,620 | ≥49,550 | 0.38    | 0.54 | 0.14      | 47.78  | 27.95  | 24.13  |        |        |
| 980269   | ESR       | ≥49,620 | ≥49,570 | 0.60    | 0.52 | 0.10      | 35.00  | 10.54  | 54.35  |        |        |
| 980270   | MS        | ≥49,620 | ≥49,580 | 0.48    | 0.62 | 0.08      | 39.30  | 25.15  | 35.47  |        |        |
| 98026402                                       | CR        | ≥49,620 | ≥48,530 | 0.16    | 0.63 | 0.97      | 55.99  | 25.34  | 11.66  | 3.56   | 1.26   |
| 98026403                                       | CR        | ≥49,620 | ≥48,530 | 0.23    | 0.63 | 0.97      | 51.17  | 29.41  | 13.04  | 4.20   |        |
| 917785   | ESR       | ≥49,620 | ≥49,540 | 0.43    | 0.53 | 0.16      | 42.06  | 28.76  | 29.03  |        |        |
| 917781   | ESR       | ≥49,620 | ≥49,560 | 0.40    | 0.40 | 0.12      | 46.30  | 26.44  | 27.14  |        |        |
| 917755   | MS        | ≥49,620 | ≥49,560 | 0.37    | 0.43 | 0.12      | 53.02  | 20.65  | 26.20  |        |        |
| 917763   | TE        | ≥49,620 | ≥49,530 | 0.35    | 0.41 | 0.17      | 47.59  | 33.98  | 18.27  |        |        |
| 917778   | TE        | ≥49,620 | ≥49,530 | 0.58    | 0.58 | 0.17      | 15.40  | 53.45  | 30.98  |        |        |
| 917721   | ESR       | ≥49,620 | ≥49,520 | 0.45    | 0.28 | 0.20      | 44.55  | 21.41  | 33.84  |        |        |
| 1030104  | ESR       | ≥49,620 | ≥49,600 | 0.63    | 0.49 | 0.03      | 29.52  | 15.60  | 54.85  |        |        |
| 1030106  | ESR       | ≥49,620 | ≥49,540 | 0.40    | 0.46 | 0.16      | 47.94  | 23.05  | 28.85  |        |        |
| 1030108  | ESR       | ≥49,620 | ≥49,540 | 0.50    | 0.41 | 0.15      | 43.76  | 12.79  | 43.30  |        |        |
| 1030111  | MS        | ≥49,620 | ≥49,550 | 0.44    | 0.44 | 0.14      | 39.03  | 34.34  | 26.49  |        |        |
| 933575   | ESR       | ≥49,620 | ≥49,520 | 0.30    | 0.45 | 0.20      | 58.29  | 22.62  | 18.89  |        |        |
| 934013   | MS        | ≥49,620 | ≥49,530 | 0.47    | 0.55 | 0.19      | 37.37  | 31.74  | 30.71  |        |        |
| 933572   | TE        | ≥49,620 | ≥49,510 | 0.35    | 0.43 | 0.22      | 52.04  | 26.05  | 21.70  |        |        |
| 933571   | ESR       | ≥49,620 | ≥49,470 | 0.36    | 0.38 | 0.29      | 55.47  | 16.30  | 27.94  |        |        |
| 933988   | ESR       | ≥49,620 | ≥49,470 | 0.40    | 0.49 | 0.30      | 47.99  | 23.89  | 27.82  |        |        |
| 933570   | MS        | ≥49,620 | ≥49,470 | 0.32    | 0.36 | 0.29      | 43.58  | 48.68  | 7.45   |        |        |

Table 6.8 Operational Item Statistics—English Language Arts Grade 7 CBT Administration

| ELA Grade 7 Computer-Based Test Administration |           |         |         |         |      |           |        |        |        |        |        |
|--|-----------|---------|---------|---------|------|-----------|--------|--------|--------|--------|--------|
| Item ID  | Item Type | Total N | Adj. N  | p-Value | Pbis | Omit Rate | % at 0 | % at 1 | % at 2 | % at 3 | % at 4 |
| 1031079  | ESR       | ≥46,400 | ≥46,390 | 0.61    | 0.41 | 0.03      | 33.17  | 10.88  | 55.91  |        |        |
| 1031074  | ESR       | ≥46,400 | ≥46,360 | 0.78    | 0.48 | 0.10      | 18.99  | 5.74   | 75.17  |        |        |
| 1031072  | TE        | ≥46,400 | ≥46,370 | 0.48    | 0.52 | 0.07      | 37.76  | 27.73  | 34.45  |        |        |
| 1031080  | ESR       | ≥46,400 | ≥46,360 | 0.44    | 0.46 | 0.10      | 54.16  | 4.33   | 41.41  |        |        |
| 1031077  | TE        | ≥46,400 | ≥46,350 | 0.46    | 0.42 | 0.11      | 43.93  | 20.27  | 35.69  |        |        |
| 1031073  | ESR       | ≥46,400 | ≥46,360 | 0.71    | 0.40 | 0.10      | 24.97  | 8.20   | 66.73  |        |        |
| 103108102                                      | CR        | ≥46,400 | ≥45,580 | 0.26    | 0.72 | 0.84      | 30.87  | 37.72  | 24.08  | 5.06   | 0.50   |
| 103108103                                      | CR        | ≥46,400 | ≥45,580 | 0.39    | 0.72 | 0.84      | 25.74  | 36.10  | 28.86  | 7.52   |        |
| 1031199  | ESR       | ≥46,400 | ≥46,320 | 0.51    | 0.37 | 0.18      | 42.23  | 13.18  | 44.41  |        |        |
| 1031201  | MS        | ≥46,400 | ≥46,260 | 0.28    | 0.39 | 0.31      | 60.99  | 21.83  | 16.87  |        |        |
| 1031204  | TE        | ≥46,400 | ≥46,240 | 0.41    | 0.48 | 0.35      | 32.86  | 51.84  | 14.94  |        |        |
| 1031202  | ESR       | ≥46,400 | ≥46,200 | 0.41    | 0.39 | 0.45      | 49.60  | 17.58  | 32.36  |        |        |
| 915570   | ESR       | ≥46,400 | ≥46,400 | 0.71    | 0.39 | 0.01      | 18.68  | 21.08  | 60.23  |        |        |
| 915572   | ESR       | ≥46,400 | ≥46,350 | 0.52    | 0.43 | 0.11      | 37.14  | 21.11  | 41.64  |        |        |
| 915573   | ESR       | ≥46,400 | ≥46,360 | 0.45    | 0.35 | 0.10      | 47.69  | 14.72  | 37.49  |        |        |
| 915574   | TE        | ≥46,400 | ≥46,350 | 0.39    | 0.40 | 0.13      | 54.05  | 13.31  | 32.51  |        |        |
| 915578   | ESR       | ≥46,400 | ≥46,370 | 0.57    | 0.46 | 0.07      | 30.50  | 24.78  | 44.65  |        |        |
| 915576   | TE        | ≥46,400 | ≥46,310 | 0.48    | 0.52 | 0.21      | 37.79  | 28.48  | 33.53  |        |        |
| 915579   | ESR       | ≥46,400 | ≥46,330 | 0.63    | 0.51 | 0.15      | 22.19  | 30.19  | 47.47  |        |        |
| 915583   | MS        | ≥46,400 | ≥46,350 | 0.55    | 0.58 | 0.11      | 25.03  | 39.95  | 34.91  |        |        |
| 91558202                                       | CR        | ≥46,400 | ≥45,510 | 0.36    | 0.75 | 0.86      | 22.89  | 28.47  | 32.33  | 11.22  | 3.16   |
| 91558203                                       | CR        | ≥46,400 | ≥45,510 | 0.44    | 0.75 | 0.86      | 25.29  | 28.49  | 31.62  | 12.68  |        |
| 995797   | ESR       | ≥46,400 | ≥46,380 | 0.54    | 0.52 | 0.05      | 35.81  | 20.43  | 43.71  |        |        |
| 995790   | TE        | ≥46,400 | ≥46,310 | 0.47    | 0.42 | 0.21      | 32.40  | 41.03  | 26.36  |        |        |
| 995795   | MS        | ≥46,400 | ≥46,340 | 0.48    | 0.52 | 0.13      | 31.79  | 40.67  | 27.40  |        |        |
| 995793   | ESR       | ≥46,400 | ≥46,350 | 0.54    | 0.46 | 0.11      | 26.86  | 37.56  | 35.47  |        |        |
| 932791   | ESR       | ≥46,400 | ≥46,330 | 0.41    | 0.28 | 0.15      | 52.54  | 11.84  | 35.47  |        |        |
| 932789   | ESR       | ≥46,400 | ≥46,340 | 0.31    | 0.38 | 0.14      | 53.31  | 31.09  | 15.46  |        |        |
| 932827   | ESR       | ≥46,400 | ≥46,290 | 0.49    | 0.46 | 0.24      | 44.42  | 13.34  | 42.01  |        |        |
| 953139   | TE        | ≥46,400 | ≥46,290 | 0.62    | 0.58 | 0.24      | 31.92  | 12.06  | 55.78  |        |        |
| 932821   | MS        | ≥46,400 | ≥46,290 | 0.33    | 0.55 | 0.25      | 48.53  | 36.67  | 14.56  |        |        |
| 933576   | MS        | ≥46,400 | ≥46,290 | 0.39    | 0.43 | 0.25      | 49.54  | 21.97  | 28.24  |        |        |

Table 6.9 Operational Item Statistics—English Language Arts Grade 8 CBT Administration

| ELA Grade 8 Computer-Based Test Administration |           |         |         |         |      |           |        |        |        |        |        |
|--|-----------|---------|---------|---------|------|-----------|--------|--------|--------|--------|--------|
| Item ID  | Item Type | Total N | Adj. N  | p-Value | Pbis | Omit Rate | % at 0 | % at 1 | % at 2 | % at 3 | % at 4 |
| 913913   | MS        | ≥50,980 | ≥50,950 | 0.45    | 0.30 | 0.06      | 41.96  | 25.41  | 32.58  |        |        |
| 982282   | MS        | ≥50,980 | ≥50,920 | 0.32    | 0.44 | 0.12      | 51.27  | 32.89  | 15.73  |        |        |
| 913915   | ESR       | ≥50,980 | ≥50,890 | 0.45    | 0.45 | 0.17      | 51.03  | 7.52   | 41.28  |        |        |
| 913917   | ESR       | ≥50,980 | ≥50,910 | 0.63    | 0.45 | 0.14      | 32.27  | 9.55   | 58.03  |        |        |
| 913916   | ESR       | ≥50,980 | ≥50,910 | 0.46    | 0.24 | 0.13      | 49.73  | 7.82   | 42.32  |        |        |
| 913918   | TE        | ≥50,980 | ≥50,880 | 0.43    | 0.50 | 0.20      | 26.50  | 60.46  | 12.84  |        |        |
| 91391902                                       | CR        | ≥50,980 | ≥49,880 | 0.36    | 0.69 | 1.03      | 17.26  | 30.12  | 40.61  | 8.58   | 1.28   |
| 91391903                                       | CR        | ≥50,980 | ≥49,880 | 0.52    | 0.69 | 1.03      | 14.04  | 27.07  | 45.63  | 11.11  |        |
| 932831   | ESR       | ≥50,980 | ≥50,710 | 0.62    | 0.54 | 0.53      | 32.07  | 10.82  | 56.59  |        |        |
| 932830   | MS        | ≥50,980 | ≥50,610 | 0.30    | 0.33 | 0.72      | 52.05  | 33.98  | 13.25  |        |        |
| 955625   | TE        | ≥50,980 | ≥50,430 | 0.60    | 0.40 | 1.07      | 19.05  | 41.85  | 38.04  |        |        |
| 932819   | ESR       | ≥50,980 | ≥50,410 | 0.60    | 0.46 | 1.12      | 35.33  | 8.59   | 54.97  |        |        |
| 982294   | MS        | ≥50,980 | ≥50,970 | 0.32    | 0.39 | 0.03      | 43.86  | 47.69  | 8.42   |        |        |
| 982297   | TE        | ≥50,980 | ≥50,940 | 0.44    | 0.46 | 0.08      | 53.62  | 4.98   | 41.32  |        |        |
| 982299   | ESR       | ≥50,980 | ≥50,920 | 0.50    | 0.43 | 0.11      | 40.91  | 17.74  | 41.24  |        |        |
| 982301   | ESR       | ≥50,980 | ≥50,910 | 0.62    | 0.39 | 0.13      | 34.19  | 7.82   | 57.86  |        |        |
| 982300   | ESR       | ≥50,980 | ≥50,940 | 0.47    | 0.49 | 0.08      | 50.74  | 5.40   | 43.78  |        |        |
| 982302   | ESR       | ≥50,980 | ≥50,930 | 0.54    | 0.47 | 0.09      | 41.65  | 7.96   | 50.30  |        |        |
| 982303   | TE        | ≥50,980 | ≥50,910 | 0.60    | 0.45 | 0.14      | 26.99  | 26.53  | 46.34  |        |        |
| 982304   | ESR       | ≥50,980 | ≥50,900 | 0.37    | 0.45 | 0.15      | 59.66  | 5.97   | 34.22  |        |        |
| 98232702                                       | CR        | ≥50,980 | ≥49,690 | 0.31    | 0.73 | 1.10      | 23.35  | 38.92  | 24.71  | 8.86   | 1.64   |
| 98232703                                       | CR        | ≥50,980 | ≥49,690 | 0.39    | 0.75 | 1.10      | 28.49  | 33.25  | 26.89  | 8.85   |        |
| 982331   | TE        | ≥50,980 | ≥50,900 | 0.66    | 0.49 | 0.15      | 14.21  | 40.41  | 45.22  |        |        |
| 982330   | ESR       | ≥50,980 | ≥50,900 | 0.44    | 0.53 | 0.16      | 52.89  | 5.15   | 41.79  |        |        |
| 982333   | ESR       | ≥50,980 | ≥50,920 | 0.39    | 0.28 | 0.11      | 52.64  | 16.86  | 30.39  |        |        |
| 982332   | TE        | ≥50,980 | ≥50,930 | 0.32    | 0.44 | 0.10      | 55.73  | 24.10  | 20.07  |        |        |
| 982344   | TE        | ≥50,980 | ≥50,910 | 0.61    | 0.44 | 0.14      | 14.31  | 48.39  | 37.17  |        |        |
| 982338   | TE        | ≥50,980 | ≥50,890 | 0.30    | 0.40 | 0.17      | 68.78  | 2.18   | 28.87  |        |        |
| 982337   | ESR       | ≥50,980 | ≥50,880 | 0.17    | 0.26 | 0.19      | 78.43  | 9.19   | 12.19  |        |        |
| 982342   | ESR       | ≥50,980 | ≥50,880 | 0.41    | 0.44 | 0.18      | 53.23  | 10.77  | 35.82  |        |        |
| 982340   | ESR       | ≥50,980 | ≥50,890 | 0.51    | 0.38 | 0.17      | 44.18  | 8.59   | 47.06  |        |        |
| 982339   | ESR       | ≥50,980 | ≥50,900 | 0.43    | 0.46 | 0.16      | 34.04  | 46.01  | 19.79  |        |        |

Table 6.10 Operational Item Statistics—Mathematics Grade 3 CBT Administration

| Mathematics Grade 3 Computer-Based Test Administration |           |         |         |         |      |           |        |        |        |        |        |        |        |
|--|-----------|---------|---------|---------|------|-----------|--------|--------|--------|--------|--------|--------|--------|
| Item ID  | Item Type | Total N | Adj. N  | p-Value | Pbis | Omit Rate | % at 0 | % at 1 | % at 2 | % at 3 | % at 4 | % at 5 | % at 6 |
| 896892   | MC        | ≥16,150 | ≥16,140 | 0.73    | 0.47 | 0.03      |        |        |        |        |        |        |        |
| 870659   | SA        | ≥16,150 | ≥16,040 | 0.49    | 0.61 | 0.68      | 51.08  | 48.24  |        |        |        |        |        |
| 896772   | MC        | ≥16,150 | ≥16,120 | 0.40    | 0.52 | 0.14      |        |        |        |        |        |        |        |
| 914009   | MC        | ≥16,150 | ≥16,110 | 0.76    | 0.52 | 0.20      |        |        |        |        |        |        |        |
| 981809   | SA        | ≥16,150 | ≥16,070 | 0.46    | 0.47 | 0.50      | 53.78  | 45.72  |        |        |        |        |        |
| 896881   | MS        | ≥16,150 | ≥16,120 | 0.46    | 0.48 | 0.18      | 54.23  | 45.59  |        |        |        |        |        |
| 981774   | MC        | ≥16,150 | ≥16,110 | 0.43    | 0.47 | 0.23      |        |        |        |        |        |        |        |
| 981799   | MC        | ≥16,150 | ≥16,100 | 0.62    | 0.42 | 0.30      |        |        |        |        |        |        |        |
| 896778   | MC        | ≥16,150 | ≥16,100 | 0.52    | 0.43 | 0.29      |        |        |        |        |        |        |        |
| 896877   | MC        | ≥16,150 | ≥16,100 | 0.71    | 0.49 | 0.30      |        |        |        |        |        |        |        |
| 906209   | MPSR      | ≥16,150 | ≥16,080 | 0.48    | 0.37 | 0.43      | 29.96  | 43.58  | 26.04  |        |        |        |        |
| 896766   | MS        | ≥16,150 | ≥16,090 | 0.53    | 0.56 | 0.35      | 46.65  | 52.99  |        |        |        |        |        |
| 896759   | SA        | ≥16,150 | ≥16,060 | 0.50    | 0.61 | 0.53      | 50.16  | 49.31  |        |        |        |        |        |
| 981736   | CR        | ≥16,150 | ≥15,500 | 0.25    | 0.59 | 1.41      | 42.46  | 25.44  | 16.05  | 8.71   | 3.31   |        |        |
| 981744   | CR        | ≥16,150 | ≥15,180 | 0.23    | 0.69 | 3.33      | 58.47  | 15.91  | 10.19  | 9.44   |        |        |        |
| 981762   | SA        | ≥16,150 | ≥16,110 | 0.75    | 0.20 | 0.20      | 25.16  | 74.64  |        |        |        |        |        |
| 1025883  | MC        | ≥16,150 | ≥16,120 | 0.94    | 0.26 | 0.17      |        |        |        |        |        |        |        |
| 914028   | MC        | ≥16,150 | ≥16,120 | 0.33    | 0.48 | 0.19      |        |        |        |        |        |        |        |
| 896900   | SA        | ≥16,150 | ≥16,120 | 0.49    | 0.61 | 0.17      | 27.58  | 46.83  | 25.42  |        |        |        |        |
| 935017   | MS        | ≥16,150 | ≥16,130 | 0.25    | 0.43 | 0.10      | 75.23  | 24.67  |        |        |        |        |        |
| 896862   | MC        | ≥16,150 | ≥16,120 | 0.65    | 0.30 | 0.15      |        |        |        |        |        |        |        |
| 981795   | MC        | ≥16,150 | ≥16,120 | 0.68    | 0.48 | 0.19      |        |        |        |        |        |        |        |
| 896676   | MC        | ≥16,150 | ≥16,130 | 0.50    | 0.54 | 0.10      |        |        |        |        |        |        |        |
| 1026036  | MC        | ≥16,150 | ≥16,130 | 0.69    | 0.37 | 0.12      |        |        |        |        |        |        |        |
| 896902   | SA        | ≥16,150 | ≥16,120 | 0.41    | 0.67 | 0.17      | 37.11  | 43.84  | 18.88  |        |        |        |        |
| 800078   | MC        | ≥16,150 | ≥16,120 | 0.56    | 0.60 | 0.19      |        |        |        |        |        |        |        |
| 896860   | SA        | ≥16,150 | ≥16,100 | 0.31    | 0.56 | 0.30      | 69.28  | 30.42  |        |        |        |        |        |
| 897730   | CR        | ≥16,150 | ≥15,440 | 0.32    | 0.57 | 1.02      | 34.90  | 32.95  | 24.78  | 3.02   |        |        |        |
| 898004   | CR        | ≥16,150 | ≥16,000 | 0.15    | 0.59 | 0.89      | 68.71  | 19.84  | 5.47   | 5.08   |        |        |        |
| 896875   | MC        | ≥16,150 | ≥16,120 | 0.82    | 0.45 | 0.15      |        |        |        |        |        |        |        |
| 896775   | MS        | ≥16,150 | ≥16,120 | 0.19    | 0.48 | 0.15      | 81.05  | 18.80  |        |        |        |        |        |
| 981791   | MC        | ≥16,150 | ≥16,120 | 0.62    | 0.53 | 0.17      |        |        |        |        |        |        |        |
| 896868   | MC        | ≥16,150 | ≥16,100 | 0.41    | 0.29 | 0.30      |        |        |        |        |        |        |        |
| 870695   | SA        | ≥16,150 | ≥16,100 | 0.65    | 0.45 | 0.26      | 35.09  | 64.65  |        |        |        |        |        |
| 1026260  | MC        | ≥16,150 | ≥16,120 | 0.76    | 0.49 | 0.14      |        |        |        |        |        |        |        |
| 896679   | MC        | ≥16,150 | ≥16,110 | 0.66    | 0.51 | 0.23      |        |        |        |        |        |        |        |
| 914004   | SA        | ≥16,150 | ≥16,090 | 0.74    | 0.52 | 0.36      | 26.24  | 73.40  |        |        |        |        |        |
| 1026164  | MC        | ≥16,150 | ≥16,120 | 0.83    | 0.37 | 0.19      |        |        |        |        |        |        |        |
| 1026301  | SA        | ≥16,150 | ≥16,090 | 0.66    | 0.15 | 0.33      | 33.76  | 65.91  |        |        |        |        |        |

| Mathematics Grade 3 Computer-Based Test Administration |           |         |         |         |      |           |        |        |        |        |        |        |        |
|--|-----------|---------|---------|---------|------|-----------|--------|--------|--------|--------|--------|--------|--------|
| Item ID  | Item Type | Total N | Adj. N  | p-Value | Pbis | Omit Rate | % at 0 | % at 1 | % at 2 | % at 3 | % at 4 | % at 5 | % at 6 |
| 1026140  | MC        | ≥16,150 | ≥16,110 | 0.75    | 0.44 | 0.20      |        |        |        |        |        |        |        |
| 981740   | CR        | ≥16,150 | ≥15,590 | 0.29    | 0.61 | 0.86      | 50.29  | 11.79  | 31.07  | 3.41   |        |        |        |
| 981747   | CR        | ≥16,150 | ≥16,090 | 0.31    | 0.74 | 0.37      | 21.21  | 31.01  | 17.98  | 13.21  | 6.75   | 5.06   | 4.41   |



Table 6.11 Operational Item Statistics—Mathematics Grade 3 PBT Administration

| Mathematics Grade 3 Paper-Based Test Administration |           |         |         |         |      |           |        |        |        |        |        |        |        |
|---|-----------|---------|---------|---------|------|-----------|--------|--------|--------|--------|--------|--------|--------|
| Item ID   | Item Type | Total N | Adj. N  | p-Value | Pbis | Omit Rate | % at 0 | % at 1 | % at 2 | % at 3 | % at 4 | % at 5 | % at 6 |
| 896892  | MC        | ≥33,240 | ≥33,090 | 0.78    | 0.47 | 0.38      |        |        |        |        |        |        |        |
| 870659  | SA        | ≥33,240 | ≥32,300 | 0.51    | 0.58 | 2.83      | 47.62  | 49.55  |        |        |        |        |        |
| 896772  | MC        | ≥33,240 | ≥32,890 | 0.46    | 0.52 | 0.98      |        |        |        |        |        |        |        |
| 914009  | MC        | ≥33,240 | ≥32,640 | 0.81    | 0.51 | 1.40      |        |        |        |        |        |        |        |
| 981809  | SA        | ≥33,240 | ≥32,220 | 0.53    | 0.47 | 3.06      | 45.49  | 51.46  |        |        |        |        |        |
| 896881  | MS        | ≥33,240 | ≥32,940 | 0.57    | 0.47 | 0.89      | 42.95  | 56.17  |        |        |        |        |        |
| 981774  | MC        | ≥33,240 | ≥32,670 | 0.50    | 0.49 | 1.00      |        |        |        |        |        |        |        |
| 981799  | MC        | ≥33,240 | ≥31,440 | 0.64    | 0.43 | 1.23      |        |        |        |        |        |        |        |
| 896778  | MC        | ≥33,240 | ≥32,820 | 0.56    | 0.43 | 1.19      |        |        |        |        |        |        |        |
| 896877  | MC        | ≥33,240 | ≥32,800 | 0.76    | 0.49 | 1.28      |        |        |        |        |        |        |        |
| 906209  | MPSR      | ≥33,240 | ≥32,860 | 0.54    | 0.43 | 1.12      | 26.25  | 38.73  | 33.90  |        |        |        |        |
| 896766  | MS        | ≥33,240 | ≥32,840 | 0.61    | 0.55 | 1.20      | 38.26  | 60.54  |        |        |        |        |        |
| 896759  | SA        | ≥33,240 | ≥32,430 | 0.51    | 0.58 | 2.42      | 47.63  | 49.95  |        |        |        |        |        |
| 981736  | CR        | ≥33,240 | ≥32,590 | 0.36    | 0.58 | 1.56      | 30.34  | 21.08  | 25.55  | 15.28  | 5.80   |        |        |
| 981744  | CR        | ≥33,240 | ≥31,000 | 0.36    | 0.74 | 6.31      | 44.17  | 17.41  | 12.48  | 19.21  |        |        |        |
| 981762  | SA        | ≥33,240 | ≥32,660 | 0.74    | 0.31 | 1.72      | 25.28  | 73.00  |        |        |        |        |        |
| 1025883   | MC        | ≥33,240 | ≥32,990 | 0.96    | 0.23 | 0.61      |        |        |        |        |        |        |        |
| 914028  | MC        | ≥33,240 | ≥32,970 | 0.39    | 0.51 | 0.74      |        |        |        |        |        |        |        |
| 896900  | SA        | ≥33,240 | ≥33,090 | 0.53    | 0.61 | 0.45      | 22.83  | 47.30  | 29.42  |        |        |        |        |
| 935017  | MS        | ≥33,240 | ≥33,040 | 0.31    | 0.46 | 0.59      | 68.39  | 31.01  |        |        |        |        |        |
| 896862  | MC        | ≥33,240 | ≥32,760 | 0.67    | 0.29 | 1.31      |        |        |        |        |        |        |        |
| 981795  | MC        | ≥33,240 | ≥31,540 | 0.73    | 0.49 | 1.96      |        |        |        |        |        |        |        |
| 896676  | MC        | ≥33,240 | ≥32,560 | 0.57    | 0.53 | 1.80      |        |        |        |        |        |        |        |
| 1026036   | MC        | ≥33,240 | ≥32,500 | 0.73    | 0.39 | 2.16      |        |        |        |        |        |        |        |
| 896902  | SA        | ≥33,240 | ≥32,970 | 0.48    | 0.68 | 0.79      | 30.62  | 42.54  | 26.05  |        |        |        |        |
| 800078  | MC        | ≥33,240 | ≥32,720 | 0.60    | 0.60 | 1.25      |        |        |        |        |        |        |        |
| 896860  | SA        | ≥33,240 | ≥32,390 | 0.35    | 0.56 | 2.55      | 63.27  | 34.19  |        |        |        |        |        |
| 897730  | CR        | ≥33,240 | ≥32,410 | 0.39    | 0.56 | 2.05      | 25.16  | 32.14  | 37.29  | 2.93   |        |        |        |
| 898004  | CR        | ≥33,240 | ≥32,860 | 0.22    | 0.59 | 1.12      | 60.20  | 21.87  | 6.92   | 9.89   |        |        |        |
| 896875  | MC        | ≥33,240 | ≥32,970 | 0.86    | 0.43 | 0.77      |        |        |        |        |        |        |        |
| 896775  | MS        | ≥33,240 | ≥32,940 | 0.27    | 0.53 | 0.91      | 72.41  | 26.69  |        |        |        |        |        |
| 981791  | MC        | ≥33,240 | ≥32,150 | 0.68    | 0.54 | 2.86      |        |        |        |        |        |        |        |
| 896868  | MC        | ≥33,240 | ≥32,680 | 0.46    | 0.30 | 1.35      |        |        |        |        |        |        |        |
| 870695  | SA        | ≥33,240 | ≥32,390 | 0.69    | 0.43 | 2.54      | 30.28  | 67.17  |        |        |        |        |        |
| 1026260   | MC        | ≥33,240 | ≥32,920 | 0.80    | 0.48 | 0.93      |        |        |        |        |        |        |        |
| 896679  | MC        | ≥33,240 | ≥32,620 | 0.69    | 0.52 | 1.61      |        |        |        |        |        |        |        |
| 914004  | SA        | ≥33,240 | ≥32,350 | 0.79    | 0.47 | 2.68      | 20.24  | 77.08  |        |        |        |        |        |
| 1026164   | MC        | ≥33,240 | ≥32,780 | 0.88    | 0.37 | 1.29      |        |        |        |        |        |        |        |
| 1026301   | SA        | ≥33,240 | ≥32,540 | 0.65    | 0.22 | 2.09      | 33.99  | 63.91  |        |        |        |        |        |

| Mathematics Grade 3 Paper-Based Test Administration |           |         |         |         |      |           |        |        |        |        |        |        |        |
|---|-----------|---------|---------|---------|------|-----------|--------|--------|--------|--------|--------|--------|--------|
| Item ID   | Item Type | Total N | Adj. N  | p-Value | Pbis | Omit Rate | % at 0 | % at 1 | % at 2 | % at 3 | % at 4 | % at 5 | % at 6 |
| 1026140   | MC        | ≥33,240 | ≥32,800 | 0.82    | 0.43 | 1.25      |        |        |        |        |        |        |        |
| 981740  | CR        | ≥33,240 | ≥32,630 | 0.32    | 0.61 | 1.49      | 46.82  | 12.38  | 35.56  | 3.41   |        |        |        |
| 981747  | CR        | ≥33,240 | ≥33,120 | 0.42    | 0.77 | 0.36      | 16.66  | 21.56  | 15.93  | 16.55  | 9.85   | 7.57   | 11.52  |

Table 6.12 Operational Item Statistics—Mathematics Grade 4 CBT Administration

| Mathematics Grade 4 Computer-Based Test Administration |           |         |         |         |      |           |        |        |        |        |        |        |        |
|--|-----------|---------|---------|---------|------|-----------|--------|--------|--------|--------|--------|--------|--------|
| Item ID  | Item Type | Total N | Adj. N  | p-Value | Pbis | Omit Rate | % at 0 | % at 1 | % at 2 | % at 3 | % at 4 | % at 5 | % at 6 |
| 897294   | MC        | ≥48,990 | ≥48,910 | 0.82    | 0.35 | 0.16      |        |        |        |        |        |        |        |
| 870319   | SA        | ≥48,990 | ≥48,870 | 0.47    | 0.52 | 0.24      | 52.76  | 47.00  |        |        |        |        |        |
| 914124   | MC        | ≥48,990 | ≥48,840 | 0.70    | 0.48 | 0.29      |        |        |        |        |        |        |        |
| 981835   | SA        | ≥48,990 | ≥48,830 | 0.22    | 0.55 | 0.33      | 77.69  | 21.98  |        |        |        |        |        |
| 981863   | MS        | ≥48,990 | ≥48,930 | 0.45    | 0.30 | 0.12      | 54.78  | 45.10  |        |        |        |        |        |
| 981874   | MPSR      | ≥48,990 | ≥48,950 | 0.52    | 0.64 | 0.08      | 30.48  | 35.74  | 33.70  |        |        |        |        |
| 1026610  | SA        | ≥48,990 | ≥48,770 | 0.35    | 0.47 | 0.43      | 64.36  | 35.21  |        |        |        |        |        |
| 897446   | SA        | ≥48,990 | ≥48,770 | 0.66    | 0.57 | 0.45      | 34.10  | 65.45  |        |        |        |        |        |
| 897465   | SA        | ≥48,990 | ≥48,820 | 0.51    | 0.47 | 0.33      | 48.57  | 51.09  |        |        |        |        |        |
| 935180   | MS        | ≥48,990 | ≥48,910 | 0.41    | 0.60 | 0.16      | 59.40  | 40.44  |        |        |        |        |        |
| 981844   | SA        | ≥48,990 | ≥48,530 | 0.26    | 0.54 | 0.94      | 73.73  | 25.33  |        |        |        |        |        |
| 981873   | MC        | ≥48,990 | ≥48,850 | 0.58    | 0.59 | 0.28      |        |        |        |        |        |        |        |
| 981870   | MC        | ≥48,990 | ≥48,670 | 0.48    | 0.40 | 0.64      |        |        |        |        |        |        |        |
| 878671   | CR        | ≥48,990 | ≥48,670 | 0.41    | 0.72 | 0.64      | 28.05  | 24.78  | 17.05  | 14.91  | 14.56  |        |        |
| 981848   | CR        | ≥48,990 | ≥47,360 | 0.35    | 0.67 | 2.26      | 31.53  | 38.30  | 17.86  | 9.00   |        |        |        |
| 897290   | SA        | ≥48,990 | ≥48,960 | 0.82    | 0.41 | 0.06      | 18.22  | 81.72  |        |        |        |        |        |
| 897470   | MC        | ≥48,990 | ≥48,940 | 0.53    | 0.66 | 0.10      |        |        |        |        |        |        |        |
| 897468   | MC        | ≥48,990 | ≥48,950 | 0.41    | 0.49 | 0.08      |        |        |        |        |        |        |        |
| 897463   | MC        | ≥48,990 | ≥48,920 | 0.63    | 0.43 | 0.13      |        |        |        |        |        |        |        |
| 897302   | MC        | ≥48,990 | ≥48,950 | 0.55    | 0.55 | 0.07      |        |        |        |        |        |        |        |
| 981855   | SA        | ≥48,990 | ≥48,870 | 0.43    | 0.36 | 0.25      | 56.87  | 42.88  |        |        |        |        |        |
| 981872   | MC        | ≥48,990 | ≥48,950 | 0.67    | 0.43 | 0.07      |        |        |        |        |        |        |        |
| 897444   | SA        | ≥48,990 | ≥48,960 | 0.69    | 0.56 | 0.06      | 15.87  | 30.20  | 53.87  |        |        |        |        |
| 1026499  | MC        | ≥48,990 | ≥48,940 | 0.60    | 0.41 | 0.09      |        |        |        |        |        |        |        |
| 897289   | MC        | ≥48,990 | ≥48,960 | 0.68    | 0.57 | 0.07      |        |        |        |        |        |        |        |
| 981877   | MPSR      | ≥48,990 | ≥48,940 | 0.54    | 0.53 | 0.09      | 24.67  | 41.75  | 33.49  |        |        |        |        |
| 897472   | MS        | ≥48,990 | ≥48,950 | 0.44    | 0.63 | 0.08      | 55.55  | 44.37  |        |        |        |        |        |
| 981831   | CR        | ≥48,990 | ≥47,890 | 0.23    | 0.67 | 1.00      | 56.22  | 21.08  | 15.39  | 5.07   |        |        |        |
| 981821   | CR        | ≥48,990 | ≥47,220 | 0.14    | 0.58 | 1.69      | 70.72  | 14.31  | 7.74   | 3.63   |        |        |        |
| 898012   | SA        | ≥48,990 | ≥48,930 | 0.72    | 0.43 | 0.12      | 27.51  | 72.37  |        |        |        |        |        |
| 981850   | MC        | ≥48,990 | ≥48,930 | 0.44    | 0.42 | 0.12      |        |        |        |        |        |        |        |
| 897310   | MC        | ≥48,990 | ≥48,910 | 0.49    | 0.58 | 0.16      |        |        |        |        |        |        |        |
| 981890   | MS        | ≥48,990 | ≥48,950 | 0.75    | 0.49 | 0.07      | 24.98  | 74.95  |        |        |        |        |        |
| 897300   | SA        | ≥48,990 | ≥48,920 | 0.44    | 0.67 | 0.14      | 55.53  | 44.33  |        |        |        |        |        |
| 897303   | MS        | ≥48,990 | ≥48,960 | 0.66    | 0.55 | 0.05      | 33.83  | 66.12  |        |        |        |        |        |
| 897438   | MC        | ≥48,990 | ≥48,920 | 0.70    | 0.47 | 0.13      |        |        |        |        |        |        |        |
| 897287   | MS        | ≥48,990 | ≥48,940 | 0.39    | 0.46 | 0.11      | 61.02  | 38.87  |        |        |        |        |        |
| 1026698  | MC        | ≥48,990 | ≥48,920 | 0.64    | 0.54 | 0.13      |        |        |        |        |        |        |        |
| 981866   | SA        | ≥48,990 | ≥48,860 | 0.51    | 0.57 | 0.27      | 48.75  | 50.99  |        |        |        |        |        |

| Mathematics Grade 4 Computer-Based Test Administration |           |         |         |         |      |           |        |        |        |        |        |        |        |
|--|-----------|---------|---------|---------|------|-----------|--------|--------|--------|--------|--------|--------|--------|
| Item ID  | Item Type | Total N | Adj. N  | p-Value | Pbis | Omit Rate | % at 0 | % at 1 | % at 2 | % at 3 | % at 4 | % at 5 | % at 6 |
| 914094   | SA        | ≥48,990 | ≥48,820 | 0.30    | 0.58 | 0.34      | 69.94  | 29.72  |        |        |        |        |        |
| 897443   | SA        | ≥48,990 | ≥48,820 | 0.31    | 0.47 | 0.33      | 68.31  | 31.36  |        |        |        |        |        |
| 900676   | CR        | ≥48,990 | ≥48,280 | 0.21    | 0.53 | 0.73      | 48.10  | 40.68  | 7.13   | 2.64   |        |        |        |
| 981827   | CR        | ≥48,990 | ≥47,980 | 0.18    | 0.65 | 1.13      | 58.10  | 9.92   | 13.45  | 4.44   | 7.13   | 2.41   | 2.50   |

Table 6.13 Operational Item Statistics—Mathematics Grade 5 CBT Administration

| Mathematics Grade 5 Computer-Based Test Administration |           |         |         |         |      |           |        |        |        |        |        |        |        |
|--|-----------|---------|---------|---------|------|-----------|--------|--------|--------|--------|--------|--------|--------|
| Item ID  | Item Type | Total N | Adj. N  | p-Value | Pbis | Omit Rate | % at 0 | % at 1 | % at 2 | % at 3 | % at 4 | % at 5 | % at 6 |
| 1027169  | MC        | ≥49,020 | ≥49,000 | 0.69    | 0.45 | 0.04      |        |        |        |        |        |        |        |
| 903245   | MC        | ≥49,020 | ≥48,980 | 0.57    | 0.28 | 0.09      |        |        |        |        |        |        |        |
| 903375   | MS        | ≥49,020 | ≥48,990 | 0.47    | 0.51 | 0.06      | 52.55  | 47.39  |        |        |        |        |        |
| 898173   | SA        | ≥49,020 | ≥48,820 | 0.38    | 0.64 | 0.41      | 61.43  | 38.16  |        |        |        |        |        |
| 897988   | TE        | ≥49,020 | ≥48,750 | 0.77    | 0.44 | 0.56      | 22.64  | 76.80  |        |        |        |        |        |
| 982511   | SA        | ≥49,020 | ≥48,530 | 0.58    | 0.53 | 1.01      | 41.21  | 57.78  |        |        |        |        |        |
| 982488   | MC        | ≥49,020 | ≥48,910 | 0.40    | 0.59 | 0.22      |        |        |        |        |        |        |        |
| 1026946  | SA        | ≥49,020 | ≥48,660 | 0.29    | 0.55 | 0.74      | 70.50  | 28.75  |        |        |        |        |        |
| 982506   | SA        | ≥49,020 | ≥48,720 | 0.39    | 0.53 | 0.62      | 60.65  | 38.73  |        |        |        |        |        |
| 868653   | MPSR      | ≥49,020 | ≥48,850 | 0.47    | 0.28 | 0.35      | 31.20  | 43.56  | 24.89  |        |        |        |        |
| 898172   | SA        | ≥49,020 | ≥48,820 | 0.68    | 0.52 | 0.42      | 31.85  | 67.73  |        |        |        |        |        |
| 898159   | SA        | ≥49,020 | ≥48,770 | 0.43    | 0.63 | 0.52      | 56.35  | 43.13  |        |        |        |        |        |
| 982492   | TE        | ≥49,020 | ≥48,810 | 0.38    | 0.61 | 0.44      | 61.54  | 38.02  |        |        |        |        |        |
| 914152   | CR        | ≥49,020 | ≥48,020 | 0.29    | 0.69 | 1.60      | 37.89  | 28.43  | 16.29  | 10.72  | 4.63   |        |        |
| 902413   | CR        | ≥49,020 | ≥48,230 | 0.21    | 0.69 | 1.62      | 58.87  | 22.64  | 10.39  | 6.49   |        |        |        |
| 1026866  | MC        | ≥49,020 | ≥49,000 | 0.49    | 0.39 | 0.04      |        |        |        |        |        |        |        |
| 870762   | SA        | ≥49,020 | ≥48,830 | 0.23    | 0.60 | 0.39      | 65.08  | 23.67  | 10.85  |        |        |        |        |
| 898169   | MC        | ≥49,020 | ≥48,980 | 0.44    | 0.41 | 0.08      |        |        |        |        |        |        |        |
| 982534   | MS        | ≥49,020 | ≥48,960 | 0.28    | 0.52 | 0.13      | 72.29  | 27.58  |        |        |        |        |        |
| 898019   | MC        | ≥49,020 | ≥48,970 | 0.77    | 0.43 | 0.10      |        |        |        |        |        |        |        |
| 898152   | MS        | ≥49,020 | ≥48,990 | 0.35    | 0.52 | 0.06      | 64.87  | 35.06  |        |        |        |        |        |
| 898011   | MC        | ≥49,020 | ≥48,940 | 0.50    | 0.43 | 0.17      |        |        |        |        |        |        |        |
| 1026988  | MC        | ≥49,020 | ≥48,950 | 0.20    | 0.38 | 0.15      |        |        |        |        |        |        |        |
| 903248   | MPSR      | ≥49,020 | ≥48,980 | 0.54    | 0.61 | 0.09      | 23.57  | 45.08  | 31.26  |        |        |        |        |
| 897984   | MC        | ≥49,020 | ≥48,930 | 0.41    | 0.52 | 0.19      |        |        |        |        |        |        |        |
| 903244   | MC        | ≥49,020 | ≥48,970 | 0.38    | 0.42 | 0.11      |        |        |        |        |        |        |        |
| 982518   | MS        | ≥49,020 | ≥48,970 | 0.75    | 0.46 | 0.11      | 25.02  | 74.87  |        |        |        |        |        |
| 912443   | CR        | ≥49,020 | ≥48,290 | 0.19    | 0.53 | 0.93      | 62.59  | 22.71  | 6.25   | 6.95   |        |        |        |
| 902414   | CR        | ≥49,020 | ≥47,790 | 0.15    | 0.56 | 1.72      | 71.18  | 11.18  | 11.24  | 3.89   |        |        |        |
| 982522   | TE        | ≥49,020 | ≥49,020 | 0.85    | 0.28 | 0.01      | 14.76  | 85.22  |        |        |        |        |        |
| 898164   | SA        | ≥49,020 | ≥48,920 | 0.56    | 0.33 | 0.21      | 44.01  | 55.78  |        |        |        |        |        |
| 982538   | MC        | ≥49,020 | ≥48,990 | 0.59    | 0.40 | 0.07      |        |        |        |        |        |        |        |
| 914580   | TE        | ≥49,020 | ≥48,980 | 0.67    | 0.43 | 0.10      | 32.55  | 67.35  |        |        |        |        |        |
| 898162   | MC        | ≥49,020 | ≥48,990 | 0.45    | 0.47 | 0.08      |        |        |        |        |        |        |        |
| 914159   | MC        | ≥49,020 | ≥48,990 | 0.30    | 0.49 | 0.07      |        |        |        |        |        |        |        |
| 904184   | TE        | ≥49,020 | ≥48,890 | 0.54    | 0.65 | 0.28      | 45.44  | 54.28  |        |        |        |        |        |
| 914156   | MS        | ≥49,020 | ≥48,960 | 0.13    | 0.42 | 0.12      | 86.77  | 13.10  |        |        |        |        |        |
| 1109475  | SA        | ≥49,020 | ≥48,950 | 0.65    | 0.50 | 0.16      | 35.06  | 64.78  |        |        |        |        |        |
| 898158   | MC        | ≥49,020 | ≥48,980 | 0.56    | 0.45 | 0.09      |        |        |        |        |        |        |        |

| Mathematics Grade 5 Computer-Based Test Administration |           |         |         |         |      |           |        |        |        |        |        |        |        |
|--|-----------|---------|---------|---------|------|-----------|--------|--------|--------|--------|--------|--------|--------|
| Item ID  | Item Type | Total N | Adj. N  | p-Value | Pbis | Omit Rate | % at 0 | % at 1 | % at 2 | % at 3 | % at 4 | % at 5 | % at 6 |
| 1026930  | MC        | ≥49,020 | ≥48,960 | 0.37    | 0.47 | 0.12      |        |        |        |        |        |        |        |
| 982503   | MC        | ≥49,020 | ≥48,960 | 0.64    | 0.48 | 0.14      |        |        |        |        |        |        |        |
| 902411   | CR        | ≥49,020 | ≥48,920 | 0.34    | 0.68 | 0.20      | 36.50  | 31.04  | 25.71  | 6.55   |        |        |        |
| 914207   | CR        | ≥49,020 | ≥48,700 | 0.15    | 0.61 | 0.65      | 42.96  | 31.04  | 18.83  | 4.87   | 0.91   | 0.52   | 0.22   |

Table 6.14 Item Statistics—Mathematics Grade 6 Computer-Based Test Administration

| Mathematics Grade 6 Computer-Based Test Administration |           |         |         |         |      |           |        |        |        |        |        |        |        |
|--|-----------|---------|---------|---------|------|-----------|--------|--------|--------|--------|--------|--------|--------|
| Item ID  | Item Type | Total N | Adj. N  | p-Value | Pbis | Omit Rate | % at 0 | % at 1 | % at 2 | % at 3 | % at 4 | % at 5 | % at 6 |
| 868801   | MC        | ≥49,430 | ≥49,400 | 0.66    | 0.50 | 0.07      |        |        |        |        |        |        |        |
| 901541   | SA        | ≥49,430 | ≥48,940 | 0.66    | 0.45 | 1.00      | 33.26  | 65.74  |        |        |        |        |        |
| 900531   | SA        | ≥49,430 | ≥49,100 | 0.70    | 0.36 | 0.67      | 30.03  | 69.30  |        |        |        |        |        |
| 914267   | SA        | ≥49,430 | ≥48,950 | 0.26    | 0.46 | 0.98      | 73.58  | 25.45  |        |        |        |        |        |
| 981981   | TE        | ≥49,430 | ≥49,320 | 0.48    | 0.54 | 0.23      | 52.33  | 47.44  |        |        |        |        |        |
| 900526   | MS        | ≥49,430 | ≥49,350 | 0.63    | 0.49 | 0.16      | 36.63  | 63.22  |        |        |        |        |        |
| 900521   | SA        | ≥49,430 | ≥49,030 | 0.32    | 0.53 | 0.81      | 67.84  | 31.35  |        |        |        |        |        |
| 901543   | MS        | ≥49,430 | ≥49,330 | 0.46    | 0.46 | 0.20      | 53.41  | 46.39  |        |        |        |        |        |
| 901534   | MPSR      | ≥49,430 | ≥49,320 | 0.69    | 0.48 | 0.21      | 14.73  | 33.32  | 51.73  |        |        |        |        |
| 981997   | TE        | ≥49,430 | ≥49,290 | 0.64    | 0.52 | 0.29      | 35.46  | 64.25  |        |        |        |        |        |
| 878305   | MC        | ≥49,430 | ≥49,240 | 0.46    | 0.39 | 0.38      |        |        |        |        |        |        |        |
| 981973   | SA        | ≥49,430 | ≥49,230 | 0.70    | 0.37 | 0.40      | 30.29  | 69.31  |        |        |        |        |        |
| 800191   | MC        | ≥49,430 | ≥49,180 | 0.54    | 0.43 | 0.51      |        |        |        |        |        |        |        |
| 1027521  | TE        | ≥49,430 | ≥49,090 | 0.30    | 0.62 | 0.69      | 69.72  | 29.59  |        |        |        |        |        |
| 914230   | SA        | ≥49,430 | ≥48,940 | 0.53    | 0.58 | 1.00      | 46.56  | 52.44  |        |        |        |        |        |
| 981977   | MC        | ≥49,430 | ≥49,040 | 0.52    | 0.47 | 0.78      |        |        |        |        |        |        |        |
| 1027593  | SA        | ≥49,430 | ≥48,370 | 0.17    | 0.45 | 2.14      | 81.07  | 16.79  |        |        |        |        |        |
| 903077   | SA        | ≥49,430 | ≥48,700 | 0.37    | 0.38 | 1.47      | 62.48  | 36.05  |        |        |        |        |        |
| 1027281  | MC        | ≥49,430 | ≥48,790 | 0.77    | 0.42 | 1.29      |        |        |        |        |        |        |        |
| 903099   | MS        | ≥49,430 | ≥49,410 | 0.62    | 0.48 | 0.04      | 37.70  | 62.26  |        |        |        |        |        |
| 982013   | MC        | ≥49,430 | ≥49,390 | 0.37    | 0.43 | 0.07      |        |        |        |        |        |        |        |
| 900537   | SA        | ≥49,430 | ≥49,250 | 0.57    | 0.38 | 0.37      | 42.37  | 57.26  |        |        |        |        |        |
| 901547   | SA        | ≥49,430 | ≥49,250 | 0.51    | 0.62 | 0.36      | 39.28  | 19.99  | 40.37  |        |        |        |        |
| 982019   | SA        | ≥49,430 | ≥49,180 | 0.33    | 0.63 | 0.50      | 66.32  | 33.17  |        |        |        |        |        |
| 903080   | SA        | ≥49,430 | ≥49,110 | 0.21    | 0.50 | 0.64      | 78.71  | 20.66  |        |        |        |        |        |
| 981963   | CR        | ≥49,430 | ≥47,790 | 0.28    | 0.65 | 1.64      | 40.54  | 23.41  | 17.05  | 10.98  | 4.69   |        |        |
| 982011   | SA        | ≥49,430 | ≥49,210 | 0.31    | 0.50 | 0.44      | 68.99  | 30.57  |        |        |        |        |        |
| 904180   | TE        | ≥49,430 | ≥49,340 | 0.28    | 0.60 | 0.18      | 56.20  | 32.16  | 11.46  |        |        |        |        |
| 981961   | CR        | ≥49,430 | ≥47,630 | 0.26    | 0.64 | 2.15      | 48.42  | 28.74  | 12.58  | 6.61   |        |        |        |
| 981955   | CR        | ≥49,430 | ≥48,540 | 0.11    | 0.56 | 1.80      | 70.39  | 12.58  | 6.09   | 2.68   | 2.65   | 2.59   | 1.22   |
| 870825   | CR        | ≥49,430 | ≥46,270 | 0.17    | 0.64 | 4.22      | 54.93  | 30.86  | 5.29   | 2.51   |        |        |        |
| 903094   | MC        | ≥49,430 | ≥49,400 | 0.48    | 0.44 | 0.06      |        |        |        |        |        |        |        |
| 903086   | MC        | ≥49,430 | ≥49,380 | 0.39    | 0.44 | 0.11      |        |        |        |        |        |        |        |
| 981982   | SA        | ≥49,430 | ≥49,380 | 0.53    | 0.64 | 0.11      | 26.99  | 39.15  | 33.75  |        |        |        |        |
| 1027312  | MS        | ≥49,430 | ≥49,400 | 0.31    | 0.32 | 0.07      | 68.74  | 31.19  |        |        |        |        |        |
| 982031   | MC        | ≥49,430 | ≥49,390 | 0.38    | 0.42 | 0.09      |        |        |        |        |        |        |        |
| 902741   | TE        | ≥49,430 | ≥49,370 | 0.74    | 0.43 | 0.13      | 25.80  | 74.08  |        |        |        |        |        |
| 903102   | SA        | ≥49,430 | ≥49,160 | 0.22    | 0.56 | 0.55      | 77.13  | 22.32  |        |        |        |        |        |
| 902748   | MC        | ≥49,430 | ≥49,390 | 0.49    | 0.40 | 0.08      |        |        |        |        |        |        |        |

| Mathematics Grade 6 Computer-Based Test Administration |           |         |         |         |      |           |        |        |        |        |        |        |        |
|--|-----------|---------|---------|---------|------|-----------|--------|--------|--------|--------|--------|--------|--------|
| Item ID  | Item Type | Total N | Adj. N  | p-Value | Pbis | Omit Rate | % at 0 | % at 1 | % at 2 | % at 3 | % at 4 | % at 5 | % at 6 |
| 902739   | SA        | ≥49,430 | ≥49,350 | 0.51    | 0.52 | 0.16      | 49.31  | 50.53  |        |        |        |        |        |
| 902991   | CR        | ≥49,430 | ≥49,380 | 0.18    | 0.44 | 0.11      | 63.17  | 24.90  | 7.56   | 4.26   |        |        |        |
| 981965   | CR        | ≥49,430 | ≥49,370 | 0.36    | 0.76 | 0.12      | 29.99  | 29.41  | 17.03  | 11.49  | 11.96  |        |        |
| 981959   | CR        | ≥49,430 | ≥47,790 | 0.27    | 0.55 | 1.45      | 47.85  | 31.35  | 5.48   | 11.99  |        |        |        |



Table 6.15 Item Statistics—Mathematics Grade 7 Computer-Based Test Administration

| Mathematics Grade 7 Computer-Based Test Administration |           |         |         |         |      |           |        |        |        |        |        |        |        |
|--|-----------|---------|---------|---------|------|-----------|--------|--------|--------|--------|--------|--------|--------|
| Item ID  | Item Type | Total N | Adj. N  | p-Value | Pbis | Omit Rate | % at 0 | % at 1 | % at 2 | % at 3 | % at 4 | % at 5 | % at 6 |
| 897996   | SA        | ≥51,040 | ≥50,830 | 0.81    | 0.36 | 0.41      | 18.89  | 80.70  |        |        |        |        |        |
| 914341   | MC        | ≥51,040 | ≥50,990 | 0.75    | 0.39 | 0.10      |        |        |        |        |        |        |        |
| 899863   | MS        | ≥51,040 | ≥50,850 | 0.34    | 0.56 | 0.38      | 65.36  | 34.26  |        |        |        |        |        |
| 982970   | TE        | ≥51,040 | ≥50,900 | 0.21    | 0.49 | 0.27      | 79.14  | 20.59  |        |        |        |        |        |
| 902442   | SA        | ≥51,040 | ≥50,470 | 0.14    | 0.50 | 1.11      | 85.48  | 13.41  |        |        |        |        |        |
| 1027689  | TE        | ≥51,040 | ≥50,850 | 0.25    | 0.50 | 0.37      | 74.82  | 24.81  |        |        |        |        |        |
| 899318   | MS        | ≥51,040 | ≥50,910 | 0.34    | 0.23 | 0.25      | 66.20  | 33.55  |        |        |        |        |        |
| 900175   | SA        | ≥51,040 | ≥49,550 | 0.14    | 0.51 | 2.92      | 83.14  | 13.93  |        |        |        |        |        |
| 800229   | MC        | ≥51,040 | ≥50,840 | 0.62    | 0.38 | 0.39      |        |        |        |        |        |        |        |
| 898450   | SA        | ≥51,040 | ≥50,610 | 0.35    | 0.49 | 0.84      | 64.03  | 35.13  |        |        |        |        |        |
| 899322   | SA        | ≥51,040 | ≥50,900 | 0.44    | 0.68 | 0.27      | 38.53  | 35.33  | 25.87  |        |        |        |        |
| 899320   | SA        | ≥51,040 | ≥49,650 | 0.24    | 0.66 | 2.73      | 74.08  | 23.19  |        |        |        |        |        |
| 800213   | MC        | ≥51,040 | ≥50,500 | 0.30    | 0.30 | 1.06      |        |        |        |        |        |        |        |
| 1027651  | SA        | ≥51,040 | ≥49,250 | 0.26    | 0.58 | 3.51      | 70.96  | 25.54  |        |        |        |        |        |
| 982988   | MS        | ≥51,040 | ≥50,300 | 0.21    | 0.55 | 1.45      | 77.55  | 21.00  |        |        |        |        |        |
| 983009   | MC        | ≥51,040 | ≥50,100 | 0.24    | 0.34 | 1.84      |        |        |        |        |        |        |        |
| 897990   | SA        | ≥51,040 | ≥49,350 | 0.37    | 0.59 | 3.31      | 60.75  | 35.94  |        |        |        |        |        |
| 902443   | MC        | ≥51,040 | ≥49,990 | 0.58    | 0.34 | 2.07      |        |        |        |        |        |        |        |
| 1027843  | MC        | ≥51,040 | ≥49,820 | 0.61    | 0.38 | 2.38      |        |        |        |        |        |        |        |
| 899859   | MC        | ≥51,040 | ≥51,000 | 0.34    | 0.31 | 0.08      |        |        |        |        |        |        |        |
| 900172   | SA        | ≥51,040 | ≥50,470 | 0.18    | 0.59 | 1.12      | 81.57  | 17.31  |        |        |        |        |        |
| 982964   | TE        | ≥51,040 | ≥50,990 | 0.40    | 0.44 | 0.11      | 60.10  | 39.80  |        |        |        |        |        |
| 1027725  | SA        | ≥51,040 | ≥50,950 | 0.35    | 0.60 | 0.18      | 47.09  | 35.60  | 17.13  |        |        |        |        |
| 899323   | SA        | ≥51,040 | ≥50,810 | 0.55    | 0.51 | 0.46      | 44.55  | 55.00  |        |        |        |        |        |
| 899315   | MS        | ≥51,040 | ≥50,880 | 0.26    | 0.44 | 0.31      | 73.51  | 26.18  |        |        |        |        |        |
| 982919   | CR        | ≥51,040 | ≥50,920 | 0.22    | 0.76 | 0.24      | 36.84  | 33.90  | 12.61  | 5.19   | 4.95   | 2.94   | 3.32   |
| 982954   | TE        | ≥51,040 | ≥50,820 | 0.30    | 0.62 | 0.43      | 60.98  | 17.35  | 21.24  |        |        |        |        |
| 902446   | MC        | ≥51,040 | ≥50,930 | 0.42    | 0.39 | 0.21      |        |        |        |        |        |        |        |
| 982923   | CR        | ≥51,040 | ≥50,830 | 0.23    | 0.43 | 0.42      | 43.31  | 46.94  | 6.92   | 2.41   |        |        |        |
| 900540   | CR        | ≥51,040 | ≥50,810 | 0.41    | 0.66 | 0.46      | 38.41  | 21.34  | 18.85  | 20.95  |        |        |        |
| 900539   | CR        | ≥51,040 | ≥49,590 | 0.24    | 0.68 | 2.85      | 49.28  | 22.47  | 10.61  | 10.51  | 4.28   |        |        |
| 982961   | MS        | ≥51,040 | ≥51,020 | 0.20    | 0.53 | 0.04      | 80.29  | 19.67  |        |        |        |        |        |
| 915699   | TE        | ≥51,040 | ≥50,990 | 0.42    | 0.56 | 0.10      | 57.64  | 42.26  |        |        |        |        |        |
| 900173   | MC        | ≥51,040 | ≥51,000 | 0.53    | 0.34 | 0.08      |        |        |        |        |        |        |        |
| 870878   | SA        | ≥51,040 | ≥50,860 | 0.21    | 0.53 | 0.35      | 78.80  | 20.85  |        |        |        |        |        |
| 898444   | SA        | ≥51,040 | ≥50,900 | 0.62    | 0.56 | 0.29      | 37.60  | 62.11  |        |        |        |        |        |
| 900180   | SA        | ≥51,040 | ≥50,890 | 0.28    | 0.64 | 0.29      | 71.68  | 28.03  |        |        |        |        |        |
| 1027728  | TE        | ≥51,040 | ≥50,960 | 0.28    | 0.61 | 0.17      | 55.85  | 31.83  | 12.14  |        |        |        |        |
| 982958   | SA        | ≥51,040 | ≥50,820 | 0.34    | 0.60 | 0.44      | 66.17  | 33.39  |        |        |        |        |        |

| Mathematics Grade 7 Computer-Based Test Administration |           |         |         |         |      |           |        |        |        |        |        |        |        |
|--|-----------|---------|---------|---------|------|-----------|--------|--------|--------|--------|--------|--------|--------|
| Item ID  | Item Type | Total N | Adj. N  | p-Value | Pbis | Omit Rate | % at 0 | % at 1 | % at 2 | % at 3 | % at 4 | % at 5 | % at 6 |
| 870880   | MC        | ≥51,040 | ≥50,980 | 0.51    | 0.31 | 0.13      |        |        |        |        |        |        |        |
| 900520   | CR        | ≥51,040 | ≥48,380 | 0.12    | 0.63 | 3.56      | 80.23  | 3.89   | 3.13   | 7.53   |        |        |        |
| 914333   | CR        | ≥51,040 | ≥49,780 | 0.33    | 0.68 | 1.68      | 31.49  | 24.99  | 22.52  | 14.43  | 4.09   |        |        |
| 982932   | CR        | ≥51,040 | ≥49,200 | 0.22    | 0.72 | 2.53      | 65.74  | 5.71   | 18.08  | 6.86   |        |        |        |

Table 6.16 Item Statistics—Mathematics Grade 8 Computer-Based Test Administration

| Mathematics Grade 8 Computer-Based Test Administration |           |         |         |         |      |           |        |        |        |        |        |        |        |
|--|-----------|---------|---------|---------|------|-----------|--------|--------|--------|--------|--------|--------|--------|
| Item ID  | Item Type | Total N | Adj. N  | p-Value | Pbis | Omit Rate | % at 0 | % at 1 | % at 2 | % at 3 | % at 4 | % at 5 | % at 6 |
| 900515   | TE        | ≥45,070 | ≥44,980 | 0.31    | 0.25 | 0.21      | 69.29  | 30.50  |        |        |        |        |        |
| 983049   | MS        | ≥45,070 | ≥44,910 | 0.33    | 0.51 | 0.37      | 66.46  | 33.18  |        |        |        |        |        |
| 983076   | MC        | ≥45,070 | ≥44,940 | 0.47    | 0.21 | 0.29      |        |        |        |        |        |        |        |
| 870345   | MPSR      | ≥45,070 | ≥45,050 | 0.44    | 0.47 | 0.05      | 30.02  | 51.21  | 18.72  |        |        |        |        |
| 897458   | SA        | ≥45,070 | ≥43,830 | 0.20    | 0.51 | 2.75      | 77.68  | 19.57  |        |        |        |        |        |
| 914388   | MC        | ≥45,070 | ≥44,830 | 0.50    | 0.40 | 0.54      |        |        |        |        |        |        |        |
| 983065   | MC        | ≥45,070 | ≥44,990 | 0.38    | 0.42 | 0.17      |        |        |        |        |        |        |        |
| 983117   | MC        | ≥45,070 | ≥44,980 | 0.71    | 0.30 | 0.19      |        |        |        |        |        |        |        |
| 983063   | TE        | ≥45,070 | ≥44,950 | 0.45    | 0.54 | 0.27      | 35.26  | 39.27  | 25.20  |        |        |        |        |
| 897074   | MS        | ≥45,070 | ≥44,990 | 0.25    | 0.43 | 0.18      | 75.21  | 24.62  |        |        |        |        |        |
| 897069   | MC        | ≥45,070 | ≥44,920 | 0.44    | 0.26 | 0.34      |        |        |        |        |        |        |        |
| 983068   | MS        | ≥45,070 | ≥44,820 | 0.30    | 0.55 | 0.55      | 70.03  | 29.43  |        |        |        |        |        |
| 1027999  | SA        | ≥45,070 | ≥43,880 | 0.23    | 0.54 | 2.65      | 74.56  | 22.79  |        |        |        |        |        |
| 983052   | TE        | ≥45,070 | ≥44,540 | 0.32    | 0.46 | 1.18      | 67.64  | 31.19  |        |        |        |        |        |
| 896995   | MS        | ≥45,070 | ≥44,800 | 0.28    | 0.39 | 0.59      | 71.10  | 28.31  |        |        |        |        |        |
| 983032   | SA        | ≥45,070 | ≥43,800 | 0.15    | 0.54 | 2.83      | 82.54  | 14.64  |        |        |        |        |        |
| 891485   | MS        | ≥45,070 | ≥44,610 | 0.17    | 0.40 | 1.02      | 81.70  | 17.28  |        |        |        |        |        |
| 898148   | MC        | ≥45,070 | ≥44,630 | 0.42    | 0.38 | 0.97      |        |        |        |        |        |        |        |
| 896996   | MC        | ≥45,070 | ≥44,550 | 0.51    | 0.30 | 1.15      |        |        |        |        |        |        |        |
| 896991   | MS        | ≥45,070 | ≥44,500 | 0.31    | 0.58 | 1.27      | 67.64  | 31.09  |        |        |        |        |        |
| 983046   | SA        | ≥45,070 | ≥44,990 | 0.27    | 0.52 | 0.18      | 55.87  | 33.21  | 10.74  |        |        |        |        |
| 983074   | MC        | ≥45,070 | ≥45,010 | 0.44    | 0.38 | 0.13      |        |        |        |        |        |        |        |
| 878967   | SA        | ≥45,070 | ≥44,830 | 0.22    | 0.56 | 0.53      | 77.75  | 21.72  |        |        |        |        |        |
| 982996   | TE        | ≥45,070 | ≥44,800 | 0.20    | 0.61 | 0.60      | 65.12  | 29.25  | 5.02   |        |        |        |        |
| 899313   | CR        | ≥45,070 | ≥42,630 | 0.15    | 0.55 | 3.55      | 55.18  | 11.51  | 20.14  | 3.38   | 2.16   | 1.29   | 0.91   |
| 983034   | TE        | ≥45,070 | ≥44,930 | 0.22    | 0.61 | 0.31      | 77.36  | 22.34  |        |        |        |        |        |
| 897072   | SA        | ≥45,070 | ≥44,630 | 0.18    | 0.57 | 0.98      | 80.71  | 18.32  |        |        |        |        |        |
| 901194   | MS        | ≥45,070 | ≥44,920 | 0.17    | 0.27 | 0.33      | 82.65  | 17.02  |        |        |        |        |        |
| 982999   | CR        | ≥45,070 | ≥42,430 | 0.13    | 0.54 | 3.45      | 69.29  | 16.04  | 5.06   | 3.74   |        |        |        |
| 982994   | CR        | ≥45,070 | ≥44,390 | 0.19    | 0.31 | 1.51      | 49.78  | 33.57  | 7.91   | 3.92   | 3.30   |        |        |
| 984137   | CR        | ≥45,070 | ≥41,140 | 0.13    | 0.44 | 5.01      | 67.32  | 13.94  | 9.41   | 0.61   |        |        |        |
| 914421   | MC        | ≥45,070 | ≥45,030 | 0.39    | 0.48 | 0.09      |        |        |        |        |        |        |        |
| 983109   | TE        | ≥45,070 | ≥45,010 | 0.65    | 0.46 | 0.13      | 35.01  | 64.85  |        |        |        |        |        |
| 914408   | TE        | ≥45,070 | ≥44,980 | 0.17    | 0.51 | 0.20      | 82.46  | 17.34  |        |        |        |        |        |
| 904551   | MC        | ≥45,070 | ≥44,980 | 0.51    | 0.43 | 0.20      |        |        |        |        |        |        |        |
| 916053   | MC        | ≥45,070 | ≥45,020 | 0.15    | 0.41 | 0.12      |        |        |        |        |        |        |        |
| 899312   | CR        | ≥45,070 | ≥44,800 | 0.34    | 0.65 | 0.61      | 39.70  | 26.87  | 23.37  | 9.46   |        |        |        |
| 878742   | MC        | ≥45,070 | ≥45,020 | 0.51    | 0.39 | 0.12      |        |        |        |        |        |        |        |
| 983050   | SA        | ≥45,070 | ≥44,980 | 0.25    | 0.53 | 0.20      | 60.91  | 27.64  | 11.25  |        |        |        |        |

| Mathematics Grade 8 Computer-Based Test Administration |           |         |         |         |      |           |        |        |        |        |        |        |        |
|--|-----------|---------|---------|---------|------|-----------|--------|--------|--------|--------|--------|--------|--------|
| Item ID  | Item Type | Total N | Adj. N  | p-Value | Pbis | Omit Rate | % at 0 | % at 1 | % at 2 | % at 3 | % at 4 | % at 5 | % at 6 |
| 899327   | CR        | ≥45,070 | ≥42,500 | 0.27    | 0.64 | 2.96      | 41.52  | 25.22  | 11.47  | 12.33  | 3.77   |        |        |
| 899329   | CR        | ≥45,070 | ≥44,820 | 0.25    | 0.52 | 0.55      | 49.79  | 30.67  | 12.44  | 6.55   |        |        |        |

These item level statistics are reviewed at the beginning of the operational analyses process to ensure that items are unflawed, and a careful quality control review is given to determine that the answer key is correct.

A multiple-choice (MC) item is reviewed during the key check process if

- it has a  $p$ -value less than 0.25 or more than .95,
- greater number of high-performing students (top 20%) choosing a distractor than are choosing the key,
- the item-total correlation of the keyed response is less than 0.20,
- any of the incorrect answer options yields a positive distractor-total correlation, or
- the percentage of students omitting or not reaching each item is 5 or greater.

Other types of autoscored items are also flagged during the key check for review if

- they have a  $p$ -value less than 0.30 or more than .80,
- the percentage of students who reached any possible score point is less than 3,
- the item-total correlation is less than 0.20, or
- the flagging criteria for omit item is 15%.

### 6.3 Item Response Theory

Item parameters for items included in the ELA and mathematics tests were estimated using a marginal maximum-likelihood (MML) procedure and the 2-parameter logistic (2PL) model for MC items and the generalized partial credit (GPC) model (Muraki, 1992) for non-MC items. Under the 2PL model, the probability that a student with a trait or scale score of  $\theta$  will respond correctly to MC item  $j$  is

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

In the equation,  $a_j$  is the item discrimination and  $b_j$  is the item difficulty. Under the GPC model, the probability that a student with a trait or scale score of  $\theta$  will respond in category  $x$  to partial-credit item  $j$  is

$$P_{jx}(\theta) = \exp\left[\sum_{k=0}^x (Z_{jk}(\theta))\right] / \sum_{h=0}^{m_j} \exp\left[\sum_{k=0}^h (Z_{jk}(\theta))\right],$$

$$\text{where } z_{jk}(\theta) = Da_j(\theta - b_j + d_{jx}),$$

where  $d_{jx}$  is the relative difficulty of score category  $x$  of item  $j$ .

The software IRTPRO (Cai, Thissen, & du Toit, 2011) was used for the IRT calibrations. IRTPRO is a multipurpose program that implements a variety of IRT models associated with mixed-item formats and

associated statistics. IRTPRO has been used to calibrate large data sets, such as those of PARCC assessments. The program implements MML estimation techniques for items and MLE estimation of theta.

This section describes the calibration sample in adherence to Standard 1.8 of the AERA, APA, & NCME (2014) *Standards for Educational and Psychological Testing*. Standard 1.8 states the following:

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 (25).

All student data available at the time of calibration was used for the grade 3 PBT and grades 3 to 8 CBT calibration, resulting in a near-census data file. Tables 6.17 and 6.18 show the representativeness of the calibration samples compared to the census data. These tables demonstrate that the calibration sample was representative of the state. Grade 3 includes both CBT and PBT students.

Table 6.17 Summary of Calibration and Census Data: English Language Arts

| Calibration and Census Data: English Language Arts |                                  |                    |         |             |         |                       |
|--|----------------------------------|--------------------|---------|-------------|---------|-----------------------|
| Grade  |                                  | Calibration Sample |         | Census Data |         | Census % -<br>Calib % |
|  |                                  | N                  | %       | N           | %       |                       |
| 3  | All Students                     | ≥49,470            | 100.00% | ≥49,620     | 100.00% | 0.00%                 |
|  | Gender                           |                    |         |             |         |                       |
|  | Male                             | ≥25,290            | 51.13%  | ≥25,370     | 51.14%  | 0.01%                 |
|  | Female                           | ≥24,170            | 48.86%  | ≥24,230     | 48.83%  | -0.03%                |
|  | Race Ethnicity                   |                    |         |             |         |                       |
|  | Hispanic/Latino                  | ≥4,980             | 10.07%  | ≥5,000      | 10.08%  | 0.01%                 |
|  | American Indian or Alaska Native | ≥270               | 0.55%   | ≥270        | 0.55%   | 0.00%                 |
|  | Asian                            | ≥840               | 1.70%   | ≥840        | 1.69%   | -0.01%                |
|  | Black or African American        | ≥20,440            | 41.33%  | ≥20,510     | 41.34%  | 0.01%                 |
|  | Native Hawaiian or Other Pacific | ≥30                | 0.08%   | ≥30         | 0.08%   | -0.00%                |
|  | White                            | ≥20,990            | 42.43%  | ≥21,030     | 42.39%  | -0.04%                |
|  | Two or More Races                | ≥1,860             | 3.76%   | ≥1,860      | 3.75%   | -0.01%                |
| 4  | All Students                     | ≥49,110            | 100.00% | ≥49,170     | 100.00% | 0.00%                 |
|  | Gender                           |                    |         |             |         |                       |
|  | Male                             | ≥25,110            | 51.14%  | ≥25,130     | 51.12%  | -0.02%                |
|  | Female                           | ≥24,000            | 48.86%  | ≥24,030     | 48.88%  | 0.02%                 |
|  | Race Ethnicity                   |                    |         |             |         |                       |
|  | Hispanic/Latino                  | ≥5,090             | 10.37%  | ≥5,090      | 10.37%  | -0.00%                |
|  | American Indian or Alaska Native | ≥260               | 0.55%   | ≥260        | 0.55%   | -0.00%                |
|  | Asian                            | ≥800               | 1.65%   | ≥800        | 1.64%   | -0.00%                |
|  | Black or African American        | ≥20,570            | 41.90%  | ≥20,610     | 41.93%  | 0.04%                 |
|  | Native Hawaiian or Other Pacific | ≥30                | 0.08%   | ≥30         | 0.08%   | -0.00%                |
|  | White                            | ≥20,600            | 41.95%  | ≥20,610     | 41.92%  | -0.03%                |
|  | Two or More Races                | ≥1,680             | 3.44%   | ≥1,680      | 3.43%   | -0.00%                |
| 5  | All Students                     | ≥49,190            | 100.00% | ≥49,250     | 100.00% | 0.00%                 |
|  | Gender                           |                    |         |             |         |                       |
|  | Male                             | ≥25,210            | 51.25%  | ≥25,240     | 51.25%  | -0.00%                |
|  | Female                           | ≥23,980            | 48.75%  | ≥24,000     | 48.75%  | 0.00%                 |
|  | Race Ethnicity                   |                    |         |             |         |                       |
|  | Hispanic/Latino                  | ≥4,800             | 9.77%   | ≥4,810      | 9.77%   | 0.00%                 |
|  | American Indian or Alaska Native | ≥250               | 0.51%   | ≥250        | 0.51%   | -0.00%                |
|  | Asian                            | ≥750               | 1.53%   | ≥750        | 1.53%   | 0.00%                 |
|  | Black or African American        | ≥20,810            | 42.30%  | ≥20,840     | 42.33%  | 0.02%                 |
|  | Native Hawaiian or Other Pacific | ≥40                | 0.09%   | ≥40         | 0.09%   | -0.00%                |
|  | White                            | ≥20,830            | 42.34%  | ≥20,840     | 42.31%  | -0.03%                |
|  | Two or More Races                | ≥1,650             | 3.37%   | ≥1,660      | 3.37%   | 0.00%                 |

| Calibration and Census Data: English Language Arts |                                  |                    |         |             |         |                       |
|--|----------------------------------|--------------------|---------|-------------|---------|-----------------------|
| Grade  |                                  | Calibration Sample |         | Census Data |         | Census % -<br>Calib % |
|  |                                  | N                  | %       | N           | %       |                       |
| 6  | All Students                     | ≥49,620            | 100.00% | ≥49,730     | 100.00% | 0.00%                 |
|  | Gender                           |                    |         |             |         |                       |
|  | Male                             | ≥25,500            | 51.39%  | ≥25,560     | 51.41%  | 0.02%                 |
|  | Female                           | ≥24,120            | 48.61%  | ≥24,160     | 48.59%  | -0.02%                |
|  | Race Ethnicity                   |                    |         |             |         |                       |
|  | Hispanic/Latino                  | ≥5,070             | 10.22%  | ≥5,080      | 10.22%  | 0.01%                 |
|  | American Indian or Alaska Native | ≥280               | 0.56%   | ≥280        | 0.57%   | 0.00%                 |
|  | Asian                            | ≥790               | 1.60%   | ≥790        | 1.60%   | 0.00%                 |
|  | Black or African American        | ≥20,870            | 42.06%  | ≥20,930     | 42.09%  | 0.03%                 |
|  | Native Hawaiian or Other Pacific | ≥20                | 0.06%   | ≥20         | 0.06%   | 0.00%                 |
|  | White                            | ≥20,890            | 42.10%  | ≥20,920     | 42.07%  | -0.04%                |
| Two or More Races                                  | ≥1,620                           | 3.28%              | ≥1,630  | 3.28%       | 0.00%   |                       |
| 7  | All Students                     | ≥46,400            | 100.00% | ≥46,570     | 100.00% | 0.00%                 |
|  | Gender                           |                    |         |             |         |                       |
|  | Male                             | ≥23,580            | 50.82%  | ≥23,670     | 50.83%  | 0.01%                 |
|  | Female                           | ≥22,820            | 49.18%  | ≥22,890     | 49.17%  | -0.01%                |
|  | Race Ethnicity                   |                    |         |             |         |                       |
|  | Hispanic/Latino                  | ≥4,660             | 10.05%  | ≥4,680      | 10.06%  | 0.01%                 |
|  | American Indian or Alaska Native | ≥290               | 0.63%   | ≥290        | 0.63%   | 0.00%                 |
|  | Asian                            | ≥690               | 1.51%   | ≥690        | 1.50%   | -0.01%                |
|  | Black or African American        | ≥19,930            | 42.95%  | ≥20,020     | 43.01%  | 0.06%                 |
|  | Native Hawaiian or Other Pacific | ≥40                | 0.09%   | ≥40         | 0.09%   | 0.00%                 |
|  | White                            | ≥19,120            | 41.20%  | ≥19,150     | 41.13%  | -0.06%                |
| Two or More Races                                  | ≥1,610                           | 3.48%              | ≥1,620  | 3.49%       | 0.00%   |                       |
| 8  | All Students                     | ≥50,980            | 100.00% | ≥51,200     | 100.00% | 0.00%                 |
|  | Gender                           |                    |         |             |         |                       |
|  | Male                             | ≥25,860            | 50.73%  | ≥25,990     | 50.76%  | 0.03%                 |
|  | Female                           | ≥25,110            | 49.27%  | ≥25,210     | 49.24%  | -0.03%                |
|  | Race Ethnicity                   |                    |         |             |         |                       |
|  | Hispanic/Latino                  | ≥4,820             | 9.47%   | ≥4,850      | 9.47%   | 0.00%                 |
|  | American Indian or Alaska Native | ≥280               | 0.56%   | ≥280        | 0.56%   | 0.00%                 |
|  | Asian                            | ≥810               | 1.60%   | ≥810        | 1.59%   | -0.01%                |
|  | Black or African American        | ≥21,580            | 42.33%  | ≥21,690     | 42.38%  | 0.05%                 |
|  | Native Hawaiian or Other Pacific | ≥40                | 0.08%   | ≥40         | 0.08%   | 0.00%                 |
|  | White                            | ≥21,770            | 42.72%  | ≥21,850     | 42.68%  | -0.04%                |
| Two or More Races                                  | ≥1,590                           | 3.12%              | ≥1,590  | 3.12%       | 0.00%   |                       |

Table 6.18 Summary of Calibration and Census Data: Mathematics

| Calibration and Census Data: Mathematics |                                  |                    |         |             |         |                    |
|--|----------------------------------|--------------------|---------|-------------|---------|--------------------|
|  |                                  | Calibration Sample |         | Census Data |         |                    |
| Grade                                    |                                  | N                  | %       | N           | %       | Census % - Calib % |
| 3  | All Students                     | ≥49,390            | 100.00% | ≥49,620     | 100.00% | 0.00%              |
|  | Gender                           |                    |         |             |         |                    |
|  | Male                             | ≥25,250            | 51.13%  | ≥25,370     | 51.14%  | 0.01%              |
|  | Female                           | ≥24,130            | 48.85%  | ≥24,230     | 48.83%  | -0.02%             |
|  | Race Ethnicity                   |                    |         |             |         |                    |
|  | Hispanic/Latino                  | ≥4,890             | 9.91%   | ≥5,000      | 10.08%  | 0.17%              |
|  | American Indian or Alaska Native | ≥270               | 0.55%   | ≥270        | 0.55%   | 0.00%              |
|  | Asian                            | ≥840               | 1.70%   | ≥840        | 1.69%   | -0.01%             |
|  | Black or African American        | ≥20,440            | 41.39%  | ≥20,500     | 41.33%  | -0.06%             |
|  | Native Hawaiian or Other Pacific | ≥30                | 0.07%   | ≥30         | 0.08%   | 0.00%              |
|  | White                            | ≥20,990            | 42.50%  | ≥21,030     | 42.39%  | -0.11%             |
|  | Two or More Races                | ≥1,860             | 3.77%   | ≥1,860      | 3.76%   | -0.02%             |
| 4  | All Students                     | ≥49,010            | 100.00% | ≥49,150     | 100.00% | 0.00%              |
|  | Gender                           |                    |         |             |         |                    |
|  | Male                             | ≥25,050            | 51.13%  | ≥25,120     | 51.12%  | -0.01%             |
|  | Female                           | ≥23,950            | 48.87%  | ≥24,020     | 48.88%  | 0.01%              |
|  | Race Ethnicity                   |                    |         |             |         |                    |
|  | Hispanic/Latino                  | ≥4,990             | 10.18%  | ≥5,090      | 10.37%  | 0.19%              |
|  | American Indian or Alaska Native | ≥260               | 0.54%   | ≥260        | 0.54%   | 0.00%              |
|  | Asian                            | ≥800               | 1.65%   | ≥800        | 1.64%   | 0.00%              |
|  | Black or African American        | ≥20,570            | 41.98%  | ≥20,600     | 41.92%  | -0.06%             |
|  | Native Hawaiian or Other Pacific | ≥30                | 0.08%   | ≥30         | 0.08%   | 0.00%              |
|  | White                            | ≥20,600            | 42.04%  | ≥20,610     | 41.93%  | -0.11%             |
|  | Two or More Races                | ≥1,680             | 3.44%   | ≥1,680      | 3.44%   | -0.01%             |
| 5  | All Students                     | ≥49,090            | 100.00% | ≥49,160     | 100.00% | 0.00%              |
|  | Gender                           |                    |         |             |         |                    |
|  | Male                             | ≥25,170            | 51.27%  | ≥25,200     | 51.26%  | -0.01%             |
|  | Female                           | ≥23,920            | 48.73%  | ≥23,960     | 48.74%  | 0.01%              |
|  | Race Ethnicity                   |                    |         |             |         |                    |
|  | Hispanic/Latino                  | ≥4,730             | 9.65%   | ≥4,790      | 9.75%   | 0.10%              |
|  | American Indian or Alaska Native | ≥250               | 0.51%   | ≥250        | 0.51%   | 0.00%              |
|  | Asian                            | ≥750               | 1.53%   | ≥750        | 1.53%   | 0.00%              |
|  | Black or African American        | ≥20,790            | 42.35%  | ≥20,790     | 42.31%  | -0.05%             |
|  | Native Hawaiian or Other Pacific | ≥40                | 0.09%   | ≥40         | 0.09%   | 0.00%              |
|  | White                            | ≥20,820            | 42.41%  | ≥20,820     | 42.35%  | -0.05%             |
|  | Two or More Races                | ≥1,650             | 3.37%   | ≥1,650      | 3.37%   | 0.00%              |



| Calibration and Census Data: Mathematics |                                  |                    |         |             |         |                    |
|--|----------------------------------|--------------------|---------|-------------|---------|--------------------|
|  |                                  | Calibration Sample |         | Census Data |         |                    |
| Grade                                    |                                  | N                  | %       | N           | %       | Census % - Calib % |
| 6  | All Students                     | ≥49,450            | 100.00% | ≥49,670     | 100.00% | 0.00%              |
|  | Gender                           |                    |         |             |         |                    |
|  | Male                             | ≥25,420            | 51.41%  | ≥25,540     | 51.42%  | 0.01%              |
|  | Female                           | ≥24,020            | 48.59%  | ≥24,120     | 48.58%  | -0.01%             |
|  | Race Ethnicity                   |                    |         |             |         |                    |
|  | Hispanic/Latino                  | ≥4,950             | 10.01%  | ≥5,070      | 10.22%  | 0.21%              |
|  | American Indian or Alaska Native | ≥280               | 0.57%   | ≥280        | 0.57%   | 0.00%              |
|  | Asian                            | ≥790               | 1.61%   | ≥790        | 1.60%   | -0.01%             |
|  | Black or African American        | ≥20,840            | 42.15%  | ≥20,890     | 42.07%  | -0.08%             |
|  | Native Hawaiian or Other Pacific | ≥20                | 0.06%   | ≥20         | 0.06%   | -0.00%             |
|  | White                            | ≥20,870            | 42.22%  | ≥20,910     | 42.10%  | -0.12%             |
| Two or More Races                        | ≥1,620                           | 3.28%              | ≥1,620  | 3.27%       | -0.01%  |                    |
| 7  | All Students                     | ≥51,040            | 100.00% | ≥51,310     | 100.00% | 0.00%              |
|  | Gender                           |                    |         |             |         |                    |
|  | Male                             | ≥25,910            | 50.77%  | ≥26,060     | 50.80%  | 0.03%              |
|  | Female                           | ≥25,120            | 49.23%  | ≥25,240     | 49.20%  | -0.03%             |
|  | Race Ethnicity                   |                    |         |             |         |                    |
|  | Hispanic/Latino                  | ≥4,710             | 9.23%   | ≥4,850      | 9.46%   | 0.23%              |
|  | American Indian or Alaska Native | ≥300               | 0.59%   | ≥300        | 0.58%   | 0.00%              |
|  | Asian                            | ≥750               | 1.47%   | ≥750        | 1.46%   | -0.01%             |
|  | Black or African American        | ≥21,950            | 43.02%  | ≥22,040     | 42.96%  | -0.06%             |
|  | Native Hawaiian or Other Pacific | ≥40                | 0.08%   | ≥40         | 0.08%   | 0.00%              |
|  | White                            | ≥21,540            | 42.20%  | ≥21,570     | 42.05%  | -0.15%             |
| Two or More Races                        | ≥1,690                           | 3.32%              | ≥1,700  | 3.32%       | -0.01%  |                    |
| 8  | All Students                     | ≥45,070            | 100.00% | ≥45,340     | 100.00% | 0.00%              |
|  | Gender                           |                    |         |             |         |                    |
|  | Male                             | ≥23,020            | 51.07%  | ≥23,180     | 51.13%  | 0.05%              |
|  | Female                           | ≥22,050            | 48.93%  | ≥22,150     | 48.87%  | -0.05%             |
|  | Race Ethnicity                   |                    |         |             |         |                    |
|  | Hispanic/Latino                  | ≥4,170             | 9.25%   | ≥4,300      | 9.49%   | 0.24%              |
|  | American Indian or Alaska Native | ≥260               | 0.59%   | ≥260        | 0.59%   | 0.00%              |
|  | Asian                            | ≥540               | 1.20%   | ≥540        | 1.19%   | -0.01%             |
|  | Black or African American        | ≥20,440            | 45.36%  | ≥20,520     | 45.27%  | -0.08%             |
|  | Native Hawaiian or Other Pacific | ≥30                | 0.07%   | ≥30         | 0.07%   | 0.00%              |
|  | White                            | ≥18,160            | 40.29%  | ≥18,200     | 40.15%  | 0.14%              |
| Two or More Races                        | ≥1,400                           | 3.11%              | ≥1,400  | 3.10%       | 0.01%   |                    |

## 6.4 Calibration and Linking

All 2022 LEAP 2025 item calibration and linking were performed based on IRT. The calibration and linking methodology used for the Spring 2022 LEAP 2025 administration closely followed most of the PARCC methods referenced in the PARCC document *Final Technical Report for 2015 Administration*. To maintain comparability to PARCC, the 2PL/GPC IRT model was applied to item calibration using the software IRTPRO (Cai et al., 2011). To avoid local independence between traits, the writing traits written expression (WE) and written knowledge and use of language (WKL) were separately calibrated using the sparse matrix method.

The Stocking & Lord (1983) procedure was applied using the transformation and scaling software STUIRT (Kim & Kolen, 2004), which can be downloaded at <https://www.education.uiowa.edu/centers/casma/computer-programs#c0748e48-f88c-6551-b2b8-ff00000648cd>. PARCC scale score transformation constants for the PARCC 2016 baseline scale were used to generate final scoring tables. All IRTPRO and STUIRT command files were prepared following PARCC examples.

Descriptions of the PARCC calibration and equating approach can be found in the PARCC documents *Final Technical Report for 2015 Administration* and *Final Technical Report for 2016 Administration*.

There were two test forms, CBT and PBT, for the 2022 LEAP 2025 grade 3 ELA and mathematics assessments. Only CBT forms were administered for the grades 4 through 8 ELA and mathematics assessments. In general, a school administered the same test mode for ELA and mathematics. Table 6.19 summarizes the student count and item count by test mode for each grade and content area.

The following two steps were taken to place the 2022 LEAP 2025 tests on the 2018 LEAP 2025 scale, which are on the 2016 PARCC baseline scale:

1. Calibrate the 2022 LEAP 2025 tests.
2. Link 2022 LEAP 2025 tests, to the LEAP 2025 scale under the non-equivalent common item design.

PARCC established a new baseline scale using 2016 PARCC spring tests. The 2016 and 2017 LEAP 2025 tests were directly linked to this new PARCC 2016 baseline scale using PARCC item parameters as anchor item parameters. Therefore, LEAP 2016 and 2017 were placed on the PARCC scale. Since the 2016 and 2017 LEAP 2025 tests were calibrated with Louisiana students, the scale for these tests will be referred to as the LEAP 2025 scale, although its scale was placed on PARCC scales built with PARCC associated states' data. The 2018 LEAP 2025 tests were equated to the 2017 LEAP 2025 tests using the anchor item parameters of the 2017 LEAP 2025 tests. The 2022 LEAP 2025 forms were linked to the LEAP 2025 scale using LEAP items, which were administered in LEAP 2025 forms in 2016-2019 as anchors by the Stocking & Lord procedure. Since the 2022 anchor items are on the PARCC scale, 2022 LEAP 2025 forms continue to be considered on the PARCC scale.

### 6.4.1 Calibration of the 2022 LEAP 2025 Tests

For 2022 LEAP 2025 item calibration, the 2PL/GPC IRT model was applied to the Louisiana students' calibration samples using the software IRTPRO (Cai et al., 2011). Table 6.19 shows the number of students in the calibration samples and number of calibration items by mode. About 67% of grade 3 students took the PBT, and about 33% of grade 3 students took the CBT. More students in grade 7 took the mathematics test than the ELA tests due to some schools voluntarily selecting to administer the Innovative Assessment Program (IAP) instead of the ELA LEAP 2025 test. More students in grade 8 took the ELA assessment than the mathematics assessment because high-performing students could take the LEAP 2025 HS Algebra I test instead of the mathematics grade 8 test. For ELA, reading items (RL/RI) in writing prompts are not counted in the N-Items columns because calibration does not include reading item scores; it only includes WE item

scores. A reading item score and a WE item score for the same writing prompt are the same. There were between 24 and 32 ELA items and between 41 and 43 mathematics items across grades.

**Table 6.19 Summary of Student Count in Calibration Sample and Item Count by Test Mode**

| Content     | Grade | N       |         |         | Percentage |       | N-Items |     |
|-------------|-------|---------|---------|---------|------------|-------|---------|-----|
|             |       | All     | CBT     | PBT     | CBT        | PBT   | CBT     | PBT |
| ELA         | 3     | ≥49,470 | ≥16,210 | ≥33,250 | 32.78      | 67.22 | 24      | 24  |
|             | 4     | ≥49,110 | ≥49,110 | *       | 100.00     | *     | 30      | *   |
|             | 5     | ≥49,190 | ≥49,190 | *       | 100.00     | *     | 28      | *   |
|             | 6     | ≥49,620 | ≥49,620 | *       | 100.00     | *     | 32      | *   |
|             | 7     | ≥46,400 | ≥46,400 | *       | 100.00     | *     | 32      | *   |
|             | 8     | ≥50,980 | ≥50,980 | *       | 100.00     | *     | 32      | *   |
| Mathematics | 3     | ≥49,390 | ≥16,150 | ≥33,230 | 32.71      | 67.29 | 42      | 42  |
|             | 4     | ≥49,010 | ≥49,010 | *       | 100.00     | *     | 43      | *   |
|             | 5     | ≥49,090 | ≥49,090 | *       | 100.00     | *     | 43      | *   |
|             | 6     | ≥49,450 | ≥49,450 | *       | 100.00     | *     | 43      | *   |
|             | 7     | ≥51,040 | ≥51,040 | *       | 100.00     | *     | 43      | *   |
|             | 8     | ≥45,070 | ≥45,070 | *       | 100.00     | *     | 41      | *   |

\* Grades 4–8 did not have a PBT form.

#### 6.4.1.1. Concurrent Calibration for PBT and CBT

For the 2022 LEAP 2025 calibration, CBT and PBT were combined and calibrated together for grade 3 based on mode effect study (section 10.4). A DIF analysis between CBT and PBT was performed for grade 3. Mantel-Haenszel (MH) DIF statistic were calculated for MC items and for dichotomously-scored constructed-response items, and the standardization DIF (Dorans & Schmitt, 1991; Zwick, Thayer & Mazzeo, 1997; Dorans, 2013) was applied to polytomously scored constructed-response items in conjunction with the Mantel chi-square statistic (Mantel, 1963; Mantel & Haenszel, 1959). Items were assigned severity classifications based on National Assessment of Educational Progress (NAEP) and Educational Testing Service (ETS) guidelines. Only |C| classifications were flagged following PARCC rules. Items with |A| or |B| classifications were considered as mode-neutral items and treated as common items across modes. Items with |C| classifications were treated as unique items across forms. DRC and LDOE content experts were asked to review the items with |C| classifications. The content experts did not find any evidence supporting that the items functioned differently due to mode. Therefore, these items were treated as mode-neutral items.

#### 6.4.1.2. Separate Calibration for ELA Prose Constructed-Response Tasks

To address the issue of local independence for ELA prose-constructed response (PCR) tasks, the sparse matrix method was applied for grades 3 to 8. Each ELA test consisted of two PCR tasks; each task had a written expression (WE) and a written knowledge and use of the language (WKL) trait. As can be seen in Table 6.20, a single calibration was performed for grades 3 to 8 by randomly splitting the students into two groups. Almost half of the data set included responses to other items and responses to two WE traits, and the other calibration data set included the same responses to other items and responses to two WKL traits. Therefore, WE item parameters were estimated using the responses from the first group and WKL item parameters were estimated using the responses from the second group. Because these two sets of item responses were calibrated together, there is only one unique set of item parameters for each item. PARCC took this sparse matrix approach for all grades.

**Table 6.20 Calibration Data Structure for ELA WE and WKL Traits with Sparse Matrix**

| Group | Other Items | WE | WKL |
|-------|-------------|----|-----|
| I     | XXXXXXXX    | XX |     |
| II    | XXXXXXXX    |    | XX  |

### 6.4.1.3. IRT Item Fit

The usefulness of IRT models is dependent on the extent to which they effectively reflect the data. Hambleton, Swaminathan, and Rogers (1991) explain, “The advantages of item response models can be obtained only when the fit between the model and the test data of interest is satisfactory. A poorly fitting IRT model will not yield invariant item and ability parameters” (p. 53).

It is important to note that while items may be flagged for misfit, these flags may not be of practical importance. Misfitting items that have content validity are often retained for use in one assessment and monitored over a period of usage. A large number of misfitting items in an assessment would indicate that caution should be exercised in the interpretation of the overall score.

After convergence was achieved for each IRT data set, an item characteristic curve (ICC) for each item was plotted with empirical students’ performances from theta ability -4 to 4. Two items were suppressed from calibration and scoring due to poor fit, one each in mathematics grade 3 and grade 8. One additional item in grade 3 mathematics was removed from the anchor set used to link the 2022 form to the LEAP 2025 scale. Additionally, seven items across the grades and subjects were removed from the anchor sets used to establish comparability of the 2022 form to the existing PARCC scale. The fit plots for the items removed from calibration are seen in Figure 6.1. Figure 6.2 displays the fit plots for the items removed from the LEAP 2025 anchor set.

Figure 6.1 Item Fit Plots of Items Removed from Calibration and Scoring

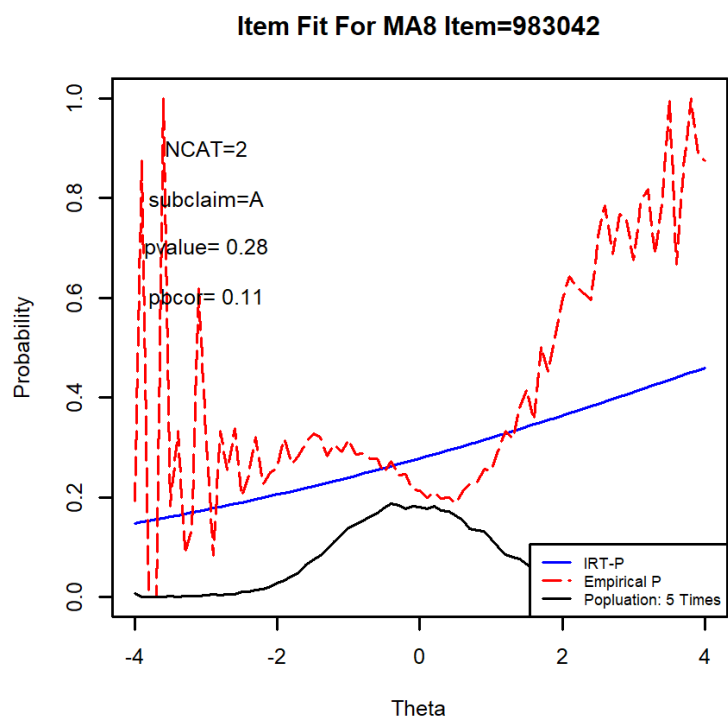
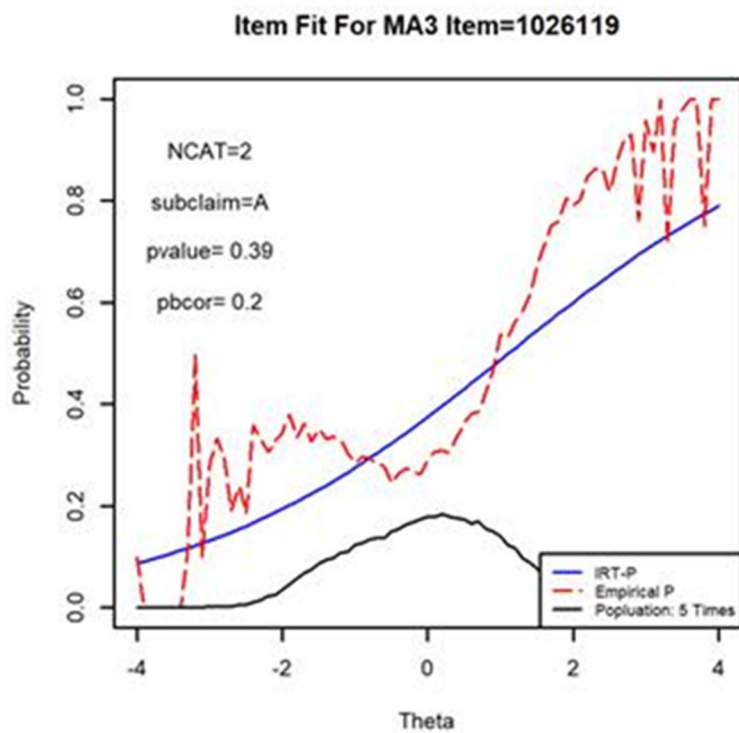
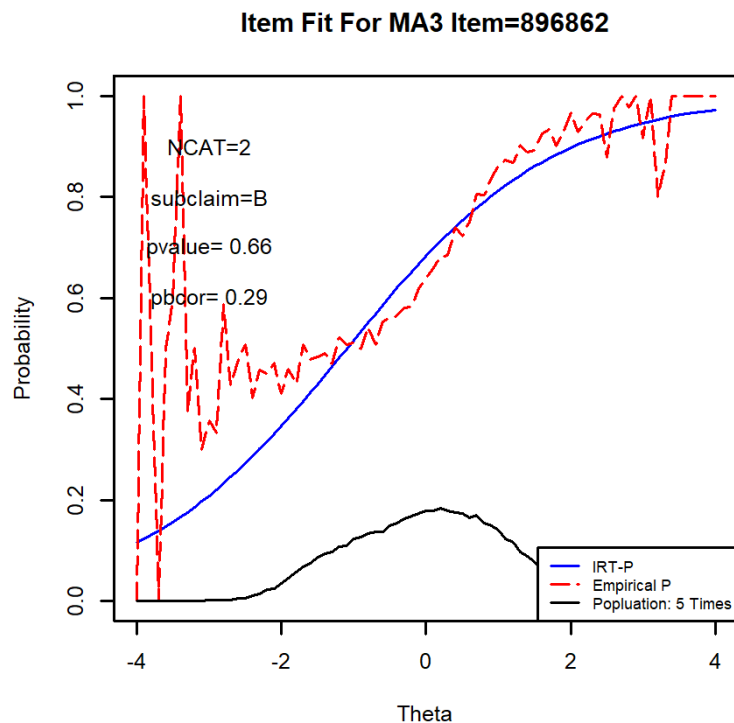


Figure 6.2 Item Fit Plots of Items Removed from Anchor Sets



After calibration, the IRT model fit was evaluated by reviewing item chi-squared statistic that were calculated using IRTPRO item parameters and item responses from students in the calibration sample. Adjusted fit values were calculated and flagged if they exceeded 0.35 (Pearson, 2018).

Since chi-square values are sensitive to sample size, these statistics are not easily compared when the number of students varies across items. As a result, adjusted fit values were calculated by dividing the chi-square fit statistic by the sample size using the following formula:

$$C = \sqrt{\frac{\chi^2}{\chi^2 + N}}$$

Tables 6.21 and 6.22 show the adjusted item fit C values using the chi-square statistics and calibration sample sizes for ELA and mathematics, respectively. The average adjusted fit ranged from 0.10 to 0.13 for ELA and 0.06 to 0.08 for mathematics. No items were excluded based on model fit statistics because the adjusted item fits for all items were lower than the criterion value of 0.35, as can be seen in the maximum values for both ELA and mathematics. The largest adjusted fit value was 0.32 for ELA grade 6.

**Table 6.21 Summary of Adjusted Fit for ELA**

| Grade | Mode    | No. Items | Mean | Std. Dev. | Min. | Max. | No. Flagged Items |
|-------|---------|-----------|------|-----------|------|------|-------------------|
| 3     | CBT/PBT | 30        | 0.12 | 0.05      | 0.04 | 0.22 | 0                 |
| 4     | CBT/PBT | 32        | 0.13 | 0.06      | 0.05 | 0.27 | 0                 |
| 5     | CBT     | 28        | 0.12 | 0.07      | 0.02 | 0.27 | 0                 |
| 6     | CBT     | 32        | 0.1  | 0.06      | 0.04 | 0.32 | 0                 |
| 7     | CBT     | 32        | 0.11 | 0.06      | 0.02 | 0.23 | 0                 |
| 8     | CBT     | 32        | 0.11 | 0.06      | 0.02 | 0.23 | 0                 |

**Table 6.22 Summary of Adjusted Fit for Mathematics**

| Grade | Mode    | No. Items | Mean | Std. Dev. | Min. | Max. | No. Flagged Items |
|-------|---------|-----------|------|-----------|------|------|-------------------|
| 3     | CBT/PBT | 43        | 0.06 | 0.03      | 0.02 | 0.15 | 0                 |
| 4     | CBT/PBT | 43        | 0.06 | 0.04      | 0.02 | 0.16 | 0                 |
| 5     | CBT     | 41        | 0.07 | 0.03      | 0.01 | 0.15 | 0                 |
| 6     | CBT     | 42        | 0.07 | 0.04      | 0.01 | 0.19 | 0                 |
| 7     | CBT     | 43        | 0.08 | 0.04      | 0.01 | 0.14 | 0                 |
| 8     | CBT     | 41        | 0.06 | 0.04      | 0.02 | 0.16 | 0                 |

### 6.4.2 Linking 2022 LEAP 2025 Grades 3–8 to PARCC Scale

The 2016 and 2017 LEAP 2025 forms were linked to the PARCC scale using intact PARCC items embedded into the LEAP 2025 forms by using the Stocking & Lord procedure (1983). Therefore, these item parameters were placed on the PARCC scale. However, these equated Louisiana item parameters are based on only Louisiana students' responses while intact PARCC item parameters were estimated based on PARCC associated states' responses. To distinguish these two sets of item parameters, item parameters based on only Louisiana student responses will be called LEAP 2025 item parameters and its scale is referred to as the LEAP 2025 scale.

Two anchor sets were created for the 2022 Spring LEAP 2025 ELA and mathematics assessments equating process. Anchor 1 items were intact PARCC items embedded in the 2022 LEAP 2025 form. Anchor 2 items were items common to the 2022 LEAP 2025 spring forms and previous years' forms, and their item parameters were from previously operational LEAP 2025 item parameters. Anchor 2 was used in the operational analyses to link to the LEAP 2025 scale, which is the same as the PARCC scale, and Anchor 1 were used to help evaluate drift from the PARCC scale. Table 6.23 provides the Stocking & Lord transformation constants that were used to link to scale. Table 6.24 summarizes the number and score points of the initial anchor item selection before equating. Table 6.24 also summarizes the number and score points of the final anchor item selections. The difference between the initial number of anchor items and the final number of anchor items is the number of anchor items that were dropped.

**Table 6.23 Stocking & Lord Transformation Constants**

| Content     | Grade | Slope    | Intercept |
|-------------|-------|----------|-----------|
| ELA         | 3     | 1.063309 | 0.0425    |
|             | 4     | 1.043935 | 0.069261  |
|             | 5     | 0.988333 | 0.076946  |
|             | 6     | 1.055337 | 0.042097  |
|             | 7     | 1.054288 | 0.004791  |
|             | 8     | 1.038305 | 0.076293  |
| Mathematics | 3     | 0.984928 | -0.273332 |
|             | 4     | 1.056141 | -0.162072 |
|             | 5     | 1.034446 | -0.316665 |
|             | 6     | 1.056702 | -0.291886 |
|             | 7     | 1.050762 | -0.226264 |
|             | 8     | 1.005947 | -0.123434 |

**Table 6.24 Number and Score Points of Initial and Final Anchor Item Sets**

| Content | Grade       | Anchor Set | Anchor 1        |              | Anchor 2        |              |    |
|---------|-------------|------------|-----------------|--------------|-----------------|--------------|----|
|         |             |            | Number of Items | Score Points | Number of Items | Score Points |    |
| ELA     | 3           | Initial    | 19              | 54           | 15              | 32           |    |
|         |             | Final      | 17              | 50           | 15              | 32           |    |
|         | 4           | Initial    | 26              | 71           | 14              | 31           |    |
|         |             | Final      | 26              | 71           | 14              | 31           |    |
|         | 5           | Initial    | 18              | 58           | 14              | 31           |    |
|         |             | Final      | 18              | 58           | 14              | 31           |    |
|         | 6           | Initial    | 20              | 62           | 16              | 35           |    |
|         |             | Final      | 19              | 60           | 16              | 35           |    |
|         | 7           | Initial    | 22              | 66           | 15              | 33           |    |
|         |             | Final      | 22              | 66           | 15              | 33           |    |
|         | 8           | Initial    | 27              | 76           | 14              | 31           |    |
|         |             | Final      | 25              | 72           | 14              | 31           |    |
|         | Mathematics | 3          | Initial         | 20           | 32              | 15           | 25 |
|         |             |            | Final           | 19           | 31              | 15           | 25 |
| 4       |             | Initial    | 16              | 25           | 15              | 24           |    |
|         |             | Final      | 15              | 24           | 15              | 24           |    |
| 5       |             | Initial    | 18              | 27           | 15              | 21           |    |
|         |             | Final      | 18              | 27           | 15              | 21           |    |
| 6       |             | Initial    | 19              | 32           | 15              | 21           |    |
|         |             | Final      | 18              | 31           | 15              | 21           |    |
| 7       |             | Initial    | 21              | 36           | 15              | 22           |    |
|         |             | Final      | 19              | 31           | 14              | 18           |    |
| 8       |             | Initial    | 22              | 32           | 15              | 20           |    |
|         |             | Final      | 21              | 31           | 15              | 20           |    |

*\*Following OP2 approach for counting Writing dimensions: Count WE and WKL only*



Figures 6.3 to 6.14 show test characteristic curves (TCCs) for anchor items, corresponding 2022 LEAP 2025 estimated anchor items (EQ\_ANC), 2018 LEAP 2025 operational items (LEAP 2018), and all 2022 LEAP 2025 estimated items (EQ\_ALL) for ELA and mathematics after applying the Stocking & Lord equating procedure. The blue solid line illustrates the anchor items, the red dotted line is the 2022 LEAP 2025 equated anchor items, the **black** solid line is for all the 2022 LEAP 2025 equated items, and the green dotted line is the 2018 LEAP 2025 operational items. Anchor items for each anchor set, 1 and 2, are different as mentioned above. For most ELA and mathematics grades, the TCCs for anchor items and the corresponding 2018 estimated anchor items were overlapped across most ability levels.

When the anchor 2, which is used for score reporting, was considered, the TCC of the anchor 2 items (ANC) and 2022 LEAP 2025 estimated anchor items (EQ\_ANC) overlapped or were close to each other for all ELA grades. The same pattern was found for all mathematics grades. Anchor sets represented the overall test form in most grades. There were some differences at the extreme ranges, such as low ability or high ability. In mathematics grade 8, anchor set was a little easier than total test.

Figures 6.15 to 6.26 present scatter plots of slope item parameters and difficulty item parameters for ELA and mathematics and their correlation after linking 2022 LEAP 2025 to the PARCC 2016 scale.

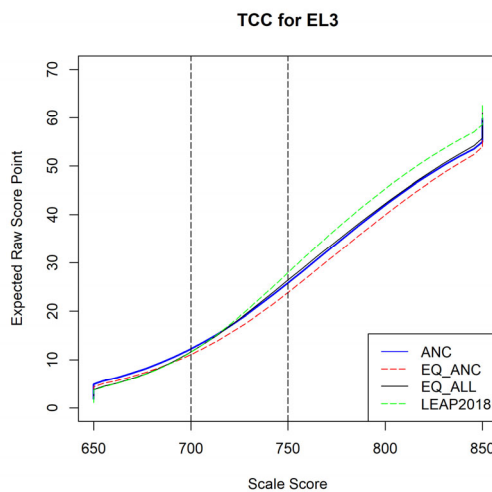
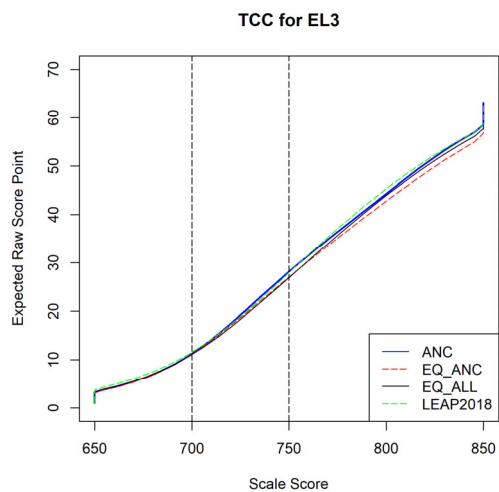
As can be seen in the ELA slope parameter plots, most parameters were around the identity line. The correlation between anchor item parameters and estimated parameters ranged from 0.95 to 0.99 with Anchor 2. For mathematics, most item slope parameters were around the identity line, and the correlations ranged from 0.92 to 0.99 with Anchor 2.

For ELA, most item difficulty parameters were around the identity line, and the correlations ranged from 0.97 to 1.00 with Anchor 2. For mathematics as well, most item difficulty parameters were around the identity line. Correlations ranged from 0.98 to 0.99 across grades with Anchor 2. It is common to find higher correlations for difficulty parameters than those for slope parameters.

**Figure 6.3 ELA Grade 3 TCC between Pre-equated Anchor, Equated Anchor, LEAP 2018, and All LEAP 2025 Items**

Anchor 1

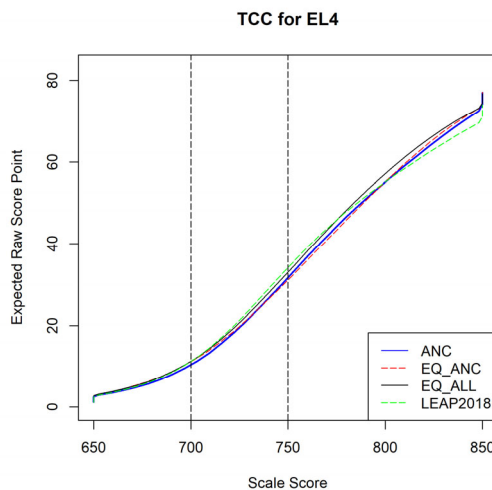
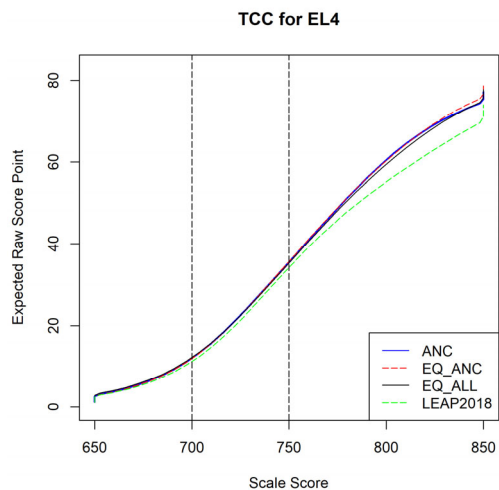
Anchor 2



**Figure 6.4 ELA Grade 4 TCC between Pre-equated Anchor, Equated Anchor, LEAP 2018, and All LEAP 2025 Items**

Anchor 1

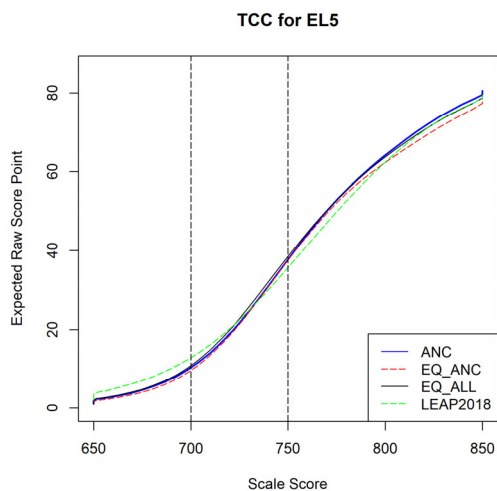
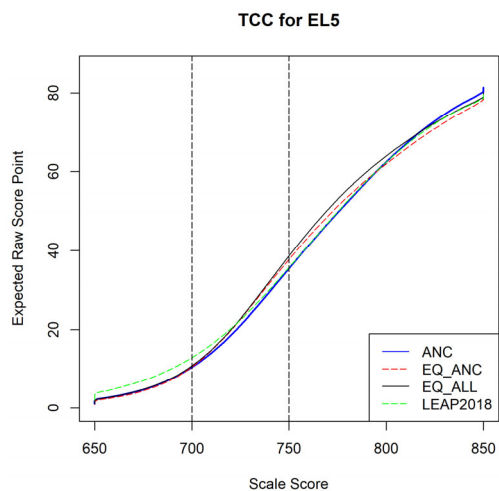
Anchor 2



**Figure 6.5 ELA Grade 5 TCC between Pre-equated Anchor, Equated Anchor, LEAP 2018, and All LEAP 2025 Items**

Anchor 1

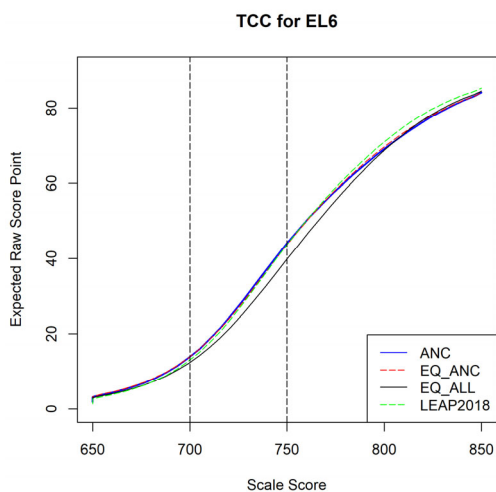
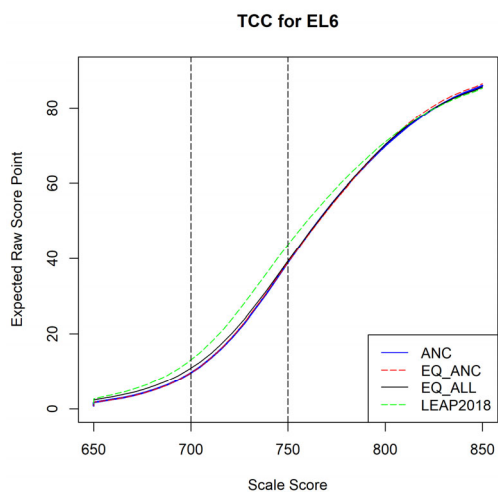
Anchor 2



**Figure 6.6 ELA Grade 6 TCC between Pre-equated Anchor, Equated Anchor, LEAP 2018, and All LEAP 2025 Items**

Anchor 1

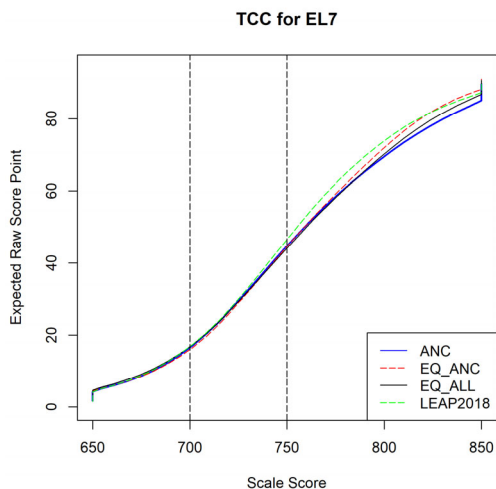
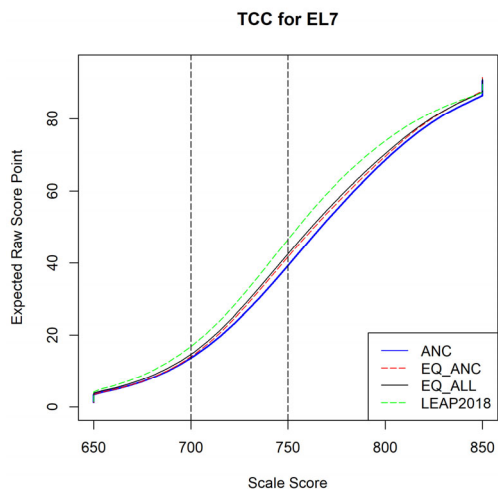
Anchor 2



**Figure 6.7 ELA Grade 7 TCC between Pre-equated Anchor, Equated Anchor, LEAP 2018, and All LEAP 2025 Items**

Anchor 1

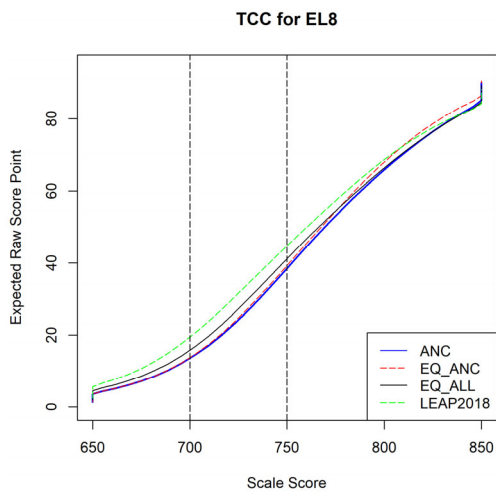
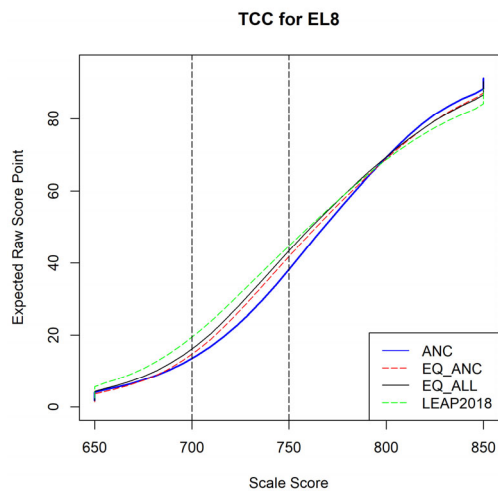
Anchor 2



**Figure 6.8 ELA Grade 8 TCC between Pre-equated Anchor, Equated Anchor, LEAP 2018, and All LEAP 2025 Items**

Anchor 1

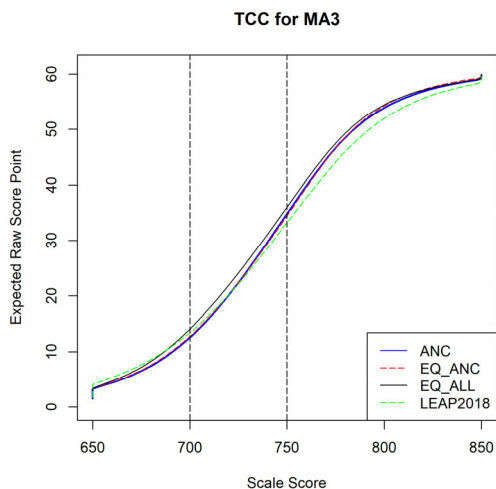
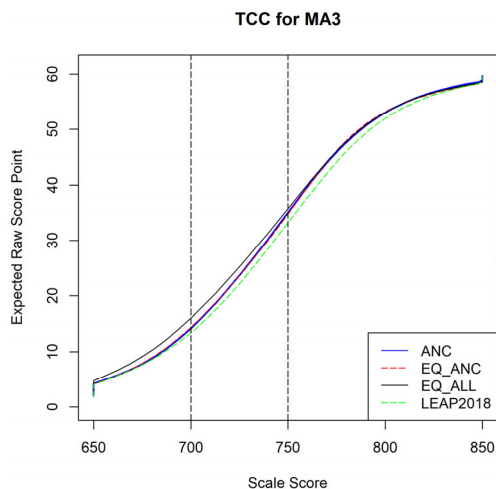
Anchor 2



**Figure 6.9 Mathematics Grade 3 TCC between Pre-equated Anchor, Equated Anchor, LEAP 2018, and All LEAP 2025 Items**

Anchor 1

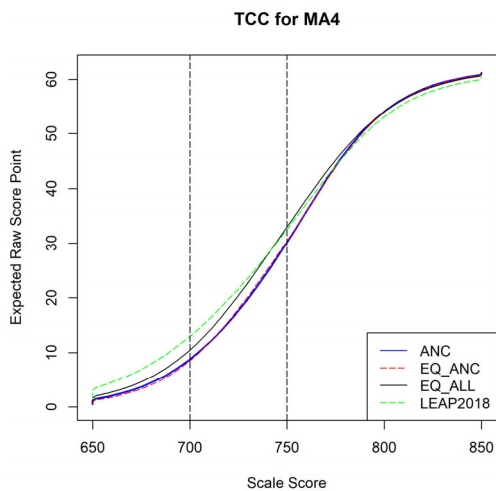
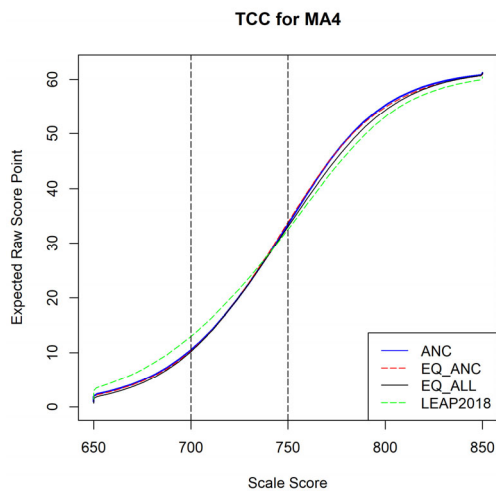
Anchor 2



**Figure 6.10 Mathematics Grade 4 TCC between Pre-equated Anchor, Equated Anchor, LEAP 2018, and All LEAP 2025 Items**

Anchor 1

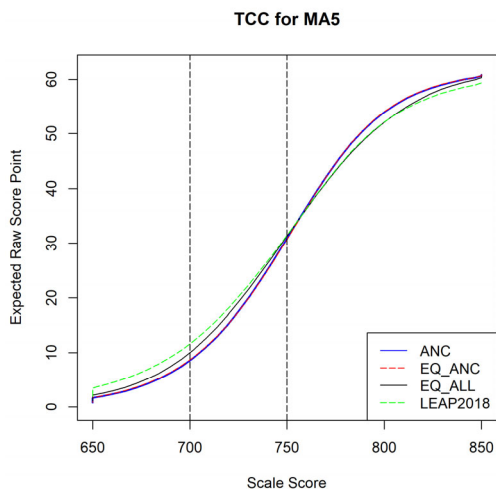
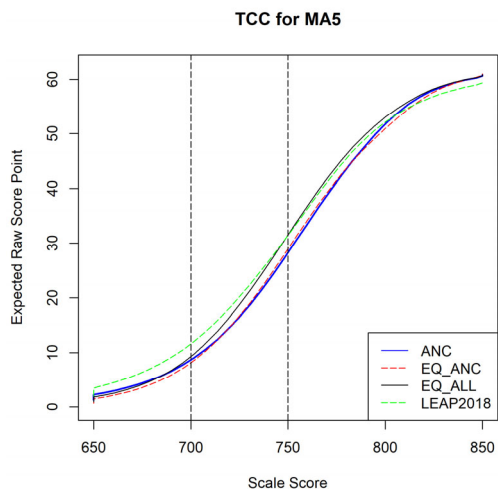
Anchor 2



**Figure 6.11 Mathematics Grade 5 TCC between Pre-equated Anchor, Equated Anchor, LEAP 2018, and All LEAP 2025 Items**

Anchor 1

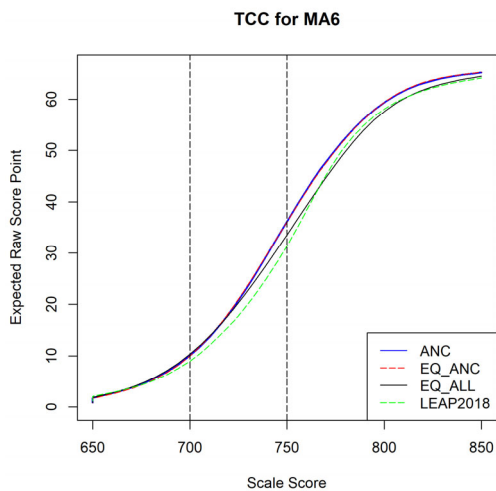
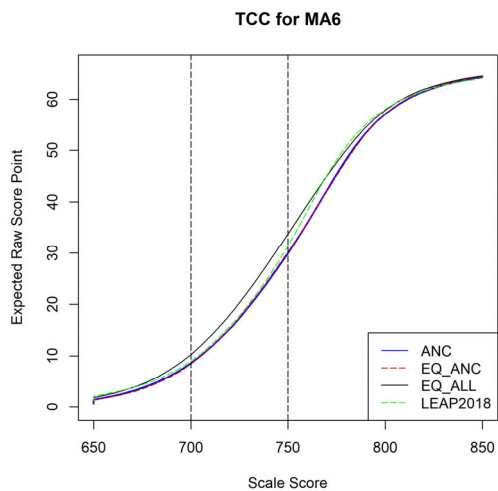
Anchor 2



**Figure 6.12 Mathematics Grade 6 TCC between Pre-equated Anchor, Equated Anchor, LEAP 2018, and All LEAP 2025 Items**

Anchor 1

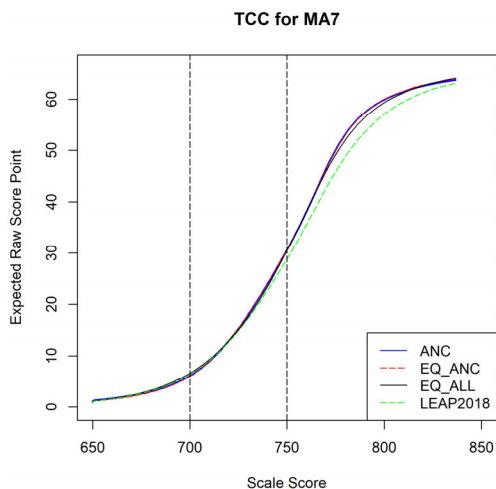
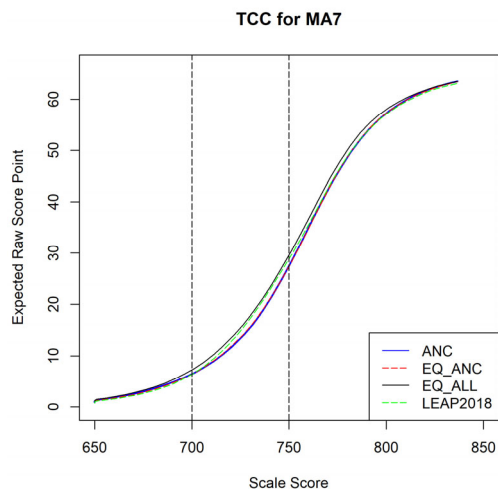
Anchor 2



**Figure 6.13 Mathematics Grade 7 TCC between Pre-equated Anchor, Equated Anchor, LEAP 2018, and All LEAP 2025 Items**

Anchor 1

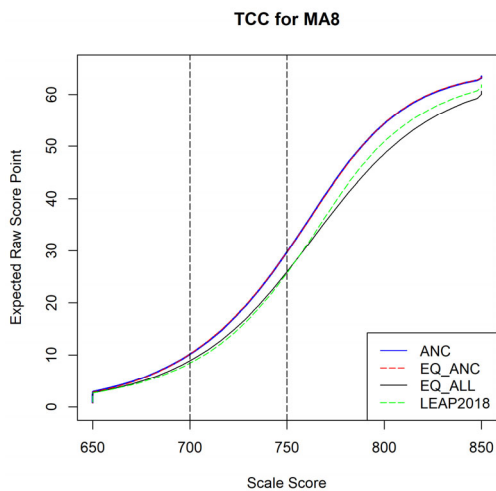
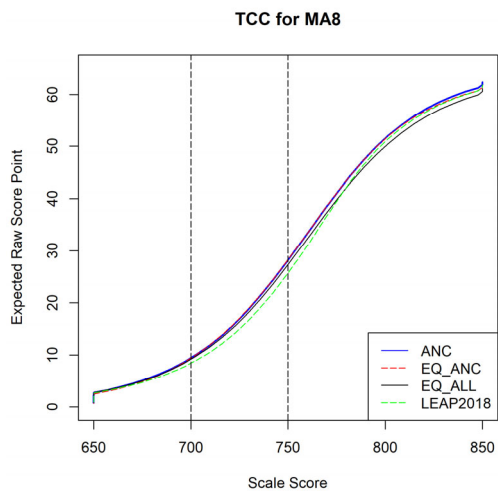
Anchor 2



**Figure 6.14 Mathematics Grade 8 TCC between Pre-equated Anchor, Equated Anchor, LEAP 2018, and All LEAP 2025 Items**

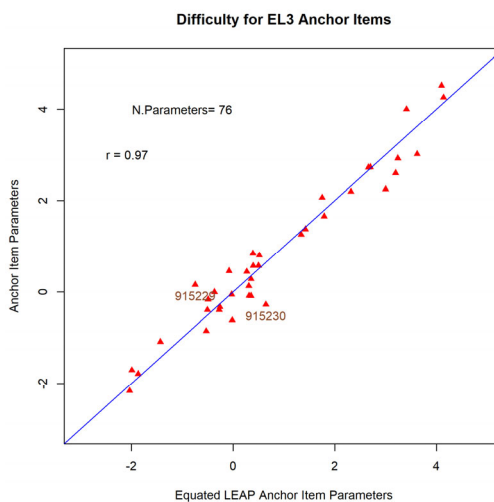
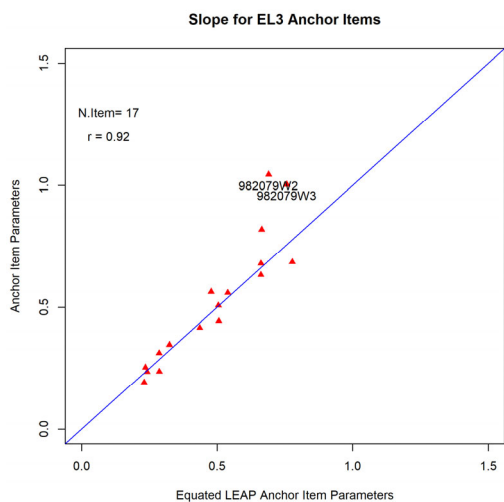
Anchor 1

Anchor 2

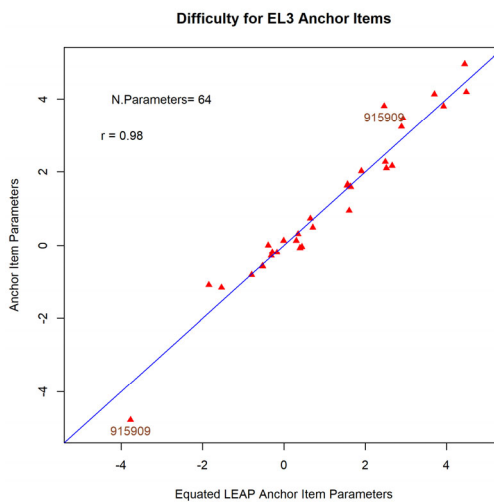
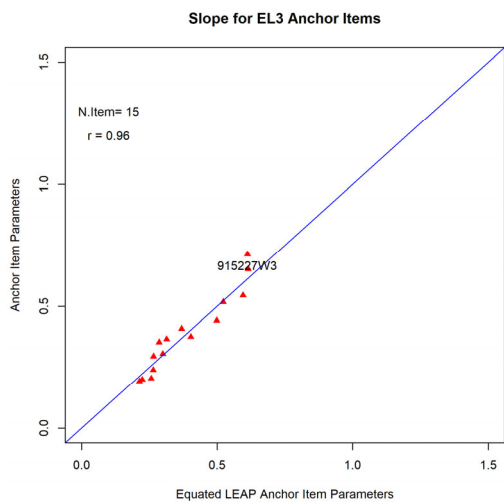


**Figure 6.15 ELA Grade 3 Slope and Difficulty Parameters Between Pre-equated and Equated Anchor Item Parameters**

**Anchor 1**



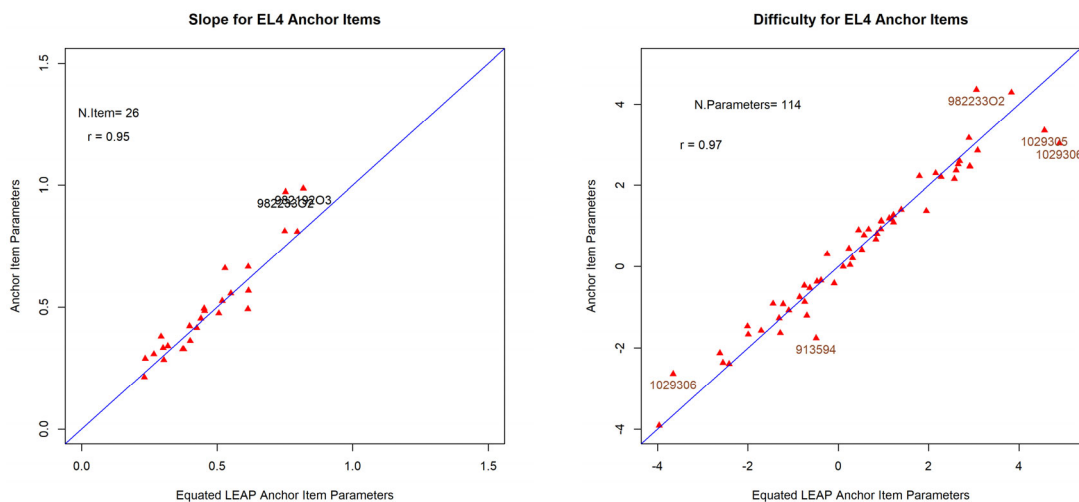
**Anchor 2**



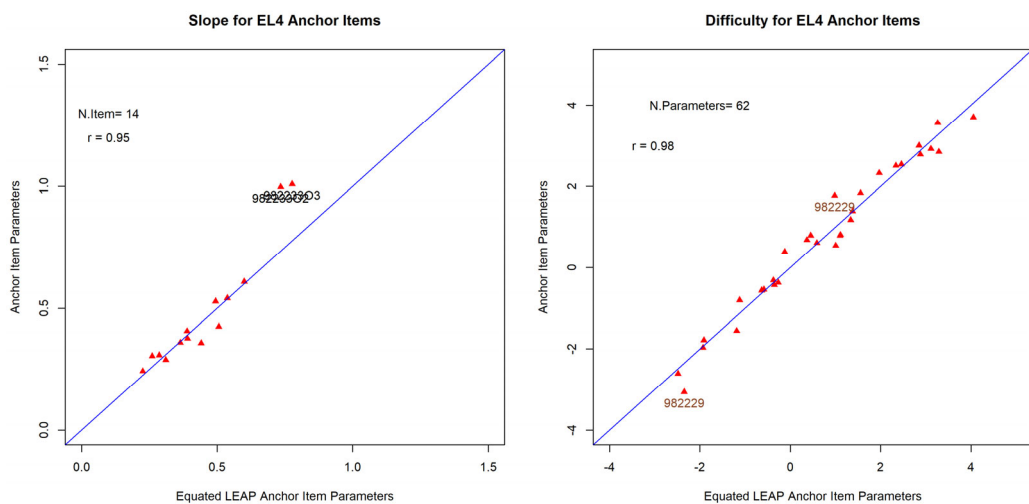


**Figure 6.16 ELA Grade 4 Slope and Difficulty Parameters Between Pre-equated and Equated Anchor Item Parameters**

**Anchor 1**

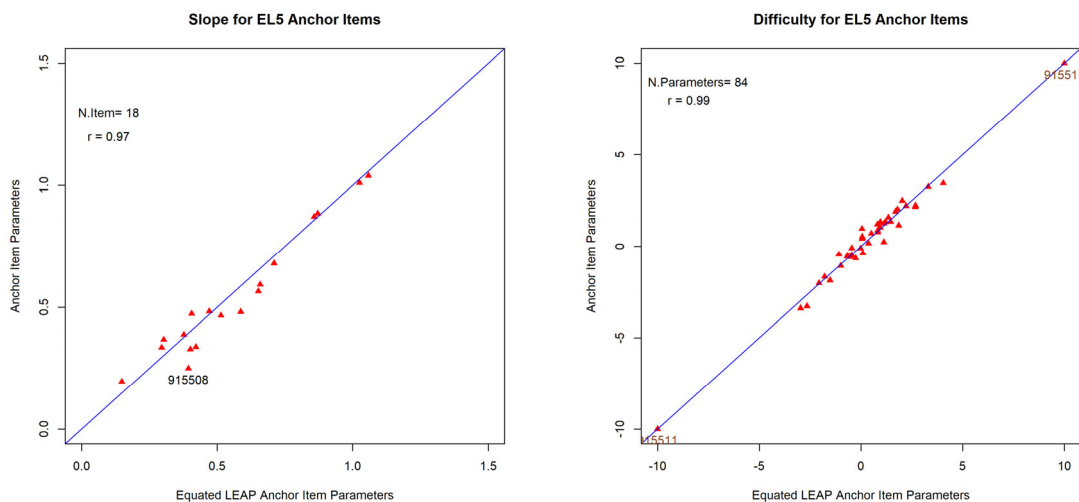


**Anchor 2**

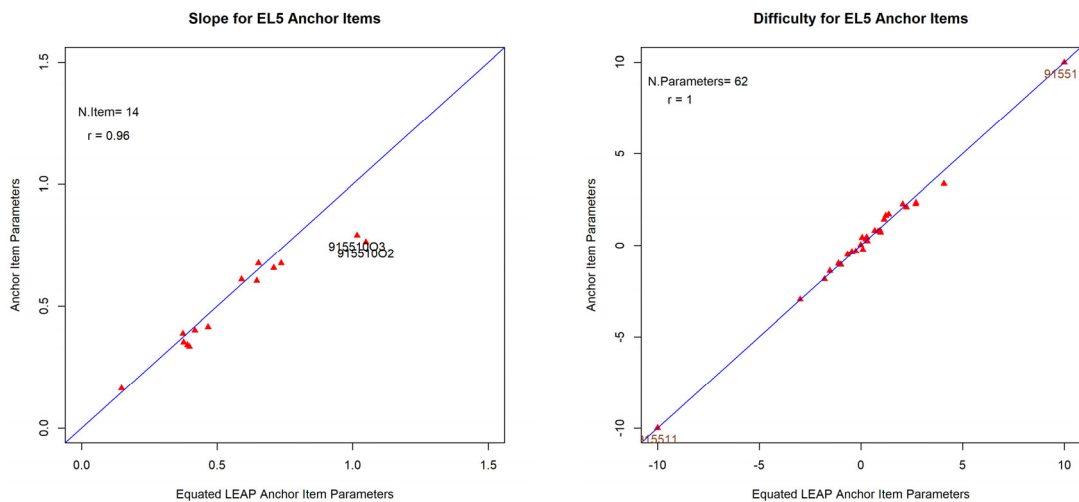


**Figure 6.17 ELA Grade 5 Slope and Difficulty Parameters Between Pre-equated and Equated Anchor Item Parameters**

**Anchor 1**

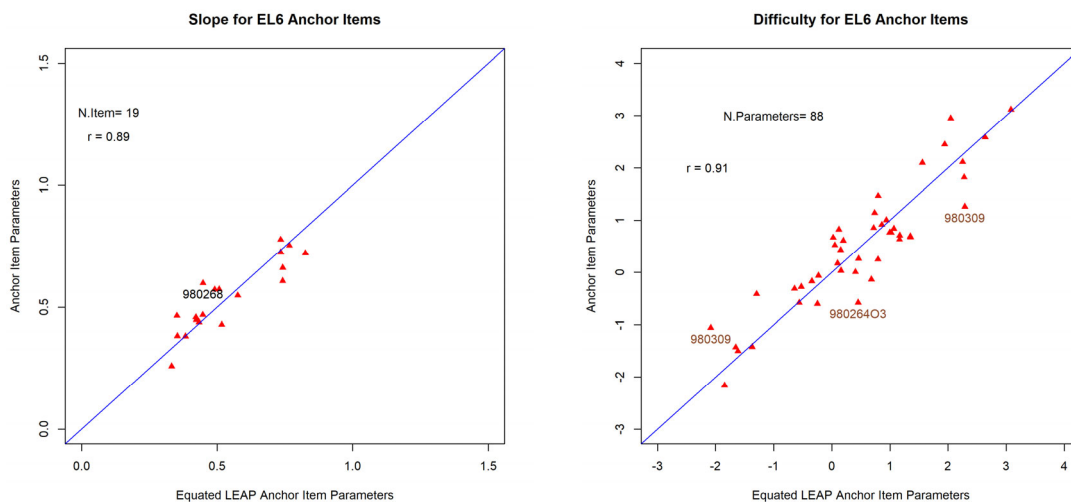


**Anchor 2**

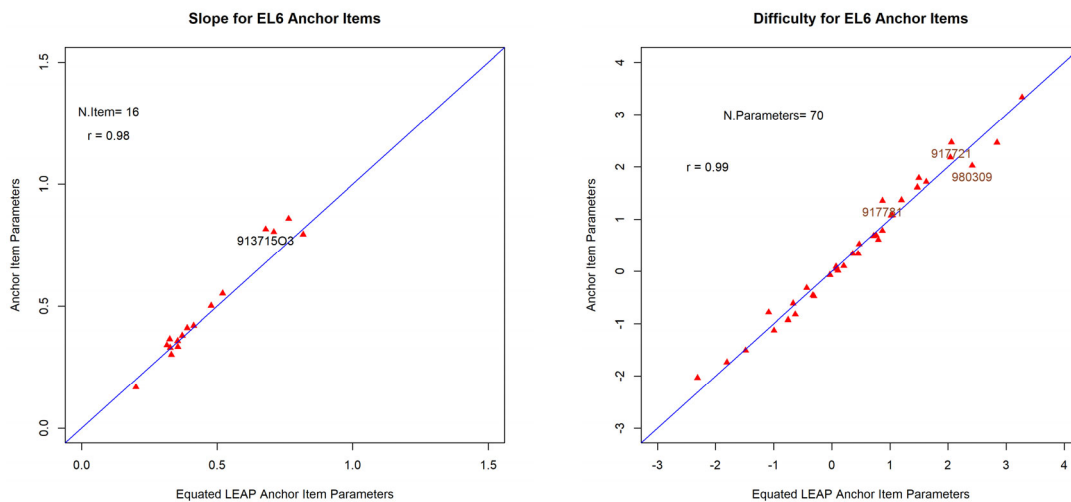


**Figure 6.18 ELA Grade 6 Slope and Difficulty Parameters Between Pre-equated and Equated Anchor Item Parameters**

**Anchor 1**

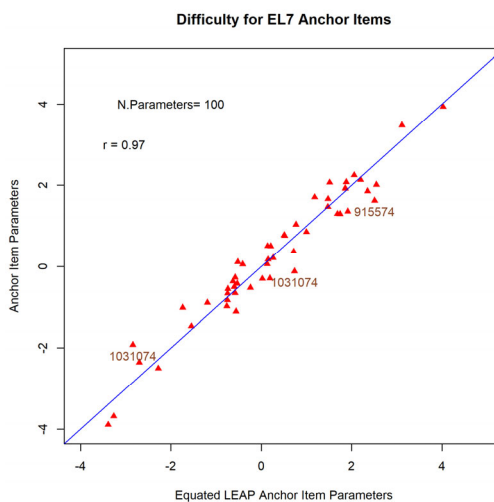
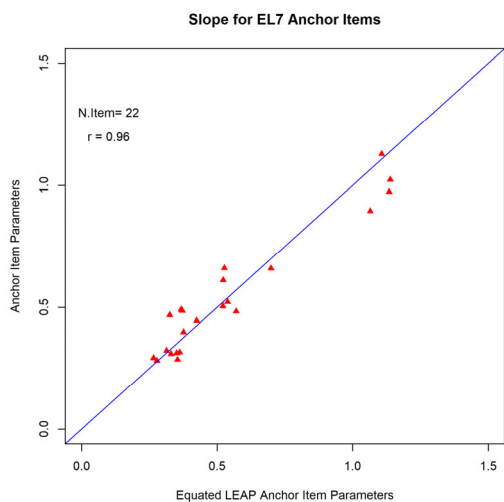


**Anchor 2**

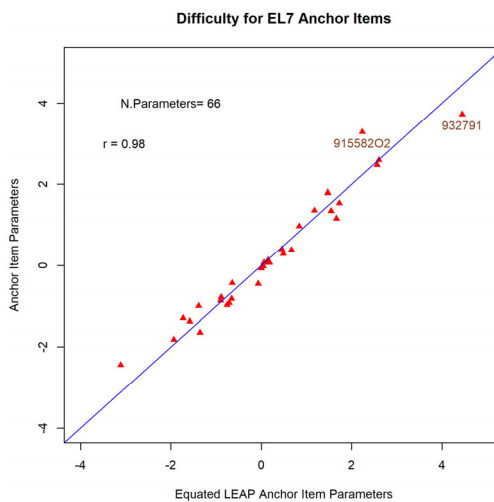
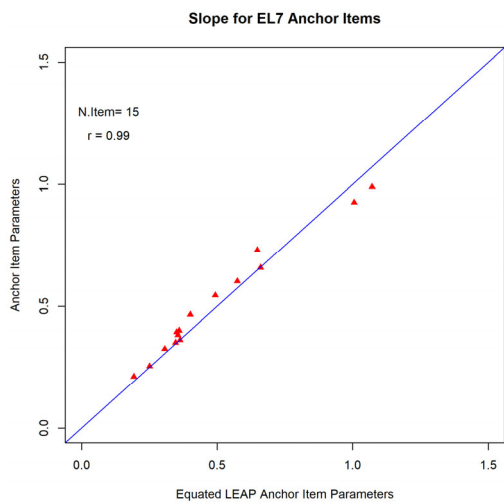


**Figure 6.19 ELA Grade 7 Slope and Difficulty Parameters Between Pre-equated and Equated Anchor Item Parameters**

**Anchor 1**

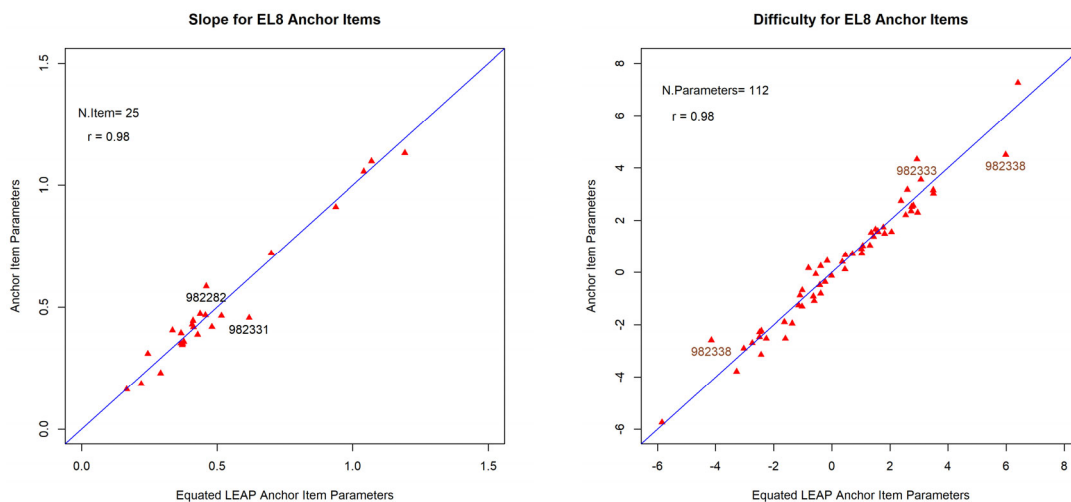


**Anchor 2**

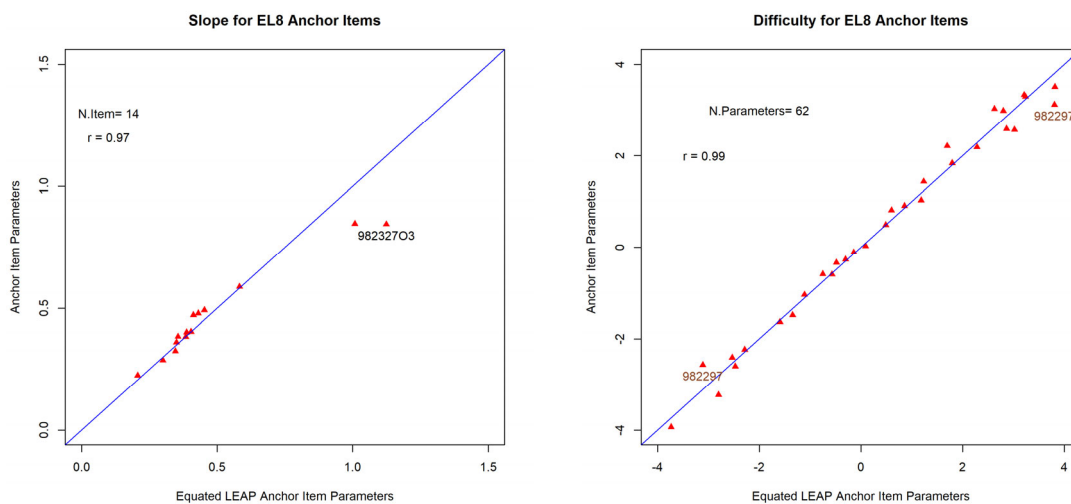


**Figure 6.20 ELA Grade 8 Slope and Difficulty Parameters Between Pre-equated and Equated Anchor Item Parameters**

**Anchor 1**

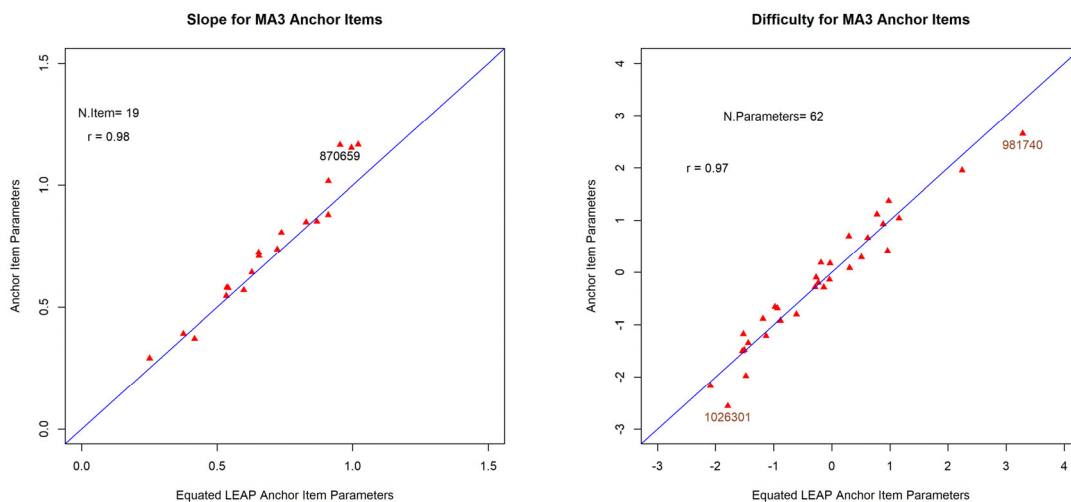


**Anchor 2**

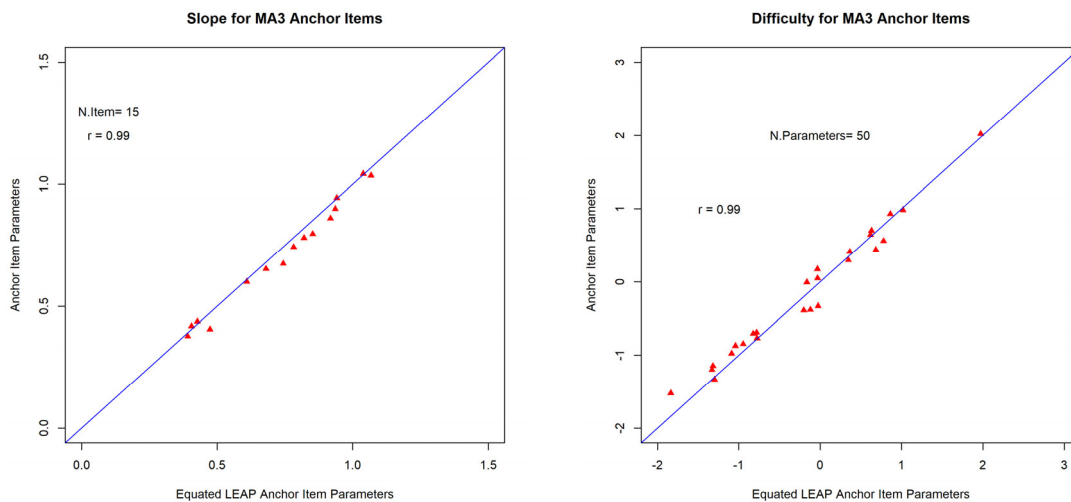


**Figure 6.21 Mathematics Grade 3 Slope and Difficulty Parameters Between Pre-equated and Equated Anchor Item Parameters**

**Anchor 1**

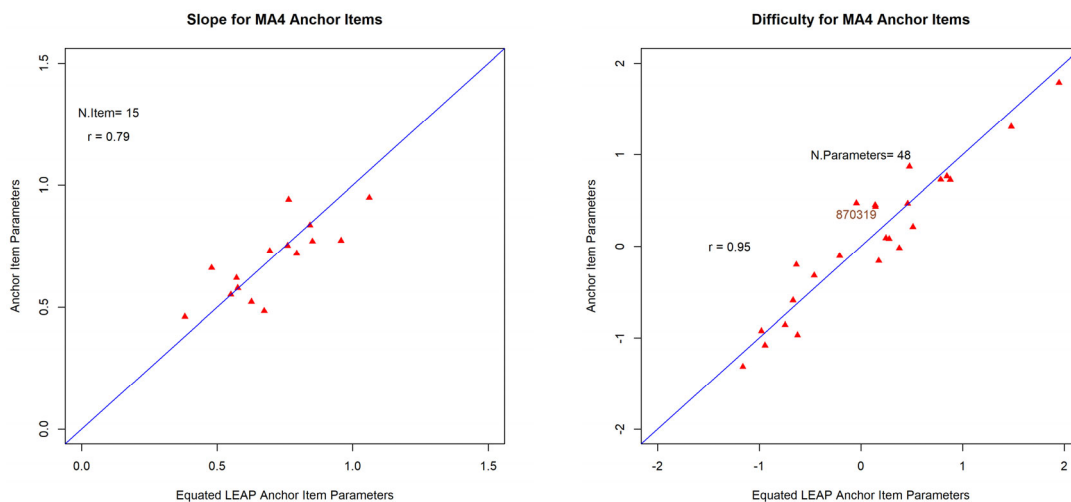


**Anchor 2**

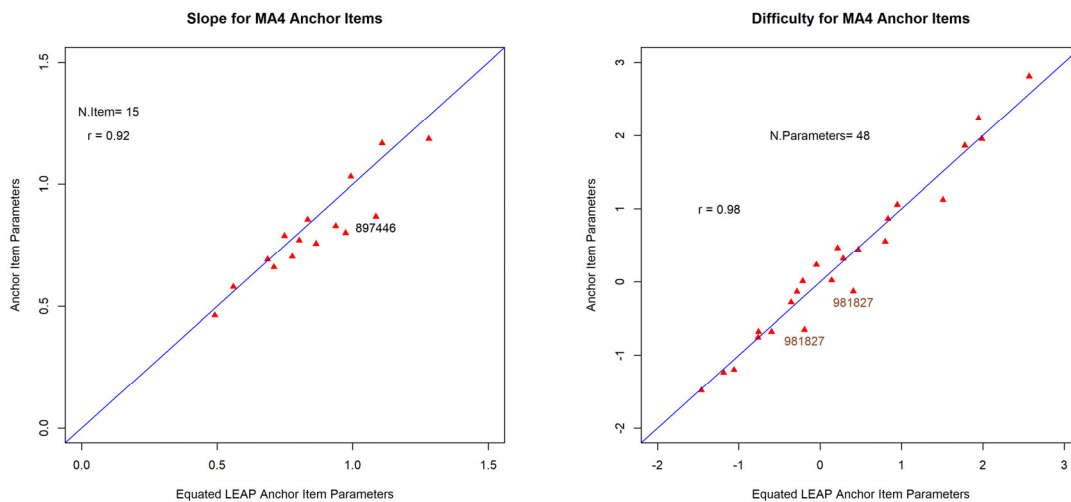


**Figure 6.22 Mathematics Grade 4 Slope and Difficulty Parameters Between Pre-equated and Equated Anchor Item Parameters**

**Anchor 1**

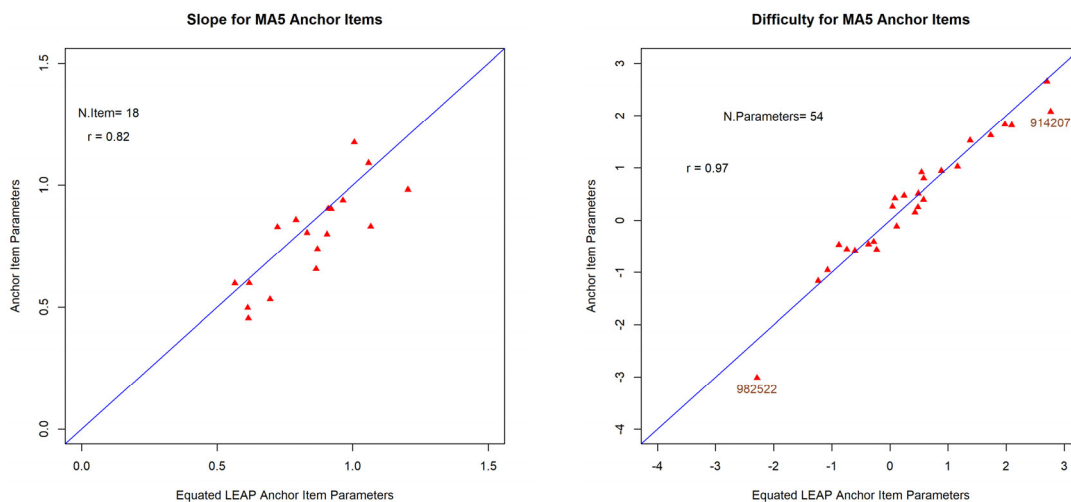


**Anchor 2**

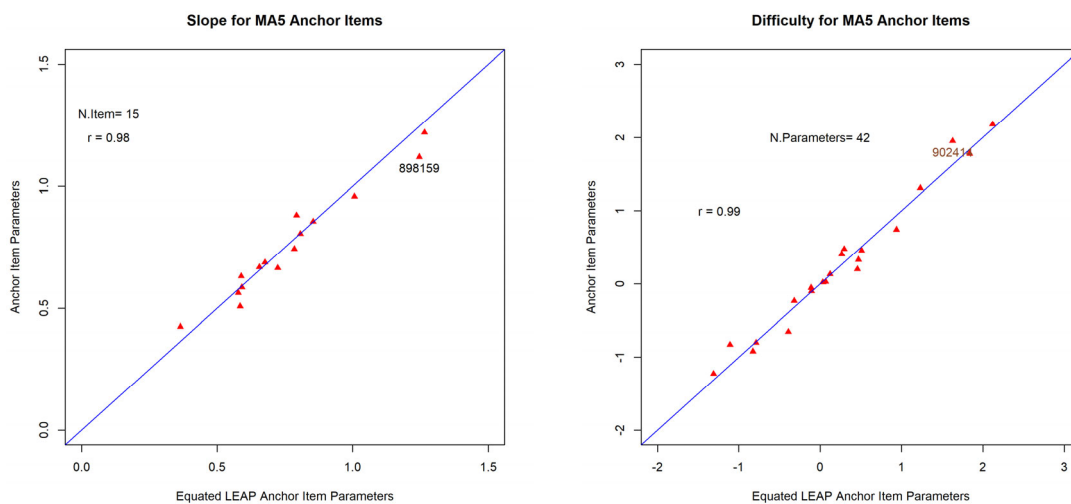


**Figure 6.23 Mathematics Grade 5 Slope and Difficulty Parameters Between Pre-equated and Equated Anchor Item Parameters**

**Anchor 1**



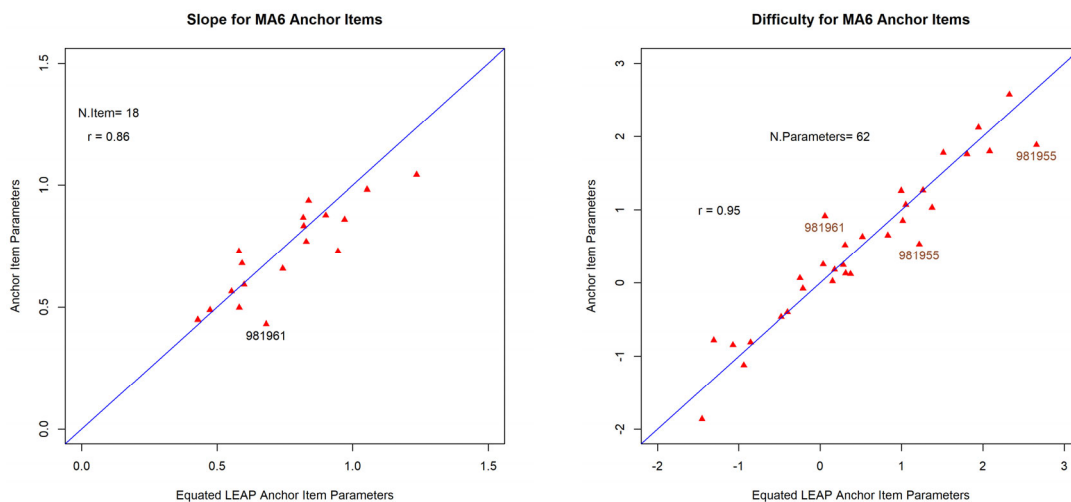
**Anchor 2**



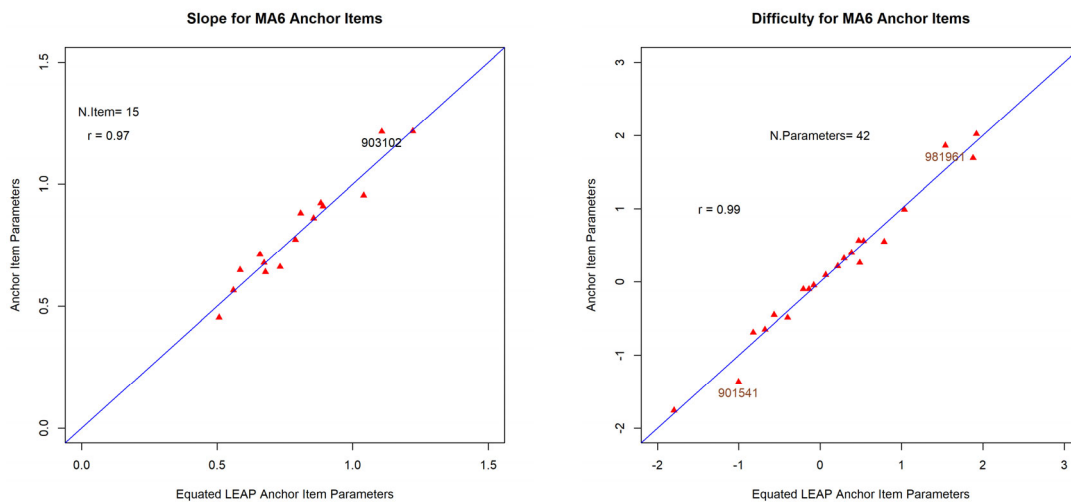


**Figure 6.24 Mathematics Grade 6 Slope and Difficulty Parameters Between Pre-equated and Equated Anchor Item Parameters**

**Anchor 1**

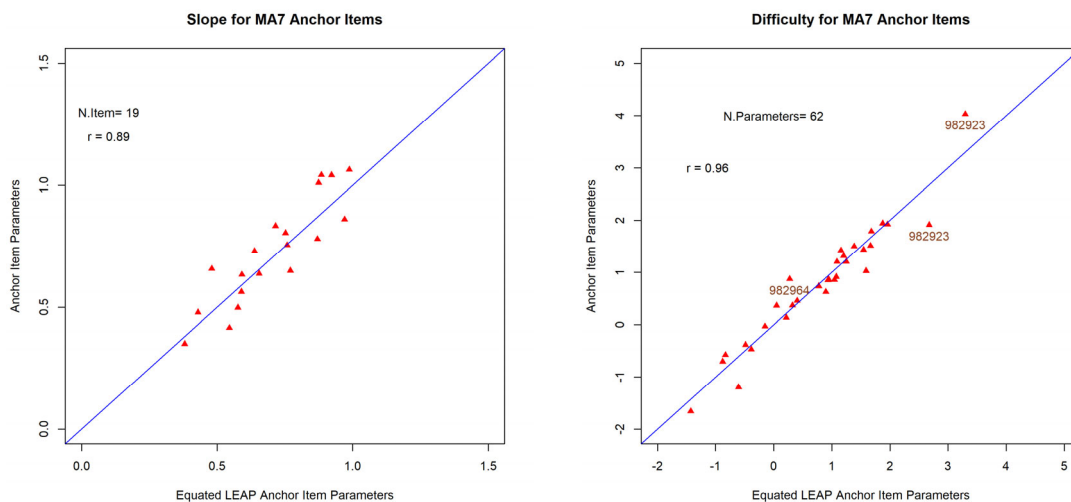


**Anchor 2**

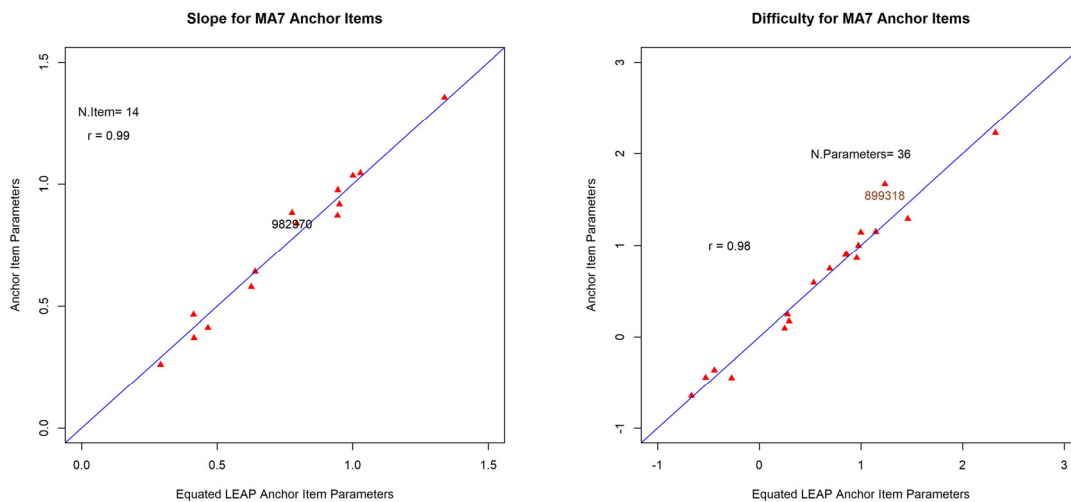


**Figure 6.25 Mathematics Grade 7 Slope and Difficulty Parameters Between Pre-equated and Equated Anchor Item Parameters**

**Anchor 1**

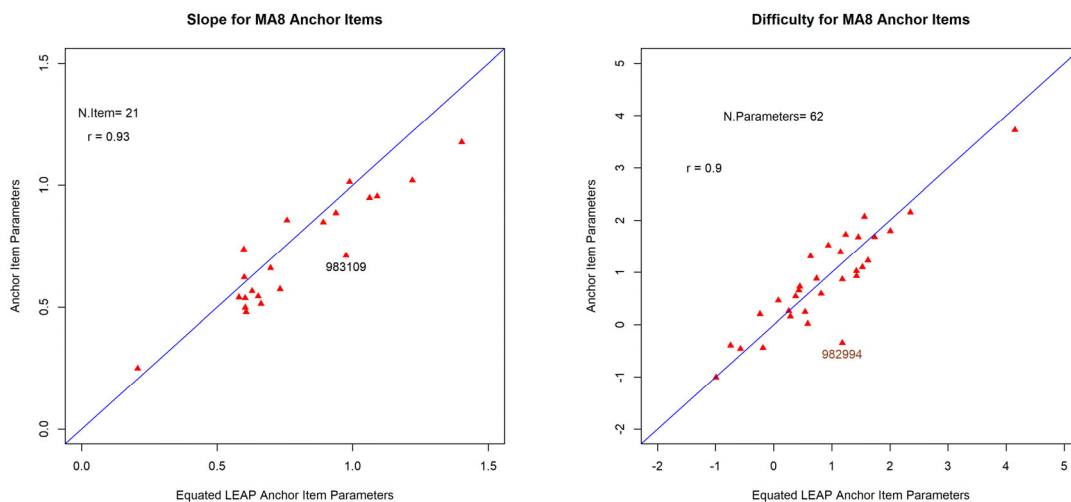


**Anchor 2**

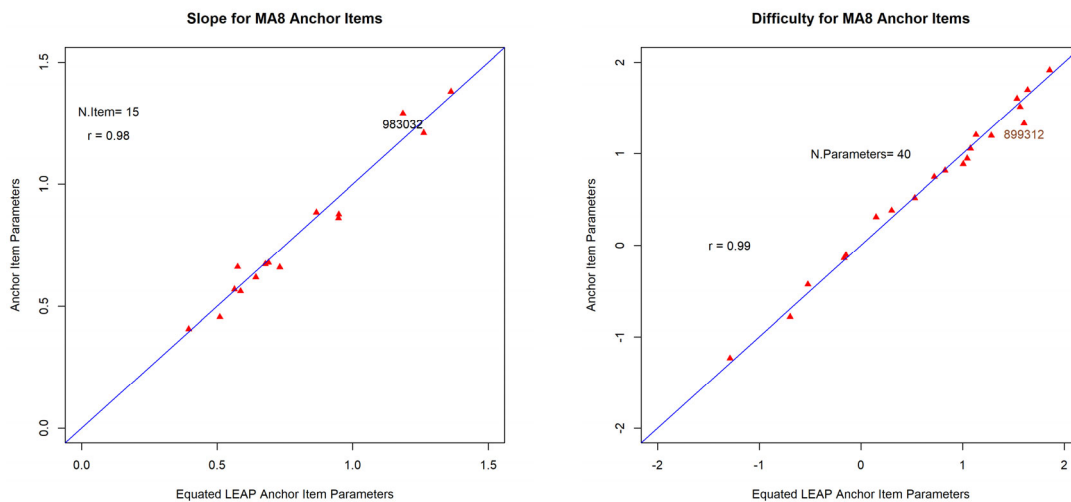


**Figure 6.26 Mathematics Grade 8 Slope and Difficulty Parameters Between Pre-equated and Equated Anchor Item Parameters**

**Anchor 1**



**Anchor 2**



### 6.4.2.1. Evaluation of Anchor Item Stability

Standard 5.15 requires that information about the anchors be presented, 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).

One of the key requirements of anchor items in deriving valid reliable linking results is that the anchor items should form a miniature version of the test in terms of content coverage or test blueprint. Dropping flagged anchor items based solely on statistical criteria may change the content coverage and impact the validity of the 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 should be evaluated.

Outliers of anchor items were reviewed with the Robust Z (Huynh & Meyer, 2010) and the weighted root mean square difference (WRMSD) method in addition to being verified from a content perspective, when reviewers considered aspects of the outliers, such as the number of items and score points for each category and subcategory. If approved by the LDOE, the outliers were dropped from anchor sets and considered to be non-common anchor items during equating. The following evaluation rules were applied in order to check the quality of anchor items and the anchor set.

- Exclude CR items from anchor set if categories were collapsed due to small sample size.
- Exclude items with content or parameter estimation issues.
- Run Robust Z method and remove flagged items from anchor set using the criterion value of  $|1.96|$
- Run STUIRT and flag items if the WRMSD was greater than the values in Table 6.25.
- Remove an item from the anchor set if it is flagged by both Robust Z and WRMSD.
- Flag outliers using the plots of slope and difficulty item parameters with their correlations (Kolen & Brennan, 2014).
- Check score points and the numbers of items by reporting category and subcategory before and after dropping an anchor item.

Huynh and Meyer (2010) suggested to applying a z statistic that is robust under the presence of outliers. The robustification is established by replacing mean with median and standard deviation with interquartile range (IQR) for anchor items. A multiplicative constant (0.74) is applied to IQR to emulate the standard deviation of the normal distribution:

$$Z = \frac{(D - Md)}{0.74 \times IQR},$$

where  $D$  is the difference between intact and estimated item parameters of an anchor item and  $Md$  is a median of differences between intact and estimate item parameters for all items. The critical value of  $\pm 1.96$  is often used to evaluate estimated robust z values.

The WRMSD values were calculated to compare to the ICCs using intact and estimated anchor item parameters. WRMSD is defined as

$$SQRT\{\sum_{Q=1}^{41} W_Q [ICC_Q(EST) - ICC_Q(INTACT)]^2\},$$

where  $Q$  represents a quadrature point (i.e., node),  $W$  represents its weight given quadrature point  $Q$  from PARSCALE PH2 output,  $INTACT$  represents intact item parameters, and  $EST$  represents estimated item parameters corresponding to intact item parameters. Table 6.25 summarizes WRMSD flagging criteria for inspection and possible removal of linking items.

**Table 6.25 PARCC WRMSD Flagging Criteria**

| Categories | Points   | WRMSD/Points | WRMSD |
|------------|----------|--------------|-------|
| 2          | 1        | 0.100        | 0.100 |
| 3          | 2        | 0.075        | 0.150 |
| 4          | 3        | 0.075        | 0.225 |
| 5          | 4        | 0.075        | 0.300 |
| 6          | 5        | 0.075        | 0.375 |
| 7          | 6        | 0.075        | 0.450 |
| $\geq 8$   | $\geq 7$ | 0.090        | 0.999 |

#### 6.4.2.2. Lowest and Highest Obtainable Scale Scores

A maximum likelihood (MML) procedure cannot produce scale score estimates for students with perfect scores or scores below the level expected when students are guessing. In addition, although MML 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 necessary non-MML procedure. These values, which are set separately by grade, are called the lowest obtainable scale score (LOSS) and the highest obtainable scale score (HOSS). All grades and content areas in 2022 LEAP 2025 used the same LOSS and HOSS values. The LOSS value was 650, and the HOSS value was 850.

#### 6.4.2.3. Reporting Category and Subcategory Subscores

A student's performance on the ELA reporting categories (i.e., Reading and Writing) and mathematics categories (i.e., Major Content, Additional & Supporting Content, Expressing Mathematical Reasoning, and Modeling & Application) is reported in one of three ratings: *Weak*, *Moderate*, or *Strong*.

Additionally, subcategory ratings are reported at the student level for ELA and mathematics. ELA has three subcategories for reading (i.e., literary text, informational text, and vocabulary) and two subcategories for writing (i.e., written expression and knowledge and use of language conventions). Mathematics has subcategories that differ by grade. Subcategory performance is reported in one of three ratings of achievement: *Strong*, *Moderate*, or *Weak*. The 2022 LEAP 2025 reporting categories are summarized in chapter 3. Please see Table 3.1 for ELA and Table 3.8 and 3.9 for mathematics.

Although the performance ratings are determined only by the items included within a category or subcategory, the level of knowledge and ability needed to achieve a performance rating is connected to the level of knowledge and ability required to reach the subject-level achievement levels in the overall tests: a *Weak* rating requires similar knowledge and ability as the *Unsatisfactory* and *Approaching Basic* achievement levels, a *Moderate* rating requires similar knowledge and ability as the *Basic* achievement level, and a *Strong* rating requires similar knowledge and ability as the *Mastery* or *Advanced* achievement levels.

Reading and writing reporting category scores were produced for ELA assessments only. The reading category score range was 10–90 and the writing category score range was 10–60. The method for scaling categories

followed the PARCC methodology (Pearson, 2017). For the reading category, two theta score points corresponding to ELA scale scores of 700 and 750 were used for scaling. Linear transformation constants mapping the two theta points to scale score points of 30 and 50 were calculated. After these transformation values were applied to item parameters belonging to the reading category, a scoring table was generated using the TCC inverse method. A similar approach was applied to scale the writing category, using two scale score points of 30 and 35. Two cut scores, 40 and 50 for reading and 30 and 35 for writing, were used to produce three performance-level ratings for each category (see Table 6.26 for cut scores for summatives, categories, and subcategories).

For reporting categories in mathematics and subcategories in ELA and mathematics, only performance-level ratings were reported. Therefore, there is no need to scale these scores. Using the item parameters belonging to a given category (mathematics) or subcategory (ELA), a raw-score-to-theta scoring table is generated by applying the TCC inverse method. PARCC estimated  $\theta_{L3}$  and  $\theta_{L4}$  corresponding to scale scores of 725 and 750 for each content/grade using PARCC 2016 operational items by the TCC inverse method, and these values are the same across years. The two raw scores corresponding to  $\theta_{L3}$  and  $\theta_{L4}$  are cut scores for the category (mathematics) and subcategory (ELA).

This is also illustrated in Table 6.26.

**Table 6.26 Cut Scores for Summative, Reporting Categories, and Subcategories**

| Performance Level | Summative Test | Category (ELA) |         | Category (Mathematics)/Subcategory (Mathematics and ELA) |
|-------------------|----------------|----------------|---------|--|
|                   |                | Reading        | Writing |  |
| 1                 |                |                |         |  |
| 2                 | 700            | 30             | 25      |  |
| 3                 | 725            | 40             | 30      | $\theta_{L3}$  |
| 4                 | 750            | 50             | 35      | $\theta_{L4}$  |
| 5                 | Around 800     |                |         |  |

\*Subcategory thetas are those from summative tests (i.e., 725 & 750).

\*\*Yellow highlight shows cut scores for category and subcategory.

### 6.4.3 Item Difficulty-Student Ability Maps

LEAP 2025 item difficulties based on item response theory (IRT) were plotted to show the distribution of the item difficulties across student performance. The plots allow easy visualization of the relationship between the distributions of item difficulty and student ability. While the item difficulty parameters estimated with the Rasch model directly place item difficulty on the student performance scale (i.e., ability/theta), those estimated with the 2PL/GPMC model cannot be placed on the student performance scale because of an additional parameter, item slope. LEAP 2025 uses the 2PL/GPMC model. To resolve this issue, the concept of response probability (RP) from item mapping procedures, such as the Bookmark Standard Setting Procedure (BSSP; Lewis, Mitzel & Green, 1996), was applied to all spring 2022 LEAP 2025 operational items.

In the BSSP, an RP specifies the probability with which a student with a given ability would be able to correctly answer an item of the same difficulty. For example, if the RP criterion is 0.67 (RP67), students with a given ability would have a 67% chance of correctly answering items with difficulty at the same level. For a BSSP, it is common to use an RP67 to clearly define when students have mastery of an item (Huynh, 1988). The choice of RP criterion to use in a BSSP is a policy decision, and many states have selected different RP criteria for different purposes, and other RP criteria are often used (Cizek & Bunch, 2007, p. 162; Mitzel, et al., 2001). For the purposes of aligning item difficulty with student performance, an RP50 was selected. This

indicates that students with a given ability would have a 50% chance of correctly answering items with difficulty at the same level.

Figure 6.27 through Figure 6.32 plot the ELA distributions and Figure 6.33 through Figure 6.38 plot the Mathematics distribution. There is one RP50 value for a multiple-choice item. There is one value where it is considered that test takers of a certain achievement level will answer the MC item correctly 1/2 of the time. In a BSSP, the RP for a polytomous item is generally split by score point; however, in this study, one RP50 was estimated under the assumption that the RP50 of a polytomous item can be considered as an appropriate mastery of the item.

The upper plot presents the scale score distribution of the test takers based on census data. The X-axis shows the scale score. The Y-axis is the density of the scale scores. The density is the number of students with a scale score divided by the total number of students who received a score.

The lower plot presents the RP50 values, as expressed on the scale score metric, for the spring 2022 LEAP 2025 operational items. The X-axis shows the scale score; this is the same scale as the upper plot. The Y-axis is a subcategory: RI, RL, RV, WE, & WKL for ELA and A, B, C, and D for Math. Each red dot represents the RP50 value of an item aligned to the subcategory. The four vertical lines are the cut scores. For all ELA grades and Math grades 7 and 8, most RP50 values were located in performance levels 3 and 4, which indicates many items were difficult for lower performing students. For Mathematics grades 3-6, most RP50 values were located in performance levels 2, 3, and 4 where most students are located.

Figure 6.27 Item Difficulty-Student Ability Map: ELA 3

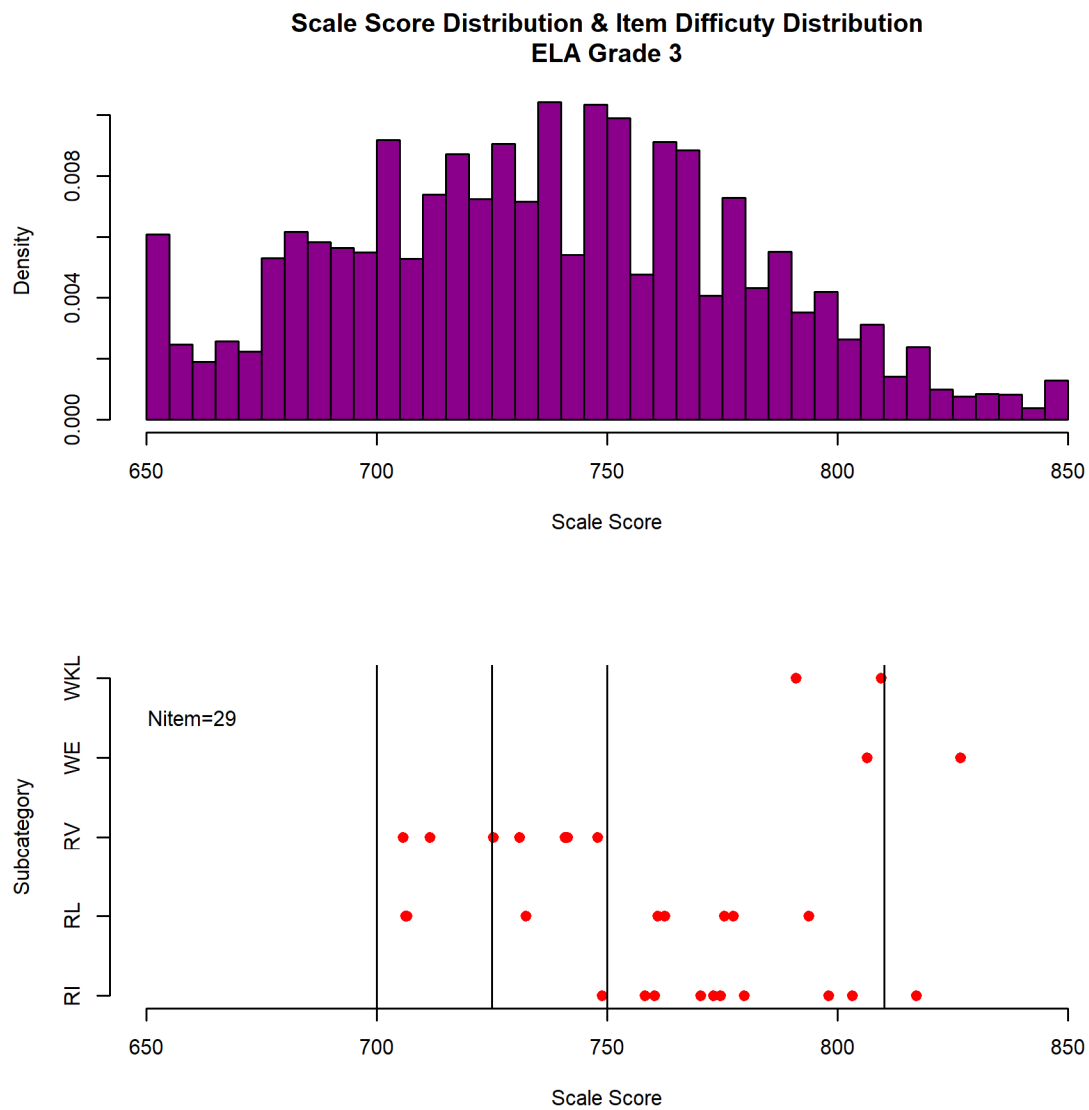




Figure 6.28 Item Difficulty-Student Ability Map: ELA 4

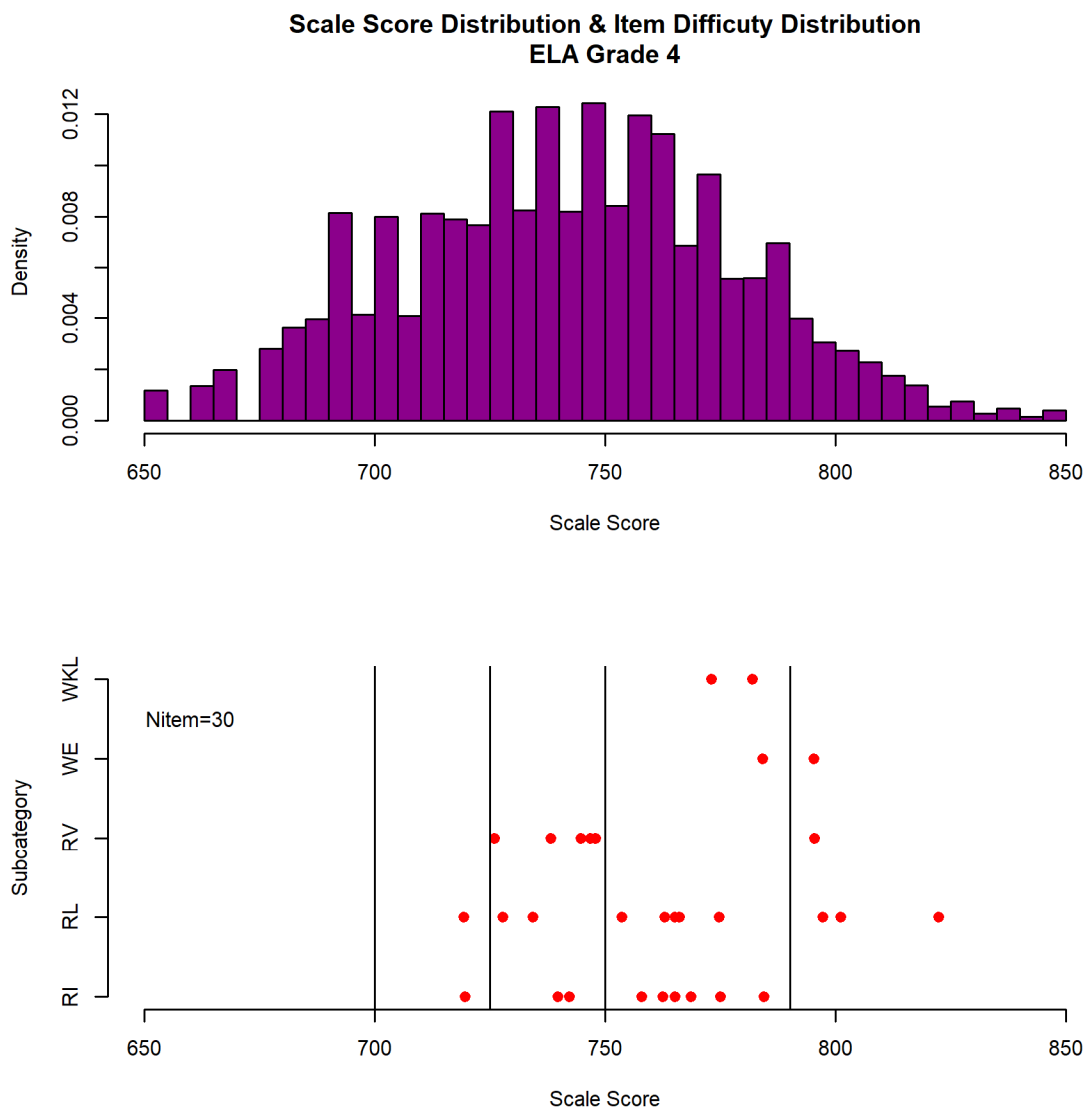


Figure 6.29 Item Difficulty-Student Ability Map: ELA 5

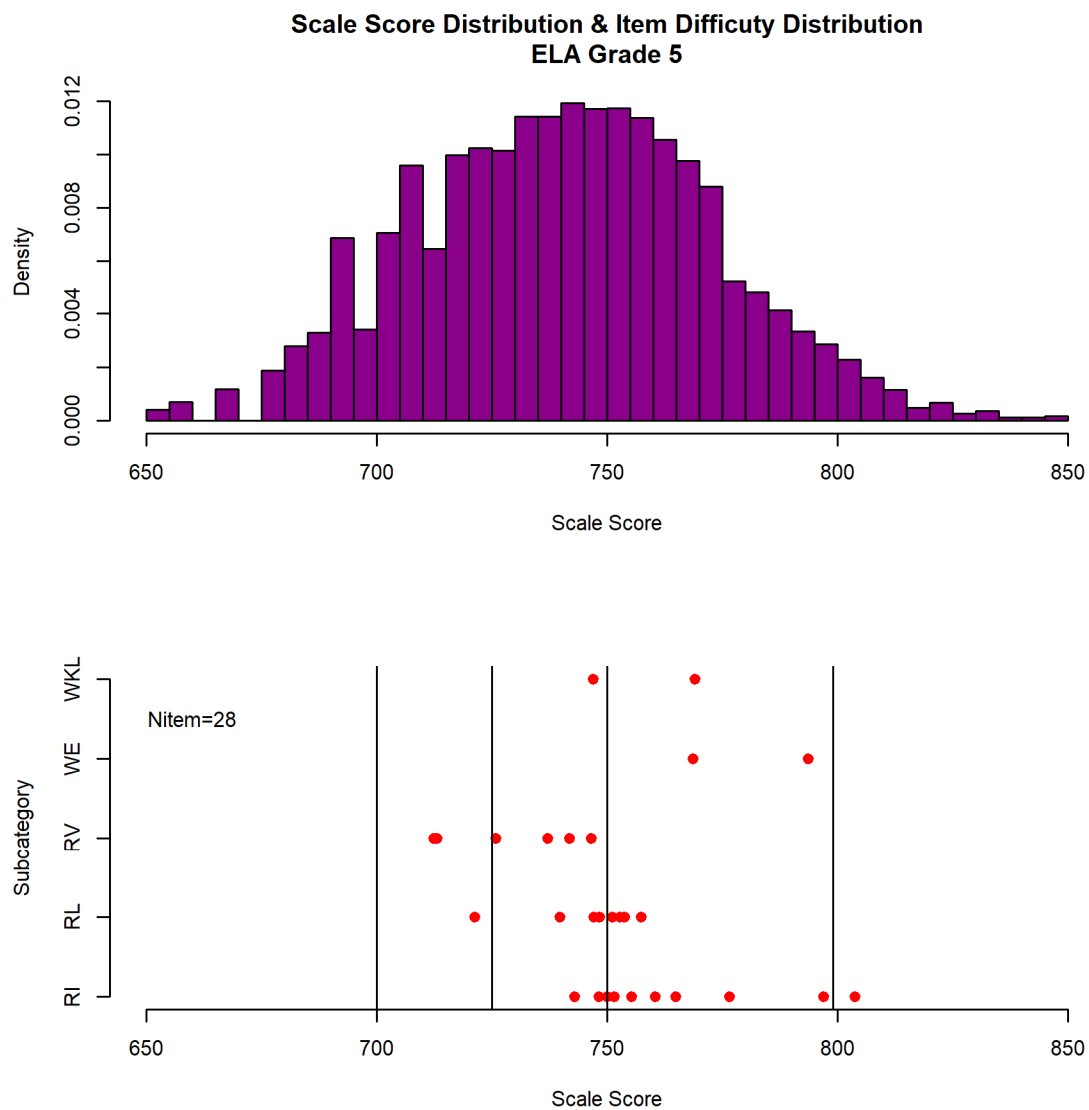


Figure 6.30 Item Difficulty-Student Ability Map: ELA 6

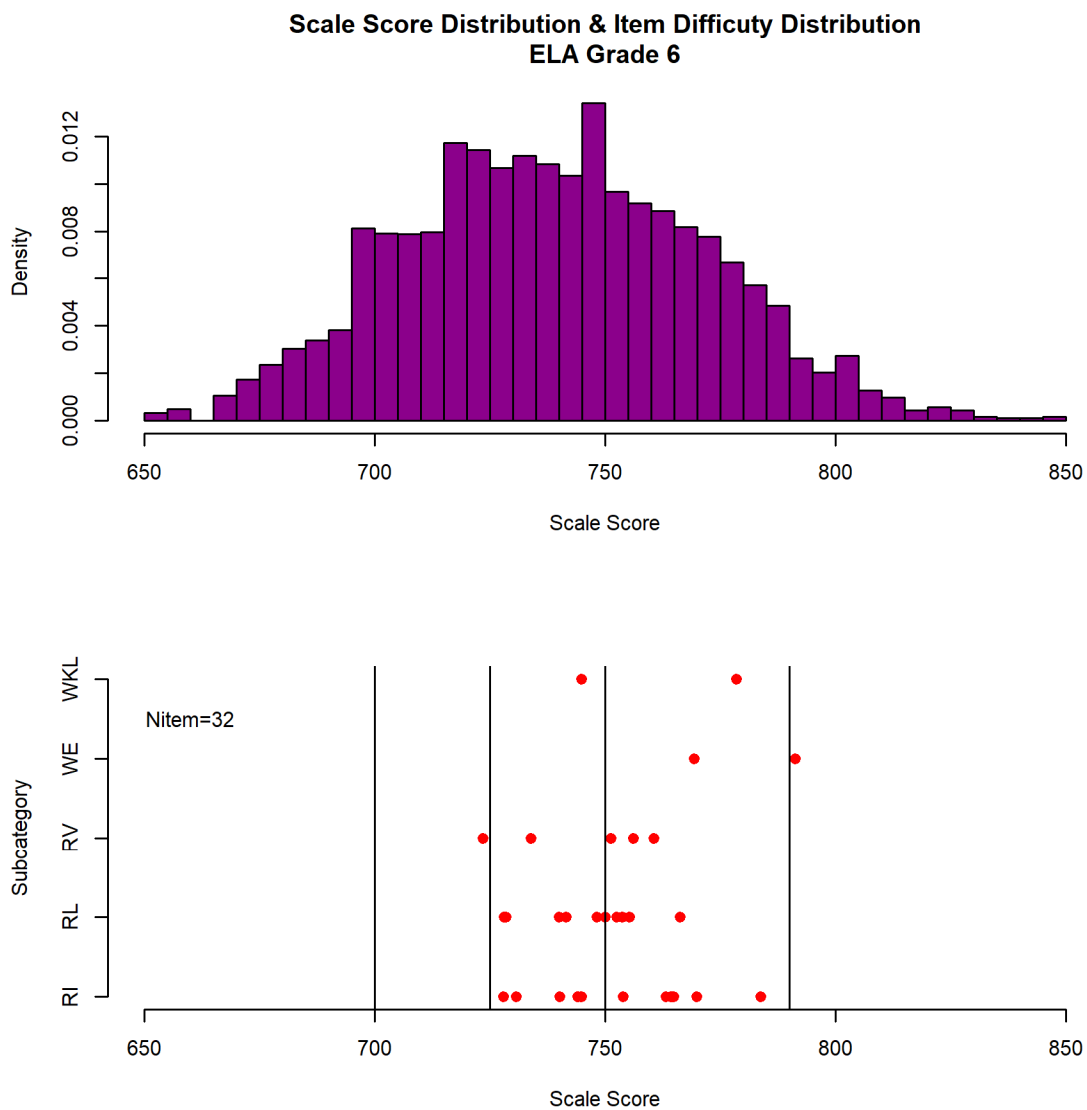


Figure 6.31 Item Difficulty-Student Ability Map: ELA 7

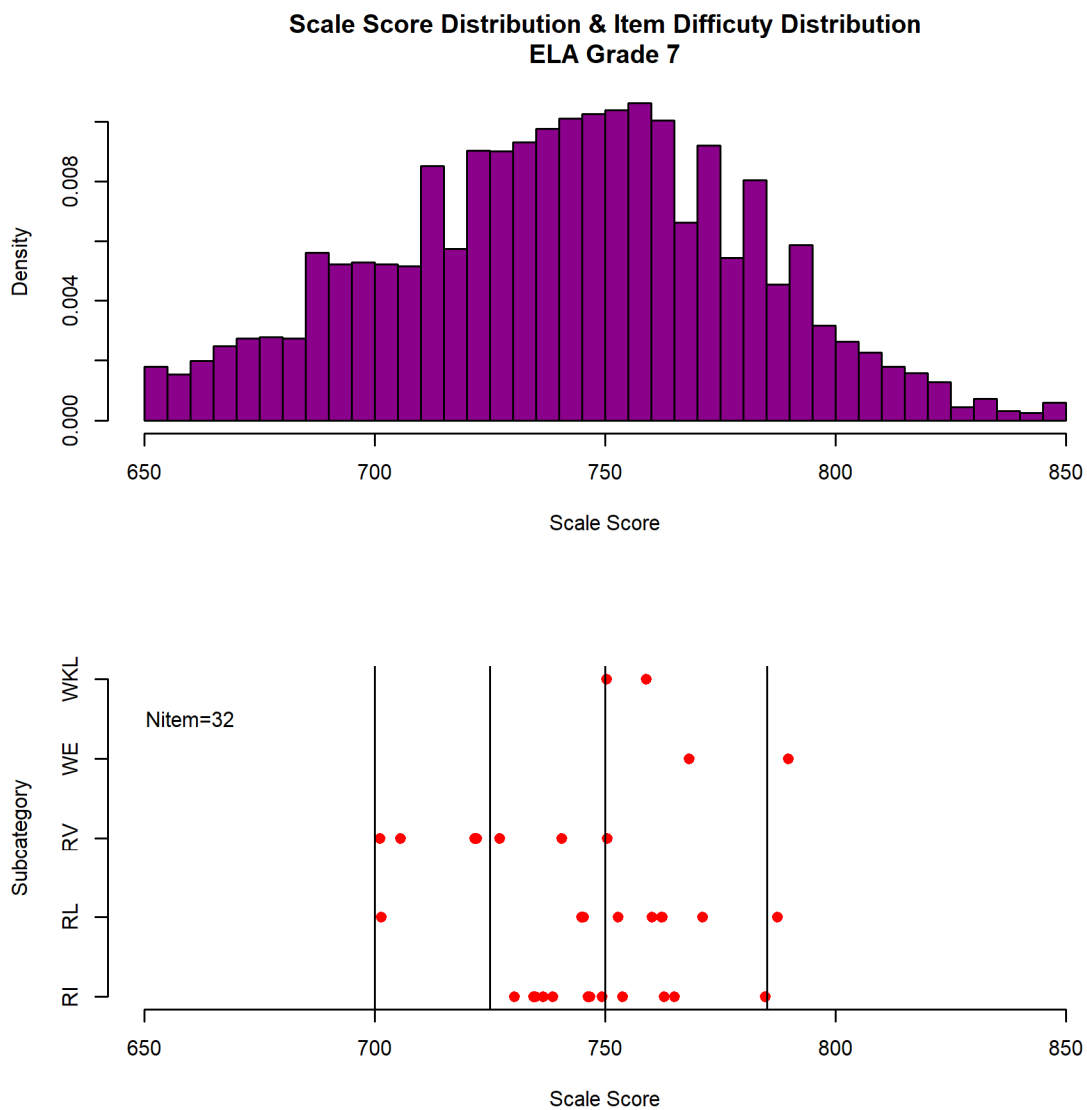


Figure 6.32 Item Difficulty-Student Ability Map: ELA 8

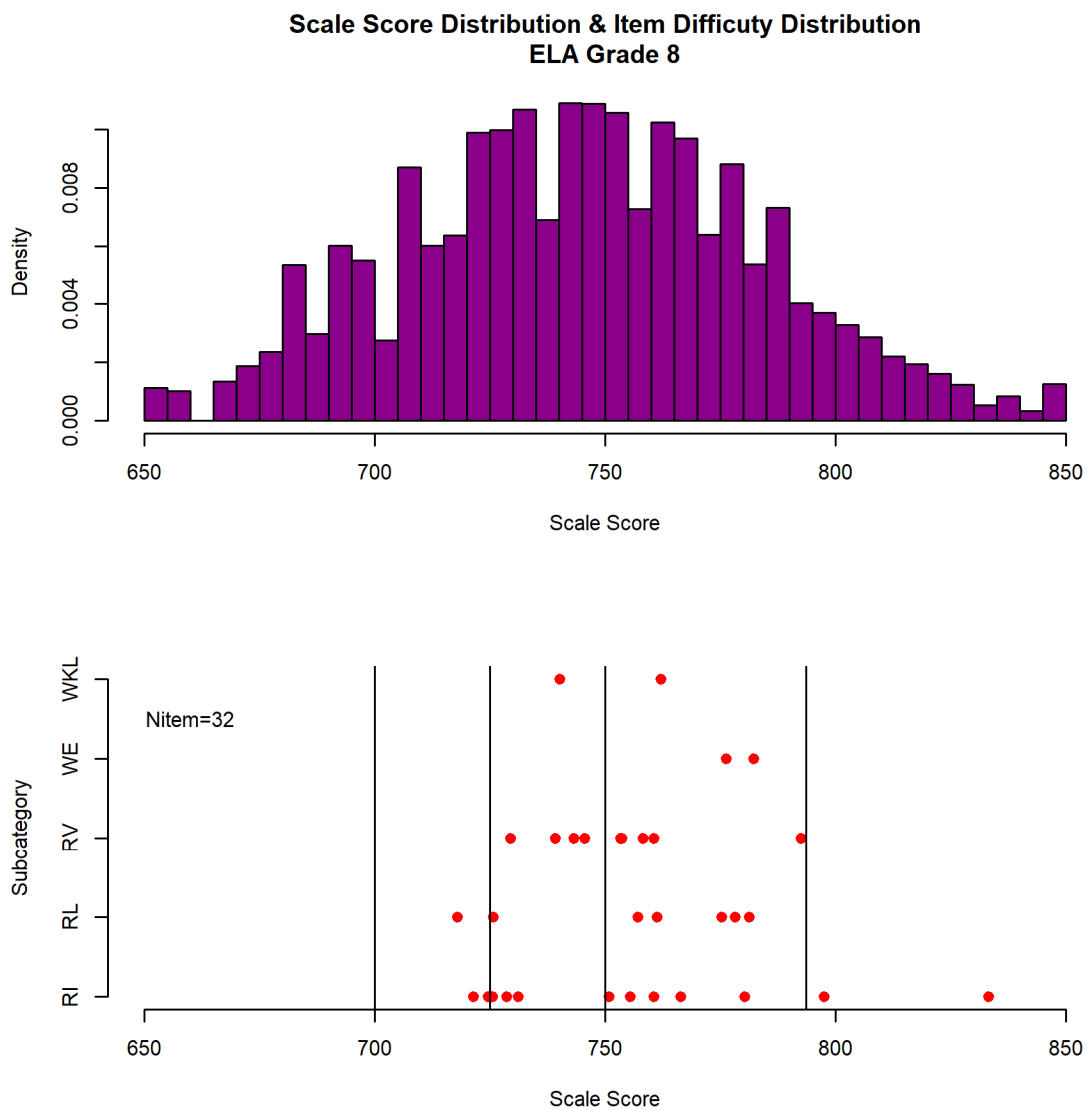


Figure 6.33 Item Difficulty-Student Ability Map: Mathematics 3

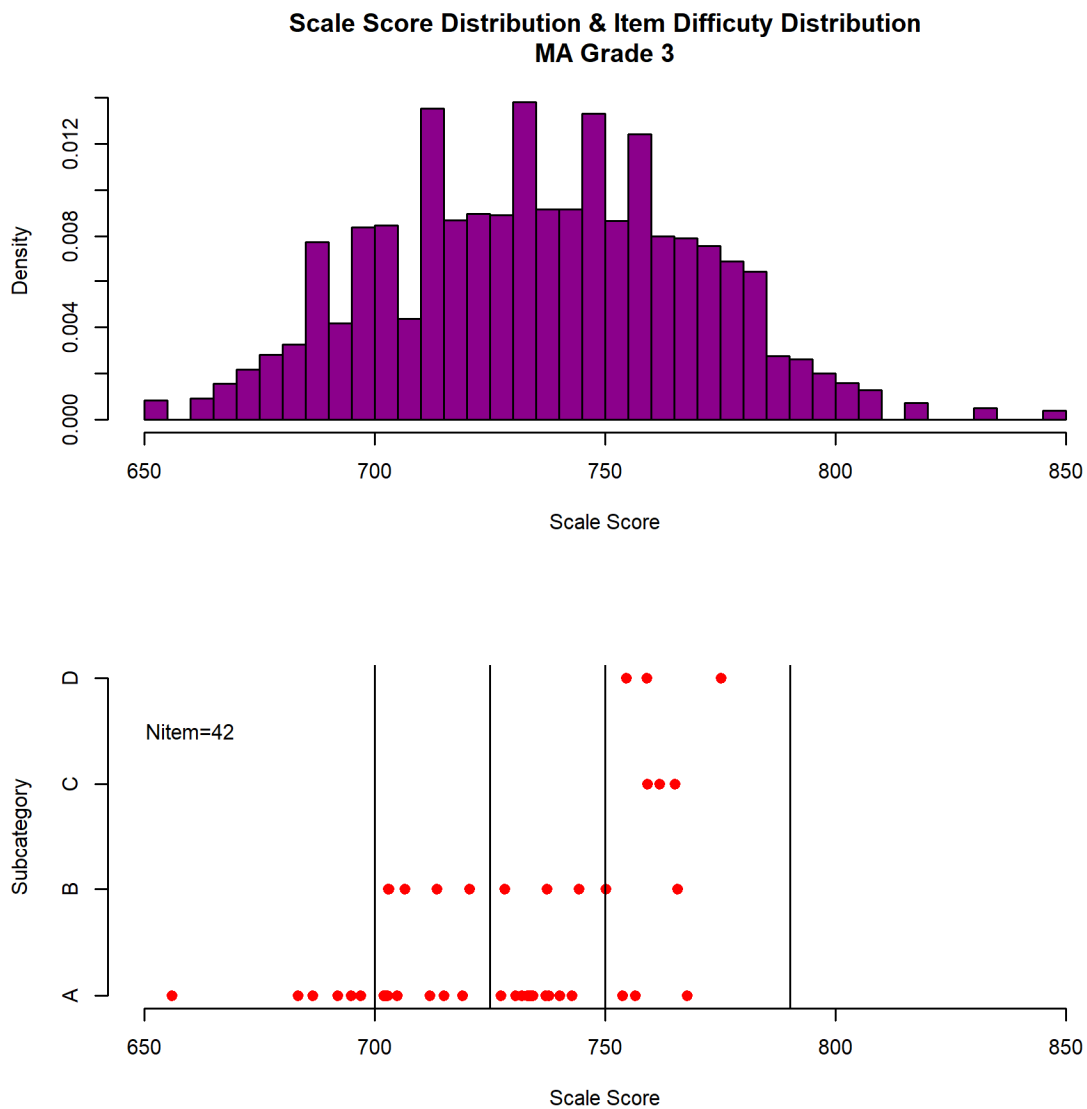


Figure 6.34 Item Difficulty-Student Ability Map: Mathematics 4

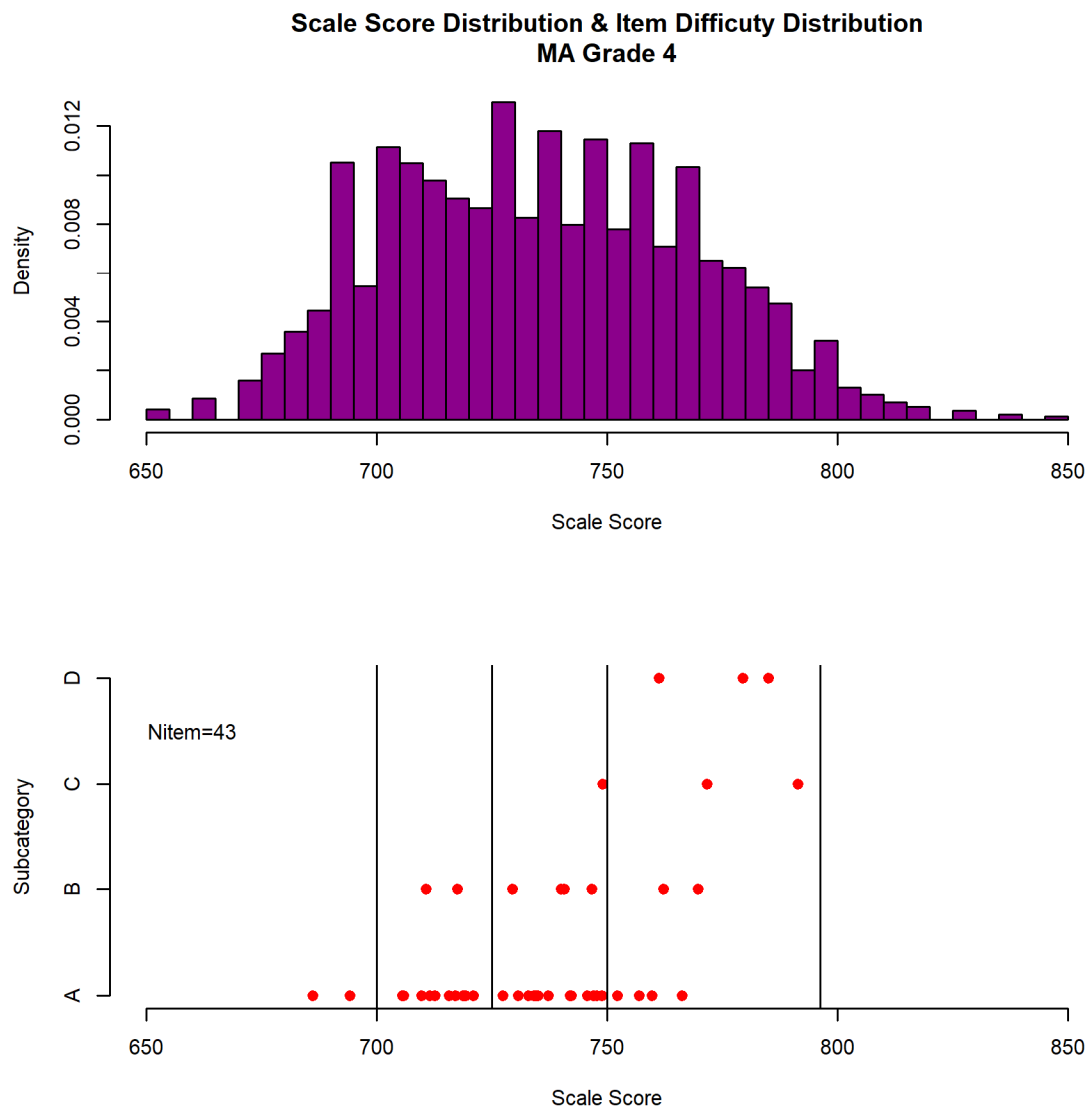


Figure 6.35 Item Difficulty-Student Ability Map: Mathematics 5

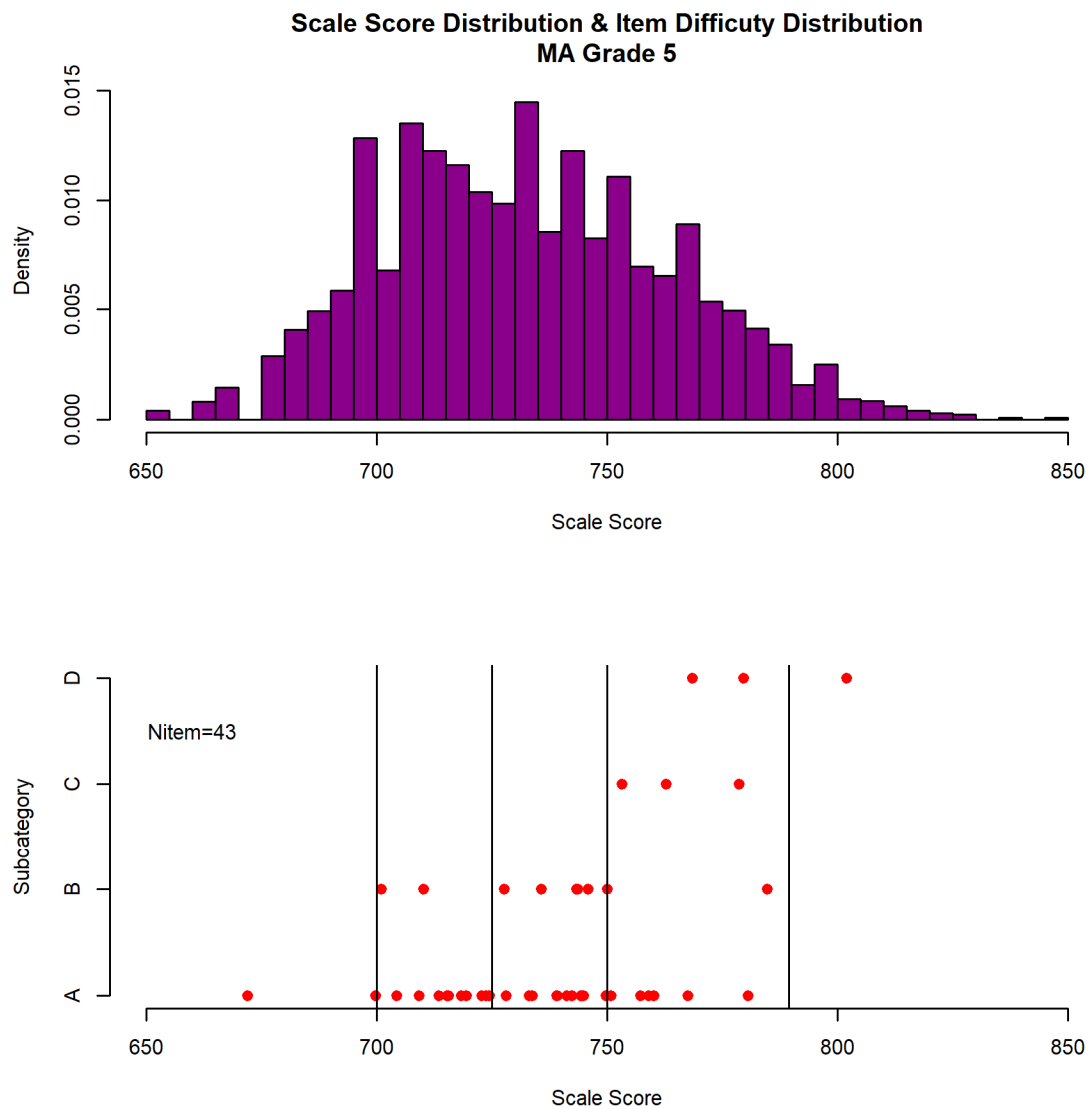




Figure 6.36 Item Difficulty-Student Ability Map: Mathematics 6

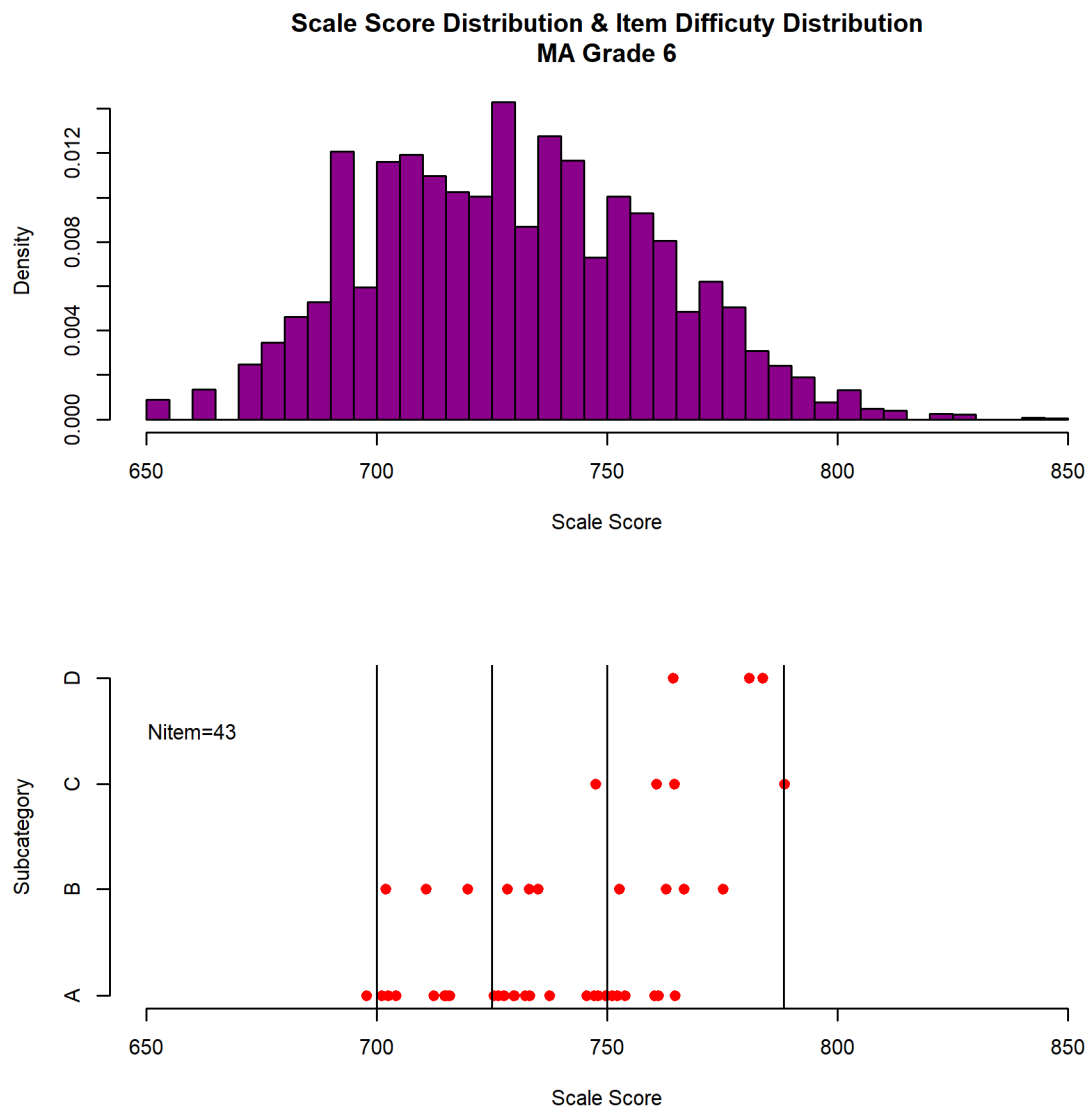


Figure 6.37 Item Difficulty-Student Ability Map: Mathematics 7

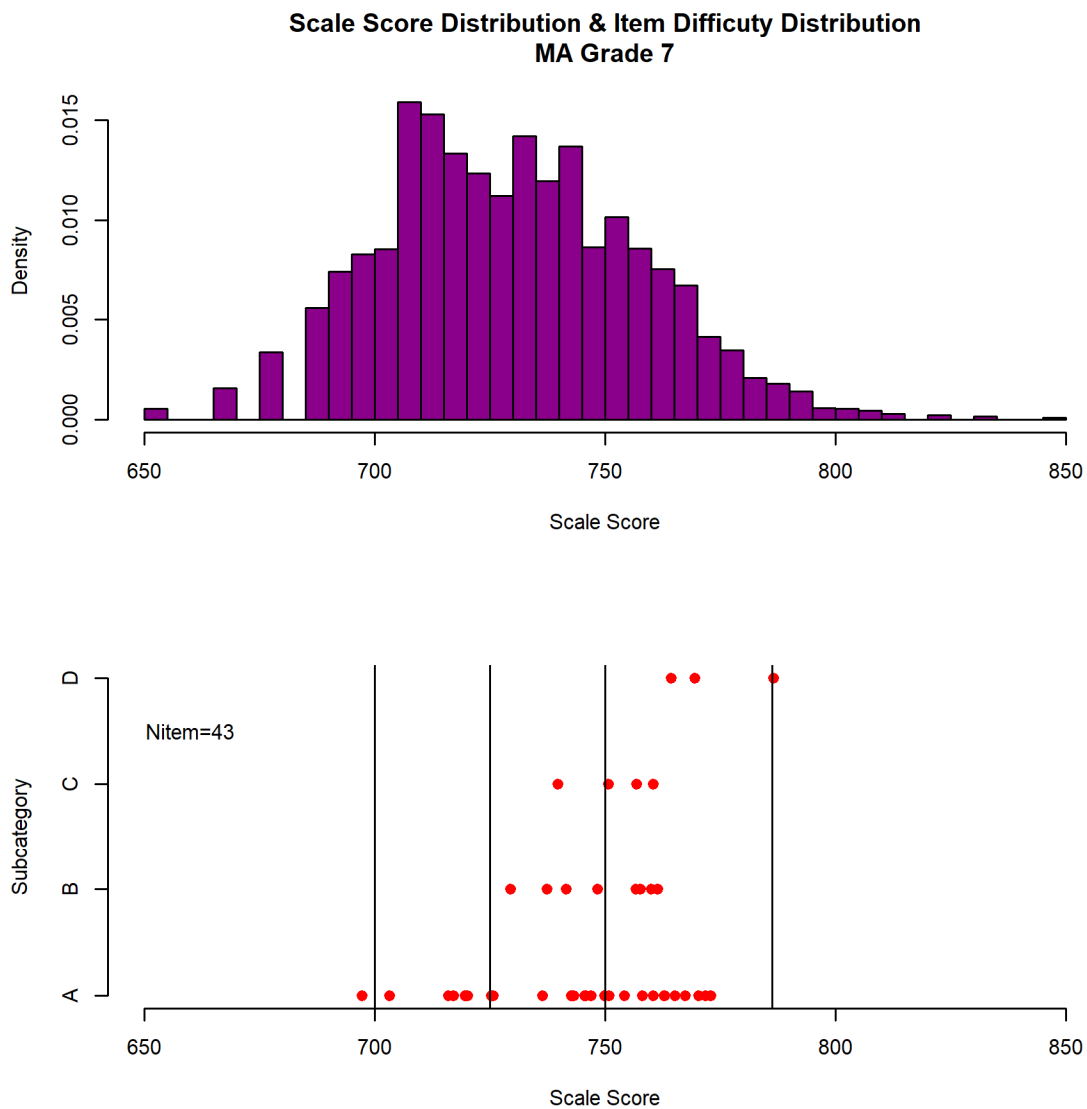
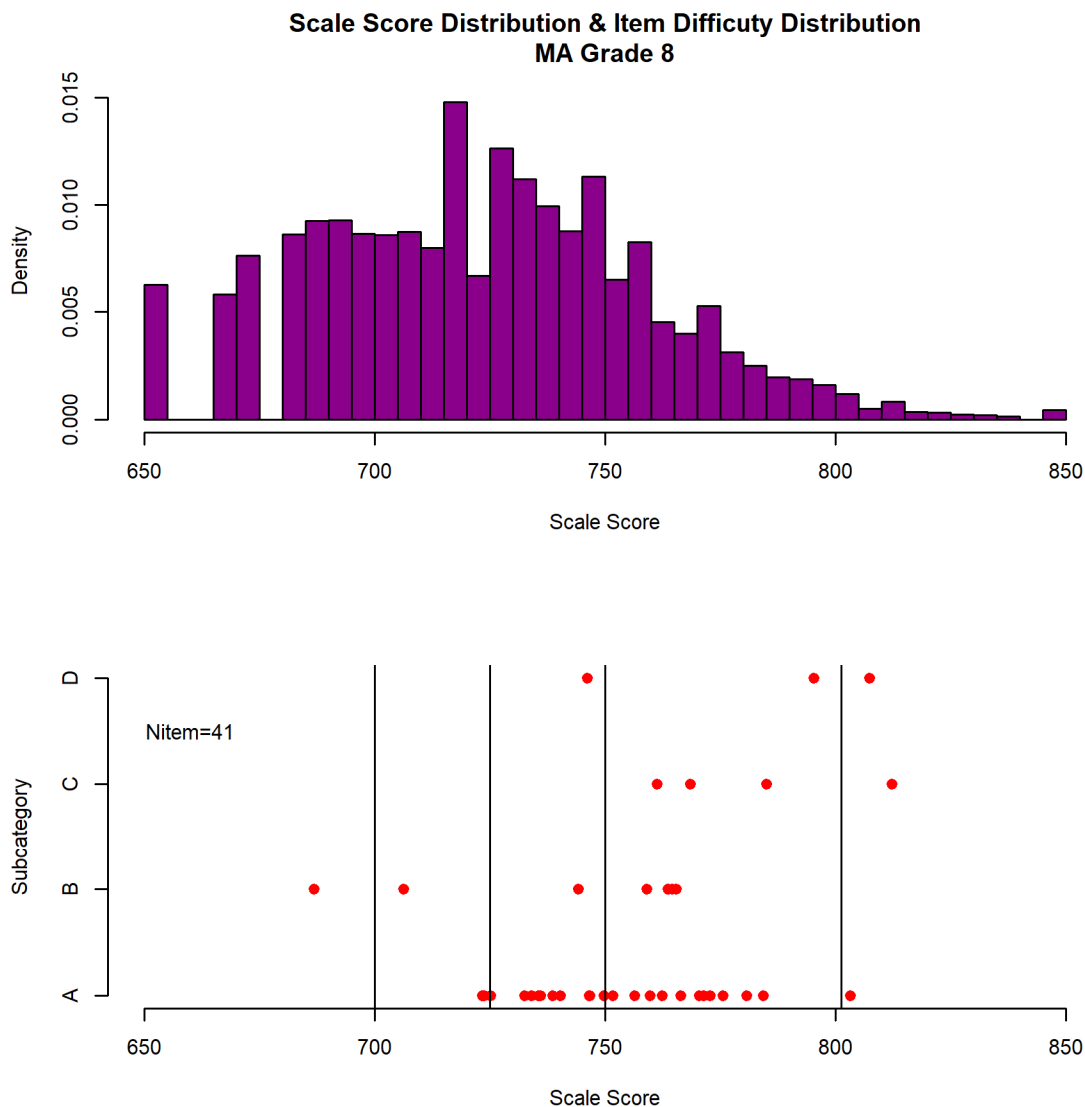


Figure 6.38 Item Difficulty-Student Ability Map: Mathematics 8



### 6.4.4 Across Year Form Comparability

The primary purpose of form equating is to establish score equivalency between two (or more) forms. Equivalency is established by first building the forms to be equated according to tight content specifications. Then the form scores are placed on the same scale (by equating), such that students performing on an assessment at the same level of (underlying) achievement should receive the same scale score, although they may not receive the same number-correct score (or raw score). The raw-to-scale-score relationship performs this leveling function based on form-equating studies. Theoretically, differences in the raw-to-scale-score relationship between the two forms can be partially due to differences in the samples utilized for calibration and the differences in item difficulty. The LDOE and DRC strive to maintain equivalent samples or use near-census samples over the years, minimizing the potential differences due to the samples. Differences in the raw-to-scale-score relationship, therefore, can be primarily attributed to the differences in item difficulty.

The forms used in the spring 2022 were post-equated forms. Just as in previous years, equating was conducted using the test characteristic transformation function method in the common-item non-equivalent-groups design (Stocking & Lord, 1983). Tables 6.27 through 6.38. provide scale scores at selected percentiles that can be used to compare the distributional characteristics of the Spring 2022 forms to previous administrations, based on census data. Although these scale scores are rounded values, there were differences in the scale-score values for a given percentile across the forms. These variations could arise for several reasons: (1) differences in the proficiency (i.e., achievement) of students in the samples or growth in student achievement across years; (2) unevenness in the respective distributions that combine with the number-correct-to-scale-score scoring method, leaving “gaps” in the scale; or (3) other sources of equating error. Other sources of equating error can include subtle content differences between forms, handscoring differences, or unusual student samples. Some equating errors will always be present between forms. This means that the forms will not measure identically, even under optimal testing conditions. In general, however, the test characteristic function equating techniques will “level” the equated forms through the raw-to-scale-score adjustment.

**Table 6.27 Comparisons of Scale Scores at Selected Percentiles—Grade 3 ELA**

|            | 2016   | 2017   | 2018   | 2019   | 2021   | 2022   |
|------------|--------|--------|--------|--------|--------|--------|
| Percentile | Form A | Form B | Form C | Form D | Form D | Form E |
| 99         | 822    | 839    | 842    | 845    | 845    | 839    |
| 95         | 796    | 810    | 810    | 816    | 812    | 809    |
| 90         | 783    | 793    | 797    | 802    | 795    | 792    |
| 85         | 774    | 784    | 788    | 792    | 785    | 783    |
| 80         | 768    | 775    | 779    | 782    | 776    | 773    |
| 75         | 762    | 770    | 773    | 776    | 767    | 767    |
| 70         | 757    | 762    | 768    | 770    | 761    | 761    |
| 65         | 751    | 757    | 762    | 764    | 755    | 755    |
| 60         | 746    | 752    | 757    | 758    | 749    | 749    |
| 55         | 741    | 748    | 752    | 752    | 743    | 743    |
| 50         | 738    | 743    | 746    | 746    | 737    | 736    |
| 45         | 732    | 739    | 741    | 740    | 731    | 730    |
| 40         | 727    | 734    | 736    | 734    | 725    | 724    |
| 35         | 721    | 727    | 730    | 728    | 719    | 718    |
| 30         | 715    | 723    | 724    | 722    | 712    | 711    |
| 25         | 712    | 718    | 715    | 715    | 708    | 705    |
| 20         | 706    | 710    | 708    | 708    | 700    | 697    |
| 15         | 695    | 701    | 701    | 700    | 690    | 688    |
| 10         | 687    | 695    | 692    | 690    | 679    | 678    |
| 5          | 676    | 679    | 676    | 679    | 664    | 662    |
| 1          | 654    | 655    | 650    | 650    | 650    | 650    |

**Table 6.28 Comparisons of Scale Scores at Selected Percentiles—Grade 4 ELA**

|                   | <b>2016</b>   | <b>2017</b>   | <b>2018</b>   | <b>2019</b>   | <b>2021</b>   | <b>2022</b>   |
|-------------------|---------------|---------------|---------------|---------------|---------------|---------------|
| <b>Percentile</b> | <b>Form A</b> | <b>Form B</b> | <b>Form C</b> | <b>Form D</b> | <b>Form D</b> | <b>Form E</b> |
| 99                | 816           | 818           | 821           | 824           | 828           | 826           |
| 95                | 794           | 796           | 800           | 801           | 802           | 802           |
| 90                | 785           | 785           | 789           | 789           | 789           | 788           |
| 85                | 777           | 777           | 778           | 780           | 780           | 782           |
| 80                | 769           | 771           | 774           | 774           | 772           | 773           |
| 75                | 765           | 765           | 767           | 768           | 766           | 767           |
| 70                | 760           | 761           | 763           | 762           | 761           | 762           |
| 65                | 755           | 756           | 757           | 758           | 755           | 758           |
| 60                | 751           | 752           | 753           | 753           | 751           | 752           |
| 55                | 746           | 748           | 749           | 750           | 746           | 748           |
| 50                | 744           | 744           | 744           | 744           | 742           | 744           |
| 45                | 740           | 741           | 740           | 741           | 737           | 738           |
| 40                | 735           | 737           | 736           | 736           | 732           | 734           |
| 35                | 731           | 733           | 731           | 731           | 727           | 728           |
| 30                | 727           | 728           | 727           | 726           | 721           | 723           |
| 25                | 722           | 724           | 721           | 721           | 716           | 716           |
| 20                | 715           | 717           | 714           | 714           | 709           | 711           |
| 15                | 709           | 711           | 707           | 706           | 703           | 702           |
| 10                | 701           | 702           | 698           | 699           | 693           | 695           |
| 5                 | 691           | 691           | 687           | 688           | 684           | 682           |
| 1                 | 666           | 670           | 668           | 665           | 664           | 661           |

**Table 6.29 Comparisons of Scale Scores at Selected Percentiles—Grade 5 ELA**

|            | 2016   | 2017   | 2018   | 2019   | 2021   | 2022   |
|------------|--------|--------|--------|--------|--------|--------|
| Percentile | Form A | Form B | Form C | Form D | Form D | Form E |
| 99         | 816    | 813    | 817    | 821    | 821    | 818    |
| 95         | 792    | 793    | 795    | 798    | 798    | 796    |
| 90         | 782    | 782    | 782    | 784    | 784    | 781    |
| 85         | 774    | 775    | 777    | 776    | 776    | 775    |
| 80         | 767    | 769    | 769    | 770    | 768    | 768    |
| 75         | 763    | 763    | 765    | 765    | 763    | 762    |
| 70         | 758    | 758    | 760    | 759    | 758    | 759    |
| 65         | 754    | 754    | 756    | 754    | 752    | 754    |
| 60         | 749    | 750    | 753    | 751    | 747    | 749    |
| 55         | 745    | 747    | 749    | 745    | 742    | 746    |
| 50         | 740    | 743    | 746    | 742    | 738    | 741    |
| 45         | 738    | 739    | 740    | 737    | 733    | 738    |
| 40         | 733    | 735    | 736    | 733    | 729    | 734    |
| 35         | 728    | 731    | 732    | 729    | 725    | 729    |
| 30         | 723    | 727    | 728    | 725    | 718    | 724    |
| 25         | 720    | 721    | 724    | 718    | 713    | 718    |
| 20         | 714    | 716    | 716    | 713    | 710    | 713    |
| 15         | 708    | 709    | 711    | 707    | 704    | 706    |
| 10         | 701    | 701    | 702    | 701    | 697    | 698    |
| 5          | 692    | 691    | 691    | 693    | 688    | 687    |
| 1          | 675    | 673    | 676    | 676    | 676    | 669    |

**Table 6.30 Comparisons of Scale Scores at Selected Percentiles—Grade 6 ELA**

|                   | <b>2016</b>   | <b>2017</b>   | <b>2018</b>   | <b>2019</b>   | <b>2021</b>   | <b>2022</b>   |
|-------------------|---------------|---------------|---------------|---------------|---------------|---------------|
| <b>Percentile</b> | <b>Form A</b> | <b>Form B</b> | <b>Form C</b> | <b>Form D</b> | <b>Form D</b> | <b>Form E</b> |
| 99                | 813           | 814           | 808           | 812           | 812           | 815           |
| 95                | 792           | 790           | 789           | 791           | 788           | 794           |
| 90                | 780           | 779           | 777           | 778           | 776           | 783           |
| 85                | 772           | 770           | 770           | 771           | 769           | 774           |
| 80                | 765           | 763           | 763           | 766           | 762           | 768           |
| 75                | 760           | 759           | 758           | 761           | 758           | 763           |
| 70                | 756           | 754           | 753           | 756           | 753           | 756           |
| 65                | 752           | 748           | 749           | 751           | 748           | 752           |
| 60                | 748           | 745           | 746           | 747           | 744           | 747           |
| 55                | 745           | 741           | 742           | 743           | 740           | 743           |
| 50                | 741           | 736           | 737           | 740           | 735           | 738           |
| 45                | 737           | 733           | 735           | 735           | 731           | 735           |
| 40                | 734           | 729           | 730           | 731           | 726           | 730           |
| 35                | 730           | 724           | 726           | 728           | 723           | 725           |
| 30                | 727           | 721           | 721           | 723           | 718           | 721           |
| 25                | 723           | 716           | 718           | 718           | 714           | 716           |
| 20                | 718           | 711           | 713           | 714           | 708           | 709           |
| 15                | 713           | 705           | 707           | 708           | 703           | 704           |
| 10                | 706           | 698           | 700           | 701           | 698           | 696           |
| 5                 | 696           | 689           | 691           | 692           | 688           | 688           |
| 1                 | 676           | 671           | 675           | 675           | 675           | 674           |

**Table 6.31 Comparisons of Scale Scores at Selected Percentiles—Grade 7 ELA**

|                   | <b>2016</b>   | <b>2017</b>   | <b>2018</b>   | <b>2019</b>   | <b>2021</b>   | <b>2022</b>   |
|-------------------|---------------|---------------|---------------|---------------|---------------|---------------|
| <b>Percentile</b> | <b>Form A</b> | <b>Form B</b> | <b>Form C</b> | <b>Form D</b> | <b>Form D</b> | <b>Form E</b> |
| 99                | 825           | 826           | 831           | 826           | 834           | 828           |
| 95                | 800           | 800           | 801           | 804           | 804           | 804           |
| 90                | 787           | 786           | 789           | 789           | 789           | 791           |
| 85                | 777           | 778           | 780           | 782           | 780           | 783           |
| 80                | 771           | 770           | 774           | 775           | 773           | 775           |
| 75                | 766           | 765           | 767           | 769           | 767           | 769           |
| 70                | 761           | 759           | 762           | 764           | 761           | 764           |
| 65                | 756           | 756           | 757           | 759           | 756           | 758           |
| 60                | 751           | 751           | 752           | 756           | 751           | 753           |
| 55                | 747           | 745           | 749           | 750           | 747           | 748           |
| 50                | 742           | 742           | 744           | 747           | 742           | 743           |
| 45                | 740           | 737           | 740           | 741           | 738           | 738           |
| 40                | 735           | 733           | 735           | 736           | 733           | 733           |
| 35                | 730           | 728           | 730           | 731           | 728           | 728           |
| 30                | 726           | 723           | 726           | 727           | 722           | 723           |
| 25                | 721           | 717           | 719           | 720           | 716           | 715           |
| 20                | 714           | 711           | 713           | 714           | 710           | 709           |
| 15                | 706           | 702           | 707           | 705           | 703           | 700           |
| 10                | 697           | 692           | 697           | 695           | 692           | 689           |
| 5                 | 683           | 675           | 685           | 681           | 681           | 674           |
| 1                 | 655           | 654           | 662           | 659           | 659           | 658           |



**Table 6.32 Comparisons of Scale Scores at Selected Percentiles—Grade 8 ELA**

|                   | <b>2016</b>   | <b>2017</b>   | <b>2018</b>   | <b>2019</b>   | <b>2021</b>   | <b>2022</b>   |
|-------------------|---------------|---------------|---------------|---------------|---------------|---------------|
| <b>Percentile</b> | <b>Form A</b> | <b>Form B</b> | <b>Form C</b> | <b>Form D</b> | <b>Form D</b> | <b>Form E</b> |
| 99                | 825           | 834           | 824           | 831           | 831           | 836           |
| 95                | 804           | 806           | 801           | 804           | 806           | 809           |
| 90                | 790           | 791           | 789           | 793           | 793           | 795           |
| 85                | 781           | 782           | 781           | 785           | 783           | 786           |
| 80                | 775           | 776           | 774           | 777           | 775           | 778           |
| 75                | 770           | 770           | 768           | 771           | 769           | 772           |
| 70                | 764           | 764           | 764           | 766           | 764           | 766           |
| 65                | 759           | 758           | 758           | 760           | 758           | 761           |
| 60                | 754           | 754           | 754           | 755           | 753           | 755           |
| 55                | 752           | 749           | 751           | 750           | 748           | 750           |
| 50                | 747           | 745           | 745           | 746           | 743           | 746           |
| 45                | 743           | 740           | 741           | 741           | 738           | 741           |
| 40                | 739           | 734           | 737           | 736           | 734           | 735           |
| 35                | 735           | 731           | 732           | 732           | 728           | 730           |
| 30                | 731           | 725           | 726           | 727           | 723           | 724           |
| 25                | 727           | 719           | 722           | 721           | 717           | 719           |
| 20                | 721           | 714           | 716           | 714           | 710           | 712           |
| 15                | 714           | 707           | 708           | 707           | 702           | 703           |
| 10                | 706           | 696           | 699           | 696           | 693           | 695           |
| 5                 | 693           | 681           | 683           | 686           | 682           | 681           |
| 1                 | 670           | 651           | 657           | 667           | 660           | 660           |

**Table 6.33 Comparisons of Scale Scores at Selected Percentiles—Grade 3 Mathematics**

|            | 2016   | 2017   | 2018   | 2019   | 2021           | 2022   |
|------------|--------|--------|--------|--------|----------------|--------|
| Percentile | Form A | Form B | Form C | Form D | Revised Form D | Form E |
| 99         | 824    | 822    | 817    | 815    | 816            | 810    |
| 95         | 802    | 796    | 793    | 796    | 790            | 789    |
| 90         | 789    | 786    | 783    | 784    | 778            | 779    |
| 85         | 781    | 776    | 775    | 776    | 768            | 771    |
| 80         | 775    | 772    | 771    | 771    | 764            | 767    |
| 75         | 770    | 765    | 764    | 764    | 758            | 760    |
| 70         | 765    | 761    | 759    | 760    | 752            | 756    |
| 65         | 760    | 756    | 755    | 756    | 748            | 750    |
| 60         | 756    | 752    | 750    | 752    | 742            | 746    |
| 55         | 751    | 747    | 746    | 748    | 738            | 742    |
| 50         | 746    | 743    | 742    | 744    | 734            | 738    |
| 45         | 741    | 738    | 740    | 738    | 727            | 733    |
| 40         | 738    | 733    | 735    | 735    | 723            | 727    |
| 35         | 733    | 728    | 731    | 731    | 719            | 722    |
| 30         | 728    | 725    | 726    | 724    | 711            | 718    |
| 25         | 722    | 720    | 719    | 720    | 706            | 713    |
| 20         | 716    | 715    | 713    | 713    | 700            | 705    |
| 15         | 710    | 706    | 708    | 705    | 694            | 700    |
| 10         | 703    | 699    | 698    | 700    | 686            | 694    |
| 5          | 692    | 689    | 686    | 686    | 677            | 683    |
| 1          | 672    | 667    | 664    | 672    | 658            | 669    |

**Table 6.34 Comparisons of Scale Scores at Selected Percentiles—Grade 4 Mathematics**

|            | 2016   | 2017   | 2018   | 2019   | 2021           | 2022   |
|------------|--------|--------|--------|--------|----------------|--------|
| Percentile | Form A | Form B | Form C | Form D | Revised Form D | Form E |
| 99         | 819    | 812    | 812    | 813    | 803            | 808    |
| 95         | 797    | 792    | 790    | 792    | 785            | 790    |
| 90         | 786    | 779    | 780    | 781    | 775            | 779    |
| 85         | 777    | 774    | 772    | 774    | 768            | 772    |
| 80         | 771    | 767    | 768    | 769    | 762            | 766    |
| 75         | 766    | 762    | 762    | 763    | 757            | 760    |
| 70         | 761    | 756    | 757    | 759    | 751            | 756    |
| 65         | 756    | 752    | 753    | 755    | 746            | 750    |
| 60         | 752    | 748    | 749    | 750    | 741            | 746    |
| 55         | 747    | 744    | 744    | 746    | 737            | 740    |
| 50         | 743    | 740    | 740    | 742    | 732            | 736    |
| 45         | 738    | 736    | 735    | 737    | 726            | 730    |
| 40         | 732    | 732    | 733    | 732    | 722            | 726    |
| 35         | 728    | 727    | 728    | 728    | 717            | 720    |
| 30         | 723    | 722    | 723    | 724    | 711            | 715    |
| 25         | 718    | 717    | 718    | 719    | 706            | 710    |
| 20         | 713    | 712    | 715    | 712    | 699            | 705    |
| 15         | 708    | 706    | 710    | 706    | 693            | 702    |
| 10         | 703    | 700    | 700    | 699    | 688            | 695    |
| 5          | 693    | 693    | 689    | 688    | 679            | 687    |
| 1          | 677    | 674    | 670    | 673    | 658            | 671    |

**Table 6.35 Comparisons of Scale Scores at Selected Percentiles—Grade 5 Mathematics**

|            | 2016   | 2017   | 2018   | 2019   | 2021           | 2022   |
|------------|--------|--------|--------|--------|----------------|--------|
| Percentile | Form A | Form B | Form C | Form D | Revised Form D | Form E |
| 99         | 819    | 808    | 810    | 809    | 803            | 807    |
| 95         | 792    | 784    | 784    | 788    | 782            | 787    |
| 90         | 779    | 774    | 774    | 778    | 772            | 774    |
| 85         | 771    | 767    | 765    | 769    | 765            | 768    |
| 80         | 766    | 760    | 759    | 763    | 757            | 761    |
| 75         | 759    | 755    | 755    | 757    | 751            | 755    |
| 70         | 754    | 751    | 749    | 753    | 747            | 749    |
| 65         | 749    | 747    | 745    | 748    | 741            | 745    |
| 60         | 745    | 742    | 743    | 744    | 737            | 739    |
| 55         | 740    | 740    | 738    | 740    | 733            | 735    |
| 50         | 735    | 735    | 734    | 737    | 729            | 731    |
| 45         | 731    | 730    | 729    | 733    | 724            | 727    |
| 40         | 728    | 728    | 727    | 728    | 719            | 722    |
| 35         | 722    | 723    | 722    | 724    | 716            | 717    |
| 30         | 720    | 720    | 720    | 719    | 710            | 712    |
| 25         | 714    | 715    | 714    | 714    | 707            | 709    |
| 20         | 711    | 709    | 711    | 711    | 703            | 703    |
| 15         | 705    | 706    | 705    | 705    | 699            | 700    |
| 10         | 699    | 699    | 698    | 699    | 690            | 692    |
| 5          | 691    | 691    | 689    | 690    | 685            | 688    |
| 1          | 678    | 675    | 672    | 674    | 671            | 670    |

**Table 6.36 Comparisons of Scale Scores at Selected Percentiles—Grade 6 Mathematics**

|            | 2016   | 2017   | 2018   | 2019   | 2021           | 2022   |
|------------|--------|--------|--------|--------|----------------|--------|
| Percentile | Form A | Form B | Form C | Form D | Revised Form D | Form E |
| 99         | 803    | 808    | 800    | 804    | 798            | 805    |
| 95         | 783    | 781    | 780    | 783    | 777            | 783    |
| 90         | 771    | 771    | 770    | 773    | 768            | 772    |
| 85         | 765    | 762    | 762    | 765    | 760            | 763    |
| 80         | 758    | 757    | 757    | 758    | 754            | 758    |
| 75         | 753    | 752    | 752    | 754    | 749            | 752    |
| 70         | 747    | 746    | 748    | 750    | 743            | 747    |
| 65         | 744    | 742    | 743    | 745    | 740            | 742    |
| 60         | 740    | 738    | 739    | 742    | 735            | 738    |
| 55         | 735    | 734    | 736    | 739    | 731            | 734    |
| 50         | 731    | 732    | 732    | 733    | 727            | 728    |
| 45         | 729    | 727    | 728    | 729    | 723            | 724    |
| 40         | 724    | 724    | 723    | 725    | 718            | 720    |
| 35         | 722    | 719    | 721    | 721    | 713            | 715    |
| 30         | 717    | 717    | 716    | 717    | 710            | 713    |
| 25         | 714    | 711    | 713    | 714    | 704            | 708    |
| 20         | 709    | 708    | 707    | 709    | 701            | 702    |
| 15         | 706    | 701    | 704    | 703    | 693            | 695    |
| 10         | 699    | 697    | 696    | 696    | 689            | 692    |
| 5          | 692    | 688    | 686    | 687    | 683            | 683    |
| 1          | 679    | 671    | 672    | 667    | 656            | 663    |

**Table 6.37 Comparisons of Scale Scores at Selected Percentiles—Grade 7 Mathematics**

|            | 2016   | 2017   | 2018   | 2019   | 2021   | 2022   |
|------------|--------|--------|--------|--------|--------|--------|
| Percentile | Form A | Form B | Form C | Form D | Form D | Form E |
| 99         | 797    | 796    | 797    | 796    | 793    | 799    |
| 95         | 779    | 777    | 777    | 776    | 773    | 776    |
| 90         | 768    | 766    | 766    | 766    | 764    | 767    |
| 85         | 760    | 760    | 759    | 761    | 757    | 760    |
| 80         | 754    | 754    | 755    | 756    | 752    | 755    |
| 75         | 750    | 749    | 750    | 752    | 748    | 749    |
| 70         | 746    | 746    | 745    | 748    | 743    | 745    |
| 65         | 742    | 741    | 742    | 743    | 740    | 741    |
| 60         | 738    | 737    | 739    | 740    | 736    | 736    |
| 55         | 734    | 734    | 735    | 736    | 732    | 733    |
| 50         | 730    | 731    | 731    | 732    | 728    | 729    |
| 45         | 728    | 727    | 729    | 730    | 724    | 725    |
| 40         | 723    | 723    | 725    | 726    | 722    | 723    |
| 35         | 721    | 721    | 721    | 722    | 719    | 718    |
| 30         | 719    | 717    | 718    | 719    | 714    | 715    |
| 25         | 714    | 712    | 713    | 714    | 711    | 709    |
| 20         | 712    | 709    | 710    | 711    | 708    | 706    |
| 15         | 706    | 706    | 706    | 705    | 701    | 702    |
| 10         | 703    | 699    | 702    | 701    | 697    | 697    |
| 5          | 695    | 694    | 693    | 692    | 687    | 686    |
| 1          | 678    | 673    | 679    | 680    | 671    | 666    |

**Table 6.38 Comparisons of Scale Scores at Selected Percentiles—Grade 8 Mathematics**

|            | 2016   | 2017   | 2018   | 2019   | 2021           | 2022   |
|------------|--------|--------|--------|--------|----------------|--------|
| Percentile | Form A | Form B | Form C | Form D | Revised Form D | Form E |
| 99         | 808    | 809    | 807    | 812    | 806            | 814    |
| 95         | 787    | 784    | 784    | 788    | 781            | 783    |
| 90         | 775    | 771    | 773    | 775    | 768            | 771    |
| 85         | 766    | 763    | 764    | 766    | 759            | 760    |
| 80         | 761    | 757    | 757    | 758    | 751            | 754    |
| 75         | 753    | 751    | 752    | 752    | 747            | 748    |
| 70         | 749    | 746    | 746    | 746    | 740            | 741    |
| 65         | 744    | 741    | 742    | 742    | 735            | 737    |
| 60         | 737    | 736    | 737    | 737    | 732            | 732    |
| 55         | 734    | 730    | 732    | 732    | 726            | 729    |
| 50         | 731    | 727    | 727    | 730    | 723            | 723    |
| 45         | 727    | 724    | 721    | 724    | 716            | 720    |
| 40         | 724    | 718    | 718    | 721    | 712            | 713    |
| 35         | 720    | 714    | 715    | 715    | 708            | 709    |
| 30         | 712    | 710    | 707    | 711    | 703            | 705    |
| 25         | 708    | 706    | 702    | 707    | 698            | 700    |
| 20         | 704    | 698    | 697    | 699    | 693            | 695    |
| 15         | 699    | 693    | 691    | 694    | 686            | 690    |
| 10         | 695    | 687    | 684    | 689    | 679            | 683    |
| 5          | 684    | 674    | 676    | 677    | 671            | 666    |
| 1          | 663    | 656    | 654    | 659    | 650            | 650    |

Additional evidence of comparability can be found by reviewing the test characteristic curves (TCCs) for the LEAP 2025 across administrations, see figures 6.39 and 6.40. For most content areas and grades, the TCCs for the five years were similar across ability ranges. Grades 3 and 8 forms have been gradually becoming more difficult from 2017 to 2022. For ELA grade 5 and 6, the 2018 forms were slightly easier than the 2017 and 2019 forms for high-performing students. Please note that ELA 2019 and 2021 administrations used the same forms.

Except for mathematics grade 5, 2017 to 2022 mathematic forms were similar across most ability ranges. For grade 5, the 2019/2021 forms were easier than the 2017 and 2018 forms for high-performing students. Please note that most items on the mathematics 2021 forms were the same as items on the 2019 forms.

Note that this different form difficulty is adjusted by reporting different scale scores for given raw scores; a scale score of a difficult form is higher than that of an easy form given the same raw score.

Figures 6.41 and 6.42 show SEMs for the 2017- 2022 LEAP 2025 assessments. For most content areas and grades, the SEMs were similar across ability ranges, especially in the middle ability ranges.

Figure 6.39 TCCs Across Years: ELA

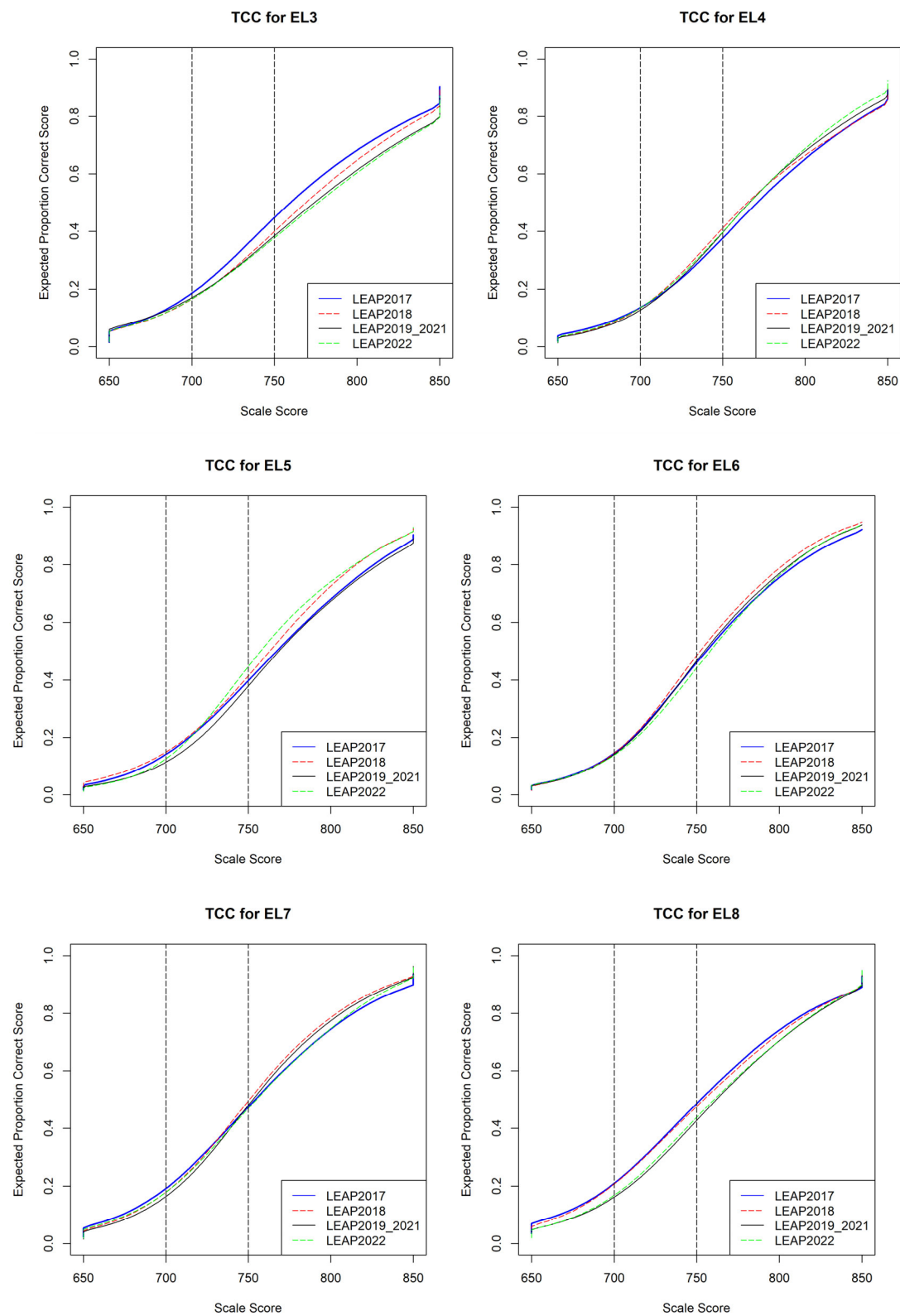




Figure 6.40 TCCs Across Years: Mathematics

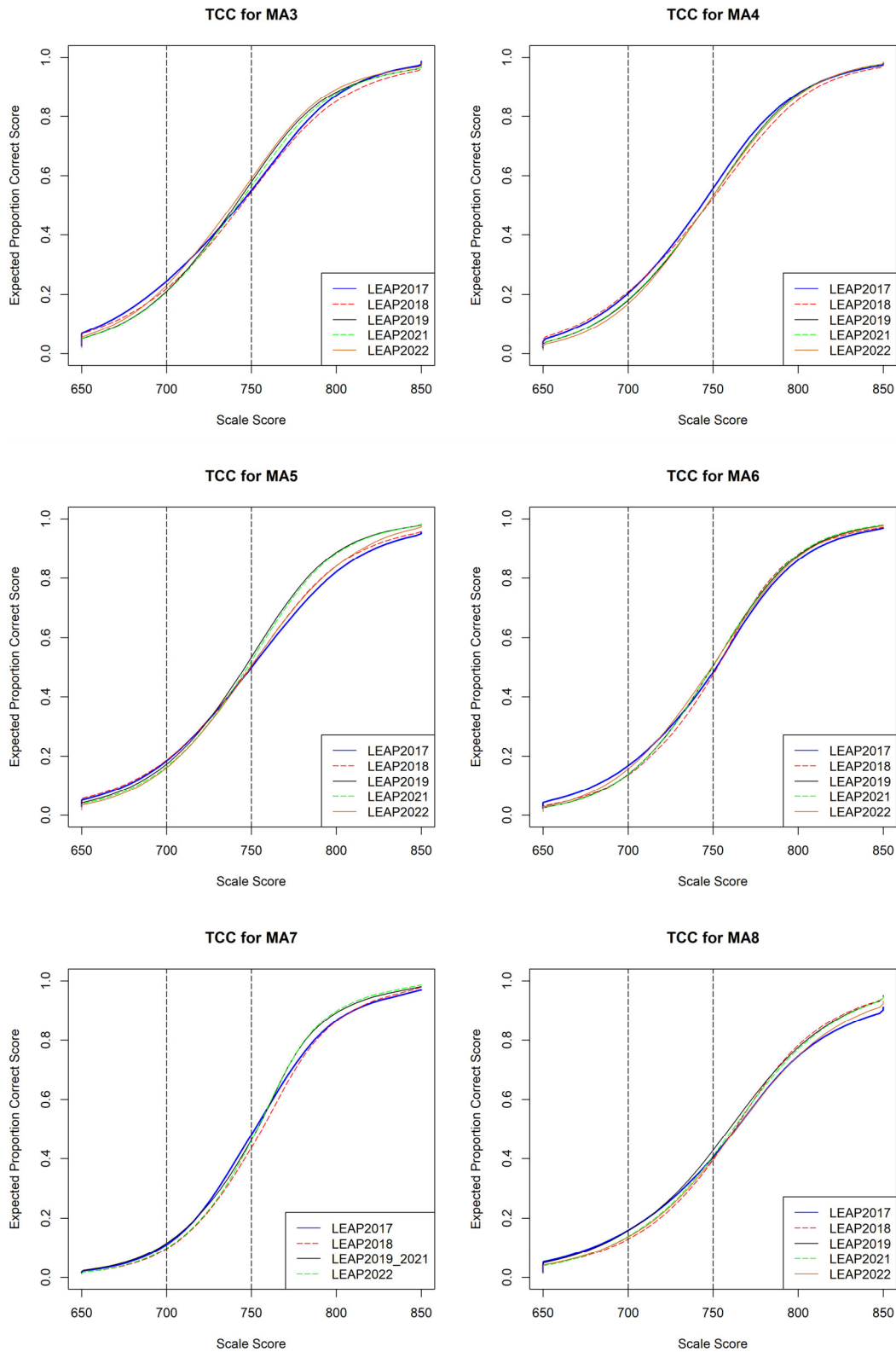


Figure 6.41 SEM Across Years: ELA

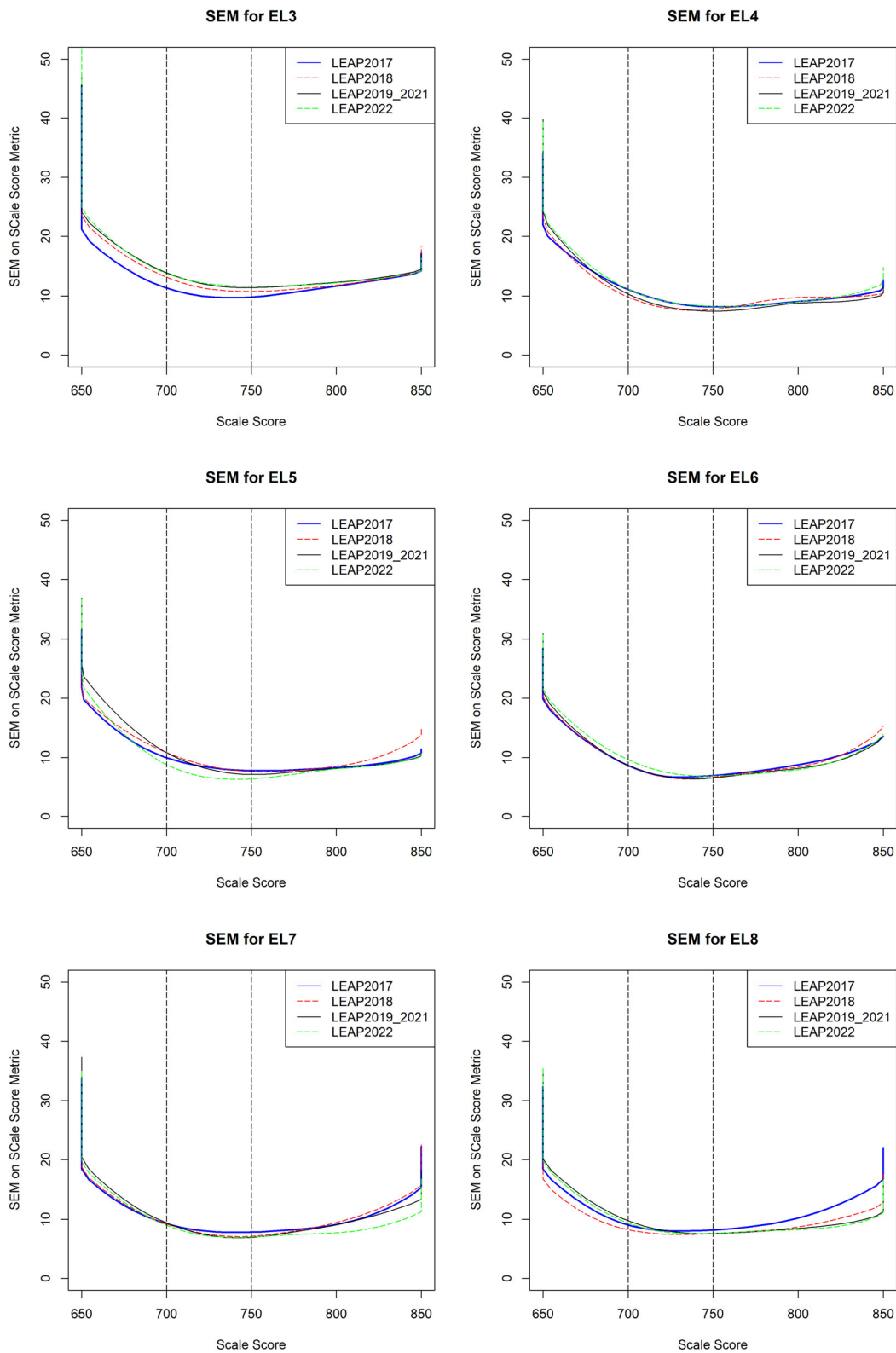
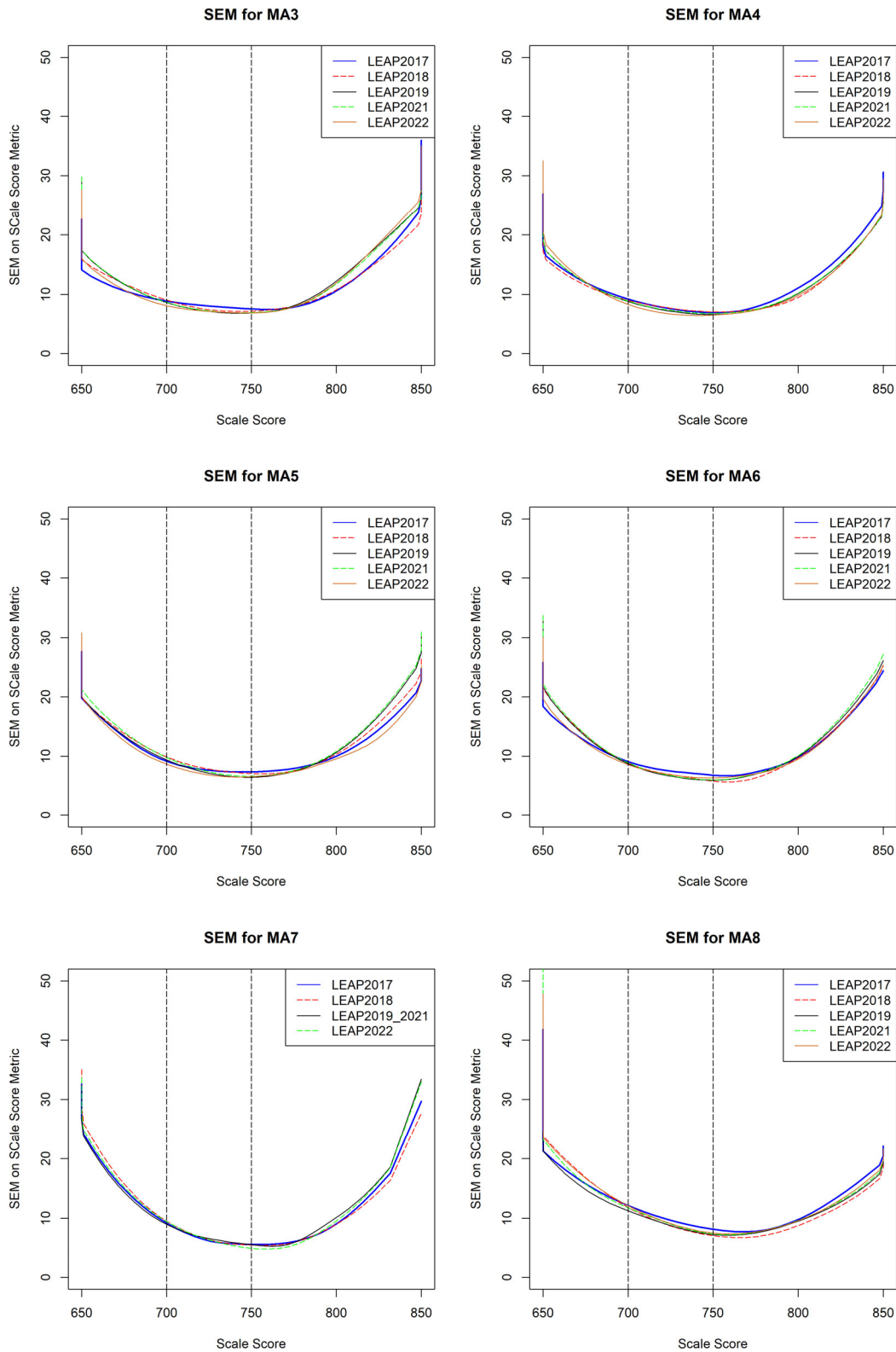


Figure 6.42 SEM Across Years: Mathematics



## 6.5 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. Operational data analyses also help maintain the test scale so that test results may be appropriately compared across years. The data analyses undertaken by DRC address multiple best practices of the testing industry but are particularly related to the following 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 (25).

**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 (90).

**Standard 5.2** The procedures for constructing scales used for reporting scores and the rationale for these procedures should be described clearly (102).

**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 (105).

**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 (105).

**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 (126).

## Chapter 7: Test Results

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This chapter of the technical report contains information on the results of the spring 2022 LEAP 2025 ELA and mathematics assessments. The scale score results and achievement level information are presented here. Presenting the results by achievement level translates the quantitative scale provided through scale scores into a qualitative description of student achievement. The levels are *Advanced*, *Mastery*, *Basic*, *Approaching Basic*, and *Unsatisfactory*.

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

This chapter also provides descriptions of the score reports, data structure, and interpretive guide. The American Educational Research Association, American Psychological Association, & National Council on Measurement in Education (AERA, APA, & NCME, 2014) *Standards for Educational & Psychological Testing* addressed in Chapter 7 are 5.1, 6.10, 7.0, and 12.18. Each standard is presented in the pertinent section of this chapter.

The results presented in this chapter are based on 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 the reliability and validity of the scores from the LEAP 2025 assessments and should not be used for state accountability purposes.

The following are subgroups reported during the administration of the LEAP 2025 tests:

- Gender: Female and Male
- Race and Ethnicity: Hispanic/Latino, American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, White, and Two or More Races
- Education Classification
- Economic Status
- English Learner (EL)
- Migrant Status

For the purposes of this report, participation rate is defined as the percentage of students who received a valid scale score given the total number of students who were expected to take the online test or receive a test book. These participation rates are summarized in Table 7.1. Both the percentage of students classified as reportable and the number of students classified as accountable are reported. Reportable students include all students with a valid scale score. The “Accountable” columns show the total numbers of students who were expected to take the online test or receive a test book. These include students who should have received a LEAP 2025 scale score but who did not take the test and could not be assigned a scale score.

Table 7.1 Participation Rates

| Participation Rates by Grade and Subgroup |                                  |                    |                              |                            |                                      |
|---|----------------------------------|--------------------|------------------------------|----------------------------|--------------------------------------|
| Grade                                     | Group                            | Accountable in ELA | Percentage Reportable in ELA | Accountable in Mathematics | Percentage Reportable in Mathematics |
| 3   | All Students                     | ≥49,540            | 99.57%                       | ≥49,850                    | 99.60%                               |
|   | <b>Gender</b>                    |                    |                              |                            |                                      |
|   | Female                           | ≥24,180            | 99.59%                       | ≥24,320                    | 99.63%                               |
|   | Male                             | ≥25,340            | 99.57%                       | ≥25,500                    | 99.62%                               |
|   | <b>Ethnicity</b>                 |                    |                              |                            |                                      |
|   | Hispanic/Latino                  | ≥4,790             | 99.65%                       | ≥4,830                     | 99.67%                               |
|   | American Indian or Alaska Native | ≥270               | 99.64%                       | ≥270                       | 99.64%                               |
|   | Asian                            | ≥830               | 99.88%                       | ≥830                       | 99.88%                               |
|   | Black or African American        | ≥20,600            | 99.44%                       | ≥20,760                    | 99.48%                               |
|   | Native Hawaiian or Other Pacific | ≥30                | 100.00%                      | ≥30                        | 100.00%                              |
|   | White                            | ≥21,070            | 99.69%                       | ≥21,150                    | 99.75%                               |
|   | Two or More Races                | ≥1,870             | 99.57%                       | ≥1,870                     | 99.63%                               |
|   | <b>Education Classification</b>  |                    |                              |                            |                                      |
|   | Regular                          | ≥43,150            | 99.62%                       | ≥43,410                    | 99.65%                               |
|   | Special                          | ≥6,380             | 99.20%                       | ≥6,440                     | 99.29%                               |
|   | <b>Economic Status</b>           |                    |                              |                            |                                      |
|   | Not Economically Disadvantaged   | ≥14,180            | 99.77%                       | ≥14,280                    | 99.74%                               |
|   | Economically Disadvantaged       | ≥35,350            | 99.49%                       | ≥35,570                    | 99.55%                               |
|   | <b>English Learner Status</b>    |                    |                              |                            |                                      |
|   | Not English Learner              | ≥46,910            | 99.55%                       | ≥47,190                    | 99.59%                               |
|   | English Learner                  | ≥2,630             | 99.81%                       | ≥2,660                     | 99.85%                               |
|   | <b>Migrant Status</b>            |                    |                              |                            |                                      |
|   | Not Migrant                      | ≥49,450            | 99.57%                       | ≥49,770                    | 99.60%                               |
|   | Migrant                          | ≥80                | 100.00%                      | ≥80                        | 100.00%                              |
|   | <b>Section 504 Status</b>        |                    |                              |                            |                                      |
|   | Not Section 504                  | ≥45,970            | 99.55%                       | ≥46,270                    | 99.59%                               |
|   | Section 504                      | ≥3,560             | 99.80%                       | ≥3,580                     | 99.80%                               |
|   | <b>Homeless Status</b>           |                    |                              |                            |                                      |
|   | Not Homeless                     | ≥48,120            | 99.58%                       | ≥48,420                    | 99.62%                               |
|   | Homeless                         | ≥1,410             | 99.01%                       | ≥1,430                     | 99.03%                               |
|   | <b>Foster Care Status</b>        |                    |                              |                            |                                      |
|   | Not in Foster Care               | ≥49,380            | 99.57%                       | ≥49,690                    | 99.60%                               |
| In Foster Care                            | ≥150                             | 100.00%            | ≥160                         | 100.00%                    |                                      |
| <b>Military Affiliation</b>               |                                  |                    |                              |                            |                                      |
| Not Military Affiliated                   | ≥48,590                          | 99.56%             | ≥48,900                      | 99.60%                     |                                      |
| Military Affiliated                       | ≥950                             | 99.79%             | ≥950                         | 99.79%                     |                                      |

| Participation Rates by Grade and Subgroup |                                  |                    |                              |                            |                                      |
|---|----------------------------------|--------------------|------------------------------|----------------------------|--------------------------------------|
| Grade                                     | Group                            | Accountable in ELA | Percentage Reportable in ELA | Accountable in Mathematics | Percentage Reportable in Mathematics |
| 4   | All Students                     | ≥48,950            | 99.70%                       | ≥48,950                    | 99.73%                               |
|   | <b>Gender</b>                    |                    |                              |                            |                                      |
|   | Female                           | ≥23,920            | 99.74%                       | ≥23,920                    | 99.78%                               |
|   | Male                             | ≥25,030            | 99.66%                       | ≥25,030                    | 99.68%                               |
|   | <b>Ethnicity</b>                 |                    |                              |                            |                                      |
|   | Hispanic/Latino                  | ≥4,860             | 99.86%                       | ≥4,860                     | 99.86%                               |
|   | American Indian or Alaska Native | ≥270               | 99.26%                       | ≥270                       | 99.26%                               |
|   | Asian                            | ≥790               | 99.87%                       | ≥790                       | 99.87%                               |
|   | Black or African American        | ≥20,630            | 99.62%                       | ≥20,630                    | 99.68%                               |
|   | Native Hawaiian or Other Pacific | ≥30                | 100.00%                      | ≥30                        | 100.00%                              |
|   | White                            | ≥20,620            | 99.74%                       | ≥20,620                    | 99.75%                               |
|   | Two or More Races                | ≥1,680             | 99.76%                       | ≥1,680                     | 99.76%                               |
|   | <b>Education Classification</b>  |                    |                              |                            |                                      |
|   | Regular                          | ≥42,960            | 99.70%                       | ≥42,970                    | 99.72%                               |
|   | Special                          | ≥5,980             | 99.73%                       | ≥5,980                     | 99.77%                               |
|   | <b>Economic Status</b>           |                    |                              |                            |                                      |
|   | Not Economically Disadvantaged   | ≥14,320            | 99.83%                       | ≥14,320                    | 99.83%                               |
|   | Economically Disadvantaged       | ≥34,630            | 99.65%                       | ≥34,630                    | 99.69%                               |
|   | <b>English Learner Status</b>    |                    |                              |                            |                                      |
|   | Not English Learner              | ≥46,720            | 99.69%                       | ≥46,720                    | 99.72%                               |
|   | English Learner                  | ≥2,230             | 99.91%                       | ≥2,230                     | 99.91%                               |
|   | <b>Migrant Status</b>            |                    |                              |                            |                                      |
|   | Not Migrant                      | ≥48,890            | 99.70%                       | ≥48,900                    | 99.73%                               |
|   | Migrant                          | ≥50                | 100.00%                      | ≥50                        | 100.00%                              |
|   | <b>Section 504 Status</b>        |                    |                              |                            |                                      |
|   | Not Section 504                  | ≥44,800            | 99.70%                       | ≥44,810                    | 99.73%                               |
|   | Section 504                      | ≥4,140             | 99.76%                       | ≥4,140                     | 99.76%                               |
|   | <b>Homeless Status</b>           |                    |                              |                            |                                      |
|   | Not Homeless                     | ≥47,660            | 99.72%                       | ≥47,660                    | 99.75%                               |
|   | Homeless                         | ≥1,290             | 98.92%                       | ≥1,290                     | 99.00%                               |
|   | <b>Foster Care Status</b>        |                    |                              |                            |                                      |
|   | Not in Foster Care               | ≥48,820            | 99.70%                       | ≥48,820                    | 99.73%                               |
|   | In Foster Care                   | ≥130               | 99.23%                       | ≥130                       | 99.23%                               |
| <b>Military Affiliation</b>               |                                  |                    |                              |                            |                                      |
| Not Military Affiliated                   | ≥47,990                          | 99.70%             | ≥48,000                      | 99.73%                     |                                      |
| Military Affiliated                       | ≥950                             | 99.79%             | ≥950                         | 99.79%                     |                                      |

| Participation Rates by Grade and Subgroup |                                  |                    |                              |                            |                                      |
|---|----------------------------------|--------------------|------------------------------|----------------------------|--------------------------------------|
| Grade                                     | Group                            | Accountable in ELA | Percentage Reportable in ELA | Accountable in Mathematics | Percentage Reportable in Mathematics |
| 5   | All Students                     | ≥49,040            | 99.69%                       | ≥49,050                    | 99.70%                               |
|   | <b>Gender</b>                    |                    |                              |                            |                                      |
|   | Female                           | ≥23,910            | 99.70%                       | ≥23,910                    | 99.72%                               |
|   | Male                             | ≥25,130            | 99.69%                       | ≥25,130                    | 99.69%                               |
|   | <b>Ethnicity</b>                 |                    |                              |                            |                                      |
|   | Hispanic/Latino                  | ≥4,590             | 99.76%                       | ≥4,590                     | 99.78%                               |
|   | American Indian or Alaska Native | ≥250               | 99.60%                       | ≥250                       | 99.60%                               |
|   | Asian                            | ≥740               | 99.87%                       | ≥740                       | 99.87%                               |
|   | Black or African American        | ≥20,850            | 99.64%                       | ≥20,850                    | 99.65%                               |
|   | Native Hawaiian or Other Pacific | ≥40                | 100.00%                      | ≥40                        | 100.00%                              |
|   | White                            | ≥20,840            | 99.76%                       | ≥20,850                    | 99.76%                               |
|   | Two or More Races                | ≥1,660             | 99.58%                       | ≥1,660                     | 99.58%                               |
|   | <b>Education Classification</b>  |                    |                              |                            |                                      |
|   | Regular                          | ≥42,990            | 99.74%                       | ≥42,990                    | 99.75%                               |
|   | Special                          | ≥6,050             | 99.37%                       | ≥6,050                     | 99.37%                               |
|   | <b>Economic Status</b>           |                    |                              |                            |                                      |
|   | Not Economically Disadvantaged   | ≥14,940            | 99.85%                       | ≥14,940                    | 99.85%                               |
|   | Economically Disadvantaged       | ≥34,100            | 99.63%                       | ≥34,100                    | 99.64%                               |
|   | <b>English Learner Status</b>    |                    |                              |                            |                                      |
|   | Not English Learner              | ≥47,200            | 99.69%                       | ≥47,200                    | 99.70%                               |
|   | English Learner                  | ≥1,840             | 99.84%                       | ≥1,840                     | 99.89%                               |
|   | <b>Migrant Status</b>            |                    |                              |                            |                                      |
|   | Not Migrant                      | ≥48,990            | 99.69%                       | ≥48,990                    | 99.70%                               |
|   | Migrant                          | ≥50                | 100.00%                      | ≥50                        | 100.00%                              |
|   | <b>Section 504 Status</b>        |                    |                              |                            |                                      |
|   | Not Section 504                  | ≥44,290            | 99.69%                       | ≥44,290                    | 99.69%                               |
|   | Section 504                      | ≥4,750             | 99.77%                       | ≥4,750                     | 99.81%                               |
|   | <b>Homeless Status</b>           |                    |                              |                            |                                      |
|   | Not Homeless                     | ≥47,840            | 99.69%                       | ≥47,850                    | 99.71%                               |
|   | Homeless                         | ≥1,190             | 99.67%                       | ≥1,190                     | 99.67%                               |
|   | <b>Foster Care Status</b>        |                    |                              |                            |                                      |
|   | Not in Foster Care               | ≥48,930            | 99.69%                       | ≥48,940                    | 99.70%                               |
| In Foster Care                            | ≥110                             | 100.00%            | ≥110                         | 100.00%                    |                                      |
| <b>Military Affiliation</b>               |                                  |                    |                              |                            |                                      |
| Not Military Affiliated                   | ≥48,150                          | 99.69%             | ≥48,150                      | 99.70%                     |                                      |
| Military Affiliated                       | ≥890                             | 99.89%             | ≥890                         | 99.89%                     |                                      |



| Participation Rates by Grade and Subgroup |                                  |                    |                              |                            |                                      |
|---|----------------------------------|--------------------|------------------------------|----------------------------|--------------------------------------|
| Grade                                     | Group                            | Accountable in ELA | Percentage Reportable in ELA | Accountable in Mathematics | Percentage Reportable in Mathematics |
| 6   | All Students                     | ≥49,580            | 99.50%                       | ≥49,590                    | 99.52%                               |
|   | <b>Gender</b>                    |                    |                              |                            |                                      |
|   | Female                           | ≥24,070            | 99.57%                       | ≥24,070                    | 99.59%                               |
|   | Male                             | ≥25,510            | 99.43%                       | ≥25,510                    | 99.46%                               |
|   | <b>Ethnicity</b>                 |                    |                              |                            |                                      |
|   | Hispanic/Latino                  | ≥4,830             | 99.79%                       | ≥4,830                     | 99.79%                               |
|   | American Indian or Alaska Native | ≥280               | 99.65%                       | ≥280                       | 99.65%                               |
|   | Asian                            | ≥780               | 99.75%                       | ≥780                       | 99.75%                               |
|   | Black or African American        | ≥21,020            | 99.27%                       | ≥21,020                    | 99.31%                               |
|   | Native Hawaiian or Other Pacific | ≥20                | 100.00%                      | ≥20                        | 100.00%                              |
|   | White                            | ≥20,940            | 99.67%                       | ≥20,940                    | 99.68%                               |
|   | Two or More Races                | ≥1,630             | 99.39%                       | ≥1,630                     | 99.39%                               |
|   | <b>Education Classification</b>  |                    |                              |                            |                                      |
|   | Regular                          | ≥43,930            | 99.56%                       | ≥43,930                    | 99.58%                               |
|   | Special                          | ≥5,650             | 99.03%                       | ≥5,650                     | 99.08%                               |
|   | <b>Economic Status</b>           |                    |                              |                            |                                      |
|   | Not Economically Disadvantaged   | ≥14,820            | 99.80%                       | ≥14,820                    | 99.80%                               |
|   | Economically Disadvantaged       | ≥34,760            | 99.37%                       | ≥34,760                    | 99.40%                               |
|   | <b>English Learner Status</b>    |                    |                              |                            |                                      |
|   | Not English Learner              | ≥47,780            | 99.49%                       | ≥47,780                    | 99.51%                               |
|   | English Learner                  | ≥1,800             | 99.89%                       | ≥1,800                     | 99.89%                               |
|   | <b>Migrant Status</b>            |                    |                              |                            |                                      |
|   | Not Migrant                      | ≥49,520            | 99.50%                       | ≥49,520                    | 99.52%                               |
|   | Migrant                          | ≥60                | 100.00%                      | ≥60                        | 100.00%                              |
|   | <b>Section 504 Status</b>        |                    |                              |                            |                                      |
|   | Not Section 504                  | ≥44,340            | 99.49%                       | ≥44,340                    | 99.51%                               |
|   | Section 504                      | ≥5,240             | 99.54%                       | ≥5,240                     | 99.58%                               |
|   | <b>Homeless Status</b>           |                    |                              |                            |                                      |
|   | Not Homeless                     | ≥48,330            | 99.52%                       | ≥48,330                    | 99.54%                               |
|   | Homeless                         | ≥1,250             | 98.73%                       | ≥1,250                     | 98.73%                               |
|   | <b>Foster Care Status</b>        |                    |                              |                            |                                      |
|   | Not in Foster Care               | ≥49,450            | 99.50%                       | ≥49,460                    | 99.52%                               |
| In Foster Care                            | ≥130                             | 99.24%             | ≥130                         | 99.24%                     |                                      |
| <b>Military Affiliation</b>               |                                  |                    |                              |                            |                                      |
| Not Military Affiliated                   | ≥48,740                          | 99.49%             | ≥48,740                      | 99.51%                     |                                      |
| Military Affiliated                       | ≥840                             | 99.88%             | ≥840                         | 99.88%                     |                                      |

| Participation Rates by Grade and Subgroup |                                  |                    |                              |                            |                                      |
|---|----------------------------------|--------------------|------------------------------|----------------------------|--------------------------------------|
| Grade                                     | Group                            | Accountable in ELA | Percentage Reportable in ELA | Accountable in Mathematics | Percentage Reportable in Mathematics |
| 7   | All Students                     | ≥46,290            | 99.30%                       | ≥51,320                    | 99.38%                               |
|   | <b>Gender</b>                    |                    |                              |                            |                                      |
|   | Female                           | ≥22,750            | 99.36%                       | ≥25,240                    | 99.41%                               |
|   | Male                             | ≥23,530            | 99.24%                       | ≥26,080                    | 99.35%                               |
|   | <b>Ethnicity</b>                 |                    |                              |                            |                                      |
|   | Hispanic/Latino                  | ≥4,430             | 99.68%                       | ≥4,620                     | 99.70%                               |
|   | American Indian or Alaska Native | ≥290               | 99.66%                       | ≥300                       | 99.67%                               |
|   | Asian                            | ≥690               | 99.86%                       | ≥740                       | 99.87%                               |
|   | Black or African American        | ≥20,010            | 99.08%                       | ≥22,190                    | 99.19%                               |
|   | Native Hawaiian or Other Pacific | ≥40                | 100.00%                      | ≥40                        | 100.00%                              |
|   | White                            | ≥19,130            | 99.44%                       | ≥21,650                    | 99.51%                               |
|   | Two or More Races                | ≥1,620             | 99.20%                       | ≥1,710                     | 99.24%                               |
|   | <b>Education Classification</b>  |                    |                              |                            |                                      |
|   | Regular                          | ≥41,330            | 99.35%                       | ≥45,680                    | 99.42%                               |
|   | Special                          | ≥4,950             | 98.91%                       | ≥5,630                     | 99.06%                               |
|   | <b>Economic Status</b>           |                    |                              |                            |                                      |
|   | Not Economically Disadvantaged   | ≥13,850            | 99.68%                       | ≥15,540                    | 99.71%                               |
|   | Economically Disadvantaged       | ≥32,430            | 99.14%                       | ≥35,780                    | 99.24%                               |
|   | <b>English Learner Status</b>    |                    |                              |                            |                                      |
|   | Not English Learner              | ≥44,770            | 99.29%                       | ≥49,740                    | 99.37%                               |
|   | English Learner                  | ≥1,520             | 99.74%                       | ≥1,570                     | 99.75%                               |
|   | <b>Migrant Status</b>            |                    |                              |                            |                                      |
|   | Not Migrant                      | ≥46,240            | 99.30%                       | ≥51,260                    | 99.38%                               |
|   | Migrant                          | ≥40                | 100.00%                      | ≥50                        | 100.00%                              |
|   | <b>Section 504 Status</b>        |                    |                              |                            |                                      |
|   | Not Section 504                  | ≥41,370            | 99.31%                       | ≥45,890                    | 99.38%                               |
|   | Section 504                      | ≥4,910             | 99.25%                       | ≥5,430                     | 99.41%                               |
|   | <b>Homeless Status</b>           |                    |                              |                            |                                      |
|   | Not Homeless                     | ≥45,150            | 99.33%                       | ≥50,150                    | 99.41%                               |
|   | Homeless                         | ≥1,130             | 97.98%                       | ≥1,170                     | 98.12%                               |
|   | <b>Foster Care Status</b>        |                    |                              |                            |                                      |
|   | Not in Foster Care               | ≥46,180            | 99.30%                       | ≥51,200                    | 99.38%                               |
|   | In Foster Care                   | ≥100               | 99.04%                       | ≥120                       | 99.20%                               |
| <b>Military Affiliation</b>               |                                  |                    |                              |                            |                                      |
| Not Military Affiliated                   | ≥45,430                          | 99.30%             | ≥50,460                      | 99.38%                     |                                      |
| Military Affiliated                       | ≥850                             | 99.53%             | ≥860                         | 99.54%                     |                                      |

| Participation Rates by Grade and Subgroup |                                  |                    |                              |                            |                                      |
|---|----------------------------------|--------------------|------------------------------|----------------------------|--------------------------------------|
| Grade                                     | Group                            | Accountable in ELA | Percentage Reportable in ELA | Accountable in Mathematics | Percentage Reportable in Mathematics |
| 8   | All Students                     | ≥51,210            | 99.17%                       | ≥51,220                    | 99.19%                               |
|   | <b>Gender</b>                    |                    |                              |                            |                                      |
|   | Female                           | ≥25,220            | 99.18%                       | ≥25,220                    | 99.20%                               |
|   | Male                             | ≥25,990            | 99.16%                       | ≥25,990                    | 99.19%                               |
|   | <b>Ethnicity</b>                 |                    |                              |                            |                                      |
|   | Hispanic/Latino                  | ≥4,600             | 99.54%                       | ≥4,600                     | 99.54%                               |
|   | American Indian or Alaska Native | ≥280               | 98.95%                       | ≥280                       | 98.95%                               |
|   | Asian                            | ≥800               | 99.63%                       | ≥800                       | 99.63%                               |
|   | Black or African American        | ≥21,870            | 98.88%                       | ≥21,870                    | 98.94%                               |
|   | Native Hawaiian or Other Pacific | ≥40                | 100.00%                      | ≥40                        | 100.00%                              |
|   | White                            | ≥21,920            | 99.35%                       | ≥21,930                    | 99.36%                               |
|   | Two or More Races                | ≥1,600             | 99.38%                       | ≥1,600                     | 99.38%                               |
|   | <b>Education Classification</b>  |                    |                              |                            |                                      |
|   | Regular                          | ≥45,900            | 99.23%                       | ≥45,910                    | 99.26%                               |
|   | Special                          | ≥5,300             | 98.62%                       | ≥5,300                     | 98.66%                               |
|   | <b>Economic Status</b>           |                    |                              |                            |                                      |
|   | Not Economically Disadvantaged   | ≥16,530            | 99.70%                       | ≥16,530                    | 99.71%                               |
|   | Economically Disadvantaged       | ≥34,670            | 98.91%                       | ≥34,680                    | 98.95%                               |
|   | <b>English Learner Status</b>    |                    |                              |                            |                                      |
|   | Not English Learner              | ≥49,640            | 99.16%                       | ≥49,650                    | 99.19%                               |
|   | English Learner                  | ≥1,560             | 99.30%                       | ≥1,560                     | 99.30%                               |
|   | <b>Migrant Status</b>            |                    |                              |                            |                                      |
|   | Not Migrant                      | ≥51,150            | 99.17%                       | ≥51,160                    | 99.19%                               |
|   | Migrant                          | ≥50                | 100.00%                      | ≥50                        | 100.00%                              |
|   | <b>Section 504 Status</b>        |                    |                              |                            |                                      |
|   | Not Section 504                  | ≥46,000            | 99.16%                       | ≥46,010                    | 99.19%                               |
|   | Section 504                      | ≥5,200             | 99.19%                       | ≥5,210                     | 99.23%                               |
|   | <b>Homeless Status</b>           |                    |                              |                            |                                      |
|   | Not Homeless                     | ≥50,080            | 99.20%                       | ≥50,090                    | 99.22%                               |
|   | Homeless                         | ≥1,120             | 97.78%                       | ≥1,120                     | 97.96%                               |
|   | <b>Foster Care Status</b>        |                    |                              |                            |                                      |
|   | Not in Foster Care               | ≥51,070            | 99.17%                       | ≥51,080                    | 99.20%                               |
| In Foster Care                            | ≥130                             | 97.83%             | ≥130                         | 97.83%                     |                                      |
| <b>Military Affiliation</b>               |                                  |                    |                              |                            |                                      |
| Not Military Affiliated                   | ≥50,290                          | 99.15%             | ≥50,310                      | 99.18%                     |                                      |
| Military Affiliated                       | ≥910                             | 100.00%            | ≥910                         | 100.00%                    |                                      |

\*Students in grade 8 who enrolled in Algebra I had the option of taking the Algebra LEAP 2025 HS test instead of the LEAP 2025 Mathematics grade 8 test.

## 7.1 Current Administration Data

Tables 7.2 through 7.13 show the percentage of students in each achievement level based on the state population for the 2022 administration of the ELA and mathematics assessments. Results from previous years are presented as well for comparison purposes.

**Table 7.2 Comparison of Percentage of Students in Achievement Levels: ELA Grade 3**

| Year | N       | Unsatisfactory | Approaching Basic | Basic | Mastery | Advanced |
|------|---------|----------------|-------------------|-------|---------|----------|
| 2017 | ≥56,800 | 13.4           | 17.8              | 24.7  | 38.9    | 5.1      |
| 2018 | ≥55,390 | 14.2           | 18.2              | 22.3  | 39.8    | 5.6      |
| 2019 | ≥52,940 | 13.2           | 17.2              | 23.7  | 39.5    | 6.4      |
| 2021 | ≥49,630 | 19.3           | 19.0              | 23.1  | 33.4    | 5.2      |
| 2022 | ≥49,380 | 21.9           | 18.9              | 21.2  | 33.6    | 4.4      |

**Table 7.3 Comparison of Percentage of Students in Achievement Levels: ELA Grade 4**

| Year | N       | Unsatisfactory | Approaching Basic | Basic | Mastery | Advanced |
|------|---------|----------------|-------------------|-------|---------|----------|
| 2017 | ≥56,230 | 8.8            | 18.3              | 29.3  | 36.2    | 7.3      |
| 2018 | ≥55,760 | 10.8           | 17.0              | 28.7  | 34.8    | 8.8      |
| 2019 | ≥54,800 | 10.3           | 18.1              | 26.6  | 36.1    | 8.9      |
| 2021 | ≥49,550 | 13.7           | 19.1              | 25.7  | 32.3    | 9.3      |
| 2022 | ≥48,980 | 13.6           | 17.9              | 24.5  | 34.1    | 10.0     |

**Table 7.4 Comparison of Percentage of Students in Achievement Levels: ELA Grade 5**

| Year | N       | Unsatisfactory | Approaching Basic | Basic | Mastery | Advanced |
|------|---------|----------------|-------------------|-------|---------|----------|
| 2017 | ≥53,300 | 8.7            | 18.8              | 31.1  | 37.9    | 3.4      |
| 2018 | ≥55,310 | 8.8            | 17.7              | 30.4  | 39.3    | 3.7      |
| 2019 | ≥54,910 | 8.4            | 21.1              | 30.0  | 36.0    | 4.4      |
| 2021 | ≥49,780 | 10.7           | 24.0              | 28.1  | 32.7    | 4.4      |
| 2022 | ≥48,980 | 10.2           | 20.0              | 29.9  | 36.2    | 3.6      |

**Table 7.5 Comparison of Percentage of Students in Achievement Levels: ELA Grade 6**

| Year | N       | Unsatisfactory | Approaching Basic | Basic | Mastery | Advanced |
|------|---------|----------------|-------------------|-------|---------|----------|
| 2017 | ≥52,370 | 10.4           | 24.9              | 29.8  | 29.4    | 5.5      |
| 2018 | ≥52,810 | 9.3            | 24.6              | 31.5  | 30.3    | 4.4      |
| 2019 | ≥54,800 | 9.2            | 23.5              | 29.8  | 32.2    | 5.3      |
| 2021 | ≥51,430 | 12.1           | 26.1              | 28.3  | 28.7    | 4.9      |
| 2022 | ≥49,450 | 12.1           | 21.6              | 28.5  | 31.3    | 6.5      |

**Table 7.6 Comparison of Percentage of Students in Achievement Levels: ELA Grade 7**

| Year | N       | Unsatisfactory | Approaching Basic | Basic | Mastery | Advanced |
|------|---------|----------------|-------------------|-------|---------|----------|
| 2017 | ≥51,930 | 13.2           | 19.2              | 26.5  | 30.3    | 10.8     |
| 2018 | ≥51,540 | 10.7           | 19.2              | 26.8  | 31.4    | 11.9     |
| 2019 | ≥52,350 | 11.6           | 16.7              | 25.1  | 33.0    | 13.7     |
| 2021 | ≥52,180 | 13.4           | 18.3              | 26.2  | 29.1    | 13.0     |
| 2022 | ≥46,360 | 14.7           | 16.6              | 24.0  | 30.6    | 14.0     |

**Table 7.7 Comparison of Percentage of Students in Achievement Levels: ELA Grade 8**

| Year | N       | Unsatisfactory | Approaching Basic | Basic | Mastery | Advanced |
|------|---------|----------------|-------------------|-------|---------|----------|
| 2017 | ≥50,450 | 11.4           | 17.4              | 27.0  | 35.1    | 9.0      |
| 2018 | ≥51,020 | 10.8           | 17.4              | 26.6  | 36.9    | 8.4      |
| 2019 | ≥50,720 | 11.7           | 16.2              | 25.4  | 37.6    | 9.2      |
| 2021 | ≥51,680 | 14.3           | 16.4              | 25.2  | 34.9    | 9.2      |
| 2022 | ≥50,820 | 12.4           | 18.2              | 22.9  | 35.7    | 10.8     |

**Table 7.8 Comparison of Percentage of Students in Achievement Levels: Mathematics Grade 3**

| Year | N       | Unsatisfactory | Approaching Basic | Basic | Mastery | Advanced |
|------|---------|----------------|-------------------|-------|---------|----------|
| 2017 | ≥56,800 | 11.1           | 18.4              | 27.1  | 36.2    | 7.1      |
| 2018 | ≥55,360 | 10.3           | 19.7              | 28.1  | 34.6    | 7.3      |
| 2019 | ≥52,820 | 9.7            | 20.6              | 26.4  | 36.5    | 6.7      |
| 2021 | ≥49,590 | 18.2           | 22.9              | 25.3  | 28.3    | 5.3      |
| 2022 | ≥49,390 | 13.9           | 21.8              | 27.3  | 32.5    | 4.5      |

**Table 7.9 Comparison of Percentage of Students in Achievement Levels: Mathematics Grade 4**

| Year | N       | Unsatisfactory | Approaching Basic | Basic | Mastery | Advanced |
|------|---------|----------------|-------------------|-------|---------|----------|
| 2017 | ≥56,230 | 8.2            | 23.2              | 29.7  | 35.0    | 3.8      |
| 2018 | ≥55,680 | 8.6            | 22.8              | 30.3  | 34.4    | 3.9      |
| 2019 | ≥54,690 | 11.1           | 20.5              | 27.1  | 38.0    | 3.3      |
| 2021 | ≥49,490 | 20.0           | 23.1              | 25.2  | 29.7    | 2.1      |
| 2022 | ≥48,960 | 14.8           | 24.6              | 24.3  | 32.6    | 3.7      |

**Table 7.10 Comparison of Percentage of Students in Achievement Levels: Mathematics Grade 5**

| Year | N       | Unsatisfactory | Approaching Basic | Basic | Mastery | Advanced |
|------|---------|----------------|-------------------|-------|---------|----------|
| 2017 | ≥53,310 | 11.1           | 24.9              | 32.4  | 27.7    | 3.9      |
| 2018 | ≥55,200 | 10.2           | 25.8              | 34.0  | 25.7    | 4.2      |
| 2019 | ≥54,730 | 10.3           | 26.8              | 28.3  | 30.5    | 4.1      |
| 2021 | ≥49,700 | 18.5           | 28.6              | 26.7  | 23.2    | 3.1      |
| 2022 | ≥48,890 | 13.4           | 28.0              | 29.2  | 24.8    | 4.6      |

**Table 7.11 Comparison of Percentage of Students in Achievement Levels: Mathematics Grade 6**

| Year | N       | Unsatisfactory | Approaching Basic | Basic | Mastery | Advanced |
|------|---------|----------------|-------------------|-------|---------|----------|
| 2017 | ≥52,350 | 12.6           | 30.8              | 29.2  | 23.7    | 3.7      |
| 2018 | ≥52,670 | 11.6           | 29.0              | 32.0  | 24.8    | 2.6      |
| 2019 | ≥54,710 | 11.4           | 26.7              | 31.7  | 26.6    | 3.6      |
| 2021 | ≥51,340 | 18.8           | 27.9              | 28.9  | 21.9    | 2.5      |
| 2022 | ≥49,390 | 18.0           | 27.4              | 27.4  | 23.9    | 3.3      |

**Table 7.12 Comparison of Percentage of Students in Achievement Levels: Mathematics Grade 7**

| Year | N       | Unsatisfactory | Approaching Basic | Basic | Mastery | Advanced |
|------|---------|----------------|-------------------|-------|---------|----------|
| 2017 | ≥51,800 | 11.2           | 28.9              | 35.2  | 22.6    | 2.1      |
| 2018 | ≥51,420 | 9.9            | 29.0              | 35.7  | 22.9    | 2.4      |
| 2019 | ≥52,090 | 9.1            | 29.5              | 34.7  | 24.5    | 2.3      |
| 2021 | ≥52,080 | 12.0           | 33.0              | 32.6  | 20.5    | 1.9      |
| 2022 | ≥51,100 | 13.4           | 29.7              | 32.8  | 21.3    | 2.7      |

**Table 7.13 Comparison of Percentage of Students in Achievement Levels: Mathematics Grade 8**

| Year | N       | Unsatisfactory | Approaching Basic | Basic | Mastery | Advanced |
|------|---------|----------------|-------------------|-------|---------|----------|
| 2017 | ≥44,710 | 20.3           | 28.2              | 25.0  | 24.7    | 1.8      |
| 2018 | ≥44,910 | 20.9           | 27.4              | 23.7  | 26.1    | 1.9      |
| 2019 | ≥44,520 | 20.9           | 25.7              | 25.4  | 25.7    | 2.3      |
| 2021 | ≥45,840 | 27.3           | 25.8              | 25.2  | 20.2    | 1.5      |
| 2022 | ≥44,990 | 23.5           | 27.7              | 25.2  | 21.5    | 2.1      |

Score reports are the primary means of communicating test scores to appropriate school system personnel (e.g., testing coordinators or superintendents), teachers, and parents. Standard 6.10 of the *Standards* states:

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 to Standard 6.10. It states:

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 of test scores are disseminated in two ways: the individual score report and the *LEAP 2025 Interpretive Guide* (2022).

In addition to providing interpretation of the test results, the LODE and DRC must ensure that the information is understandable for the target audience. Standard 7.0 states:

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).

The LDOE and DRC strive to create documents that will be accessible to parents, teachers, and all other stakeholders.

The Individual Student-Level Report (ISR) is the primary means for sharing student test results with parents. As such, it is a stand-alone document from which parents can glean information that is relevant to understanding their children’s test scores. For more information about the test, parents are provided [A Parent Guide to the LEAP 2025 Student Reports](#). In the 2022 administration year, student reports for each school were posted by grade, then downloaded and printed from DRC INSIGHT Portal (eDIRECT) by school systems and schools. DRC INSIGHT Portal (eDIRECT) is DRC’s secure online system that provides schools and districts access to student tests and reports.

### 7.1.1 Description of Each Type of Report

In this section, descriptions of the School Roster Report and the ISR are provided.

In compliance with AERA, APA, & NCME (2014) Standard 12.18, the LEAP 2025 score reports provide clear information about the results of individual students and of specific groups of students. Standard 12.18 states:

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).

### ***School Roster Report***

A School Roster Report, which provides summary information about student performance on the LEAP 2025 ELA and Mathematics tests, is available to school systems and schools through DRC INSIGHT Portal (eDIRECT). Total test scores and achievement-level indicators are shown for the content area of interest. Reporting category and subcategory performance ratings are also reported for students. At the school level, the percentage of students at each achievement level and rating by category and subcategory are summarized. More details can be found in the [LEAP 2025 Interpretive Guide](#).

### ***Individual Student-Level Report***

The ISR is another type of report available through the DRC INSIGHT Portal (eDIRECT) system. ISRs may be downloaded and printed by schools to be sent home to parents. At the top of the page, overall student performance is reported by scale scores and achievement level. To give context to the student score, the student's school system and state averages are presented to the right of the student information. In the middle of the page, category and subcategory performance indicators are reported. achievement-level descriptors and the percentage of students in each achievement level by school, school system, and the state, which allows comparisons of the student's overall achievement level to those of their peers, are found at the bottom of the page. When a student does not receive a scale score, their achievement level will be left blank. ISRs for students whose scores were invalidated will display a blank scale score for a given content area.

A data file referred to as Louisiana Department of Education Student File (LDESTD) was provided to the LDOE by DRC. It contains one record for every student tested; each record contains demographic information, responses for multiple-choice (MC) items, scores for items that are not MC items, raw scores, content and process standard raw scores, scale scores, and performance-level data for each content area.

The [LEAP 2025 Interpretive Guide](#) was written to help Louisiana school system and school administrators, teachers, parents, and the general public to better understand the LEAP 2025 ELA and mathematics tests. The *LEAP 2025 Interpretive Guide* was developed collaboratively by DRC and LDOE staff. LDOE staff had opportunities to review the guide, provide feedback, and give final approval.

The *LEAP 2025 Interpretive Guide* has three sections. The first section presents an introduction and an overview of key terms and test-related concepts. The second section discusses assessment terms and types of scores that are presented on the ISRs. Sample ISRs are included in the guide. The third section discusses information that is presented on the School Roster Report and an example of the report.

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 address multiple best practices of the testing industry but are particularly related to the following 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 (102).



**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 scores represent, the precision/reliability of the scores, and how scores are intended to be used (119).

**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 (125).

**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 (200).

## Chapter 8: Performance-Level Setting

This chapter briefly describes the LEAP 2025 performance-level setting and presents the cut scores and achievement-level descriptors derived from the performance-level setting. Since the LDOE uses PARCC cut scores for the LEAP 2025 ELA and mathematics tests, a brief overview of the PARCC performance-level setting procedures is included in this chapter. A more detailed discussion and the results of the PARCC performance-level setting may be found in the *Performance Level Setting Technical Report* (Pearson, 2015).

The AERA, APA, & NCME (2014) Standards addressed by the *Performance Level Setting Technical Report* (Pearson, 2015) are 5.21 and 5.22.

Starting in the spring of 2015, the ELA and mathematics assessments measured different content and constructs than did previous tests were administered to Louisiana students. The new tests were built using the PARCC item bank and were fully aligned to the Louisiana Student Standards. The new tests were reported on new scales, and students were classified by achievement levels based on their knowledge and ability to perform different tasks in relation to the new test content and standards.

In terms of the validity of the LEAP 2025 test scores, it is essential to understand that descriptors and cut scores are established in a collaborative and participatory process. The descriptors clearly establish, in plain language, the proper frame of reference for understanding how to interpret test scores, particularly cut scores.

### 8.1 PARCC Performance-Level Setting Process for English Language Arts and Mathematics

According to the *Performance Level Setting Technical Report* (Pearson, 2015), PARCC used the evidence-based standard setting (EBSS) method (Beimers, Way, McClarty, & Miles, 2012) for the PARCC performance-level setting (PLS) process. The EBSS method is used to combine various considerations into the process for setting performance levels, including policy considerations, content standards, research, and educator judgment about what students should know and be able to demonstrate, and to support PARCC's policy goals related to college- and career-readiness expectations. Additional details about the EBSS method can be found in the *Performance Level Setting Technical Report* (Pearson, 2015).

### 8.2 Cut Scores

This section presents the cut scores for each grade and content area of the LEAP 2025. Tables 8.1 and 8.2 show the ELA and mathematics cut scores for students in grades 3 through 8.

**Table 8.1 English Language Arts Cut Scores**

| Grade | Cut Scores               |              |                |                 |
|-------|--------------------------|--------------|----------------|-----------------|
|       | <i>Approaching Basic</i> | <i>Basic</i> | <i>Mastery</i> | <i>Advanced</i> |
| 3     | 700                      | 725          | 750            | 810             |
| 4     | 700                      | 725          | 750            | 790             |
| 5     | 700                      | 725          | 750            | 799             |
| 6     | 700                      | 725          | 750            | 790             |
| 7     | 700                      | 725          | 750            | 785             |
| 8     | 700                      | 725          | 750            | 794             |

**Table 8.2 Mathematics Cut Scores**

| Grade | Cut Scores               |              |                |                 |
|-------|--------------------------|--------------|----------------|-----------------|
|       | <i>Approaching Basic</i> | <i>Basic</i> | <i>Mastery</i> | <i>Advanced</i> |
| 3     | 700                      | 725          | 750            | 790             |
| 4     | 700                      | 725          | 750            | 796             |
| 5     | 700                      | 725          | 750            | 790             |
| 6     | 700                      | 725          | 750            | 788             |
| 7     | 700                      | 725          | 750            | 786             |
| 8     | 700                      | 725          | 750            | 801             |

### 8.2.1 Reporting Category Cut Scores

As stated in Section 6.4.2.3, student performance on ELA and mathematics reporting categories and subcategories was classified into one of three performance ratings: *Strong*, *Moderate*, and *Weak*. Detailed rules for calculating performance ratings for ELA and mathematics reporting categories and subcategories can be found in that section.

The cut scores divide the continuum of student achievement into the following five achievement levels used by the LDOE for reporting purposes:

- *Advanced*: Students performing at this level have **exceeded** college- and career-readiness expectations and are well prepared for the next level of study in this content area.
- *Mastery*: Students performing at this level have **met** college- and career-readiness expectations and are prepared for the next level of study in this content area.
- *Basic*: Students performing at this level have **nearly met** college- and career-readiness expectations and may need additional support to be fully prepared for the next level of study in this content area.
- *Approaching Basic*: Students performing at this level have **partially met** college- and career-readiness expectations and will need much support to be prepared for the next level of study in this content area.
- *Unsatisfactory*: Students performing at this level have **not yet met** the college- and career-readiness expectations and will need extensive support to be prepared for the next level of study in this content area.

Table 8.3 summarizes the LEAP 2025 ELA and mathematics scale score ranges for each level of achievement.

**Table 8.3 Achievement-Level Scale Score Ranges**

| ELA                      |         |         |         |         |         |         |
|--------------------------|---------|---------|---------|---------|---------|---------|
| Achievement Level        | Grade 3 | Grade 4 | Grade 5 | Grade 6 | Grade 7 | Grade 8 |
| <i>Advanced</i>          | 810–850 | 790–850 | 799–850 | 790–850 | 785–850 | 794–850 |
| <i>Mastery</i>           | 750–809 | 750–789 | 750–798 | 750–789 | 750–784 | 750–793 |
| <i>Basic</i>             | 725–749 |         |         |         |         |         |
| <i>Approaching Basic</i> | 700–724 |         |         |         |         |         |
| <i>Unsatisfactory</i>    | 650–699 |         |         |         |         |         |
| MATHEMATICS              |         |         |         |         |         |         |
| Achievement Level        | Grade 3 | Grade 4 | Grade 5 | Grade 6 | Grade 7 | Grade 8 |
| <i>Advanced</i>          | 790–850 | 796–850 | 790–850 | 788–850 | 786–850 | 801–850 |
| <i>Mastery</i>           | 750–789 | 750–795 | 750–789 | 750–787 | 750–785 | 750–800 |
| <i>Basic</i>             | 725–749 |         |         |         |         |         |
| <i>Approaching Basic</i> | 700–724 |         |         |         |         |         |
| <i>Unsatisfactory</i>    | 650–699 |         |         |         |         |         |

This chapter presented a brief overview of PARCC’s performance-level setting process, which set the cut scores used by the LDOE for reporting student performance on the LEAP 2025 ELA and mathematics tests. These procedures are addressed in more detail in relevant technical reports.

The performance-level setting process undertaken by PARCC addresses the following 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).

## Chapter 9: Evidence of Validity

Evidence for validity—the meaning of test scores and the inferences they support—is the central concept underlying the LEAP 2025 validation process. Validity evidence, from the design of the test to item development and scoring, is created throughout the entire assessment process. Therefore, evidence of validity is described throughout the LEAP 2025 technical report. Table 9.1 summarizes the sources of evidence of validity and indicates where the evidence can be found in the technical report.

**Table 9.1 Summary of Evidence of Validity and the Report Chapter in Which it is Found**

| Source of Validity                                 | Related Information   | Related Chapter/Source   |
|--|---|--|
| Evidence Based on Test Content                     | Item Development Process                                      | Chapter 3<br>2021–2022 LEAP Grades 3-8 ELA and Mathematics Assessment Frameworks |
|  | Test Blueprint and Item Alignment to Curriculum and Standards | Chapter 3<br>2021–2022 LEAP Grades 3-8 ELA and Mathematics Assessment Frameworks |
|  | Item Bias, Sensitivity, and Content Appropriateness           | Chapter 3  |
|  | Accommodations  | Chapters 3 and 4   |
| Evidence Based on Response Processes               | Testing Time  | Chapter 4  |
|  | Evaluation of the criteria used by hand scorers               | Spring 2022 LEAP 2025 Handscoring Specifications                                 |
|  | Features Scored by Artificial Intelligence (AI) Engines       | Chapter 5<br>2022 LEAP 2025 Handscoring Specifications                           |
| Evidence Based on Internal Structure               | Inter-rater Agreement   | Chapter 5  |
|  | Reliability and Standard Errors of Measurement                | Chapter 9  |
|  | Decision Accuracy   | Chapter 9  |
|  | Dimensionality  | Chapter 9  |
|  | Differential Item Functioning                                 | Chapter 10   |
|  | Student Group Reliability                                     | Chapter 10   |
| Evidence Based on Relationships to Other Variables | Divergent Validity  | Chapter 9  |
|  | Regression of LEAP 2025 from 2021 to 2022                     | Chapter 9  |
| Evidence Based on the Consequences of Testing      | Scale Score and Performance Level Information                 | Chapter 7  |
|  | Test Interpretive Guide                                       | Chapter 4  |

In this chapter, DRC presents evidence of construct-related validity through studies of test reliability, convergent validity, and divergent validity. All analyses in this chapter are based on census data, after removing data from the test takers who were administered the Spanish language and Braille versions of the test forms.

Chapter 9 of this report demonstrates adherence to the American Educational Research Association, American Psychological Association, & National Council on Measurement in Education (AERA, APA, & NCME, 2014) Standards 1.13, 1.21, 2.0, 2.3, 2.13, 2.14, 2.16, and 2.19. Each standard is discussed in the pertinent section of this chapter.

## 9.1 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 1–5 and Chapter 6 for more information on step 6).

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 is 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 content of the assessment does not reflect the full range of content that the assessment is expected to cover. Specification and review, a process through which test blueprints are developed and reviewed, 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. Often, however, it is impractical to administer multiple forms of the test, and reliability is estimated 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 of validity.

The 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 *Standards* in developing and maintaining tests of the highest quality, DRC has calculated the reliability of each LEAP 2025 test in a variety of ways: reliability of raw scores, overall standard

error of measurement (SEM), IRT-based conditional SEM, and decision consistency of achievement-level classifications.

There are several specific standards that this chapter addresses. These include Standards 2.0, 2.3, 2.13, and 2.19, each of which is articulated below.

**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 score reliabilities are discussed in Section 9.2.1 of this chapter. The SEMs and subscore reliabilities are presented in Sections 9.4.2 and 9.4.3. The SEM of the total score is discussed in Section 9.2.2.

**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 SEM based on raw scores is discussed in Section 9.2.2 and is reported in raw score units. The conditional SEM is discussed in Section 9.2.3 and is presented in scale score units.

**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).

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 the 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, the more consistent the scores, where 1 refers to a perfectly consistent test. In general, 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

$$\alpha = \frac{n}{n-1} \left[ 1 - \frac{\sum_{i=1}^n \sigma_i^2}{\sigma_x^2} \right], \quad (9.1)$$

where  $n$  is the number of items on the test,  $\sigma_i^2$  is the variance of item  $i$ , and  $\sigma_x^2$  is the variance of the total test score.

Total test reliability measures, such as Cronbach’s coefficient alpha and SEM, consider the consistency (i.e., 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; for example, a longer test can be expected to be more reliable than a shorter test.

The reliability coefficients for the LEAP 2025 are reported in Table 9.2. These reliability coefficients were computed using the census data. The reliability statistics ranged from 0.86 to 0.92 for all ELA forms. The ELA forms have one writing component (RI or RL) that is the same score of another component (WE); the item score for the RI/RL component was excluded from the reliability computation. For mathematics, the reliabilities ranged from 0.92 to 0.94. These results indicate acceptable reliability coefficients for the LEAP 2025 tests.

**Table 9.2 Reliability in English Language Arts and Mathematics**

| Content     | Grade | Mode | Number of Items | Number of Score Points | SEM  | Cronbach's Alpha | N-Count |
|-------------|-------|------|-----------------|------------------------|------|------------------|---------|
| ELA         | 3     | CBT  | 24              | 70                     | 4.48 | 0.88             | ≥16,210 |
| ELA         | 3     | PBT  | 24              | 70                     | 4.54 | 0.86             | ≥33,260 |
| ELA         | 4     | CBT  | 30              | 83                     | 5.06 | 0.90             | ≥49,110 |
| ELA         | 5     | CBT  | 28              | 86                     | 5.13 | 0.91             | ≥49,180 |
| ELA         | 6     | CBT  | 32              | 90                     | 5.14 | 0.92             | ≥49,620 |
| ELA         | 7     | CBT  | 32              | 94                     | 5.61 | 0.92             | ≥46,400 |
| ELA         | 8     | CBT  | 32              | 94                     | 5.70 | 0.91             | ≥50,980 |
| Mathematics | 3     | CBT  | 42              | 61                     | 3.49 | 0.93             | ≥16,210 |
| Mathematics | 3     | PBT  | 42              | 61                     | 3.72 | 0.93             | ≥33,270 |
| Mathematics | 4     | CBT  | 43              | 62                     | 3.52 | 0.94             | ≥49,090 |
| Mathematics | 5     | CBT  | 43              | 62                     | 3.31 | 0.94             | ≥49,090 |
| Mathematics | 6     | CBT  | 43              | 66                     | 3.63 | 0.93             | ≥49,550 |
| Mathematics | 7     | CBT  | 43              | 66                     | 3.62 | 0.94             | ≥51,170 |
| Mathematics | 8     | CBT  | 41              | 65                     | 3.44 | 0.92             | ≥45,200 |

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

$$SEM = SD\sqrt{1 - R_{xx'}}, \quad (9.2)$$



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

The SEM at the test-form level was computed in raw score metric and is also presented in Table 9.2 for ELA and mathematics.

### 9.2.3 Conditional Standard Error of Measurement

In contrast to SEM, conditional standard error of measurement (CSEM) expresses the degree of measurement error in scale score units and is conditioned on the ability of the student. DRC reports the CSEM in support of Standard 2.14, which states:

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 Table 9.3.

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). The CSEM is defined in the following equation:

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

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

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

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

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 expected when IRT methods are used. Since LEAP 2025 was first administered, every effort has been made to make the TCC and CSEM values at the cut scores between the PARCC assessments and the LEAP 2025 assessments similar. Both TCC and CSEM values have been similar across the LEAP 2025 alternate forms given the same content because similar or the same statistical properties are important for alternate forms. To provide context regarding the magnitude of the CSEMs, it is important to also refer to sections 9.2.1 Test Reliability and 9.2.4 Classification Accuracy and Consistency where evidence is provided of high measures of form reliability and levels of accurate student classification at the cutpoints to support the use of the LEAP 2025 assessments. The CSEMs at the four cut scores that define the performance levels are presented in Table 9.3.

**Table 9.3 Conditional Standard Errors of Measurement at the *Approaching Basic, Basic, Mastery, and Advanced* Cut Scores**

|              |       |      | <i>Approaching Basic</i> |      | <i>Basic</i> |      | <i>Mastery</i> |      | <i>Advanced</i> |      |
|--------------|-------|------|--------------------------|------|--------------|------|----------------|------|-----------------|------|
| Content Area | Grade | Mode | Cut Score                | CSEM | Cut Score    | CSEM | Cut Score      | CSEM | Cut Score       | CSEM |
| ELA          | 3     | CBT  | 700                      | 14   | 725          | 12   | 750            | 12   | 810             | 13   |
| ELA          | 3     | PBT  | 700                      | 13   | 725          | 12   | 750            | 11   | 810             | 12   |
| ELA          | 4     | CBT  | 700                      | 11   | 725          | 9    | 750            | 8    | 790             | 9    |
| ELA          | 5     | CBT  | 700                      | 9    | 725          | 7    | 750            | 6    | 799             | 8    |
| ELA          | 6     | CBT  | 700                      | 9    | 725          | 7    | 750            | 7    | 790             | 8    |
| ELA          | 7     | CBT  | 700                      | 9    | 725          | 7    | 750            | 7    | 785             | 8    |
| ELA          | 8     | CBT  | 700                      | 9    | 725          | 8    | 750            | 8    | 794             | 8    |
| Mathematics  | 3     | CBT  | 700                      | 8    | 725          | 7    | 750            | 7    | 790             | 10   |
| Mathematics  | 3     | PBT  | 700                      | 8    | 725          | 7    | 750            | 7    | 790             | 10   |
| Mathematics  | 4     | CBT  | 700                      | 8    | 725          | 7    | 750            | 7    | 796             | 9    |
| Mathematics  | 5     | CBT  | 700                      | 9    | 725          | 7    | 750            | 7    | 790             | 9    |
| Mathematics  | 6     | CBT  | 700                      | 8    | 725          | 7    | 750            | 6    | 788             | 8    |
| Mathematics  | 7     | CBT  | 700                      | 9    | 725          | 6    | 750            | 5    | 786             | 7    |
| Mathematics  | 8     | CBT  | 700                      | 12   | 725          | 9    | 750            | 8    | 801             | 10   |

Figures 9.1 and 9.2 display the CSEM (conditional standard error of measurement) curves for each grade and content area by mode. Typically, with fixed-form assessments, the estimates of measurement error tend to be higher at the low and high ends of the scale-score range where few items measure those ability levels. 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. The middle ability range, where cut scores are located, shows lower measurement error than the low and high ends of the ability ranges. Figures 9.1 and 9.2 demonstrate that the tests are designed so that measurement error is minimized in the middle of the scale range, where most students are located.

Figure 9.1 CSEM Curves for ELA Grades 3 through 8

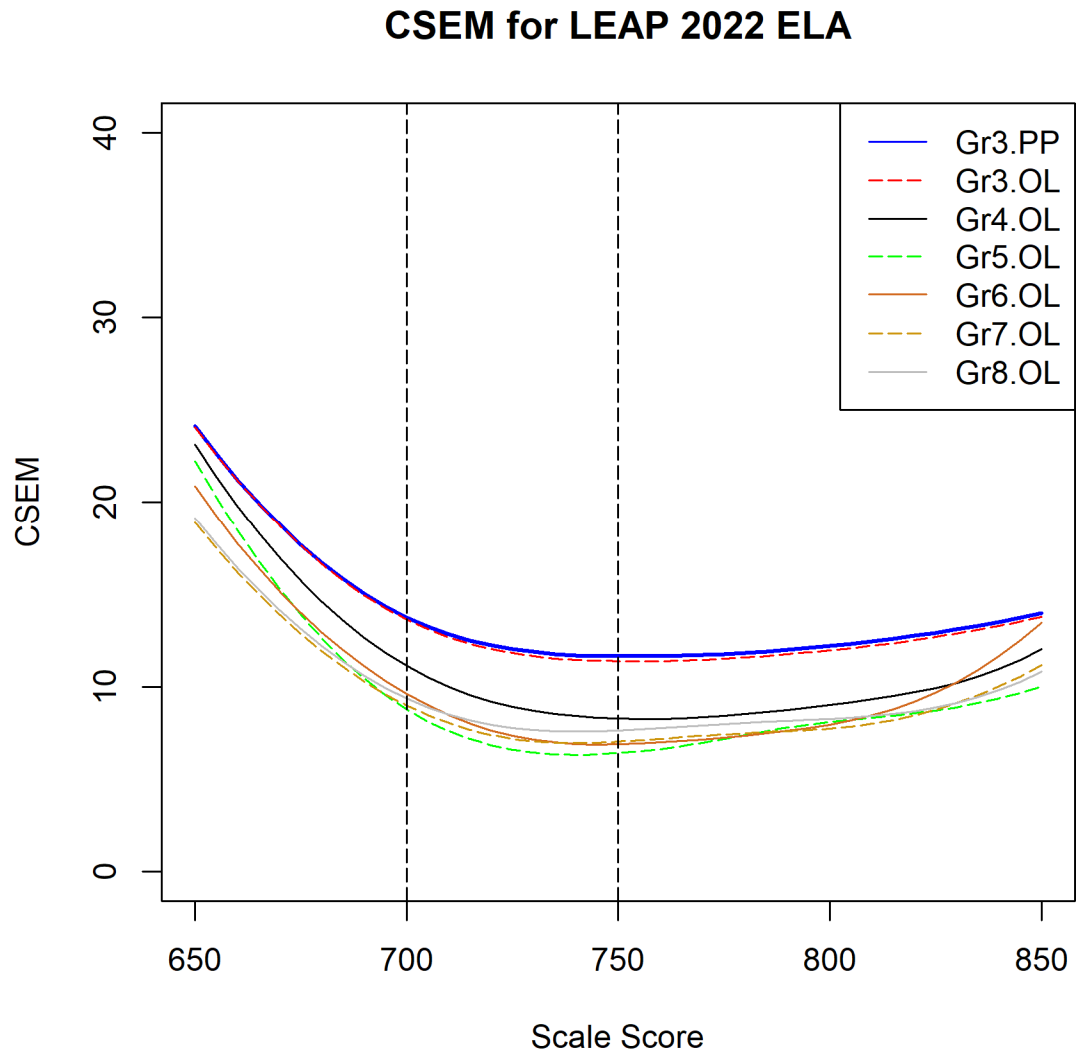
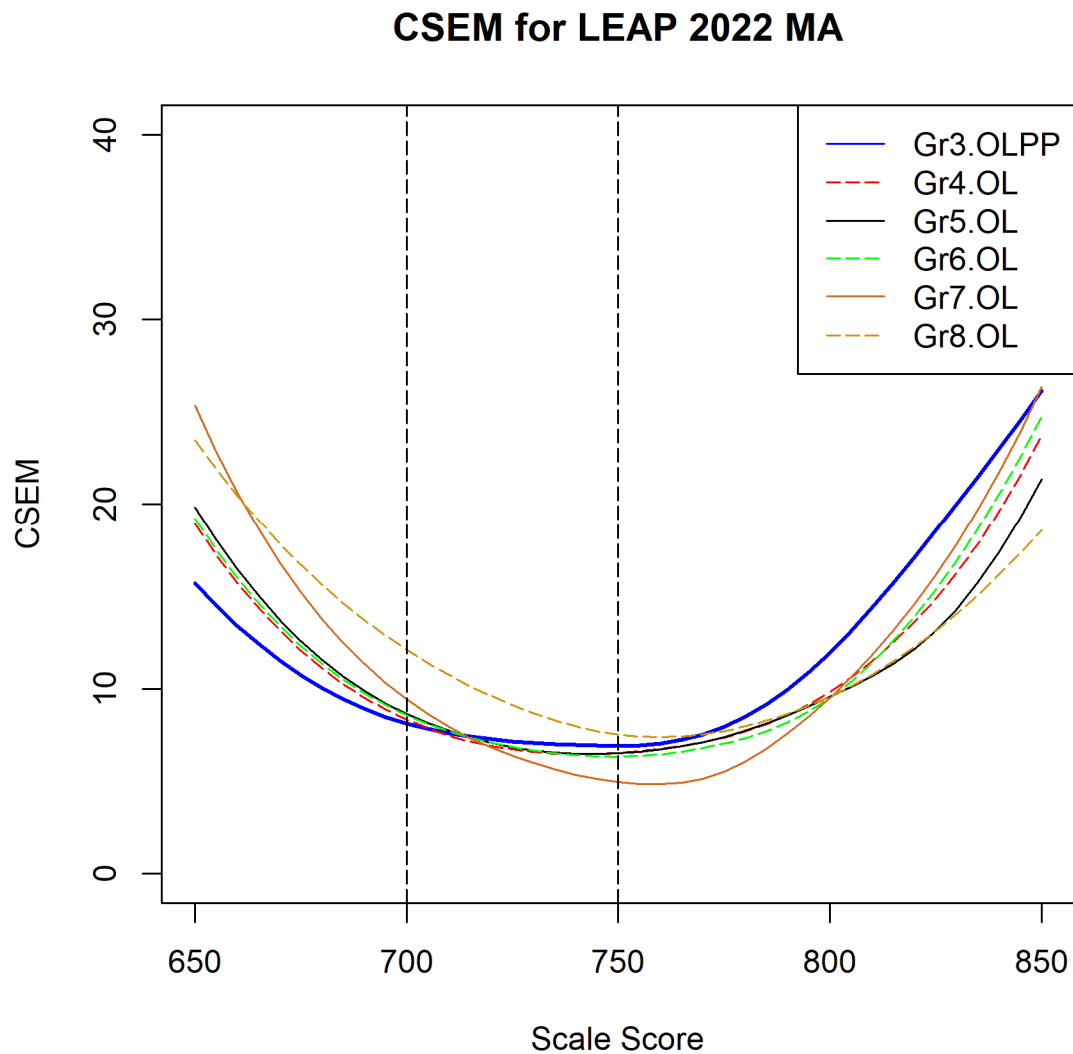


Figure 9.2 CSEM Curves for Mathematics Grades 3 through 8



## 9.2.4 Classification Accuracy and Consistency

### **Classification Accuracy**

Classification accuracy is defined as the extent to which the actual classifications of test takers into various achievement levels match classifications made based on their true scores (Livingston & Lewis, 1995). Classification accuracy refers to the agreement between the observed score and the true score, whereas classification consistency refers to the agreement between two observed scores.

### **Classification Consistency**

Classification consistency is defined as the extent to which the classifications of students in a particular achievement level match based on two independent administrations of the same test form or one administration of two parallel test forms. It is often logistically infeasible, as well as expensive, to obtain data from repeated administrations of a test, be it re-administration of the same test or administration of a parallel form. Therefore, a common practice is to estimate classification consistency from one administration of a test.

The Livingston-Lewis (1995) methodology was used to calculate classification accuracy statistics based on the spring 2022 LEAP 2025 results. The Livingston-Lewis procedure utilizes a beta-binomial model that requires two steps: (1) fitting proportion-correct true scores to a four-parameter beta distribution and (2) using the binomial distribution to estimate classification accuracy and consistency. All calculations for classification accuracy and consistency are based on census data.

Classification consistency and classification accuracy conditioned on achievement level (see Table 9.4 and Table 9.5) and on cut score (see Table 9.6 and Table 9.7) are presented for the 2022 LEAP 2025 in this section of the report. The magnitude of classification consistency and accuracy measures is influenced by several key features of the test design, including the number of items, the location and number of cut scores, the score distribution, and the reliability and associated SEM. As can be seen in Table 9.4, classification accuracy conditioned on achievement level ranged from 0.44 to 0.86 for ELA and 0.46 to 0.87 for mathematics. Classification consistency (see Table 9.5) conditioned on achievement level ranged from 0.41 to 0.77 for ELA and 0.47 to 0.81 for mathematics. Table 9.6 shows that classification accuracy at achievement cut points ranged from 0.89 to 0.97 for ELA and 0.89 to 0.99 for mathematics. Classification consistency (see Table 9.7) conditioned at achievement cut points ranged from 0.85 to 0.96 for ELA and 0.84 to 0.99 for mathematics. Classification consistency and accuracy at achievement cut points tend to be higher values than those conditioned on achievement level. For some tests, classification accuracy and consistency conditioned on the *Advanced* level were lower than 0.50. One reason for these relatively low *Advanced* level values is few highly difficult items to distinguish the *Advanced* level from other achievement levels.

**Table 9.4 Classification Accuracy Conditioned on Level of Achievement**

| Content Area | Classification Accuracy |      |                |                   |       |         |          |
|--------------|-------------------------|------|----------------|-------------------|-------|---------|----------|
|              | Grade                   | Mode | Unsatisfactory | Approaching Basic | Basic | Mastery | Advanced |
| ELA          | 3                       | CBT  | 0.79           | 0.55              | 0.57  | 0.78    | 0.52     |
| ELA          | 3                       | PBT  | 0.72           | 0.56              | 0.60  | 0.80    | 0.45     |
| ELA          | 4                       | CBT  | 0.68           | 0.63              | 0.69  | 0.79    | 0.69     |
| ELA          | 5                       | CBT  | 0.72           | 0.72              | 0.74  | 0.86    | 0.44     |
| ELA          | 6                       | CBT  | 0.66           | 0.72              | 0.72  | 0.84    | 0.69     |
| ELA          | 7                       | CBT  | 0.77           | 0.67              | 0.70  | 0.76    | 0.76     |
| ELA          | 8                       | CBT  | 0.72           | 0.68              | 0.66  | 0.80    | 0.73     |
| Mathematics  | 3                       | CBT  | 0.79           | 0.72              | 0.77  | 0.85    | 0.47     |
| Mathematics  | 3                       | PBT  | 0.77           | 0.70              | 0.75  | 0.86    | 0.46     |
| Mathematics  | 4                       | CBT  | 0.79           | 0.73              | 0.74  | 0.87    | 0.55     |
| Mathematics  | 5                       | CBT  | 0.72           | 0.75              | 0.78  | 0.83    | 0.68     |
| Mathematics  | 6                       | CBT  | 0.80           | 0.73              | 0.77  | 0.83    | 0.66     |
| Mathematics  | 7                       | CBT  | 0.63           | 0.68              | 0.79  | 0.85    | 0.72     |
| Mathematics  | 8                       | CBT  | 0.78           | 0.64              | 0.68  | 0.83    | 0.70     |

**Table 9.5 Classification Consistency Conditioned on Level of Achievement**

| Content Area | Classification Consistency |      |                |                   |       |         |          |
|--------------|----------------------------|------|----------------|-------------------|-------|---------|----------|
|              | Grade                      | Mode | Unsatisfactory | Approaching Basic | Basic | Mastery | Advanced |
| ELA          | 3                          | CBT  | 0.74           | 0.41              | 0.42  | 0.69    | 0.53     |
| ELA          | 3                          | PBT  | 0.69           | 0.43              | 0.43  | 0.71    | 0.48     |
| ELA          | 4                          | CBT  | 0.67           | 0.49              | 0.54  | 0.69    | 0.66     |
| ELA          | 5                          | CBT  | 0.68           | 0.59              | 0.63  | 0.77    | 0.43     |
| ELA          | 6                          | CBT  | 0.65           | 0.56              | 0.63  | 0.74    | 0.65     |
| ELA          | 7                          | CBT  | 0.74           | 0.53              | 0.57  | 0.65    | 0.72     |
| ELA          | 8                          | CBT  | 0.69           | 0.54              | 0.52  | 0.71    | 0.68     |
| Mathematics  | 3                          | CBT  | 0.74           | 0.62              | 0.65  | 0.78    | 0.49     |
| Mathematics  | 3                          | PBT  | 0.71           | 0.59              | 0.63  | 0.78    | 0.47     |
| Mathematics  | 4                          | CBT  | 0.71           | 0.62              | 0.64  | 0.81    | 0.49     |
| Mathematics  | 5                          | CBT  | 0.65           | 0.62              | 0.69  | 0.77    | 0.64     |
| Mathematics  | 6                          | CBT  | 0.73           | 0.62              | 0.66  | 0.78    | 0.65     |
| Mathematics  | 7                          | CBT  | 0.50           | 0.58              | 0.70  | 0.80    | 0.68     |
| Mathematics  | 8                          | CBT  | 0.69           | 0.51              | 0.57  | 0.77    | 0.66     |

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 achievement levels is collapsed into a dichotomized distribution around that specific cut point. As an example, for the LEAP 2025 assessments, a dichotomization at the cut point between the *Basic* and *Mastery* classifications was formed. The proportion of correct classifications below this particular cut

point is equal to the sum of all the cells at the *Unsatisfactory*, *Approaching Basic*, and *Basic* levels, and the proportion of correct classifications above that particular cut point is equal to the sum of all the cells at the *Mastery* and *Advanced* levels. Table 9.6 shows the classification accuracy and Table 9.7 shows the consistency estimates when conditioned on LEAP 2025 cut scores. The classification accuracy statistics are at or above 0.89, while the classification consistency statistics are at or above 0.84. These results suggest that consistent and accurate achievement-level classifications are being made for students in Louisiana based on the LEAP 2025.

**Table 9.6 Classification Accuracy at Achievement Cut Points**

| Content Area | Grade | Mode | Classification Accuracy                          |   |                           |                              |
|--------------|-------|------|--|---|---------------------------|------------------------------|
|              |       |      | <i>Unsatisfactory/<br/>Approaching<br/>Basic</i> | <i>Approaching<br/>Basic/<br/>Basic</i> | <i>Basic/<br/>Mastery</i> | <i>Mastery/<br/>Advanced</i> |
| ELA          | 3     | CBT  | 0.90   | 0.90                                    | 0.91                      | 0.97                         |
| ELA          | 3     | PBT  | 0.92   | 0.89                                    | 0.89                      | 0.97                         |
| ELA          | 4     | CBT  | 0.94   | 0.92                                    | 0.91                      | 0.95                         |
| ELA          | 5     | CBT  | 0.95   | 0.92                                    | 0.91                      | 0.97                         |
| ELA          | 6     | CBT  | 0.94   | 0.92                                    | 0.92                      | 0.97                         |
| ELA          | 7     | CBT  | 0.95   | 0.93                                    | 0.91                      | 0.94                         |
| ELA          | 8     | CBT  | 0.95   | 0.92                                    | 0.91                      | 0.95                         |
| Mathematics  | 3     | CBT  | 0.94   | 0.92                                    | 0.94                      | 0.98                         |
| Mathematics  | 3     | PBT  | 0.95   | 0.93                                    | 0.93                      | 0.96                         |
| Mathematics  | 4     | CBT  | 0.94   | 0.93                                    | 0.94                      | 0.97                         |
| Mathematics  | 5     | CBT  | 0.93   | 0.92                                    | 0.94                      | 0.98                         |
| Mathematics  | 6     | CBT  | 0.93   | 0.92                                    | 0.94                      | 0.98                         |
| Mathematics  | 7     | CBT  | 0.89   | 0.92                                    | 0.95                      | 0.99                         |
| Mathematics  | 8     | CBT  | 0.89   | 0.91                                    | 0.94                      | 0.99                         |

**Table 9.7 Classification Consistency at Achievement Cut Points**

| Content Area | Grade | Mode | Classification Consistency              |                                |                   |                      |
|--------------|-------|------|---|--------------------------------|-------------------|----------------------|
|              |       |      | Unsatisfactory/<br>Approaching<br>Basic | Approaching<br>Basic/<br>Basic | Basic/<br>Mastery | Mastery/<br>Advanced |
| ELA          | 3     | CBT  | 0.86                                    | 0.86                           | 0.87              | 0.96                 |
| ELA          | 3     | PBT  | 0.89                                    | 0.85                           | 0.85              | 0.95                 |
| ELA          | 4     | CBT  | 0.91                                    | 0.88                           | 0.87              | 0.93                 |
| ELA          | 5     | CBT  | 0.94                                    | 0.89                           | 0.88              | 0.96                 |
| ELA          | 6     | CBT  | 0.91                                    | 0.89                           | 0.89              | 0.95                 |
| ELA          | 7     | CBT  | 0.93                                    | 0.90                           | 0.88              | 0.92                 |
| ELA          | 8     | CBT  | 0.93                                    | 0.89                           | 0.87              | 0.93                 |
| Mathematics  | 3     | CBT  | 0.91                                    | 0.89                           | 0.91              | 0.97                 |
| Mathematics  | 3     | PBT  | 0.93                                    | 0.90                           | 0.90              | 0.95                 |
| Mathematics  | 4     | CBT  | 0.91                                    | 0.90                           | 0.91              | 0.96                 |
| Mathematics  | 5     | CBT  | 0.90                                    | 0.89                           | 0.92              | 0.97                 |
| Mathematics  | 6     | CBT  | 0.90                                    | 0.89                           | 0.92              | 0.98                 |
| Mathematics  | 7     | CBT  | 0.86                                    | 0.88                           | 0.93              | 0.98                 |
| Mathematics  | 8     | CBT  | 0.84                                    | 0.87                           | 0.91              | 0.99                 |

### 9.2.5 Convergent Validity

Convergent validity is a subtype of construct validity that can be estimated by the extent to which measures of constructs that theoretically should be related to each other are, in fact, observed as related to each other. 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 LEAP 2025 mathematics test is designed to measure a single overall construct—mathematics achievement; therefore, the items comprising the LEAP 2025 mathematics test should measure only mathematics, not language or reading.

This technical report summarizes additional statistics that contribute to construct validity (Cronbach’s coefficient alpha is reported previously in this section, and item fit is reported in Chapter 6). The internal consistency coefficient (i.e., Cronbach’s alpha) reported is typically measured via correlations among the test items and indicates of the degree of the same general construct (Pearson, 2015, page 128). Table 9.2 shows test reliability statistics for ELA and mathematics. The reliability statistics ranged from 0.86 to 0.92 for ELA forms and from 0.92 to 0.94 for mathematics forms, indicating that items on the 2022 LEAP 2025 assessments are homogenous. For a group of items to be homogeneous, the items must measure the same construct (i.e., construct validity) or represent the same content domain (i.e., content validity). Because IRT models were used to calibrate test items and to report student scores, item fit is also relevant to construct validity. The extent to which test items function as the IRT model prescribes is relevant to the validation of test scores. As shown in Chapter 6, few items were flagged for poor model/data fit.



### 9.3 Principal Components Analysis

As another measure of construct validity, DRC examined the unidimensionality of each grade-level LEAP 2025 test. One of the underlying assumptions of the IRT models used to scale the LEAP 2025 tests is that the tests being calibrated are unidimensional; that is, items in each grade and content area measure a single content domain. For example, mathematics items should measure mathematics ability and not reading skills.

Standard 1.13 of the *Standards* states:

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).

This section examines the internal structure of the LEAP 2025 tests by evaluating the unidimensionality assumption through principal components analysis (PCA), which is one of the frequently used methods to do so (Chou and Wang, 2010). 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., that it measures one underlying construct).

A PCA was conducted for each grade, content area, and mode of the LEAP 2025 assessments. 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, content areas, and modes of the LEAP 2025 assessments, the ratio of variance accounted for by the first factor to variance accounted for by the second is sufficiently large to indicate that the unidimensionality assumption holds. All the LEAP 2025 content-area tests exhibit first principal components accounting for more than 20% of the test variance for ELA (see Table 9.8) and for mathematics (see Table 9.9). Reckase (1979) proposed that the first component should account for at least 20% of the variance to claim unidimensionality.

To further investigate the unidimensionality of the ELA and mathematics assessments, the ratio of the first eigenvalue to the second eigenvalue was determined (see Tables 9.8 and 9.9). When the first eigenvalue is sufficiently larger than the second eigenvalue, that is considered evidence of unidimensionality (Lord, 1980; Lumsden, 1957, 1961). These ratios show that the first eigenvalue is at least four times as large as the second eigenvalue for all the grades, content areas, and modes. This substantial difference in magnitude indicates that one factor appears to be dominant and that the ELA and mathematics tests are essentially unidimensional.

This evidence supports the claim that there is a dominant dimension underlying the items and tasks in each test and that scores from each test represent performance primarily determined by that ability. Construct-irrelevant variance, such as factual knowledge irrelevant to doing well in a subject, does not appear to create significant nuisance factors.

**Table 9.8 Principal Component Analysis for English Language Arts**

| <b>Grade</b> | <b>Mode</b> | <b>Components</b>    | <b>Eigenvalue</b> | <b>Percentage of Variance Explained</b> | <b>Cumulative Percentage of Variance Explained</b> |
|--------------|-------------|----------------------|-------------------|---|--|
| 3            | CBT         | First Component      | 6.65              | 27.70                                   | 27.70  |
| 3            | CBT         | Second Component     | 1.28              | 5.35                                    | 33.05  |
| 3            | CBT         | Ratio (First/Second) | 5.17              |   |  |
| 3            | PBT         | First Component      | 6.04              | 25.18                                   | 25.18  |
| 3            | PBT         | Second Component     | 1.35              | 5.61                                    | 30.79  |
| 3            | PBT         | Ratio (First/Second) | 4.49              |   |  |
| 4            | CBT         | First Component      | 7.99              | 26.62                                   | 26.62  |
| 4            | CBT         | Second Component     | 1.26              | 4.21                                    | 30.83  |
| 4            | CBT         | Ratio (First/Second) | 6.33              |   |  |
| 5            | CBT         | First Component      | 8.47              | 30.25                                   | 30.25  |
| 5            | CBT         | Second Component     | 1.31              | 4.66                                    | 34.91  |
| 5            | CBT         | Ratio (First/Second) | 6.49              |   |  |
| 6            | CBT         | First Component      | 9.26              | 28.95                                   | 28.95  |
| 6            | CBT         | Second Component     | 1.32              | 4.14                                    | 33.09  |
| 6            | CBT         | Ratio (First/Second) | 7.00              |   |  |
| 7            | CBT         | First Component      | 9.35              | 29.22                                   | 29.22  |
| 7            | CBT         | Second Component     | 1.37              | 4.27                                    | 33.49  |
| 7            | CBT         | Ratio (First/Second) | 6.84              |   |  |
| 8            | CBT         | First Component      | 8.64              | 26.99                                   | 26.99  |
| 8            | CBT         | Second Component     | 1.41              | 4.41                                    | 31.40  |
| 8            | CBT         | Ratio (First/Second) | 6.12              |   |  |

**Table 9.9 Principal Component Analysis for Mathematics**

| Grade | Mode | Components           | Eigenvalue | Percentage of Variance Explained | Cumulative Percentage of Variance Explained |
|-------|------|----------------------|------------|----------------------------------|---|
| 3     | CBT  | First Component      | 12.04      | 28.66                            | 28.66                                       |
| 3     | CBT  | Second Component     | 1.68       | 3.99                             | 32.65                                       |
| 3     | CBT  | Ratio (First/Second) | 7.18       |                                  |   |
| 3     | PBT  | First Component      | 12.05      | 28.68                            | 28.68                                       |
| 3     | PBT  | Second Component     | 1.65       | 3.93                             | 32.61                                       |
| 3     | PBT  | Ratio (First/Second) | 7.29       |                                  |   |
| 4     | CBT  | First Component      | 13.63      | 31.70                            | 31.70                                       |
| 4     | CBT  | Second Component     | 1.47       | 3.41                             | 35.11                                       |
| 4     | CBT  | Ratio (First/Second) | 9.29       |                                  |   |
| 5     | CBT  | First Component      | 12.57      | 29.23                            | 29.23                                       |
| 5     | CBT  | Second Component     | 1.64       | 3.81                             | 33.04                                       |
| 5     | CBT  | Ratio (First/Second) | 7.66       |                                  |   |
| 6     | CBT  | First Component      | 12.51      | 29.10                            | 29.10                                       |
| 6     | CBT  | Second Component     | 1.54       | 3.58                             | 32.68                                       |
| 6     | CBT  | Ratio (First/Second) | 8.12       |                                  |   |
| 7     | CBT  | First Component      | 13.32      | 30.98                            | 30.98                                       |
| 7     | CBT  | Second Component     | 1.57       | 3.65                             | 34.63                                       |
| 7     | CBT  | Ratio (First/Second) | 8.49       |                                  |   |
| 8     | CBT  | First Component      | 10.67      | 26.01                            | 26.01                                       |
| 8     | CBT  | Second Component     | 1.31       | 3.19                             | 29.21                                       |
| 8     | CBT  | Ratio (First/Second) | 8.15       |                                  |   |

## 9.4 Analyses by Reporting Categories and Subcategories

Three sets of analyses were conducted at the reporting category and subcategory levels for ELA and mathematics in another attempt to assess the construct validity of the LEAP 2025 assessments. First, correlation coefficients that measure the relationship between the reporting category scores and subcategory scores in both subjects were computed. Second, the reliability of each reporting category and subcategory was computed. Finally, the SEM was computed for each reportable category and subcategory.

### 9.4.1 Correlations among Reporting Categories and Subcategories

This section reports the strength of the interrelationships among the categories or subcategories by computing the correlation between them. Tables 9.10–9.13 report the uncorrected Pearson product-moment (PPM) correlation coefficients, the PPM corrected for attenuation (CAPPMM), and the reliability coefficients described above. The PPM among the categories and subcategories is presented below the diagonal portion of the matrix, the CAPPMM is presented above the diagonal portion of the matrix, and the reliability coefficients used are shown in Tables 9.10–9.13.

The uncorrected PPM in Tables 9.10–9.13 should be interpreted in the context of the reliability coefficient. In general, lower PPM coefficients are expected between variables that are less reliable. In most cases, the PPM

coefficients show that performance on one category or subcategory is moderately to strongly related to performance on another category or subcategory within the same grade and content area. The value of the correlation coefficients will be affected by the limited number of items measuring each category or subcategory. Therefore, caution should be used when comparing the PPM coefficients that measure the relationships between categories or subcategories to those that measure the relationships between content areas. A more modest relationship (i.e., smaller correlation coefficients) is expected to be reported between the categories and subcategories as a consequence of the lower number of items measuring each of the reporting categories. The PPM between two category or subcategory scores may be artificially low because of measurement error.

Standard 1.21 states:

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 (29).

The attenuation of the PPM can be corrected statistically using Spearman's formula:

$$CAPP\text{M} = \frac{r_{xy}}{\sqrt{r_{xx}r_{yy}}}, \quad (9.5)$$

where  $r_{xy}$  is the PPM between two claims or GLE strands,  $r_{xx}$  is the reliability of one of those claims or GLE strands, and  $r_{yy}$  is the reliability of the other claim or GLE strand.

ELA shows moderate relationships between the reading and writing reporting categories across all grades, indicating that these two categories measure some different traits. Across all tables, the CAPPM indicates moderate or strong relationships between subcategories. The CAPPM for reading vocabulary, written expression, and knowledge and use of language are moderate. In some cases, the CAPPM is greater than 1.0. "Disattenuated values greater than 1.00 indicate that measurement error is not randomly distributed" (Schumacker, 1996). The moderate or strong relationships suggested by the CAPPM in Tables 9.10–9.13 are further evidence of the validity of the test construct. Since the overall content area is comprised of the category or subcategories subscores and the content area is expected to measure a single dimension, these subscores are expected to be moderately or highly related.

**Table 9.10 Uncorrected Correlation Coefficient (below Diagonal) and Corrected Correlation Coefficient (above Diagonal) among Reporting Category: English Language Arts**

| Uncorrected and Corrected Correlation Coefficients: English Language Arts Reporting Category |      |     |          |         |      |      |
|--|------|-----|----------|---------|------|------|
| Grade  | Mode | No. | Category | N Items | 1    | 2    |
| 3  | CBT  | 1   | Reading  | 20      | .    | 0.85 |
|  | CBT  | 2   | Writing  | 4       | 0.72 | .    |
|  | PBT  | 1   | Reading  | 20      | .    | 0.83 |
|  | PBT  | 2   | Writing  | 4       | 0.67 | .    |
| 4  | CBT  | 1   | Reading  | 26      | .    | 0.83 |
|  | CBT  | 2   | Writing  | 4       | 0.72 | .    |
| 5  | CBT  | 1   | Reading  | 24      | .    | 0.86 |
|  | CBT  | 2   | Writing  | 4       | 0.77 | .    |
| 6  | CBT  | 1   | Reading  | 28      | .    | 0.81 |
|  | CBT  | 2   | Writing  | 4       | 0.72 | .    |
| 7  | CBT  | 1   | Reading  | 28      | .    | 0.84 |
|  | CBT  | 2   | Writing  | 4       | 0.78 | .    |
| 8  | CBT  | 1   | Reading  | 28      | .    | 0.84 |
|  | CBT  | 2   | Writing  | 4       | 0.76 | .    |

**Table 9.11 Uncorrected Correlation Coefficient (below Diagonal) and Corrected Correlation Coefficient (above Diagonal) among Reporting Subcategories: English Language Arts**

| Uncorrected and Corrected Correlation Coefficients: English Language Arts Reporting Subcategory |      |     |                             |         |      |      |      |      |      |
|---|------|-----|-----------------------------|---------|------|------|------|------|------|
| Grade   | Mode | No. | Subcategory                 | N Items | 1    | 2    | 3    | 4    | 5    |
| 3   | CBT  | 1   | Reading Literary Text       | 7       | .    | 1.05 | 0.99 | 1.00 | 0.86 |
|   | CBT  | 2   | Reading Information Text    | 7       | 0.65 | .    | 0.98 | 0.98 | 0.82 |
|   | CBT  | 3   | Reading Vocabulary          | 6       | 0.66 | 0.61 | .    | 0.78 | 0.71 |
|   | CBT  | 4   | Written Expression          | 4       | 0.68 | 0.62 | 0.53 | .    | 1.06 |
|   | CBT  | 5   | Knowledge & Use of Language | 2       | 0.62 | 0.56 | 0.52 | 0.79 | .    |
|   | PBT  | 1   | Reading Literary Text       | 7       | .    | 1.01 | 0.99 | 1.07 | 0.92 |
|   | PBT  | 2   | Reading Information Text    | 7       | 0.61 | .    | 0.94 | 1.09 | 0.94 |
|   | PBT  | 3   | Reading Vocabulary          | 6       | 0.66 | 0.57 | .    | 0.81 | 0.76 |
|   | PBT  | 4   | Written Expression          | 4       | 0.62 | 0.58 | 0.47 | .    | 1.40 |
|   | PBT  | 5   | Knowledge & Use of Language | 2       | 0.58 | 0.54 | 0.48 | 0.78 | .    |
| 4   | CBT  | 1   | Reading Literary Text       | 11      | .    | 1.01 | 0.99 | 0.88 | 0.86 |
|   | CBT  | 2   | Reading Information Text    | 9       | 0.71 | .    | 1.03 | 0.99 | 0.96 |
|   | CBT  | 3   | Reading Vocabulary          | 6       | 0.67 | 0.71 | .    | 0.85 | 0.83 |
|   | CBT  | 4   | Written Expression          | 4       | 0.61 | 0.70 | 0.57 | .    | 1.29 |
|   | CBT  | 5   | Knowledge & Use of Language | 2       | 0.60 | 0.69 | 0.56 | 0.90 | .    |
| 5   | CBT  | 1   | Reading Literary Text       | 8       | .    | 0.98 | 0.97 | 0.97 | 0.92 |
|   | CBT  | 2   | Reading Information Text    | 10      | 0.72 | .    | 0.94 | 0.90 | 0.86 |
|   | CBT  | 3   | Reading Vocabulary          | 6       | 0.70 | 0.67 | .    | 0.83 | 0.80 |
|   | CBT  | 4   | Written Expression          | 4       | 0.74 | 0.68 | 0.62 | .    | 1.16 |
|   | CBT  | 5   | Knowledge & Use of Language | 2       | 0.71 | 0.66 | 0.60 | 0.93 | .    |
| 6   | CBT  | 1   | Reading Literary Text       | 10      | .    | 0.98 | 1.01 | 0.83 | 0.82 |
|   | CBT  | 2   | Reading Information Text    | 13      | 0.77 | .    | 1.00 | 0.93 | 0.91 |
|   | CBT  | 3   | Reading Vocabulary          | 5       | 0.66 | 0.67 | .    | 0.84 | 0.83 |
|   | CBT  | 4   | Written Expression          | 4       | 0.62 | 0.71 | 0.54 | .    | 1.26 |
|   | CBT  | 5   | Knowledge & Use of Language | 2       | 0.62 | 0.70 | 0.53 | 0.92 | .    |
| 7   | CBT  | 1   | Reading Literary Text       | 9       | .    | 1.03 | 0.98 | 0.90 | 0.87 |
|   | CBT  | 2   | Reading Information Text    | 12      | 0.77 | .    | 0.99 | 0.90 | 0.88 |
|   | CBT  | 3   | Reading Vocabulary          | 7       | 0.69 | 0.71 | .    | 0.77 | 0.76 |
|   | CBT  | 4   | Written Expression          | 4       | 0.73 | 0.74 | 0.59 | .    | 1.07 |
|   | CBT  | 5   | Knowledge & Use of Language | 2       | 0.71 | 0.73 | 0.59 | 0.95 | .    |
| 8   | CBT  | 1   | Reading Literary Text       | 7       | .    | 1.07 | 1.03 | 1.02 | 1.01 |
|   | CBT  | 2   | Reading Information Text    | 12      | 0.71 | .    | 1.01 | 0.90 | 0.91 |
|   | CBT  | 3   | Reading Vocabulary          | 9       | 0.68 | 0.74 | .    | 0.75 | 0.77 |
|   | CBT  | 4   | Written Expression          | 4       | 0.73 | 0.72 | 0.59 | .    | 1.11 |
|   | CBT  | 5   | Knowledge & Use of Language | 2       | 0.72 | 0.72 | 0.60 | 0.95 | .    |

**Table 9.12 Uncorrected Correlation Coefficient (below Diagonal) and Corrected Correlation Coefficient (above Diagonal) among Reporting Categories: Mathematics**

| Uncorrected and Corrected Correlation Coefficients: Mathematics Reporting Category |      |     |                             |         |      |      |      |      |
|--|------|-----|-----------------------------|---------|------|------|------|------|
| Grade  | Mode | No. | Category                    | N Items | 1    | 2    | 3    | 4    |
| 3  | CBT  | 1   | Major Content               | 26      | .    | 0.98 | 0.97 | 0.94 |
|  | CBT  | 2   | Additional & Supporting Con | 10      | 0.79 | .    | 0.97 | 0.98 |
|  | CBT  | 3   | Expressing Mathematical Rea | 3       | 0.74 | 0.67 | .    | 1.04 |
|  | CBT  | 4   | Modeling & Application      | 3       | 0.76 | 0.71 | 0.72 | .    |
|  | PBT  | 1   | Major Content               | 26      | .    | 0.99 | 0.99 | 0.97 |
|  | PBT  | 2   | Additional & Supporting Con | 10      | 0.79 | .    | 1.00 | 1.01 |
|  | PBT  | 3   | Expressing Mathematical Rea | 3       | 0.74 | 0.67 | .    | 1.04 |
|  | PBT  | 4   | Modeling & Application      | 3       | 0.79 | 0.74 | 0.71 | .    |
| 4  | CBT  | 1   | Major Content               | 29      | .    | 0.96 | 1.01 | 0.92 |
|  | CBT  | 2   | Additional & Supporting Con | 8       | 0.79 | .    | 1.00 | 0.94 |
|  | CBT  | 3   | Expressing Mathematical Rea | 3       | 0.79 | 0.70 | .    | 1.04 |
|  | CBT  | 4   | Modeling & Application      | 3       | 0.73 | 0.66 | 0.71 | .    |
| 5  | CBT  | 1   | Major Content               | 28      | .    | 0.98 | 0.98 | 0.93 |
|  | CBT  | 2   | Additional & Supporting Con | 9       | 0.82 | .    | 0.97 | 0.94 |
|  | CBT  | 3   | Expressing Mathematical Rea | 3       | 0.77 | 0.70 | .    | 1.02 |
|  | CBT  | 4   | Modeling & Application      | 3       | 0.74 | 0.69 | 0.71 | .    |
| 6  | CBT  | 1   | Major Content               | 26      | .    | 0.96 | 0.99 | 0.93 |
|  | CBT  | 2   | Additional & Supporting Con | 10      | 0.79 | .    | 0.96 | 0.91 |
|  | CBT  | 3   | Expressing Mathematical Rea | 4       | 0.81 | 0.71 | .    | 1.03 |
|  | CBT  | 4   | Modeling & Application      | 3       | 0.70 | 0.62 | 0.70 | .    |
| 7  | CBT  | 1   | Major Content               | 28      | .    | 0.99 | 0.97 | 1.01 |
|  | CBT  | 2   | Additional & Supporting Con | 8       | 0.80 | .    | 0.99 | 1.06 |
|  | CBT  | 3   | Expressing Mathematical Rea | 4       | 0.83 | 0.75 | .    | 1.02 |
|  | CBT  | 4   | Modeling & Application      | 3       | 0.77 | 0.71 | 0.73 | .    |
| 8  | CBT  | 1   | Major Content               | 26      | .    | 1.00 | 1.01 | 0.96 |
|  | CBT  | 2   | Additional & Supporting Con | 8       | 0.78 | .    | 1.00 | 0.97 |
|  | CBT  | 3   | Expressing Mathematical Rea | 4       | 0.73 | 0.65 | .    | 1.05 |
|  | CBT  | 4   | Modeling & Application      | 3       | 0.69 | 0.63 | 0.62 | .    |

**Table 9.13 Uncorrected Correlation Coefficient (below Diagonal) and Corrected Correlation Coefficient (above Diagonal) among Reporting Subcategories: Mathematics**

| Uncorrected and Corrected Correlation Coefficients: Mathematics Reporting Subcategory |      |     |             |         |      |      |      |      |
|---|------|-----|-------------|---------|------|------|------|------|
| Grade   | Mode | No. | Subcategory | N Items | 1    | 2    | 3    | 4    |
| 3   | CBT  | 1   | A1          | 9       | .    | 0.91 | 0.89 | 1.00 |
|   | CBT  | 2   | A2          | 2       | 0.59 | .    | 0.95 | 1.02 |
|   | CBT  | 3   | A3          | 7       | 0.64 | 0.54 | .    | 0.93 |
|   | CBT  | 4   | A4          | 8       | 0.74 | 0.60 | 0.61 | .    |
|   | PBT  | 1   | A1          | 9       | .    | 0.92 | 0.91 | 1.01 |
|   | PBT  | 2   | A2          | 2       | 0.58 | .    | 0.96 | 1.02 |
|   | PBT  | 3   | A3          | 7       | 0.66 | 0.55 | .    | 0.96 |
|   | PBT  | 4   | A4          | 8       | 0.75 | 0.60 | 0.65 | .    |
| 4   | CBT  | 1   | A1          | 9       | .    | 0.89 | 0.94 | .    |
|   | CBT  | 2   | A2          | 6       | 0.69 | .    | 0.84 | .    |
|   | CBT  | 3   | A3          | 7       | 0.72 | 0.60 | .    | .    |
| 5   | CBT  | 1   | A1          | 4       | .    | 0.94 | 0.96 | 0.95 |
|   | CBT  | 2   | A2          | 10      | 0.62 | .    | 0.96 | 0.93 |
|   | CBT  | 3   | A3          | 5       | 0.54 | 0.63 | .    | 0.89 |
|   | CBT  | 4   | A4          | 8       | 0.61 | 0.69 | 0.57 | .    |
| 6   | CBT  | 1   | A1          | 11      | .    | 0.98 | 0.95 | .    |
|   | CBT  | 2   | A2          | 6       | 0.74 | .    | 0.98 | .    |
|   | CBT  | 3   | A3          | 9       | 0.73 | 0.73 | .    | .    |
| 7   | CBT  | 1   | A1          | 10      | .    | 0.98 | 1.02 | .    |
|   | CBT  | 2   | A2          | 12      | 0.76 | .    | 1.03 | .    |
|   | CBT  | 3   | A3          | 6       | 0.74 | 0.75 | .    | .    |
| 8   | CBT  | 1   | A1          | 5       | .    | 0.95 | 0.98 | 0.88 |
|   | CBT  | 2   | A2          | 8       | 0.50 | .    | 0.97 | 0.94 |
|   | CBT  | 3   | A3          | 5       | 0.50 | 0.59 | .    | 0.94 |
|   | CBT  | 4   | A4          | 8       | 0.52 | 0.65 | 0.63 | .    |

#### 9.4.2 Reliability of Reporting Categories and Subcategories

Raw score summary statistics (i.e., mean and standard deviation), Cronbach's (1951) coefficient alpha, and SEM were computed for each of the reporting categories or subcategories by grade, content area, and mode using the census data. These statistics are presented in Tables 9.14–9.17 for ELA and mathematics. Reliability indices, such as Cronbach's coefficient alpha (and resulting SEM), are a function of the number of items on a test, the average covariance between item-pairs, and the variance of a test's total score. In general, it is expected that the coefficient alpha would be lower for a reporting category or subcategory assessed by a small number of items than for one assessed by a larger number of items.



### 9.4.3 Standard Error of Measurement of Reporting Categories and Subcategories

This chapter also reports the SEM associated with each of the reporting categories and subcategories in Tables 9.14–9.17 for ELA and mathematics. In these tables the RI/RL writing component was included. These SEMs are reported in the raw score metric.

**Table 9.14 Mean, Standard Deviation, and Standard Error of Measurement (SEM) of English Language Arts Reporting Categories**

| Grade | Mode | Category | Number of Items | Number of Score Points | Mean Raw Score | Raw Score Std. Dev. | SEM  | Cronbach's Alpha |
|-------|------|----------|-----------------|------------------------|----------------|---------------------|------|------------------|
| 3     | CBT  | Reading  | 22              | 46                     | 16.53          | 8.86                | 3.61 | 0.83             |
|       | CBT  | Writing  | 4               | 24                     | 4.68           | 4.69                | 1.69 | 0.87             |
|       | PBT  | Reading  | 22              | 46                     | 19.08          | 8.80                | 3.66 | 0.83             |
|       | PBT  | Writing  | 4               | 24                     | 4.76           | 4.40                | 2.01 | 0.79             |
| 4     | CBT  | Reading  | 27              | 56                     | 23.46          | 11.22               | 4.07 | 0.87             |
|       | CBT  | Writing  | 4               | 27                     | 7.01           | 5.75                | 2.03 | 0.88             |
| 5     | CBT  | Reading  | 26              | 56                     | 24.41          | 11.51               | 4.05 | 0.88             |
|       | CBT  | Writing  | 4               | 30                     | 9.03           | 6.38                | 1.82 | 0.92             |
| 6     | CBT  | Reading  | 29              | 60                     | 26.29          | 12.57               | 4.07 | 0.90             |
|       | CBT  | Writing  | 4               | 30                     | 7.90           | 6.59                | 2.15 | 0.89             |
| 7     | CBT  | Reading  | 30              | 64                     | 30.34          | 13.17               | 4.41 | 0.89             |
|       | CBT  | Writing  | 4               | 30                     | 9.74           | 7.36                | 1.63 | 0.95             |
| 8     | CBT  | Reading  | 30              | 64                     | 28.53          | 12.64               | 4.51 | 0.87             |
|       | CBT  | Writing  | 4               | 30                     | 10.56          | 7.04                | 1.71 | 0.94             |

**Table 9.15 Mean, Standard Deviation, and Standard Error of Measurement (SEM) of English Language Arts Reporting Subcategories**

| Mean, Standard Deviation, and SEM: English Language Arts |      |                             |                 |                      |                |                     |      |                  |
|--|------|-----------------------------|-----------------|----------------------|----------------|---------------------|------|------------------|
| Grade  | Mode | Subcategory                 | Number of Items | Number of Score Pts. | Mean Raw Score | Raw Score Std. Dev. | SEM  | Cronbach's Alpha |
| 3  | CBT  | Reading Literary Text       | 8               | 17                   | 5.78           | 3.77                | 2.20 | 0.66             |
|  | CBT  | Reading Information Text    | 8               | 17                   | 4.97           | 3.14                | 2.04 | 0.58             |
|  | CBT  | Reading Vocabulary          | 6               | 12                   | 5.78           | 3.24                | 1.87 | 0.67             |
|  | CBT  | Written Expression          | 2               | 18                   | 3.34           | 3.52                | 1.92 | 0.70             |
|  | CBT  | Knowledge & Use of Language | 2               | 6                    | 1.34           | 1.38                | 0.61 | 0.80             |
|  | PBT  | Reading Literary Text       | 8               | 17                   | 7.00           | 3.68                | 2.16 | 0.65             |
|  | PBT  | Reading Information Text    | 8               | 17                   | 5.22           | 3.26                | 2.19 | 0.55             |
|  | PBT  | Reading Vocabulary          | 6               | 12                   | 6.86           | 3.27                | 1.86 | 0.68             |
|  | PBT  | Written Expression          | 2               | 18                   | 3.37           | 3.38                | 2.37 | 0.51             |
|  | PBT  | Knowledge & Use of Language | 2               | 6                    | 1.39           | 1.23                | 0.77 | 0.60             |
| 4  | CBT  | Reading Literary Text       | 11              | 22                   | 9.18           | 4.57                | 2.53 | 0.69             |
|  | CBT  | Reading Information Text    | 10              | 22                   | 8.64           | 4.82                | 2.55 | 0.72             |
|  | CBT  | Reading Vocabulary          | 6               | 12                   | 5.64           | 3.14                | 1.83 | 0.66             |
|  | CBT  | Written Expression          | 2               | 21                   | 5.13           | 4.44                | 2.48 | 0.69             |
|  | CBT  | Knowledge & Use of Language | 2               | 6                    | 1.88           | 1.43                | 0.77 | 0.71             |
| 5  | CBT  | Reading Literary Text       | 9               | 20                   | 8.71           | 4.57                | 2.35 | 0.74             |
|  | CBT  | Reading Information Text    | 11              | 24                   | 8.39           | 5.00                | 2.64 | 0.72             |
|  | CBT  | Reading Vocabulary          | 6               | 12                   | 7.31           | 3.28                | 1.79 | 0.70             |
|  | CBT  | Written Expression          | 2               | 24                   | 6.76           | 4.84                | 2.22 | 0.79             |
|  | CBT  | Knowledge & Use of Language | 2               | 6                    | 2.28           | 1.63                | 0.71 | 0.81             |
| 6  | CBT  | Reading Literary Text       | 10              | 20                   | 9.21           | 4.81                | 2.28 | 0.78             |
|  | CBT  | Reading Information Text    | 14              | 30                   | 12.38          | 6.53                | 2.90 | 0.80             |
|  | CBT  | Reading Vocabulary          | 5               | 10                   | 4.70           | 2.50                | 1.66 | 0.56             |
|  | CBT  | Written Expression          | 2               | 24                   | 5.86           | 5.03                | 2.63 | 0.73             |
|  | CBT  | Knowledge & Use of Language | 2               | 6                    | 2.03           | 1.66                | 0.85 | 0.74             |
| 7  | CBT  | Reading Literary Text       | 10              | 22                   | 9.04           | 4.86                | 2.47 | 0.74             |
|  | CBT  | Reading Information Text    | 13              | 28                   | 12.82          | 6.11                | 2.93 | 0.77             |
|  | CBT  | Reading Vocabulary          | 7               | 14                   | 8.48           | 3.53                | 2.03 | 0.67             |
|  | CBT  | Written Expression          | 2               | 24                   | 7.27           | 5.61                | 1.96 | 0.88             |
|  | CBT  | Knowledge & Use of Language | 2               | 6                    | 2.46           | 1.82                | 0.60 | 0.89             |
| 8  | CBT  | Reading Literary Text       | 8               | 18                   | 7.84           | 3.66                | 2.32 | 0.60             |
|  | CBT  | Reading Information Text    | 13              | 28                   | 12.15          | 5.94                | 3.00 | 0.74             |
|  | CBT  | Reading Vocabulary          | 9               | 18                   | 8.55           | 4.41                | 2.33 | 0.72             |
|  | CBT  | Written Expression          | 2               | 24                   | 7.91           | 5.38                | 2.05 | 0.86             |
|  | CBT  | Knowledge & Use of Language | 2               | 6                    | 2.65           | 1.73                | 0.66 | 0.86             |

**Table 9.16 Mean, Standard Deviation, and Standard Error of Measurement (SEM) of Mathematics Reporting Categories**

| Mean, Standard Deviation, and SEM: Mathematics |      |                                   |                 |                        |                |                     |      |                  |
|--|------|-----------------------------------|-----------------|------------------------|----------------|---------------------|------|------------------|
| Grade  | Mode | Category                          | Number of Items | Number of Score Points | Mean Raw Score | Raw Score Std. Dev. | SEM  | Cronbach's Alpha |
| 3  | CBT  | Major Content                     | 26              | 29                     | 16.67          | 6.67                | 2.19 | 0.89             |
|  | CBT  | Additional & Supporting Content   | 10              | 10                     | 5.37           | 2.55                | 1.34 | 0.72             |
|  | CBT  | Expressing Mathematical Reasoning | 3               | 10                     | 2.72           | 2.30                | 1.36 | 0.65             |
|  | CBT  | Modeling & Application            | 3               | 12                     | 2.95           | 2.92                | 1.52 | 0.73             |
|  | PBT  | Major Content                     | 26              | 29                     | 17.83          | 6.70                | 2.19 | 0.89             |
|  | PBT  | Additional & Supporting Content   | 10              | 10                     | 5.72           | 2.54                | 1.35 | 0.72             |
|  | PBT  | Expressing Mathematical Reasoning | 3               | 10                     | 3.50           | 2.37                | 1.45 | 0.63             |
|  | PBT  | Modeling & Application            | 3               | 12                     | 4.15           | 3.47                | 1.77 | 0.74             |
| 4  | CBT  | Major Content                     | 29              | 30                     | 16.43          | 7.87                | 2.23 | 0.92             |
|  | CBT  | Additional & Supporting Content   | 8               | 10                     | 5.05           | 2.62                | 1.36 | 0.73             |
|  | CBT  | Expressing Mathematical Reasoning | 3               | 10                     | 2.91           | 2.46                | 1.41 | 0.67             |
|  | CBT  | Modeling & Application            | 3               | 12                     | 2.47           | 2.73                | 1.53 | 0.69             |
| 5  | CBT  | Major Content                     | 28              | 30                     | 14.68          | 7.07                | 2.29 | 0.90             |
|  | CBT  | Additional & Supporting Content   | 9               | 10                     | 4.70           | 2.67                | 1.29 | 0.77             |
|  | CBT  | Expressing Mathematical Reasoning | 3               | 10                     | 2.70           | 2.38                | 1.33 | 0.69             |
|  | CBT  | Modeling & Application            | 3               | 12                     | 1.99           | 2.20                | 1.20 | 0.70             |
| 6  | CBT  | Major Content                     | 26              | 30                     | 14.64          | 7.39                | 2.34 | 0.90             |
|  | CBT  | Additional & Supporting Content   | 10              | 10                     | 4.36           | 2.55                | 1.30 | 0.74             |
|  | CBT  | Expressing Mathematical Reasoning | 4               | 14                     | 3.81           | 3.27                | 1.67 | 0.74             |
|  | CBT  | Modeling & Application            | 3               | 12                     | 1.91           | 2.35                | 1.44 | 0.62             |
| 7  | CBT  | Major Content                     | 28              | 30                     | 11.22          | 7.06                | 2.20 | 0.90             |
|  | CBT  | Additional & Supporting Content   | 8               | 10                     | 3.40           | 2.50                | 1.34 | 0.71             |
|  | CBT  | Expressing Mathematical Reasoning | 4               | 14                     | 4.06           | 3.62                | 1.60 | 0.80             |
|  | CBT  | Modeling & Application            | 3               | 12                     | 2.29           | 2.49                | 1.51 | 0.63             |
| 8  | CBT  | Major Content                     | 26              | 29                     | 9.62           | 6.08                | 2.20 | 0.87             |
|  | CBT  | Additional & Supporting Content   | 8               | 10                     | 3.43           | 2.37                | 1.27 | 0.71             |
|  | CBT  | Expressing Mathematical Reasoning | 4               | 14                     | 2.87           | 2.61                | 1.67 | 0.59             |
|  | CBT  | Modeling & Application            | 3               | 12                     | 2.19           | 2.23                | 1.42 | 0.60             |

**Table 9.17 Mean, Standard Deviation, and Standard Error of Measurement (SEM) of Mathematics Reporting Subcategories**

| Mean, Standard Deviation, and SEM: Mathematics |      |                           |                 |                        |                |                     |      |                  |
|--|------|---------------------------|-----------------|------------------------|----------------|---------------------|------|------------------|
| Grade  | Mode | Major Content Subcategory | Number of Items | Number of Score Points | Mean Raw Score | Raw Score Std. Dev. | SEM  | Cronbach's Alpha |
| 3  | CBT  | A1                        | 9               | 9                      | 5.80           | 2.64                | 1.15 | 0.81             |
|  | CBT  | A2                        | 2               | 3                      | 1.28           | 1.00                | 0.70 | 0.51             |
|  | CBT  | A3                        | 7               | 8                      | 4.33           | 1.88                | 1.14 | 0.63             |
|  | CBT  | A4                        | 8               | 9                      | 5.26           | 2.24                | 1.26 | 0.68             |
|  | PBT  | A1                        | 9               | 9                      | 6.12           | 2.50                | 1.14 | 0.79             |
|  | PBT  | A2                        | 2               | 3                      | 1.40           | 1.00                | 0.71 | 0.50             |
|  | PBT  | A3                        | 7               | 8                      | 4.74           | 1.95                | 1.15 | 0.65             |
|  | PBT  | A4                        | 8               | 9                      | 5.57           | 2.29                | 1.26 | 0.70             |
| 4  | CBT  | A1                        | 9               | 10                     | 5.55           | 3.04                | 1.27 | 0.82             |
|  | CBT  | A2                        | 6               | 6                      | 2.51           | 1.83                | 0.97 | 0.72             |
|  | CBT  | A3                        | 7               | 7                      | 4.12           | 1.96                | 1.06 | 0.71             |
| 5  | CBT  | A1                        | 4               | 4                      | 2.44           | 1.21                | 0.79 | 0.57             |
|  | CBT  | A2                        | 10              | 10                     | 4.37           | 2.75                | 1.32 | 0.77             |
|  | CBT  | A3                        | 5               | 6                      | 2.55           | 1.60                | 1.06 | 0.56             |
|  | CBT  | A4                        | 8               | 9                      | 4.94           | 2.35                | 1.23 | 0.73             |
| 6  | CBT  | A1                        | 11              | 12                     | 6.94           | 3.06                | 1.44 | 0.78             |
|  | CBT  | A2                        | 6               | 8                      | 3.59           | 2.39                | 1.24 | 0.73             |
|  | CBT  | A3                        | 9               | 10                     | 4.10           | 2.70                | 1.33 | 0.76             |
| 7  | CBT  | A1                        | 10              | 11                     | 4.46           | 2.90                | 1.37 | 0.78             |
|  | CBT  | A2                        | 12              | 12                     | 3.96           | 2.84                | 1.31 | 0.79             |
|  | CBT  | A3                        | 6               | 7                      | 2.79           | 1.96                | 1.12 | 0.67             |
| 8  | CBT  | A1                        | 5               | 5                      | 1.42           | 1.20                | 0.89 | 0.44             |
|  | CBT  | A2                        | 8               | 8                      | 3.11           | 1.98                | 1.22 | 0.62             |
|  | CBT  | A3                        | 5               | 6                      | 1.52           | 1.43                | 0.91 | 0.59             |
|  | CBT  | A4                        | 8               | 10                     | 3.57           | 2.68                | 1.27 | 0.78             |

## 9.5 Divergent (Discriminant) Validity

Measures of different constructs should not be highly correlated with each other. Divergent validity is a subtype of construct validity that 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 validity.

To assess the divergent validity of the LEAP 2025 assessments, correlations were computed between the ELA, mathematics, social studies, and science scale scores for students who took more than one LEAP 2025 content-area test in 2022. These correlations are based on the census data, and the results are shown in Table 9.18. The correlation coefficients ranged from 0.72 (between mathematics and social studies in grades 3 and 5) to 0.84 (between ELA and social studies in grades 6 and 8 and social studies and science in grade 8). The correlation coefficients suggest that individual student scores across subjects are moderately related, indicating that these tests measure a similar knowledge base or general underlying ability while still measuring some different traits as planned.

**Table 9.18 Inter-Correlation of English Language Arts and Mathematics Scale Scores**

| Grade | ELA/<br>Mathematics | ELA/<br>Social Studies | ELA/<br>Science | Mathematics/<br>Social Studies | Mathematics/<br>Science | Social Studies/<br>Science |
|-------|---------------------|------------------------|-----------------|--------------------------------|-------------------------|----------------------------|
| 3     | 0.75                | 0.77                   | 0.76            | 0.72                           | 0.75                    | 0.78                       |
| 4     | 0.76                | 0.78                   | 0.78            | 0.74                           | 0.76                    | 0.78                       |
| 5     | 0.75                | 0.79                   | 0.82            | 0.72                           | 0.78                    | 0.80                       |
| 6     | 0.78                | 0.84                   | 0.79            | 0.79                           | 0.79                    | 0.82                       |
| 7     | 0.78                | 0.80                   | 0.78            | 0.78                           | 0.80                    | 0.80                       |
| 8     | 0.74                | 0.84                   | 0.80            | 0.73                           | 0.75                    | 0.84                       |

## 9.6 Regression of LEAP 2025 from 2021 to 2022

The LEAP 2025 assessments were designed to support an integrated educational system where the scope and sequence of each grade's curriculum will support student readiness for and achievement in the next education level. Effective measurement is expected to result in assessments that produce scores that consistently measure each grade's content and produce data that provide strong evidence of preparedness for the content measured by assessments at the education level.

This study required the collection of data from adjacent grades for each content area. For this purpose, matched longitudinal LEAP 2025 test data from spring 2021 and spring 2022 were used. For example, grade 3 students were matched with grade 4 students, and only matched students were used to estimate correlation and perform linear regression from 2021 to 2022.

Table 9.19 summarizes the correlation and regression results for 2021 and 2022 LEAP 2025. For ELA, the correlation ranged from 0.78 to 0.85, and for mathematics, the correlation ranged from 0.82 to 0.86. Correlations for mathematics were slightly higher than those for ELA. Correlations for both content areas can be considered moderate, which can often be found in state assessments.  $R^2$  indicates how much of the 2021 performance can explain the 2022 performance. For example, 0.61 for ELA 2021 grade 3 and 2022 grade 4 means that 2021's grade 3 performance can explain (predict) about 61% of 2022's grade 4 performance. This  $R^2$  value is generally the power of 2 for the matching correlation. The  $R^2$  values for ELA range from 0.61 to 0.72, and those for mathematics range from 0.68 to 0.74. These also show the moderate relationships between adjacent grades for both ELA and mathematics.

**Table 9.19 Correlation and Regression Summary for 2021 and 2022 LEAP 2025**

| Content     | 2021 Grade | 2022 Grade | N       | Correlation | R <sup>2</sup> |
|-------------|------------|------------|---------|-------------|----------------|
| ELA         | 3          | 4          | ≥45,390 | 0.78        | 0.61           |
|             | 4          | 5          | ≥45,590 | 0.81        | 0.65           |
|             | 5          | 6          | ≥45,460 | 0.82        | 0.67           |
|             | 6          | 7          | ≥42,170 | 0.83        | 0.69           |
|             | 7          | 8          | ≥46,930 | 0.85        | 0.72           |
| Mathematics | 3          | 4          | ≥45,320 | 0.82        | 0.68           |
|             | 4          | 5          | ≥45,440 | 0.83        | 0.69           |
|             | 5          | 3          | ≥45,300 | 0.83        | 0.69           |
|             | 6          | 7          | ≥46,550 | 0.86        | 0.74           |
|             | 7          | 8          | ≥41,200 | 0.81        | 0.65           |

Figures 9.3 and 9.4 show regression line and scatter plots for ELA and mathematics. The linear lines in the plots are linear regression lines from 2021 to 2022. In general, the length of band given the linear regression line shows the strength of correlation. If the band is narrow, the correlation is high, and if the band is large, the correlation is low. Every plot shows some moderate linear relationships between 2021 and 2022 adjacent grades for both ELA and mathematics.

Figure 9.3 Regression Line and Scatter Plots:

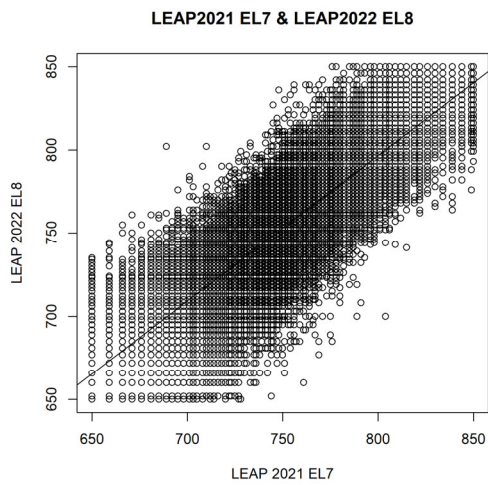
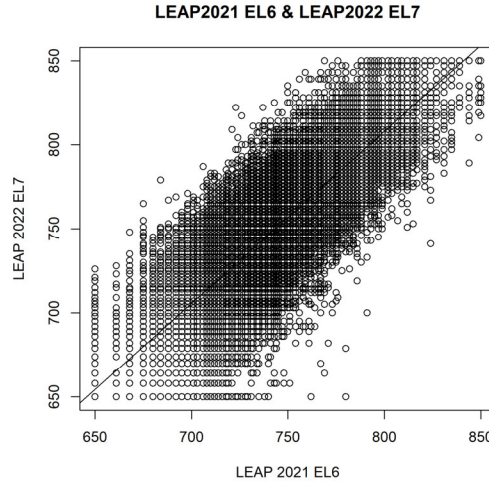
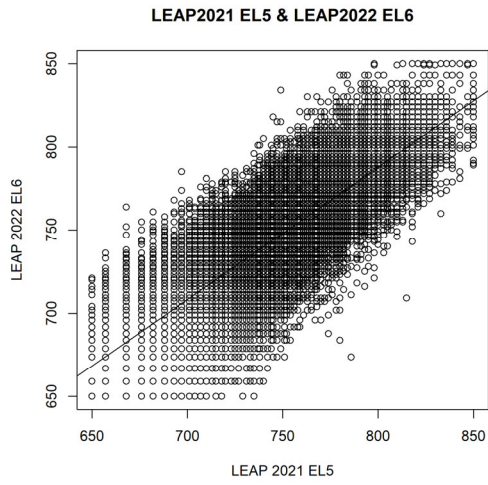
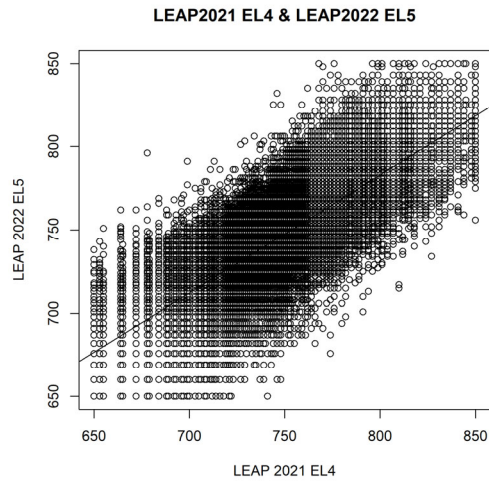
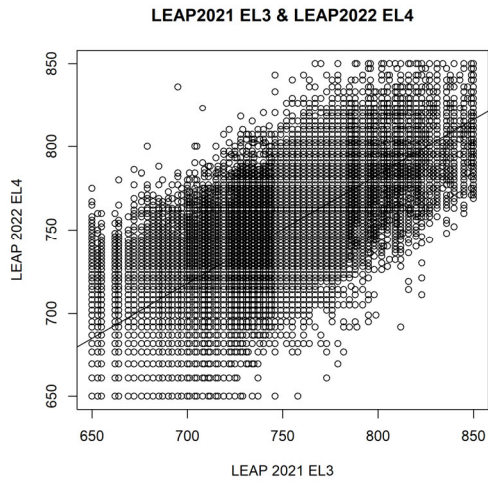
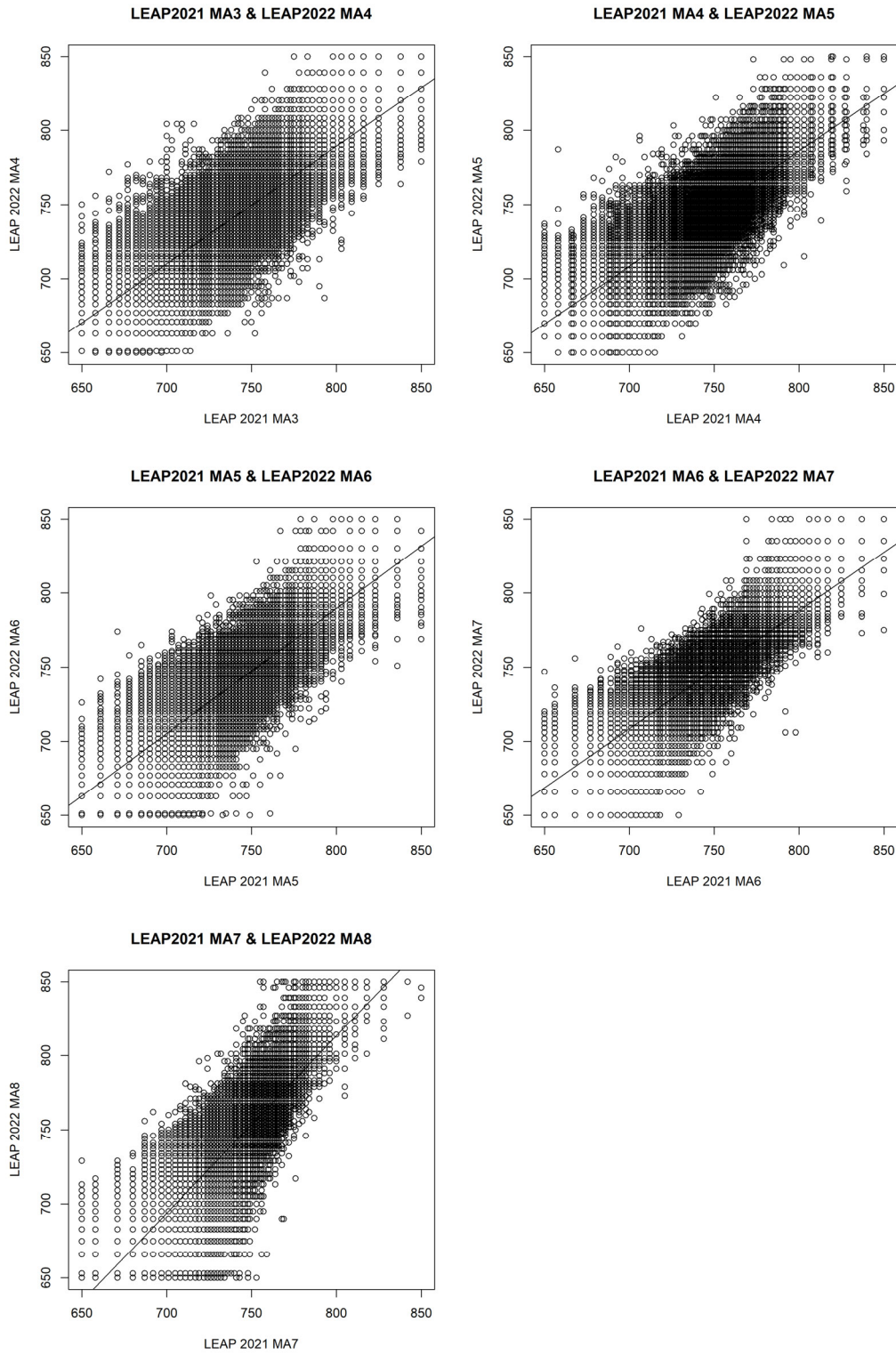


Figure 9.4 Regression Line and Scatter Plots: Mathematics





## 9.7 Summary

In summary, the overall purpose of establishing construct validity is to ensure that the interpretation of test scores is supported. Evidence of validity is necessary to justify the use of the LEAP 2025 test scores. This evidence addresses multiple best practices of the testing industry but particularly relates to the following standards.

**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 (26).

**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 (29).

**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).

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

**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 (46).

**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).

**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).

## Chapter 10: Fairness

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As noted in the *Standards for Educational and Psychological Testing* (American Educational Research Association [AERA], American Psychological Association [APA], & National Council on Measurement in Education [NCME], 2014), there are varying definitions of fairness. This chapter examines fairness as it relates to minimizing bias on a test. This chapter also discusses test performance among varying subgroups assessed by LEAP 2025 assessments. It should be noted that having differences in test performance among subgroups does not mean that a test is unfair—it simply means that groups perform differently on a 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 demonstrates for the LEAP 2025 assessments adhere to AERA, APA, & NCME Standards 3.1–3.6. These standards are from Chapter 3 of the *Standards*, which is titled “Fairness in Testing.” Each of these standards is presented in this chapter.

Standard 3.6 states:

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).

Test scores of examinee subgroups that differ in meaning are an ongoing concern in any large-scale testing program. To lessen the possibility of differences in test score meaning, DRC follows several steps in the item development and item selection processes, as is explained in Section 10.1 of this chapter. In addition, the LDOE assessment research and development experts, and Louisiana educators, conduct content and bias reviews on items during the selection process, as explained in Chapter 3. These practices adhere to Standard 3.3, which states, “Those responsible for test development should include relevant subgroups in validity, reliability/precision, and other preliminary studies used when constructing the test” (64).

The PARCC consortium, as well as DRC, conducted differential item functioning (DIF) studies of their items prior to operational administrations. Items are typically evaluated for possible DIF in the field test phase of the test development process, and any items flagged for DIF are further examined to determine possible bias. During the ELA and mathematics test development process, DRC content experts tried to avoid including operational items flagged for DIF. Section 10.2 of this chapter explains the steps taken to evaluate LEAP 2025 items using DIF to adhere to Standard 3.3.

In addition, the standardized test administration practices and the extensive training process for test score interpretation for LEAP 2025 comply with Standards 3.4 and 3.5, which state:

**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).

Section 10.1 of this chapter is also 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).

This chapter explains the steps taken by DRC to minimize words, phrases, and content that may be regarded as offensive by members of particular demographic subgroups. Section 3.2 of Chapter 3 discusses the content and bias review conducted for LEAP 2025. This review is also critical in fulfilling Standards 3.1 and 3.2. The PARCC operational items used in the LEAP 2025 forms were critical to the forms construction process. Refer to the PARCC website for the bias and sensitivity guidelines used and the processes and procedures followed by [PARCC](#) pertaining to these items.

## 10.1 Minimizing Bias through Careful Test Development

The construction 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 validity during the item development and item selection processes. Bias can occur only if the test is measuring different things for different groups. The possibility of bias is reduced by eliminating irrelevant skills or knowledge from the items.

Second, item writers and test developers followed PARCC Fairness and Sensitivity Guidelines for reducing or eliminating bias. DRC test development staff reviewed all items and other testing materials with these guidelines in mind. Internal editorial reviews were conducted by at least three different people: a content editor who directly supervised the item writers, a style editor, and a content supervisor. The final test was again reviewed by people in these same roles and was also subjected to an independent review by the LDOE assessment research and development specialists.

Third, careful attention was given to item statistics throughout the test development process. As part of the test assembly process, attempts were 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 testing an ability that is irrelevant to the construct being measured. DIF statistics were also examined during test construction. Items that had exhibited significant DIF against one or more subgroups were removed from further consideration unless it was essential to include them to meet content specifications.

## 10.2 Evaluating Bias through Differential Item Functioning (DIF) 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 a particular focus group perform better or worse than expected on each item as compared to the reference group. The DIF procedures used, and the results of these analyses, are detailed in this section. It should be noted, however, that all items included in LEAP 2025 were thoroughly reviewed for content and bias by the LDOE and DRC content experts to ensure the items do not test knowledge or ability 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, languages, 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 expected of 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).

To lessen this bias, 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. Unfortunately, in some cases these elements may continue to play a substantial role in some cases. 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 level. Two DIF statistics that are commonly used for this purpose are the Mantel-Haenszel (MH) statistic (1959) and the standardized mean difference (SMD) between the reference and focal groups, proposed by Dorans and 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  $k$ th 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 (ETS) first developed the MH-D DIF statistic. To compute delta, alpha (the odds ratio) is first computed as follows:

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

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 as follows:

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

For selected-response items, the MH ( $\chi^2_{MH}$ ) 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  $\alpha$  is assumed to be constant across the  $K$  matched levels. The  $\chi^2_{MH}$ , then, estimates a pooled common-odds ratio. Taking the natural logarithm of the common-odds ratio and its confidence limits and multiplying these with the constant  $-2.35$  may then allow the resulting values to be placed on the MH delta metric ( $\Delta_{MH}$ ) 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  $|\text{MH D-DIF}| \geq 1.5$

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 effect size index of DIF, which is relatively easy to interpret. 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, which for these analyses is the LEAP 2025 raw score. The SMD is computed as follows (Zwick et al., 1993):

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

where  $p_{Fk}$  = the proportion of the focal group members at the  $k$ th level of the matching variable,  $m_{Fk} = 1/N_{F1k}$ , and  $m_{Rk} = 1/N_{R1k}$ . Items are flagged using the same rules that are used in NAEP:

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

A positive DIF value indicates that the item favors the focal group, while a negative value indicates that the item disadvantages the focal group.

DIF analyses were conducted for groups defined by demographic characteristics. Data from test takers who were administered the Spanish language and Braille versions of the test were not used in the analyses. Tables 10.1 and 10.2 show the DIF results for the following subgroups:

**Gender:** Focal group is females; reference group is males.

**Ethnicity:** Focal groups are Hispanic/Latino, American Indian or Alaska Native, Asian, Black or African American, and two or more races; reference group is white.

**Education Classification:** Focal group is students who are classified as special education; reference group is all others.

**EL Status:** Focal group is students who are classified as EL; reference group is all others.

**Economic Status:** Focal group is students who are classified as economically disadvantaged; 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 less than 200. In these cases, the statistical procedures do not have sufficient power to detect potential differences.

Tables 10.1 (ELA) and 10.2 (mathematics) summarize the number of DIF flags by content area, grade, and test form for each focal group that included at least 200 students. Results are not reported (NR) for groups with an insufficient number of students. The analyses were conducted by test form.

DIF statistics are produced and examined for all newly field-tested items and for all items being administered for the first time operationally in Louisiana. In the spring 2022 administration, items were field tested in all grades for ELA and mathematics. The PBT form for ELA students in grade 3 (see Table 10.1) can be considered as an example. In this form, twenty-two items were administered for the first time to Louisiana test takers. Of them, one items exhibited moderate negative DIF each for the Hispanic/Latino group, the Black or African American group, and for the EL group.

Table 10.1 2022 LEAP 2025 DIF Statistics: Number of Flagged Items, English Language Arts

| DIF Statistics: English Language Arts |      |                 |                          |                                  | Count of Items at DIF Magnitude |    |       |    |
|---------------------------------------|------|-----------------|--------------------------|----------------------------------|---------------------------------|----|-------|----|
|                                       |      |                 |                          |                                  | Moderate                        |    | Large |    |
| Grade                                 | Mode | Number of Items | Category                 | Group                            | B-                              | B+ | C-    | C+ |
| 3                                     | CBT  | 22              | Gender                   | Female                           | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Ethnicity                | Hispanic/Latino                  | 1                               | 0  | 0     | 0  |
|                                       |      |                 | Ethnicity                | American Indian or Alaska Native | NR                              | NR | NR    | NR |
|                                       |      |                 | Ethnicity                | Asian                            | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Ethnicity                | Black or African American        | 1                               | 0  | 0     | 0  |
|                                       |      |                 | Ethnicity                | Two or More Races                | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Education Classification | Special                          | 0                               | 0  | 0     | 0  |
|                                       |      |                 | EL Status                | EL                               | 1                               | 0  | 0     | 0  |
|                                       |      |                 | Economic Status          | Economically Disadvantaged       | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Section 504 Status       | Section 504                      | 0                               | 0  | 0     | 0  |
| 3                                     | PBT  | 22              | Gender                   | Female                           | 0                               | 1  | 0     | 0  |
|                                       |      |                 | Ethnicity                | Hispanic/Latino                  | 1                               | 0  | 0     | 0  |
|                                       |      |                 | Ethnicity                | American Indian or Alaska Native | NR                              | NR | NR    | NR |
|                                       |      |                 | Ethnicity                | Asian                            | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Ethnicity                | Black or African American        | 1                               | 0  | 0     | 0  |
|                                       |      |                 | Ethnicity                | Two or More Races                | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Education Classification | Special                          | 0                               | 0  | 0     | 0  |
|                                       |      |                 | EL Status                | EL                               | 2                               | 0  | 0     | 0  |
|                                       |      |                 | Economic Status          | Economically Disadvantaged       | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Section 504 Status       | Section 504                      | 0                               | 0  | 0     | 0  |
| 4                                     | CBT  | 23              | Gender                   | Female                           | 0                               | 1  | 0     | 0  |
|                                       |      |                 | Ethnicity                | Hispanic/Latino                  | 1                               | 0  | 0     | 0  |
|                                       |      |                 | Ethnicity                | American Indian or Alaska Native | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Ethnicity                | Asian                            | 1                               | 0  | 0     | 0  |
|                                       |      |                 | Ethnicity                | Black or African American        | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Ethnicity                | Two or More Races                | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Education Classification | Special                          | 0                               | 0  | 0     | 0  |
|                                       |      |                 | EL Status                | EL                               | 2                               | 0  | 1     | 0  |
|                                       |      |                 | Economic Status          | Economically Disadvantaged       | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Section 504 Status       | Section 504                      | 0                               | 0  | 0     | 0  |

| DIF Statistics: English Language Arts |      |                 |                          |                                  | Count of Items at DIF Magnitude |    |       |    |
|---------------------------------------|------|-----------------|--------------------------|----------------------------------|---------------------------------|----|-------|----|
|                                       |      |                 |                          |                                  | Moderate                        |    | Large |    |
| Grade                                 | Mode | Number of Items | Category                 | Group                            | B-                              | B+ | C-    | C+ |
| 5                                     | CBT  | 23              | Gender                   | Female                           | 0                               | 2  | 0     | 0  |
|                                       |      |                 | Ethnicity                | Hispanic/Latino                  | 1                               | 0  | 0     | 0  |
|                                       |      |                 | Ethnicity                | American Indian or Alaska Native | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Ethnicity                | Asian                            | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Ethnicity                | Black or African American        | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Ethnicity                | Two or More Races                | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Education Classification | Special                          | 1                               | 0  | 0     | 0  |
|                                       |      |                 | EL Status                | EL                               | 1                               | 0  | 1     | 0  |
|                                       |      |                 | Economic Status          | Economically Disadvantaged       | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Section 504 Status       | Section 504                      | 0                               | 0  | 0     | 0  |
| 6                                     | CBT  | 26              | Gender                   | Female                           | 1                               | 2  | 1     | 0  |
|                                       |      |                 | Ethnicity                | Hispanic/Latino                  | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Ethnicity                | American Indian or Alaska Native | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Ethnicity                | Asian                            | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Ethnicity                | Black or African American        | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Ethnicity                | Two or More Races                | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Education Classification | Special                          | 0                               | 0  | 0     | 0  |
|                                       |      |                 | EL Status                | EL                               | 2                               | 0  | 0     | 0  |
|                                       |      |                 | Economic Status          | Economically Disadvantaged       | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Section 504 Status       | Section 504                      | 0                               | 0  | 0     | 0  |
| 7                                     | CBT  | 28              | Gender                   | Female                           | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Ethnicity                | Hispanic/Latino                  | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Ethnicity                | American Indian or Alaska Native | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Ethnicity                | Asian                            | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Ethnicity                | Black or African American        | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Ethnicity                | Two or More Races                | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Education Classification | Special                          | 0                               | 0  | 0     | 0  |
|                                       |      |                 | EL Status                | EL                               | 2                               | 0  | 0     | 0  |
|                                       |      |                 | Economic Status          | Economically Disadvantaged       | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Section 504 Status       | Section 504                      | 0                               | 0  | 0     | 0  |



| DIF Statistics: English Language Arts |      |                 |                          |                                  | Count of Items at DIF Magnitude |    |       |    |
|---------------------------------------|------|-----------------|--------------------------|----------------------------------|---------------------------------|----|-------|----|
|                                       |      |                 |                          |                                  | Moderate                        |    | Large |    |
| Grade                                 | Mode | Number of Items | Category                 | Group                            | B-                              | B+ | C-    | C+ |
| 8                                     | CBT  | 29              | Gender                   | Female                           | 0                               | 1  | 0     | 0  |
|                                       |      |                 | Ethnicity                | Hispanic/Latino                  | 1                               | 0  | 0     | 0  |
|                                       |      |                 | Ethnicity                | American Indian or Alaska Native | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Ethnicity                | Asian                            | 0                               | 1  | 0     | 0  |
|                                       |      |                 | Ethnicity                | Black or African American        | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Ethnicity                | Two or More Races                | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Education Classification | Special                          | 0                               | 0  | 0     | 0  |
|                                       |      |                 | EL Status                | EL                               | 2                               | 0  | 1     | 0  |
|                                       |      |                 | Economic Status          | Economically Disadvantaged       | 0                               | 0  | 0     | 0  |
|                                       |      |                 | Section 504 Status       | Section 504                      | 0                               | 0  | 0     | 0  |

Table 10.2 2022 LEAP 2025 DIF Statistics: Number of Flagged Items, Mathematics

| DIF Statistics: Mathematics |      |                 |                          |                                  | Count of Items at DIF Magnitude |    |       |    |
|-----------------------------|------|-----------------|--------------------------|----------------------------------|---------------------------------|----|-------|----|
|                             |      |                 |                          |                                  | Moderate                        |    | Large |    |
| Grade                       | Mode | Number of Items | Category                 | Group                            | B-                              | B+ | C-    | C+ |
| 3                           | CBT  | 14              | Gender                   | Female                           | 0                               | 0  | 0     | 0  |
|                             |      |                 | Ethnicity                | Hispanic/Latino                  | 0                               | 0  | 0     | 0  |
|                             |      |                 | Ethnicity                | American Indian or Alaska Native | NR                              | NR | NR    | NR |
|                             |      |                 | Ethnicity                | Asian                            | 0                               | 0  | 0     | 0  |
|                             |      |                 | Ethnicity                | Black or African American        | 0                               | 0  | 0     | 0  |
|                             |      |                 | Ethnicity                | Two or More Races                | 0                               | 0  | 0     | 0  |
|                             |      |                 | Education Classification | Special                          | 3                               | 2  | 1     | 0  |
|                             |      |                 | EL Status                | EL                               | 0                               | 0  | 0     | 0  |
|                             |      |                 | Economic Status          | Economically Disadvantaged       | 0                               | 0  | 0     | 0  |
|                             |      |                 | Section 504 Status       | Section 504                      | 0                               | 0  | 0     | 0  |
| 3                           | PBT  | 60              | Gender                   | Female                           | 5                               | 1  | 0     | 0  |
|                             |      |                 | Ethnicity                | Hispanic/Latino                  | 0                               | 0  | 0     | 0  |
|                             |      |                 | Ethnicity                | American Indian or Alaska Native | NR                              | NR | NR    | NR |
|                             |      |                 | Ethnicity                | Asian                            | 1                               | 1  | 0     | 0  |
|                             |      |                 | Ethnicity                | Black or African American        | 2                               | 2  | 0     | 0  |
|                             |      |                 | Ethnicity                | Two or More Races                | 0                               | 0  | 0     | 0  |
|                             |      |                 | Education Classification | Special                          | 4                               | 0  | 0     | 0  |
|                             |      |                 | EL Status                | EL                               | 0                               | 0  | 0     | 0  |
|                             |      |                 | Economic Status          | Economically Disadvantaged       | 0                               | 0  | 0     | 0  |
|                             |      |                 | Section 504 Status       | Section 504                      | 0                               | 0  | 0     | 0  |

| DIF Statistics: Mathematics |      |                 |                          |                                  | Count of Items at DIF Magnitude |    |       |    |
|-----------------------------|------|-----------------|--------------------------|----------------------------------|---------------------------------|----|-------|----|
|                             |      |                 |                          |                                  | Moderate                        |    | Large |    |
| Grade                       | Mode | Number of Items | Category                 | Group                            | B-                              | B+ | C-    | C+ |
| 4                           | CBT  | 52              | Gender                   | Female                           | 2                               | 0  | 0     | 0  |
|                             |      |                 | Ethnicity                | Hispanic/Latino                  | 0                               | 0  | 1     | 0  |
|                             |      |                 | Ethnicity                | American Indian or Alaska Native | 0                               | 0  | 0     | 1  |
|                             |      |                 | Ethnicity                | Asian                            | 0                               | 0  | 0     | 0  |
|                             |      |                 | Ethnicity                | Black or African American        | 0                               | 0  | 0     | 0  |
|                             |      |                 | Ethnicity                | Two or More Races                | 0                               | 0  | 0     | 0  |
|                             |      |                 | Education Classification | Special                          | 0                               | 0  | 1     | 0  |
|                             |      |                 | EL Status                | EL                               | 0                               | 0  | 0     | 0  |
|                             |      |                 | Economic Status          | Economically Disadvantaged       | 0                               | 0  | 0     | 0  |
|                             |      |                 | Section 504 Status       | Section 504                      | 0                               | 0  | 0     | 0  |
| 5                           | CBT  | 60              | Gender                   | Female                           | 2                               | 0  | 0     | 0  |
|                             |      |                 | Ethnicity                | Hispanic/Latino                  | 0                               | 0  | 0     | 0  |
|                             |      |                 | Ethnicity                | American Indian or Alaska Native | 1                               | 0  | 0     | 0  |
|                             |      |                 | Ethnicity                | Asian                            | 0                               | 0  | 0     | 0  |
|                             |      |                 | Ethnicity                | Black or African American        | 0                               | 0  | 1     | 0  |
|                             |      |                 | Ethnicity                | Two or More Races                | 0                               | 0  | 0     | 0  |
|                             |      |                 | Education Classification | Special                          | 0                               | 0  | 0     | 1  |
|                             |      |                 | EL Status                | EL                               | 0                               | 0  | 0     | 0  |
|                             |      |                 | Economic Status          | Economically Disadvantaged       | 1                               | 0  | 0     | 0  |
|                             |      |                 | Section 504 Status       | Section 504                      | 0                               | 0  | 0     | 0  |
| 6                           | CBT  | 75              | Gender                   | Female                           | 0                               | 0  | 0     | 0  |
|                             |      |                 | Ethnicity                | Hispanic/Latino                  | 1                               | 0  | 0     | 0  |
|                             |      |                 | Ethnicity                | American Indian or Alaska Native | 0                               | 0  | 0     | 0  |
|                             |      |                 | Ethnicity                | Asian                            | 0                               | 1  | 0     | 0  |
|                             |      |                 | Ethnicity                | Black or African American        | 2                               | 0  | 0     | 0  |
|                             |      |                 | Ethnicity                | Two or More Races                | 0                               | 0  | 0     | 0  |
|                             |      |                 | Education Classification | Special                          | 0                               | 1  | 0     | 0  |
|                             |      |                 | EL Status                | EL                               | 0                               | 0  | 0     | 0  |
|                             |      |                 | Economic Status          | Economically Disadvantaged       | 0                               | 0  | 0     | 0  |
|                             |      |                 | Section 504 Status       | Section 504                      | 0                               | 0  | 0     | 0  |

| DIF Statistics: Mathematics |      |                 |                          |                                  | Count of Items at DIF Magnitude |    |       |    |
|-----------------------------|------|-----------------|--------------------------|----------------------------------|---------------------------------|----|-------|----|
|                             |      |                 |                          |                                  | Moderate                        |    | Large |    |
| Grade                       | Mode | Number of Items | Category                 | Group                            | B-                              | B+ | C-    | C+ |
| 7                           | CBT  | 80              | Gender                   | Female                           | 1                               | 0  | 0     | 0  |
|                             |      |                 | Ethnicity                | Hispanic/Latino                  | 1                               | 0  | 0     | 0  |
|                             |      |                 | Ethnicity                | American Indian or Alaska Native | 0                               | 0  | 0     | 0  |
|                             |      |                 | Ethnicity                | Asian                            | 0                               | 0  | 0     | 0  |
|                             |      |                 | Ethnicity                | Black or African American        | 4                               | 0  | 0     | 0  |
|                             |      |                 | Ethnicity                | Two or More Races                | 0                               | 0  | 0     | 0  |
|                             |      |                 | Education Classification | Special                          | 0                               | 0  | 0     | 0  |
|                             |      |                 | EL Status                | EL                               | 0                               | 0  | 0     | 0  |
|                             |      |                 | Economic Status          | Economically Disadvantaged       | 0                               | 0  | 0     | 0  |
|                             |      |                 | Section 504 Status       | Section 504                      | 0                               | 0  | 0     | 0  |
| 8                           | CBT  | 102             | Gender                   | Female                           | 0                               | 0  | 0     | 0  |
|                             |      |                 | Ethnicity                | Hispanic/Latino                  | 0                               | 0  | 0     | 0  |
|                             |      |                 | Ethnicity                | American Indian or Alaska Native | 0                               | 0  | 0     | 0  |
|                             |      |                 | Ethnicity                | Asian                            | 0                               | 0  | 0     | 0  |
|                             |      |                 | Ethnicity                | Black or African American        | 1                               | 0  | 0     | 0  |
|                             |      |                 | Ethnicity                | Two or More Races                | 0                               | 0  | 0     | 0  |
|                             |      |                 | Education Classification | Special                          | 0                               | 0  | 0     | 1  |
|                             |      |                 | EL Status                | EL                               | 0                               | 0  | 0     | 0  |
|                             |      |                 | Economic Status          | Economically Disadvantaged       | 0                               | 0  | 0     | 0  |
|                             |      |                 | Section 504 Status       | Section 504                      | 0                               | 0  | 0     | 0  |

## 10.3 Spanish and English Language Form Comparability

### 10.3.1 Reliability of Spanish Language Forms

Table 10.3 reports the form reliability of the Spanish language forms. Cronbach's alpha values ranged from 0.74 (grade 8) to 0.91 for the grade 3 PBT form. Please note that the interpretation of Cronbach's alpha values needs to be conservative due to the small case counts, especially for grade 3 PBT.

**Table 10.3 Form Reliability for the Spanish Language Forms**

| Content     | Grade | Mode | Number of Items | Number of Score Points | SEM  | Cronbach's Alpha | N-Count |
|-------------|-------|------|-----------------|------------------------|------|------------------|---------|
| Mathematics | 3     | CBT  | 42              | 61                     | 2.89 | 0.85             | ≥50     |
| Mathematics | 3     | PBT  | 42              | 61                     | 3.50 | 0.91             | ≥30     |
| Mathematics | 4     | CBT  | 43              | 62                     | 2.73 | 0.85             | ≥100    |
| Mathematics | 5     | CBT  | 43              | 62                     | 2.61 | 0.61             | ≥60     |
| Mathematics | 6     | CBT  | 43              | 66                     | 2.65 | 0.80             | ≥120    |
| Mathematics | 7     | CBT  | 43              | 66                     | 2.49 | 0.82             | ≥130    |
| Mathematics | 8     | CBT  | 41              | 65                     | 2.53 | 0.74             | ≥130    |

### 10.3.2 DIF Statistics for Test Language

All items on one CBT and one PBT form of the mathematics test at each grade are transadapted from English into Spanish. Transadaptation takes into consideration linguistic and cultural differences and grade-level appropriate words. By accounting for these differences, the achievement of Spanish speakers can be measured in the same way as the achievement of English speakers. Please refer to Appendix C for more information about the transadaptation of Spanish mathematics forms. To help confirm that the test items can be measured similarly regardless of the language in which the items are published, a DIF set of analyses was performed in 2022. Two DIF analyses were performed using the 2022 LEAP 2025 mathematics operational items, regardless of student count in the reference or focal group. Smaller counts for the groups needed to be tolerated since the overall count for those being administered the Spanish form was low.

For the first analysis, student responses for the shared operational items between 2021 and 2022 LEAP 2025 mathematics were combined. This approach increased the number of students who took the Spanish versions of the items. The Mantel-Haenszel (MH) and the Standardized Mean Difference (SMD) DIF procedures were performed on these shared items and DIF flags applied. The second analysis focused on the items that were not common between the 2021 and 2022 administrations. The MH and the SMD DIF procedures were performed on all 2022 LEAP 2025 operational items, including items that were unique to the 2022 administration in addition to those in common with the 2021 administration. However, DIF flags were applied to only the items that were not shared between 2021 and 2022.

For both analyses, DIF results were carefully reviewed whenever sample sizes were smaller than the required minimum sample size and when an item showed large (C) DIF. All items were determined by the LDOE to be suitable for scoring. Table 10.4 summarizes how many items overall exhibited moderate or large DIF in mathematics.

**Table 10.4 2022 LEAP 2025 DIF Statistics: Number of Flagged Items, Mathematics**

| DIF Statistics: Mathematics |                 |               |         | Count of Items at DIF Magnitude |    |       |    |
|-----------------------------|-----------------|---------------|---------|---------------------------------|----|-------|----|
|                             |                 |               |         | Moderate                        |    | Large |    |
| Grade                       | Number of Items | Category      | Group   | B-                              | B+ | C-    | C+ |
| 3                           | 16              | Test Language | Spanish | 2                               | 0  | 2     | 0  |
| 4                           | 15              | Test Language | Spanish | 1                               | 0  | 1     | 0  |
| 5                           | 16              | Test Language | Spanish | 2                               | 0  | 0     | 0  |
| 6                           | 17              | Test Language | Spanish | 1                               | 1  | 0     | 0  |
| 7                           | 15              | Test Language | Spanish | 0                               | 0  | 2     | 0  |
| 8                           | 17              | Test Language | Spanish | 1                               | 0  | 0     | 0  |

### 10.3.3 Propensity Score Matching Study

The fairness of using the translated form was also evaluated by examining the performance of those who took either the Spanish form or the English form. A propensity score matching study (PSM) matches groups based on similar characteristics and then compares performance. The PSM study groups were selected using covariates (matching variables), such as students' spring 2022 LEAP 2025 ELA score and their bio-demographic information, such as gender, ethnicity, economic status, and English learner status. Equivalent groups were created with the difference being which form – Spanish language or English language – was administered. The mathematics Spanish test was administered to a smaller number of students than the mathematics English test; therefore, the group who took the Spanish test was designated as the focal group for the PSM study (Rosenbaum & Rubin, 1983), and the English language test takers were considered to be the reference group. 5 shows the number of equivalent Spanish test takers and English test students matched by the PSM method using the R package, MatchIt for PSM.

**Table 10.5 Number of Students Used for Propensity Score Matching**

| Grade | Spanish | English |          |
|-------|---------|---------|----------|
|       | Total   | Total   | Selected |
| 3     | ≥80     | ≥49,060 | ≥80      |
| 4     | ≥100    | ≥48,970 | ≥100     |
| 5     | ≥60     | ≥49,020 | ≥60      |
| 6     | ≥120    | ≥49,420 | ≥120     |
| 7     | ≥120    | ≥46,240 | ≥120     |
| 8     | ≥130    | ≥45,060 | ≥130     |

\*Total: Number of students who have information for all covariates

Scale scores of the Spanish language and English language administrations were estimated using the item parameters for score reporting, and their difference scores were calculated. Effect sizes (ES) of the difference scores were calculated as follows:

$$ES = (\text{Spanish Mean} - \text{English Mean}) / \sqrt{(\text{SPN VAR} + \text{ENG VAR}) / 2}, \text{ where } VAR = SD^2.$$

Table 10.6 through Table 11, summarizes, for the flagged items, the mean, standard deviation, effect size (ES), and flag for the ES for Algebra I items by Spanish and matching English tests. Two flag criteria, |0.2| and |0.5| were applied as small differences (B) and medium differences (C) flags. When |0.2| was applied, the count of items flagged ranged from eight in grade 6 to 13 in grade 5. Items with larger ES values greater than

[0.5] included one in grade 4 and three in grade 5. Please note that the results of this PSM should be carefully used due to the relatively small sample size.

**Table 10.6 Item Statistics and Effect Size: Grade 3**

| Item id | Mean    |         | Standard Deviation |         | ES    | Flag |
|---------|---------|---------|--------------------|---------|-------|------|
|         | Spanish | English | Spanish            | English |       |      |
| 896772  | 0.02381 | 0.16667 | 0.15337            | 0.37492 | 0.50  | B    |
| 914009  | 0.41667 | 0.58333 | 0.49597            | 0.49597 | 0.34  | B    |
| 896881  | 0.32143 | 0.17857 | 0.46983            | 0.38529 | -0.33 | B    |
| 896759  | 0.28571 | 0.19048 | 0.45447            | 0.39504 | -0.22 | B    |
| 981736  | 0.32143 | 0.55952 | 0.62403            | 0.96131 | 0.29  | B    |
| 896900  | 0.51190 | 0.64286 | 0.63043            | 0.61395 | 0.21  | B    |
| 981795  | 0.53571 | 0.42857 | 0.50172            | 0.49784 | -0.21 | B    |
| 981791  | 0.34524 | 0.47619 | 0.47830            | 0.50243 | 0.27  | B    |
| 1026140 | 0.63095 | 0.48810 | 0.48545            | 0.50286 | -0.29 | B    |

**Table 10.7 Item Statistics and Effect Size: Grade 4**

| Item id | Mean    |         | Standard Deviation |         | ES    | Flag |
|---------|---------|---------|--------------------|---------|-------|------|
|         | Spanish | English | Spanish            | English |       |      |
| 870319  | 0.12500 | 0.26923 | 0.33232            | 0.44571 | 0.37  | B    |
| 981874  | 0.56731 | 0.70192 | 0.65008            | 0.69506 | 0.20  | B    |
| 897446  | 0.17308 | 0.31731 | 0.38015            | 0.46768 | 0.34  | B    |
| 897465  | 0.10577 | 0.26923 | 0.30903            | 0.44571 | 0.43  | B    |
| 935180  | 0.18269 | 0.09615 | 0.38829            | 0.29623 | -0.25 | B    |
| 981870  | 0.38462 | 0.28846 | 0.48886            | 0.45524 | -0.20 | B    |
| 878671  | 0.54808 | 0.74038 | 0.93352            | 0.92427 | 0.21  | B    |
| 981848  | 0.27885 | 0.38462 | 0.49181            | 0.50833 | 0.21  | B    |
| 897290  | 0.44231 | 0.62500 | 0.49907            | 0.48647 | 0.37  | B    |
| 897470  | 0.17308 | 0.29808 | 0.38015            | 0.45963 | 0.30  | B    |
| 897463  | 0.16346 | 0.38462 | 0.37158            | 0.48886 | 0.51  | C    |
| 897444  | 0.47115 | 0.60577 | 0.57381            | 0.70254 | 0.21  | B    |
| 897289  | 0.14423 | 0.29808 | 0.35302            | 0.45963 | 0.38  | B    |
| 981831  | 0.06731 | 0.21154 | 0.28776            | 0.45524 | 0.38  | B    |
| 981890  | 0.33654 | 0.44231 | 0.47481            | 0.49907 | 0.22  | B    |
| 897300  | 0.04808 | 0.17308 | 0.21496            | 0.38015 | 0.40  | B    |

**Table 10.2 Item Statistics and Effect Size: Grade 5**

| Item id | Mean    |         | Standard Deviation |         | ES    | Flag |
|---------|---------|---------|--------------------|---------|-------|------|
|         | Spanish | English | Spanish            | English |       |      |
| 898173  | 0.01563 | 0.06250 | 0.12500            | 0.24398 | 0.24  | B    |
| 982488  | 0.21875 | 0.12500 | 0.41667            | 0.33333 | -0.25 | B    |
| 1026946 | 0.00000 | 0.15625 | 0.00000            | 0.36596 | 0.60  | C    |
| 868653  | 0.65625 | 0.90625 | 0.67185            | 0.65994 | 0.38  | B    |
| 898172  | 0.14063 | 0.39063 | 0.35038            | 0.49175 | 0.59  | C    |
| 982492  | 0.01563 | 0.06250 | 0.12500            | 0.24398 | 0.24  | B    |
| 898152  | 0.09375 | 0.17188 | 0.29378            | 0.38025 | 0.23  | B    |
| 898011  | 0.26563 | 0.37500 | 0.44516            | 0.48795 | 0.23  | B    |
| 903244  | 0.12500 | 0.21875 | 0.33333            | 0.41667 | 0.25  | B    |
| 982518  | 0.39063 | 0.53125 | 0.49175            | 0.50297 | 0.28  | B    |
| 982538  | 0.32813 | 0.59375 | 0.47324            | 0.49501 | 0.55  | C    |
| 914580  | 0.26563 | 0.37500 | 0.44516            | 0.48795 | 0.23  | B    |
| 914159  | 0.18750 | 0.10938 | 0.39340            | 0.31458 | -0.22 | B    |
| 904184  | 0.12500 | 0.23438 | 0.33333            | 0.42696 | 0.29  | B    |
| 1109475 | 0.31250 | 0.43750 | 0.46718            | 0.50000 | 0.26  | B    |
| 898158  | 0.34375 | 0.25000 | 0.47871            | 0.43644 | -0.20 | B    |

**Table 10.9 Item Statistics and Effect Size: Grade 6**

| Item id | Mean    |         | Standard Deviation |         | ES    | Flag |
|---------|---------|---------|--------------------|---------|-------|------|
|         | Spanish | English | Spanish            | English |       |      |
| 878305  | 0.30579 | 0.40496 | 0.46265            | 0.49293 | 0.21  | B    |
| 981973  | 0.27273 | 0.39669 | 0.44721            | 0.49125 | 0.26  | B    |
| 800191  | 0.28099 | 0.39669 | 0.45135            | 0.49125 | 0.25  | B    |
| 1027521 | 0.00000 | 0.03306 | 0.00000            | 0.17953 | 0.26  | B    |
| 981977  | 0.25620 | 0.16529 | 0.43835            | 0.37299 | -0.22 | B    |
| 903099  | 0.30579 | 0.17355 | 0.46265            | 0.38030 | -0.31 | B    |
| 900537  | 0.14050 | 0.22314 | 0.34895            | 0.41808 | 0.21  | B    |
| 901547  | 0.64463 | 0.42975 | 0.83526            | 0.75085 | -0.27 | B    |

**Table 10.10 Item Statistics and Effect Size: Grade 7**

| Item id | Mean    |         | Standard Deviation |         | ES    | Flag |
|---------|---------|---------|--------------------|---------|-------|------|
|         | Spanish | English | Spanish            | English |       |      |
| 914341  | 0.30469 | 0.41406 | 0.46208            | 0.49449 | 0.23  | B    |
| 898450  | 0.12500 | 0.04688 | 0.33202            | 0.21220 | -0.28 | B    |
| 902443  | 0.48438 | 0.32813 | 0.50172            | 0.47138 | -0.32 | B    |
| 899859  | 0.27344 | 0.13281 | 0.44747            | 0.34071 | -0.35 | B    |
| 899323  | 0.27344 | 0.14063 | 0.44747            | 0.34900 | -0.33 | B    |
| 899315  | 0.10156 | 0.04688 | 0.30326            | 0.21220 | -0.21 | B    |
| 915699  | 0.14844 | 0.07031 | 0.35693            | 0.25668 | -0.25 | B    |
| 900180  | 0.10938 | 0.02344 | 0.31334            | 0.15188 | -0.35 | B    |
| 870880  | 0.40625 | 0.23438 | 0.49306            | 0.42527 | -0.37 | B    |
| 914333  | 0.24219 | 0.13281 | 0.61152            | 0.42317 | -0.21 | B    |
| 982932  | 0.14063 | 0.04688 | 0.52847            | 0.32867 | -0.21 | B    |

**Table 10.11 Item Statistics and Effect Size: Grade 8**

| Item id | Mean    |         | Standard Deviation |         | ES    | Flag |
|---------|---------|---------|--------------------|---------|-------|------|
|         | Spanish | English | Spanish            | English |       |      |
| 897069  | 0.19847 | 0.31298 | 0.40038            | 0.46549 | 0.26  | B    |
| 898148  | 0.27481 | 0.14504 | 0.44813            | 0.35349 | -0.32 | B    |
| 878967  | 0.09160 | 0.03817 | 0.28957            | 0.19234 | -0.22 | B    |
| 897072  | 0.06870 | 0.00000 | 0.25392            | 0.00000 | -0.38 | B    |
| 901194  | 0.16031 | 0.04580 | 0.36830            | 0.20986 | -0.38 | B    |
| 984137  | 0.11450 | 0.04580 | 0.36461            | 0.20986 | -0.23 | B    |
| 983109  | 0.50382 | 0.28244 | 0.50190            | 0.45192 | -0.46 | B    |
| 914408  | 0.00763 | 0.05344 | 0.08737            | 0.22576 | 0.27  | B    |
| 904551  | 0.32061 | 0.19084 | 0.46850            | 0.39447 | -0.30 | B    |
| 899312  | 0.43511 | 0.26718 | 0.65749            | 0.55226 | -0.28 | B    |

## 10.4 Evaluating Bias through Impact Analysis

The impact of achievement testing on subgroups can be determined and reported in the form of average scores and also in terms of test score reliability. Tables 10.12–10.18 present the number of students, test form reliability statistics (i.e., coefficient alpha; see Chapter 9), scale score means and standard deviations, and effect size (i.e., Cohen's *d*) for the various subgroups of interest by form.



### 10.4.1 Reliability

Tables 10.12–10.18 show the test form reliability coefficients and SEM by student gender, ethnicity, education classification, EL status, economic status, and Section 504 status. Analyses were based on census data, after removing data from the test takers who were administered the Spanish language and Braille versions of the test forms. The reliability coefficients for English language arts forms ranged from 0.75 to 0.93. For mathematics the reliability coefficients ranged from 0.82 to 0.94. These analyses show that the test reliability is of acceptable magnitude for all the subgroups. Note that the reliability coefficients are NR for subgroups with fewer than 10 students.

**Table 10.12 Grade 3 Computer-Based Test Administration Reliability and SEM by Subgroup**

| Group                            | ELA     |                  |      | Mathematics |                  |      |
|----------------------------------|---------|------------------|------|-------------|------------------|------|
|                                  | N Count | Cronbach's Alpha | SEM  | N Count     | Cronbach's Alpha | SEM  |
| <b>All Students</b>              | ≥16,210 | 0.88             | 4.48 | ≥16,210     | 0.93             | 3.49 |
| <b>Gender</b>                    |         |                  |      |             |                  |      |
| Female                           | ≥8,240  | 0.88             | 4.41 | ≥8,240      | 0.93             | 3.47 |
| Male                             | ≥7,960  | 0.87             | 4.53 | ≥7,960      | 0.93             | 3.50 |
| <b>Ethnicity</b>                 |         |                  |      |             |                  |      |
| Hispanic/Latino                  | ≥2,310  | 0.87             | 4.36 | ≥2,310      | 0.93             | 3.44 |
| American Indian or Alaska Native | ≥130    | 0.88             | 4.52 | ≥130        | 0.93             | 3.58 |
| Asian                            | ≥280    | 0.90             | 4.82 | ≥280        | 0.92             | 3.58 |
| Black or African American        | ≥6,830  | 0.85             | 4.36 | ≥6,840      | 0.92             | 3.31 |
| Native Hawaiian or Other Pacific | ≥10     | 0.84             | 4.42 | ≥10         | 0.90             | 3.61 |
| White                            | ≥5,910  | 0.87             | 4.63 | ≥5,910      | 0.92             | 3.58 |
| Two or More Races                | ≥670    | 0.88             | 4.61 | ≥670        | 0.92             | 3.56 |
| <b>Education Classification</b>  |         |                  |      |             |                  |      |
| Regular                          | ≥14,310 | 0.87             | 4.52 | ≥14,300     | 0.93             | 3.51 |
| Special                          | ≥1,900  | 0.85             | 4.03 | ≥1,900      | 0.92             | 3.29 |
| <b>English Learner Status</b>    |         |                  |      |             |                  |      |
| Not English Learner              | ≥14,780 | 0.87             | 4.52 | ≥14,780     | 0.93             | 3.50 |
| English Learner                  | ≥1,430  | 0.79             | 4.15 | ≥1,430      | 0.92             | 3.25 |
| <b>Economic Status</b>           |         |                  |      |             |                  |      |
| Economically Disadvantaged       | ≥12,400 | 0.86             | 4.42 | ≥12,400     | 0.92             | 3.41 |
| Not Economically Disadvantaged   | ≥3,800  | 0.88             | 4.72 | ≥3,800      | 0.92             | 3.68 |
| <b>Section 504 Status</b>        |         |                  |      |             |                  |      |
| Not Section 504                  | ≥15,380 | 0.88             | 4.48 | ≥15,380     | 0.93             | 3.49 |
| Section 504                      | ≥820    | 0.84             | 4.29 | ≥820        | 0.92             | 3.33 |

Table 10.13 Grade 3 Paper-Based Test Administration Reliability and SEM by Subgroup

| Group                            | ELA     |                  |      | Mathematics |                  |      |
|----------------------------------|---------|------------------|------|-------------|------------------|------|
|                                  | N Count | Cronbach's Alpha | SEM  | N Count     | Cronbach's Alpha | SEM  |
| <b>All Students</b>              | ≥33,260 | 0.86             | 4.54 | ≥33,270     | 0.93             | 3.72 |
| <b>Gender</b>                    |         |                  |      |             |                  |      |
| Female                           | ≥17,040 | 0.87             | 4.46 | ≥17,060     | 0.93             | 3.71 |
| Male                             | ≥16,200 | 0.86             | 4.61 | ≥16,200     | 0.92             | 3.72 |
| <b>Ethnicity</b>                 |         |                  |      |             |                  |      |
| Hispanic/Latino                  | ≥2,660  | 0.87             | 4.44 | ≥2,660      | 0.92             | 3.69 |
| American Indian or Alaska Native | ≥130    | 0.84             | 4.67 | ≥130        | 0.91             | 3.69 |
| Asian                            | ≥550    | 0.87             | 4.83 | ≥550        | 0.92             | 3.63 |
| Black or African American        | ≥13,590 | 0.84             | 4.37 | ≥13,590     | 0.92             | 3.53 |
| Native Hawaiian or Other Pacific | ≥20     | 0.88             | 4.59 | ≥20         | 0.94             | 3.67 |
| White                            | ≥15,070 | 0.84             | 4.70 | ≥15,070     | 0.91             | 3.73 |
| Two or More Races                | ≥1,180  | 0.85             | 4.62 | ≥1,190      | 0.92             | 3.72 |
| <b>Education Classification</b>  |         |                  |      |             |                  |      |
| Regular                          | ≥28,880 | 0.86             | 4.58 | ≥28,880     | 0.92             | 3.73 |
| Special                          | ≥4,370  | 0.85             | 4.23 | ≥4,390      | 0.93             | 3.54 |
| <b>English Learner Status</b>    |         |                  |      |             |                  |      |
| Not English Learner              | ≥31,840 | 0.86             | 4.56 | ≥31,850     | 0.93             | 3.72 |
| English Learner                  | ≥1,420  | 0.78             | 4.17 | ≥1,420      | 0.92             | 3.50 |
| <b>Economic Status</b>           |         |                  |      |             |                  |      |
| Economically Disadvantaged       | ≥22,900 | 0.84             | 4.43 | ≥22,900     | 0.92             | 3.63 |
| Not Economically Disadvantaged   | ≥10,350 | 0.84             | 4.79 | ≥10,370     | 0.91             | 3.73 |
| <b>Section 504 Status</b>        |         |                  |      |             |                  |      |
| Not Section 504                  | ≥30,550 | 0.86             | 4.56 | ≥30,560     | 0.93             | 3.72 |
| Section 504                      | ≥2,700  | 0.82             | 4.30 | ≥2,710      | 0.92             | 3.60 |

Table 10.14 Grade 4 Computer-Based Test Administration Reliability and SEM by Subgroup

| Group                            | ELA     |                  |      | Mathematics |                  |      |
|----------------------------------|---------|------------------|------|-------------|------------------|------|
|                                  | N Count | Cronbach's Alpha | SEM  | N Count     | Cronbach's Alpha | SEM  |
| <b>All Students</b>              | ≥49,110 | 0.90             | 5.06 | ≥49,090     | 0.94             | 3.52 |
| <b>Gender</b>                    |         |                  |      |             |                  |      |
| Female                           | ≥25,110 | 0.90             | 4.96 | ≥25,100     | 0.94             | 3.52 |
| Male                             | ≥23,990 | 0.90             | 5.15 | ≥23,990     | 0.94             | 3.51 |
| <b>Ethnicity</b>                 |         |                  |      |             |                  |      |
| Hispanic/Latino                  | ≥5,090  | 0.91             | 4.89 | ≥5,090      | 0.94             | 3.48 |
| American Indian or Alaska Native | ≥260    | 0.89             | 5.25 | ≥260        | 0.93             | 3.62 |
| Asian                            | ≥800    | 0.90             | 5.35 | ≥800        | 0.93             | 3.68 |
| Black or African American        | ≥20,570 | 0.88             | 4.91 | ≥20,560     | 0.93             | 3.28 |
| Native Hawaiian or Other Pacific | ≥30     | 0.84             | 5.42 | ≥30         | 0.93             | 3.59 |
| White                            | ≥20,600 | 0.88             | 5.20 | ≥20,600     | 0.93             | 3.63 |
| Two or More Races                | ≥1,680  | 0.88             | 5.18 | ≥1,680      | 0.93             | 3.58 |
| <b>Education Classification</b>  |         |                  |      |             |                  |      |
| Regular                          | ≥43,130 | 0.89             | 5.11 | ≥43,110     | 0.94             | 3.54 |
| Special                          | ≥5,970  | 0.88             | 4.57 | ≥5,980      | 0.93             | 3.26 |
| <b>English Learner Status</b>    |         |                  |      |             |                  |      |
| Not English Learner              | ≥46,630 | 0.90             | 5.09 | ≥46,620     | 0.94             | 3.53 |
| English Learner                  | ≥2,470  | 0.85             | 4.37 | ≥2,470      | 0.93             | 3.20 |
| <b>Economic Status</b>           |         |                  |      |             |                  |      |
| Economically Disadvantaged       | ≥34,780 | 0.89             | 4.97 | ≥34,760     | 0.93             | 3.40 |
| Not Economically Disadvantaged   | ≥14,320 | 0.88             | 5.32 | ≥14,320     | 0.93             | 3.71 |
| <b>Section 504 Status</b>        |         |                  |      |             |                  |      |
| Not Section 504                  | ≥44,960 | 0.90             | 5.08 | ≥44,950     | 0.94             | 3.52 |
| Section 504                      | ≥4,140  | 0.88             | 4.84 | ≥4,140      | 0.93             | 3.41 |

Table 10.15 Grade 5 Computer-Based Test Administration Reliability and SEM by Subgroup

| Group                            | ELA     |                  |      | Mathematics |                  |      |
|----------------------------------|---------|------------------|------|-------------|------------------|------|
|                                  | N Count | Cronbach's Alpha | SEM  | N Count     | Cronbach's Alpha | SEM  |
| <b>All Students</b>              | ≥49,180 | 0.91             | 5.13 | ≥49,090     | 0.94             | 3.31 |
| <b>Gender</b>                    |         |                  |      |             |                  |      |
| Female                           | ≥25,210 | 0.91             | 5.01 | ≥25,160     | 0.94             | 3.30 |
| Male                             | ≥23,970 | 0.90             | 5.18 | ≥23,920     | 0.93             | 3.33 |
| <b>Ethnicity</b>                 |         |                  |      |             |                  |      |
| Hispanic/Latino                  | ≥4,800  | 0.92             | 5.06 | ≥4,780      | 0.93             | 3.28 |
| American Indian or Alaska Native | ≥250    | 0.90             | 5.24 | ≥250        | 0.92             | 3.36 |
| Asian                            | ≥750    | 0.91             | 5.08 | ≥750        | 0.93             | 3.51 |
| Black or African American        | ≥20,800 | 0.89             | 5.09 | ≥20,750     | 0.92             | 3.12 |
| Native Hawaiian or Other Pacific | ≥40     | 0.92             | 5.46 | ≥40         | 0.92             | 3.43 |
| White                            | ≥20,830 | 0.90             | 5.17 | ≥20,810     | 0.93             | 3.43 |
| Two or More Races                | ≥1,650  | 0.90             | 5.20 | ≥1,650      | 0.93             | 3.37 |
| <b>Education Classification</b>  |         |                  |      |             |                  |      |
| Regular                          | ≥43,170 | 0.90             | 5.15 | ≥43,080     | 0.94             | 3.35 |
| Special                          | ≥6,010  | 0.90             | 4.61 | ≥6,000      | 0.91             | 2.98 |
| <b>English Learner Status</b>    |         |                  |      |             |                  |      |
| Not English Learner              | ≥47,100 | 0.91             | 5.14 | ≥47,010     | 0.94             | 3.32 |
| English Learner                  | ≥2,080  | 0.85             | 4.74 | ≥2,070      | 0.90             | 2.96 |
| <b>Economic Status</b>           |         |                  |      |             |                  |      |
| Economically Disadvantaged       | ≥34,210 | 0.90             | 5.10 | ≥34,140     | 0.93             | 3.22 |
| Not Economically Disadvantaged   | ≥14,960 | 0.89             | 5.21 | ≥14,940     | 0.93             | 3.51 |
| <b>Section 504 Status</b>        |         |                  |      |             |                  |      |
| Not Section 504                  | ≥44,430 | 0.91             | 5.13 | ≥44,340     | 0.94             | 3.33 |
| Section 504                      | ≥4,750  | 0.89             | 5.02 | ≥4,740      | 0.92             | 3.18 |

**Table 10.16 Grade 6 Computer-Based Test Administration Reliability and SEM by Subgroup**

| Group                            | ELA     |                  |      | Mathematics |                  |      |
|----------------------------------|---------|------------------|------|-------------|------------------|------|
|                                  | N Count | Cronbach's Alpha | SEM  | N Count     | Cronbach's Alpha | SEM  |
| <b>All Students</b>              | ≥49,620 | 0.92             | 5.14 | ≥49,550     | 0.93             | 3.63 |
| <b>Gender</b>                    |         |                  |      |             |                  |      |
| Female                           | ≥25,490 | 0.92             | 4.99 | ≥25,470     | 0.94             | 3.60 |
| Male                             | ≥24,120 | 0.92             | 5.23 | ≥24,080     | 0.93             | 3.65 |
| <b>Ethnicity</b>                 |         |                  |      |             |                  |      |
| Hispanic/Latino                  | ≥5,070  | 0.92             | 5.02 | ≥5,060      | 0.93             | 3.53 |
| American Indian or Alaska Native | ≥280    | 0.90             | 5.22 | ≥280        | 0.92             | 3.67 |
| Asian                            | ≥790    | 0.93             | 5.40 | ≥790        | 0.94             | 4.01 |
| Black or African American        | ≥20,860 | 0.90             | 5.01 | ≥20,820     | 0.92             | 3.36 |
| Native Hawaiian or Other Pacific | ≥20     | 0.91             | 5.18 | ≥20         | 0.94             | 4.00 |
| White                            | ≥20,890 | 0.91             | 5.25 | ≥20,880     | 0.93             | 3.80 |
| Two or More Races                | ≥1,620  | 0.91             | 5.24 | ≥1,620      | 0.93             | 3.68 |
| <b>Education Classification</b>  |         |                  |      |             |                  |      |
| Regular                          | ≥44,030 | 0.91             | 5.18 | ≥43,970     | 0.93             | 3.67 |
| Special                          | ≥5,580  | 0.89             | 4.50 | ≥5,580      | 0.91             | 3.04 |
| <b>English Learner Status</b>    |         |                  |      |             |                  |      |
| Not English Learner              | ≥47,550 | 0.92             | 5.17 | ≥47,480     | 0.93             | 3.64 |
| English Learner                  | ≥2,070  | 0.84             | 4.40 | ≥2,070      | 0.90             | 3.03 |
| <b>Economic Status</b>           |         |                  |      |             |                  |      |
| Economically Disadvantaged       | ≥34,790 | 0.91             | 5.05 | ≥34,730     | 0.92             | 3.47 |
| Not Economically Disadvantaged   | ≥14,820 | 0.91             | 5.33 | ≥14,820     | 0.92             | 3.92 |
| <b>Section 504 Status</b>        |         |                  |      |             |                  |      |
| Not Section 504                  | ≥44,400 | 0.92             | 5.15 | ≥44,330     | 0.93             | 3.65 |
| Section 504                      | ≥5,210  | 0.89             | 4.98 | ≥5,210      | 0.92             | 3.39 |

Table 10.17 Grade 7 Computer-Based Test Administration Reliability and SEM by Subgroup

| Group                            | ELA     |                  |      | Mathematics |                  |      |
|----------------------------------|---------|------------------|------|-------------|------------------|------|
|                                  | N Count | Cronbach's Alpha | SEM  | N Count     | Cronbach's Alpha | SEM  |
| <b>All Students</b>              | ≥46,400 | 0.92             | 5.61 | ≥51,170     | 0.94             | 3.62 |
| <b>Gender</b>                    |         |                  |      |             |                  |      |
| Female                           | ≥23,580 | 0.92             | 5.49 | ≥25,990     | 0.94             | 3.57 |
| Male                             | ≥22,820 | 0.91             | 5.64 | ≥25,180     | 0.93             | 3.65 |
| <b>Ethnicity</b>                 |         |                  |      |             |                  |      |
| Hispanic/Latino                  | ≥4,660  | 0.93             | 5.52 | ≥4,840      | 0.93             | 3.50 |
| American Indian or Alaska Native | ≥290    | 0.91             | 5.59 | ≥300        | 0.92             | 3.60 |
| Asian                            | ≥690    | 0.91             | 5.59 | ≥750        | 0.94             | 4.03 |
| Black or African American        | ≥19,930 | 0.91             | 5.50 | ≥21,950     | 0.91             | 3.19 |
| Native Hawaiian or Other Pacific | ≥40     | 0.87             | 6.02 | ≥40         | 0.93             | 4.10 |
| White                            | ≥19,120 | 0.91             | 5.69 | ≥21,540     | 0.93             | 3.88 |
| Two or More Races                | ≥1,610  | 0.91             | 5.70 | ≥1,690      | 0.93             | 3.72 |
| <b>Education Classification</b>  |         |                  |      |             |                  |      |
| Regular                          | ≥41,460 | 0.91             | 5.64 | ≥45,610     | 0.94             | 3.68 |
| Special                          | ≥4,940  | 0.89             | 4.91 | ≥5,550      | 0.91             | 2.76 |
| <b>English Learner Status</b>    |         |                  |      |             |                  |      |
| Not English Learner              | ≥44,640 | 0.91             | 5.63 | ≥49,340     | 0.94             | 3.64 |
| English Learner                  | ≥1,760  | 0.86             | 4.98 | ≥1,830      | 0.89             | 2.74 |
| <b>Economic Status</b>           |         |                  |      |             |                  |      |
| Economically Disadvantaged       | ≥32,520 | 0.91             | 5.55 | ≥35,650     | 0.93             | 3.39 |
| Not Economically Disadvantaged   | ≥13,880 | 0.90             | 5.76 | ≥15,520     | 0.93             | 3.97 |
| <b>Section 504 Status</b>        |         |                  |      |             |                  |      |
| Not Section 504                  | ≥41,500 | 0.92             | 5.61 | ≥45,790     | 0.94             | 3.65 |
| Section 504                      | ≥4,900  | 0.90             | 5.50 | ≥5,380      | 0.93             | 3.22 |

**Table 10.18 Grade 8 Computer-Based Test Administration Reliability and SEM by Subgroup**

| Group                            | ELA     |                  |      | Mathematics |                  |      |
|----------------------------------|---------|------------------|------|-------------|------------------|------|
|                                  | N Count | Cronbach's Alpha | SEM  | N Count     | Cronbach's Alpha | SEM  |
| <b>All Students</b>              | ≥50,980 | 0.91             | 5.70 | ≥45,200     | 0.92             | 3.44 |
| <b>Gender</b>                    |         |                  |      |             |                  |      |
| Female                           | ≥25,860 | 0.91             | 5.59 | ≥23,100     | 0.92             | 3.37 |
| Male                             | ≥25,110 | 0.90             | 5.71 | ≥22,100     | 0.91             | 3.51 |
| <b>Ethnicity</b>                 |         |                  |      |             |                  |      |
| Hispanic/Latino                  | ≥4,820  | 0.91             | 5.68 | ≥4,290      | 0.91             | 3.33 |
| American Indian or Alaska Native | ≥280    | 0.89             | 5.87 | ≥260        | 0.93             | 3.60 |
| Asian                            | ≥810    | 0.91             | 5.75 | ≥540        | 0.94             | 3.93 |
| Black or African American        | ≥21,580 | 0.89             | 5.62 | ≥20,440     | 0.89             | 3.18 |
| Native Hawaiian or Other Pacific | ≥40     | 0.91             | 5.68 | ≥30         | 0.91             | 3.80 |
| White                            | ≥21,770 | 0.90             | 5.76 | ≥18,160     | 0.91             | 3.68 |
| Two or More Races                | ≥1,590  | 0.90             | 5.76 | ≥1,400      | 0.92             | 3.50 |
| <b>Education Classification</b>  |         |                  |      |             |                  |      |
| Regular                          | ≥45,760 | 0.90             | 5.72 | ≥40,090     | 0.91             | 3.50 |
| Special                          | ≥5,210  | 0.86             | 5.12 | ≥5,100      | 0.87             | 2.77 |
| <b>English Learner Status</b>    |         |                  |      |             |                  |      |
| Not English Learner              | ≥49,160 | 0.90             | 5.71 | ≥43,410     | 0.92             | 3.46 |
| English Learner                  | ≥1,820  | 0.83             | 5.27 | ≥1,780      | 0.88             | 2.75 |
| <b>Economic Status</b>           |         |                  |      |             |                  |      |
| Economically Disadvantaged       | ≥34,470 | 0.89             | 5.65 | ≥32,160     | 0.90             | 3.29 |
| Not Economically Disadvantaged   | ≥16,500 | 0.89             | 5.84 | ≥13,040     | 0.92             | 3.76 |
| <b>Section 504 Status</b>        |         |                  |      |             |                  |      |
| Not Section 504                  | ≥45,800 | 0.91             | 5.71 | ≥40,280     | 0.92             | 3.47 |
| Section 504                      | ≥5,170  | 0.89             | 5.54 | ≥4,920      | 0.90             | 3.18 |

### 10.4.2 Effect Size

One way to evaluate the magnitude of the standardized mean difference (SMD) is to calculate the ES. Cohen's  $d$  was used on the statewide population to calculate the ES. Cohen's  $d$  is given by the following formula:

$$d = \frac{\bar{x}_a - \bar{x}_b}{\sqrt{\frac{(n_a - 1)s_a^2 + (n_b - 1)s_b^2}{(n_a + n_b) - 2}}},$$

where  $\bar{x}_a$  is the mean score of group A,  $\bar{x}_b$  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 SMD 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 Cohen's (1988) guidelines, certain trends become apparent in Tables 10.19–10.25. Results are NR for subgroups with fewer than 10 students. If the effect size is negative, that means the group performs at a higher level than the group to which it's being compared. A positive effect size indicates the group performs at a lower level than the group to which it is being compared. For example, in Table 10.19 in regard to the ELA test, the effect size for the group female is -0.11 indicating that although there is less than a small difference in performance, females are scoring higher than males. On the ELA test in most grades, there are small differences in mean test scores at grades 5 through 8 between females and males where females outperform males. For most ELA and mathematics tests, mean scale scores and ES show that Asian and white students tend to outperform other ethnicity groups across grades. For most ELA and mathematics tests, there were clear performance differences between regular education and special education students in Education Classification, between not economically disadvantaged and economically disadvantaged in economic status, and non-EL and EL students in EL status.



Table 10.19 Impact Analysis, Grade 3 Computer-Based Test Administration

| Group                            | ELA     |                  |                       |             | Mathematics |                  |                       |             |
|----------------------------------|---------|------------------|-----------------------|-------------|-------------|------------------|-----------------------|-------------|
|                                  | N       | Scale Score Mean | Scale Score Std. Dev. | Effect Size | N           | Scale Score Mean | Scale Score Std. Dev. | Effect Size |
| <b>All Students</b>              | ≥16,140 | 730.20           | 44.55                 |             | ≥16,130     | 731.05           | 31.80                 |             |
| <b>Gender</b>                    |         |                  |                       |             |             |                  |                       |             |
| Male                             | ≥8,210  | 727.81           | 44.65                 |             | ≥8,210      | 731.84           | 32.54                 |             |
| Female                           | ≥7,920  | 732.69           | 44.31                 | -0.11       | ≥7,920      | 730.24           | 31.00                 | 0.05        |
| <b>Ethnicity</b>                 |         |                  |                       |             |             |                  |                       |             |
| White                            | ≥5,880  | 744.57           | 43.30                 |             | ≥5,880      | 743.07           | 30.48                 |             |
| Hispanic/Latino                  | ≥2,310  | 718.91           | 44.73                 | 0.59        | ≥2,310      | 727.16           | 31.30                 | 0.52        |
| American Indian or Alaska Native | ≥130    | 748.70           | 43.25                 | -0.10       | ≥130        | 739.17           | 31.03                 | 0.13        |
| Asian                            | ≥280    | 764.83           | 50.30                 | -0.46       | ≥280        | 761.83           | 32.74                 | -0.61       |
| Black or African American        | ≥6,820  | 718.87           | 40.45                 | 0.62        | ≥6,820      | 720.15           | 28.39                 | 0.78        |
| Native Hawaiian or Other Pacific | ≥10     | 702.08           | 43.39                 | 0.98        | ≥10         | 719.75           | 26.05                 | 0.77        |
| Two or More Races                | ≥670    | 740.90           | 44.76                 | 0.08        | ≥670        | 735.90           | 31.04                 | 0.23        |
| <b>Education Classification</b>  |         |                  |                       |             |             |                  |                       |             |
| Regular                          | ≥14,240 | 733.51           | 44.24                 |             | ≥14,240     | 733.19           | 31.40                 |             |
| Special                          | ≥1,890  | 705.37           | 38.61                 | 0.65        | ≥1,890      | 715.03           | 30.18                 | 0.58        |
| <b>Economic Status</b>           |         |                  |                       |             |             |                  |                       |             |
| Not Economically Disadvantaged   | ≥3,790  | 752.37           | 45.14                 |             | ≥3,780      | 748.08           | 31.72                 |             |
| Economically Disadvantaged       | ≥12,350 | 723.40           | 42.09                 | 0.68        | ≥12,350     | 725.83           | 29.94                 | 0.73        |
| <b>English Learner Status</b>    |         |                  |                       |             |             |                  |                       |             |
| Not English Learner              | ≥14,710 | 733.10           | 44.26                 |             | ≥14,710     | 732.34           | 31.84                 |             |
| English Learner                  | ≥1,420  | 700.32           | 35.62                 | 0.75        | ≥1,420      | 717.83           | 28.15                 | 0.46        |
| <b>Migrant Status</b>            |         |                  |                       |             |             |                  |                       |             |
| Not Migrant                      | ≥16,110 | 730.21           | 44.55                 |             | ≥16,110     | 731.06           | 31.80                 |             |
| Migrant                          | ≥20     | 724.48           | 42.42                 | 0.13        | ≥20         | 727.89           | 32.59                 | 0.10        |
| <b>Section 504 Status</b>        |         |                  |                       |             |             |                  |                       |             |
| Not Section 504                  | ≥15,310 | 730.92           | 44.72                 |             | ≥15,310     | 731.58           | 31.86                 |             |
| Section 504                      | ≥820    | 716.94           | 38.98                 | 0.31        | ≥820        | 721.31           | 29.00                 | 0.32        |

Table 10.20 Impact Analysis, Grade 3 Paper-Based Test Administration

| Group                            | ELA     |                  |                       |             | Mathematics |                  |                       |             |
|----------------------------------|---------|------------------|-----------------------|-------------|-------------|------------------|-----------------------|-------------|
|                                  | N       | Scale Score Mean | Scale Score Std. Dev. | Effect Size | N           | Scale Score Mean | Scale Score Std. Dev. | Effect Size |
| <b>All Students</b>              | ≥33,240 | 739.31           | 42.46                 |             | ≥33,250     | 739.38           | 33.40                 |             |
| <b>Gender</b>                    |         |                  |                       |             |             |                  |                       |             |
| Male                             | ≥17,030 | 737.09           | 42.47                 |             | ≥17,040     | 739.73           | 34.07                 |             |
| Female                           | ≥16,200 | 741.65           | 42.32                 | -0.11       | ≥16,190     | 739.04           | 32.67                 | 0.02        |
| <b>Ethnicity</b>                 |         |                  |                       |             |             |                  |                       |             |
| White                            | ≥15,070 | 753.17           | 40.14                 |             | ≥15,070     | 751.48           | 30.92                 |             |
| Hispanic/Latino                  | ≥2,660  | 727.59           | 43.95                 | 0.63        | ≥2,660      | 735.47           | 32.72                 | 0.51        |
| American Indian or Alaska Native | ≥130    | 745.51           | 38.64                 | 0.19        | ≥130        | 746.56           | 29.63                 | 0.16        |
| Asian                            | ≥550    | 760.27           | 46.19                 | -0.18       | ≥550        | 764.78           | 33.39                 | -0.43       |
| Black or African American        | ≥13,580 | 724.79           | 38.99                 | 0.72        | ≥13,580     | 725.42           | 30.45                 | 0.85        |
| Native Hawaiian or Other Pacific | ≥20     | 746.85           | 47.38                 | 0.16        | ≥20         | 746.81           | 38.42                 | 0.15        |
| Two or More Races                | ≥1,180  | 745.21           | 40.73                 | 0.20        | ≥1,190      | 741.93           | 31.30                 | 0.31        |
| <b>Education Classification</b>  |         |                  |                       |             |             |                  |                       |             |
| Regular                          | ≥28,840 | 742.66           | 41.95                 |             | ≥28,840     | 741.91           | 32.84                 |             |
| Special                          | ≥4,400  | 717.37           | 39.09                 | 0.61        | ≥4,410      | 722.87           | 32.29                 | 0.58        |
| <b>Economic Status</b>           |         |                  |                       |             |             |                  |                       |             |
| Not Economically Disadvantaged   | ≥10,340 | 760.73           | 39.88                 |             | ≥10,360     | 757.31           | 30.55                 |             |
| Economically Disadvantaged       | ≥22,900 | 729.63           | 39.97                 | 0.78        | ≥22,890     | 731.27           | 31.41                 | 0.84        |
| <b>English Learner Status</b>    |         |                  |                       |             |             |                  |                       |             |
| Not English Learner              | ≥31,820 | 740.87           | 42.08                 |             | ≥31,830     | 740.12           | 33.34                 |             |
| English Learner                  | ≥1,420  | 704.24           | 35.04                 | 0.88        | ≥1,410      | 722.93           | 30.35                 | 0.52        |
| <b>Migrant Status</b>            |         |                  |                       |             |             |                  |                       |             |
| Not Migrant                      | ≥33,180 | 739.37           | 42.44                 |             | ≥33,190     | 739.42           | 33.39                 |             |
| Migrant                          | ≥60     | 705.28           | 40.41                 | 0.80        | ≥60         | 718.98           | 35.36                 | 0.61        |
| <b>Section 504 Status</b>        |         |                  |                       |             |             |                  |                       |             |
| Not Section 504                  | ≥30,530 | 740.58           | 42.70                 |             | ≥30,530     | 740.35           | 33.51                 |             |
| Section 504                      | ≥2,710  | 724.94           | 36.74                 | 0.37        | ≥2,710      | 728.50           | 30.13                 | 0.36        |

Table 10.21 Impact Analysis, Grade 4 Computer-Based Test Administration

| Group                            | ELA     |                  |                       |             | Mathematics |                  |                       |             |
|----------------------------------|---------|------------------|-----------------------|-------------|-------------|------------------|-----------------------|-------------|
|                                  | N       | Scale Score Mean | Scale Score Std. Dev. | Effect Size | N           | Scale Score Mean | Scale Score Std. Dev. | Effect Size |
| <b>All Students</b>              | ≥48,980 | 742.60           | 36.19                 |             | ≥48,960     | 736.38           | 32.94                 |             |
| <b>Gender</b>                    |         |                  |                       |             |             |                  |                       |             |
| Male                             | ≥25,030 | 740.71           | 36.06                 |             | ≥25,020     | 737.81           | 33.36                 |             |
| Female                           | ≥23,940 | 744.57           | 36.21                 | -0.11       | ≥23,930     | 734.88           | 32.44                 | 0.09        |
| <b>Ethnicity</b>                 |         |                  |                       |             |             |                  |                       |             |
| White                            | ≥20,530 | 756.23           | 33.33                 |             | ≥20,530     | 750.09           | 30.48                 |             |
| Hispanic/Latino                  | ≥5,090  | 732.70           | 38.31                 | 0.68        | ≥5,090      | 732.05           | 32.94                 | 0.58        |
| American Indian or Alaska Native | ≥260    | 749.95           | 34.17                 | 0.19        | ≥260        | 741.53           | 30.42                 | 0.28        |
| Asian                            | ≥800    | 766.72           | 39.00                 | -0.31       | ≥800        | 766.25           | 33.51                 | -0.53       |
| Black or African American        | ≥20,530 | 729.80           | 32.80                 | 0.80        | ≥20,520     | 722.09           | 28.61                 | 0.95        |
| Native Hawaiian or Other Pacific | ≥30     | 748.64           | 29.26                 | 0.23        | ≥30         | 744.49           | 30.36                 | 0.18        |
| Two or More Races                | ≥1,680  | 749.67           | 33.72                 | 0.20        | ≥1,680      | 741.28           | 31.06                 | 0.29        |
| <b>Education Classification</b>  |         |                  |                       |             |             |                  |                       |             |
| Regular                          | ≥42,990 | 745.72           | 35.54                 |             | ≥42,980     | 738.95           | 32.63                 |             |
| Special                          | ≥5,980  | 720.12           | 32.68                 | 0.73        | ≥5,980      | 717.88           | 29.04                 | 0.65        |
| <b>Economic Status</b>           |         |                  |                       |             |             |                  |                       |             |
| Not Economically Disadvantaged   | ≥14,280 | 761.40           | 33.83                 |             | ≥14,280     | 754.71           | 31.26                 |             |
| Economically Disadvantaged       | ≥34,690 | 734.86           | 34.23                 | 0.78        | ≥34,680     | 728.83           | 30.57                 | 0.84        |
| <b>English Learner Status</b>    |         |                  |                       |             |             |                  |                       |             |
| Not English Learner              | ≥46,500 | 744.38           | 35.59                 |             | ≥46,490     | 737.41           | 32.83                 |             |
| English Learner                  | ≥2,470  | 709.09           | 30.48                 | 1.00        | ≥2,470      | 716.99           | 28.84                 | 0.63        |
| <b>Migrant Status</b>            |         |                  |                       |             |             |                  |                       |             |
| Not Migrant                      | ≥48,910 | 742.62           | 36.18                 |             | ≥48,900     | 736.38           | 32.94                 |             |
| Migrant                          | ≥60     | 726.10           | 38.51                 | 0.46        | ≥60         | 733.08           | 36.15                 | 0.10        |
| <b>Section 504 Status</b>        |         |                  |                       |             |             |                  |                       |             |
| Not Section 504                  | ≥44,830 | 743.55           | 36.37                 |             | ≥44,810     | 737.16           | 33.07                 |             |
| Section 504                      | ≥4,140  | 732.30           | 32.37                 | 0.31        | ≥4,140      | 727.94           | 30.35                 | 0.28        |

Table 10.22 Impact Analysis, Grade 5 Computer-Based Test Administration

| Group                            | ELA     |                  |                       |             | Mathematics |                  |                       |             |
|----------------------------------|---------|------------------|-----------------------|-------------|-------------|------------------|-----------------------|-------------|
|                                  | N       | Scale Score Mean | Scale Score Std. Dev. | Effect Size | N           | Scale Score Mean | Scale Score Std. Dev. | Effect Size |
| <b>All Students</b>              | ≥48,980 | 741.38           | 32.07                 |             | ≥48,890     | 732.87           | 31.36                 |             |
| <b>Gender</b>                    |         |                  |                       |             |             |                  |                       |             |
| Male                             | ≥25,110 | 738.09           | 32.05                 |             | ≥25,070     | 733.05           | 32.10                 |             |
| Female                           | ≥23,870 | 744.84           | 31.72                 | -0.21       | ≥23,820     | 732.69           | 30.57                 | 0.01        |
| <b>Ethnicity</b>                 |         |                  |                       |             |             |                  |                       |             |
| White                            | ≥20,750 | 752.14           | 29.96                 |             | ≥20,740     | 745.01           | 30.07                 |             |
| Hispanic/Latino                  | ≥4,800  | 735.33           | 33.57                 | 0.55        | ≥4,780      | 728.68           | 30.28                 | 0.54        |
| American Indian or Alaska Native | ≥250    | 741.66           | 31.08                 | 0.35        | ≥250        | 733.38           | 27.09                 | 0.39        |
| Asian                            | ≥740    | 767.18           | 34.37                 | -0.50       | ≥740        | 764.24           | 32.89                 | -0.64       |
| Black or African American        | ≥20,710 | 730.58           | 29.50                 | 0.72        | ≥20,660     | 720.18           | 27.07                 | 0.87        |
| Native Hawaiian or Other Pacific | ≥40     | 744.34           | 36.81                 | 0.26        | ≥40         | 732.05           | 29.38                 | 0.43        |
| Two or More Races                | ≥1,650  | 747.46           | 30.71                 | 0.16        | ≥1,650      | 737.44           | 30.62                 | 0.25        |
| <b>Education Classification</b>  |         |                  |                       |             |             |                  |                       |             |
| Regular                          | ≥42,950 | 744.98           | 30.76                 |             | ≥42,870     | 735.29           | 31.37                 |             |
| Special                          | ≥6,030  | 715.73           | 29.36                 | 0.96        | ≥6,020      | 715.64           | 25.33                 | 0.64        |
| <b>Economic Status</b>           |         |                  |                       |             |             |                  |                       |             |
| Not Economically Disadvantaged   | ≥14,910 | 757.52           | 30.45                 |             | ≥14,880     | 749.99           | 30.61                 |             |
| Economically Disadvantaged       | ≥34,070 | 734.32           | 30.14                 | 0.77        | ≥34,010     | 725.38           | 28.63                 | 0.84        |
| <b>English Learner Status</b>    |         |                  |                       |             |             |                  |                       |             |
| Not English Learner              | ≥46,900 | 742.70           | 31.67                 |             | ≥46,820     | 733.78           | 31.32                 |             |
| English Learner                  | ≥2,080  | 711.70           | 25.92                 | 0.99        | ≥2,070      | 712.46           | 24.76                 | 0.69        |
| <b>Migrant Status</b>            |         |                  |                       |             |             |                  |                       |             |
| Not Migrant                      | ≥48,920 | 741.40           | 32.06                 |             | ≥48,840     | 732.89           | 31.36                 |             |
| Migrant                          | ≥60     | 725.17           | 28.83                 | 0.51        | ≥50         | 714.47           | 29.62                 | 0.59        |
| <b>Section 504 Status</b>        |         |                  |                       |             |             |                  |                       |             |
| Not Section 504                  | ≥44,230 | 742.45           | 32.24                 |             | ≥44,150     | 733.82           | 31.58                 |             |
| Section 504                      | ≥4,740  | 731.41           | 28.47                 | 0.35        | ≥4,740      | 724.03           | 27.70                 | 0.31        |

Table 10.23 Impact Analysis, Grade 6 Computer-Based Test Administration

| Group                            | ELA     |                  |                       |             | Mathematics |                  |                       |             |
|----------------------------------|---------|------------------|-----------------------|-------------|-------------|------------------|-----------------------|-------------|
|                                  | N       | Scale Score Mean | Scale Score Std. Dev. | Effect Size | N           | Scale Score Mean | Scale Score Std. Dev. | Effect Size |
| <b>All Students</b>              | ≥49,450 | 739.38           | 32.58                 |             | ≥49,390     | 730.31           | 31.08                 |             |
| <b>Gender</b>                    |         |                  |                       |             |             |                  |                       |             |
| Male                             | ≥25,430 | 734.80           | 32.07                 |             | ≥25,410     | 729.43           | 31.55                 |             |
| Female                           | ≥24,010 | 744.23           | 32.41                 | -0.29       | ≥23,970     | 731.24           | 30.54                 | -0.06       |
| <b>Ethnicity</b>                 |         |                  |                       |             |             |                  |                       |             |
| White                            | ≥20,810 | 750.32           | 31.30                 |             | ≥20,800     | 742.57           | 28.95                 |             |
| Hispanic/Latino                  | ≥5,080  | 731.40           | 33.71                 | 0.59        | ≥5,070      | 724.13           | 30.77                 | 0.63        |
| American Indian or Alaska Native | ≥280    | 742.94           | 28.92                 | 0.24        | ≥280        | 735.40           | 26.64                 | 0.25        |
| Asian                            | ≥790    | 765.10           | 37.43                 | -0.47       | ≥790        | 760.87           | 35.53                 | -0.63       |
| Black or African American        | ≥20,800 | 728.94           | 29.18                 | 0.71        | ≥20,760     | 717.99           | 27.37                 | 0.87        |
| Native Hawaiian or Other Pacific | ≥20     | 753.14           | 30.38                 | -0.09       | ≥20         | 746.45           | 35.55                 | -0.13       |
| Two or More Races                | ≥1,620  | 744.57           | 31.00                 | 0.18        | ≥1,620      | 734.25           | 29.30                 | 0.29        |
| <b>Education Classification</b>  |         |                  |                       |             |             |                  |                       |             |
| Regular                          | ≥43,840 | 742.62           | 31.78                 |             | ≥43,790     | 733.01           | 30.78                 |             |
| Special                          | ≥5,600  | 714.03           | 27.12                 | 0.91        | ≥5,600      | 709.20           | 24.60                 | 0.79        |
| <b>Economic Status</b>           |         |                  |                       |             |             |                  |                       |             |
| Not Economically Disadvantaged   | ≥14,750 | 756.12           | 31.21                 |             | ≥14,740     | 747.53           | 29.65                 |             |
| Economically Disadvantaged       | ≥34,690 | 732.26           | 30.47                 | 0.78        | ≥34,640     | 722.98           | 28.68                 | 0.85        |
| <b>English Learner Status</b>    |         |                  |                       |             |             |                  |                       |             |
| Not English Learner              | ≥47,370 | 740.83           | 32.11                 |             | ≥47,310     | 731.40           | 30.85                 |             |
| English Learner                  | ≥2,080  | 706.27           | 24.64                 | 1.09        | ≥2,080      | 705.55           | 25.37                 | 0.84        |
| <b>Migrant Status</b>            |         |                  |                       |             |             |                  |                       |             |
| Not Migrant                      | ≥49,380 | 739.38           | 32.57                 |             | ≥49,320     | 730.31           | 31.08                 |             |
| Migrant                          | ≥60     | 735.94           | 36.50                 | 0.11        | ≥60         | 728.45           | 31.20                 | 0.06        |
| <b>Section 504 Status</b>        |         |                  |                       |             |             |                  |                       |             |
| Not Section 504                  | ≥44,230 | 740.76           | 32.76                 |             | ≥44,170     | 731.47           | 31.34                 |             |
| Section 504                      | ≥5,210  | 727.70           | 28.38                 | 0.40        | ≥5,210      | 720.49           | 26.81                 | 0.36        |

Table 10.24 Impact Analysis, Grade 7 Computer-Based Test Administration

| Group                            | ELA     |                  |                       |             | Mathematics |                  |                       |             |
|----------------------------------|---------|------------------|-----------------------|-------------|-------------|------------------|-----------------------|-------------|
|                                  | N       | Scale Score Mean | Scale Score Std. Dev. | Effect Size | N           | Scale Score Mean | Scale Score Std. Dev. | Effect Size |
| <b>All Students</b>              | ≥46,360 | 742.08           | 38.64                 |             | ≥51,100     | 730.21           | 27.86                 |             |
| <b>Gender</b>                    |         |                  |                       |             |             |                  |                       |             |
| Male                             | ≥23,570 | 735.18           | 38.32                 |             | ≥25,960     | 729.71           | 28.68                 |             |
| Female                           | ≥22,780 | 749.23           | 37.65                 | -0.37       | ≥25,130     | 730.74           | 26.98                 | -0.04       |
| <b>Ethnicity</b>                 |         |                  |                       |             |             |                  |                       |             |
| White                            | ≥19,060 | 753.98           | 36.31                 |             | ≥21,480     | 741.31           | 26.73                 |             |
| Hispanic/Latino                  | ≥4,670  | 733.98           | 41.97                 | 0.53        | ≥4,850      | 725.48           | 27.44                 | 0.59        |
| American Indian or Alaska Native | ≥290    | 745.67           | 36.02                 | 0.23        | ≥290        | 729.89           | 24.24                 | 0.43        |
| Asian                            | ≥690    | 774.19           | 38.54                 | -0.56       | ≥740        | 758.72           | 30.87                 | -0.65       |
| Black or African American        | ≥19,950 | 730.89           | 35.97                 | 0.64        | ≥21,960     | 719.15           | 23.76                 | 0.88        |
| Native Hawaiian or Other Pacific | ≥40     | 761.07           | 33.29                 | -0.20       | ≥40         | 740.23           | 29.40                 | 0.04        |
| Two or More Races                | ≥1,610  | 748.59           | 37.07                 | 0.15        | ≥1,690      | 733.84           | 27.32                 | 0.28        |
| <b>Education Classification</b>  |         |                  |                       |             |             |                  |                       |             |
| Regular                          | ≥41,390 | 746.39           | 37.05                 |             | ≥45,520     | 732.93           | 27.23                 |             |
| Special                          | ≥4,960  | 706.20           | 32.38                 | 1.10        | ≥5,580      | 708.04           | 22.59                 | 0.93        |
| <b>Economic Status</b>           |         |                  |                       |             |             |                  |                       |             |
| Not Economically Disadvantaged   | ≥13,800 | 759.64           | 36.57                 |             | ≥15,430     | 744.77           | 27.42                 |             |
| Economically Disadvantaged       | ≥32,550 | 734.64           | 37.05                 | 0.68        | ≥35,660     | 723.91           | 25.60                 | 0.80        |
| <b>English Learner Status</b>    |         |                  |                       |             |             |                  |                       |             |
| Not English Learner              | ≥44,580 | 743.75           | 37.97                 |             | ≥49,260     | 731.03           | 27.73                 |             |
| English Learner                  | ≥1,780  | 700.34           | 30.87                 | 1.15        | ≥1,830      | 708.24           | 21.68                 | 0.83        |
| <b>Migrant Status</b>            |         |                  |                       |             |             |                  |                       |             |
| Not Migrant                      | ≥46,310 | 742.09           | 38.63                 |             | ≥51,040     | 730.22           | 27.87                 |             |
| Migrant                          | ≥40     | 736.81           | 45.56                 | 0.14        | ≥60         | 725.02           | 23.45                 | 0.19        |
| <b>Section 504 Status</b>        |         |                  |                       |             |             |                  |                       |             |
| Not Section 504                  | ≥41,430 | 743.92           | 38.62                 |             | ≥45,700     | 731.40           | 27.95                 |             |
| Section 504                      | ≥4,920  | 726.62           | 35.13                 | 0.45        | ≥5,400      | 720.19           | 24.93                 | 0.41        |

**Table 10.25 Impact Analysis, Grade 8 Computer-Based Test Administration**

| Group                            | ELA     |                  |                       |             | Mathematics |                  |                       |             |
|----------------------------------|---------|------------------|-----------------------|-------------|-------------|------------------|-----------------------|-------------|
|                                  | N       | Scale Score Mean | Scale Score Std. Dev. | Effect Size | N           | Scale Score Mean | Scale Score Std. Dev. | Effect Size |
| <b>All Students</b>              | ≥50,820 | 745.62           | 38.41                 |             | ≥44,990     | 724.30           | 35.29                 |             |
| <b>Gender</b>                    |         |                  |                       |             |             |                  |                       |             |
| Male                             | ≥25,780 | 738.42           | 38.22                 |             | ≥22,990     | 721.78           | 36.41                 |             |
| Female                           | ≥25,040 | 753.03           | 37.19                 | -0.39       | ≥21,990     | 726.94           | 33.88                 | -0.15       |
| <b>Ethnicity</b>                 |         |                  |                       |             |             |                  |                       |             |
| White                            | ≥21,660 | 757.45           | 36.88                 |             | ≥18,030     | 737.29           | 34.19                 |             |
| Hispanic/Latino                  | ≥4,840  | 737.62           | 40.84                 | 0.53        | ≥4,300      | 718.71           | 35.00                 | 0.54        |
| American Indian or Alaska Native | ≥280    | 749.36           | 36.83                 | 0.22        | ≥260        | 734.73           | 37.38                 | 0.07        |
| Asian                            | ≥810    | 778.04           | 40.15                 | -0.56       | ≥530        | 758.60           | 42.49                 | -0.62       |
| Black or African American        | ≥21,580 | 733.77           | 34.86                 | 0.66        | ≥20,420     | 712.68           | 31.25                 | 0.75        |
| Native Hawaiian or Other Pacific | ≥40     | 763.67           | 39.69                 | -0.17       | ≥30         | 734.97           | 35.23                 | 0.07        |
| Two or More Races                | ≥1,580  | 751.95           | 36.86                 | 0.15        | ≥1,390      | 728.43           | 35.32                 | 0.26        |
| <b>Education Classification</b>  |         |                  |                       |             |             |                  |                       |             |
| Regular                          | ≥45,570 | 749.69           | 37.06                 |             | ≥39,850     | 727.64           | 34.64                 |             |
| Special                          | ≥5,250  | 710.31           | 31.21                 | 1.08        | ≥5,130      | 698.35           | 28.94                 | 0.86        |
| <b>Economic Status</b>           |         |                  |                       |             |             |                  |                       |             |
| Not Economically Disadvantaged   | ≥16,380 | 763.53           | 36.73                 |             | ≥12,900     | 741.27           | 35.08                 |             |
| Economically Disadvantaged       | ≥34,440 | 737.10           | 36.21                 | 0.73        | ≥32,080     | 717.47           | 33.00                 | 0.71        |
| <b>English Learner Status</b>    |         |                  |                       |             |             |                  |                       |             |
| Not English Learner              | ≥49,000 | 747.10           | 37.91                 |             | ≥43,200     | 725.33           | 35.13                 |             |
| English Learner                  | ≥1,820  | 705.81           | 29.57                 | 1.10        | ≥1,780      | 699.39           | 29.47                 | 0.74        |
| <b>Migrant Status</b>            |         |                  |                       |             |             |                  |                       |             |
| Not Migrant                      | ≥50,760 | 745.63           | 38.42                 |             | ≥44,930     | 724.31           | 35.29                 |             |
| Migrant                          | ≥60     | 733.15           | 34.22                 | 0.32        | ≥50         | 717.10           | 30.99                 | 0.20        |
| <b>Section 504 Status</b>        |         |                  |                       |             |             |                  |                       |             |
| Not Section 504                  | ≥45,630 | 747.39           | 38.47                 |             | ≥40,050     | 725.62           | 35.42                 |             |
| Section 504                      | ≥5,180  | 730.05           | 34.16                 | 0.46        | ≥4,930      | 713.55           | 32.24                 | 0.34        |

Additional data for mean scale scores are provided in Tables 10.26 and 10.27. These tables report the number of students, mean scale scores, and standard deviations for special education classification. Groups that have fewer than 50 students are NR. The analyses were based on census data.

**Table 10.26 Special Education Classification Scale-Score Means and Standard Deviations: English Language Arts**

| Special Education Classification Scale-Score Means and Standard Deviations: English Language Arts |                               |        |        |           |         |        |           |
|---|-------------------------------|--------|--------|-----------|---------|--------|-----------|
| Grade   | Group                         | Yes    |        |           | No      |        |           |
|   |                               | N      | Mean   | Std. Dev. | N       | Mean   | Std. Dev. |
| 3   | Gifted                        | ≥710   | 805.58 | 29.58     | ≥48,670 | 735.32 | 42.71     |
|   | Talented                      | ≥570   | 773.82 | 38.62     | ≥48,810 | 735.89 | 43.22     |
|   | Autism                        | ≥460   | 702.26 | 38.36     | ≥48,920 | 736.65 | 43.28     |
|   | Deaf-Blindness                | <50    | NR     | NR        | ≥49,380 | 736.33 | 43.36     |
|   | Developmental Delay           | ≥710   | 703.29 | 34.09     | ≥48,670 | 736.82 | 43.30     |
|   | Emotional Disturbance         | ≥50    | 711.25 | 38.18     | ≥49,330 | 736.36 | 43.36     |
|   | HI—Deaf                       | <50    | NR     | NR        | ≥49,360 | 736.34 | 43.36     |
|   | HI—Hard-of-Hearing            | ≥50    | 719.37 | 44.87     | ≥49,330 | 736.35 | 43.36     |
|   | Mild Mental Disability        | ≥400   | 686.30 | 24.47     | ≥48,980 | 736.74 | 43.25     |
|   | Moderate Mental Disability    | <50    | NR     | NR        | ≥49,380 | 736.34 | 43.36     |
|   | Orthopedic Impairment         | <50    | NR     | NR        | ≥49,340 | 736.35 | 43.36     |
|   | Other Health Impairment       | ≥650   | 709.81 | 37.75     | ≥48,730 | 736.69 | 43.32     |
|   | Specific Learning Disability  | ≥2,100 | 707.09 | 31.14     | ≥47,280 | 737.63 | 43.37     |
|   | Speech or Language Impairment | ≥1,750 | 736.22 | 43.01     | ≥47,630 | 736.33 | 43.38     |
|   | Traumatic Brain Injury        | <50    | NR     | NR        | ≥49,380 | 736.33 | 43.36     |
|   | Visual Impairment             | <50    | NR     | NR        | ≥49,350 | 736.34 | 43.37     |
|   | Other                         | <50    | NR     | NR        | ≥49,380 | 736.34 | 43.36     |
|   | HI—Hearing Impairment         | <50    | NR     | NR        | ≥49,380 | 736.33 | 43.36     |
|   | Unknown                       | <50    | NR     | NR        | ≥49,380 | 736.33 | 43.36     |
| 4   | Gifted                        | ≥930   | 800.60 | 24.78     | ≥48,040 | 741.47 | 35.44     |
|   | Talented                      | ≥910   | 772.97 | 31.75     | ≥48,060 | 742.02 | 36.02     |
|   | Autism                        | ≥410   | 715.13 | 35.85     | ≥48,560 | 742.83 | 36.10     |
|   | Deaf-Blindness                | <50    | NR     | NR        | ≥48,970 | 742.60 | 36.19     |
|   | Developmental Delay           | <50    | NR     | NR        | ≥48,940 | 742.62 | 36.18     |
|   | Emotional Disturbance         | ≥70    | 719.01 | 36.21     | ≥48,900 | 742.63 | 36.17     |
|   | HI—Deaf                       | <50    | NR     | NR        | ≥48,950 | 742.61 | 36.18     |
|   | HI—Hard-of-Hearing            | ≥50    | 717.24 | 35.61     | ≥48,920 | 742.62 | 36.18     |
|   | Mild Mental Disability        | ≥430   | 694.91 | 19.93     | ≥48,540 | 743.02 | 36.02     |
|   | Moderate Mental Disability    | <50    | NR     | NR        | ≥48,970 | 742.61 | 36.18     |
|   | Orthopedic Impairment         | ≥50    | 735.85 | 33.06     | ≥48,920 | 742.60 | 36.19     |
|   | Other Health Impairment       | ≥890   | 715.36 | 30.11     | ≥48,080 | 743.10 | 36.10     |
|   | Specific Learning Disability  | ≥2,640 | 715.76 | 25.88     | ≥46,330 | 744.13 | 36.09     |
|   | Speech or Language Impairment | ≥1,290 | 741.83 | 36.43     | ≥47,680 | 742.62 | 36.18     |
|   | Traumatic Brain Injury        | <50    | NR     | NR        | ≥48,970 | 742.60 | 36.19     |
|   | Visual Impairment             | <50    | NR     | NR        | ≥48,940 | 742.59 | 36.19     |
|   | Other                         | <50    | NR     | NR        | ≥48,970 | 742.60 | 36.19     |
|   | HI—Hearing Impairment         | <50    | NR     | NR        | ≥48,980 | 742.60 | 36.19     |
|   | Unknown                       | <50    | NR     | NR        | ≥48,980 | 742.60 | 36.19     |



| Special Education Classification Scale-Score Means and Standard Deviations: English Language Arts |                               |        |        |           |         |        |           |
|---|-------------------------------|--------|--------|-----------|---------|--------|-----------|
| Grade   | Group                         | Yes    |        |           | No      |        |           |
|   |                               | N      | Mean   | Std. Dev. | N       | Mean   | Std. Dev. |
| 5   | Gifted                        | ≥1,090 | 789.38 | 23.34     | ≥47,880 | 740.28 | 31.39     |
|   | Talented                      | ≥1,190 | 768.24 | 27.34     | ≥47,780 | 740.71 | 31.89     |
|   | Autism                        | ≥400   | 713.00 | 29.67     | ≥48,580 | 741.62 | 31.98     |
|   | Deaf-Blindness                | <50    | NR     | NR        | ≥48,980 | 741.38 | 32.06     |
|   | Developmental Delay           | ≥110   | 710.04 | 28.60     | ≥48,870 | 741.45 | 32.04     |
|   | Emotional Disturbance         | ≥110   | 715.76 | 30.22     | ≥48,860 | 741.44 | 32.05     |
|   | HI—Deaf                       | <50    | NR     | NR        | ≥48,960 | 741.39 | 32.06     |
|   | HI—Hard-of-Hearing            | ≥60    | 726.50 | 36.42     | ≥48,920 | 741.40 | 32.06     |
|   | Mild Mental Disability        | ≥430   | 691.90 | 16.90     | ≥48,550 | 741.82 | 31.82     |
|   | Moderate Mental Disability    | <50    | NR     | NR        | ≥48,970 | 741.39 | 32.06     |
|   | Orthopedic Impairment         | <50    | NR     | NR        | ≥48,940 | 741.39 | 32.07     |
|   | Other Health Impairment       | ≥1,010 | 714.32 | 27.09     | ≥47,970 | 741.95 | 31.92     |
|   | Specific Learning Disability  | ≥2,810 | 711.12 | 23.61     | ≥46,170 | 743.23 | 31.59     |
|   | Speech or Language Impairment | ≥950   | 742.20 | 32.68     | ≥48,020 | 741.37 | 32.05     |
|   | Traumatic Brain Injury        | <50    | NR     | NR        | ≥48,970 | 741.39 | 32.06     |
|   | Visual Impairment             | <50    | NR     | NR        | ≥48,940 | 741.40 | 32.06     |
|   | Other                         | <50    | NR     | NR        | ≥48,980 | 741.39 | 32.06     |
|   | HI—Hearing Impairment         | <50    | NR     | NR        | ≥48,980 | 741.38 | 32.07     |
| Unknown   | <50                           | NR     | NR     | ≥48,980   | 741.38  | 32.07  |           |
| 6   | Gifted                        | ≥1,150 | 790.83 | 24.25     | ≥48,290 | 738.15 | 31.74     |
|   | Talented                      | ≥1,400 | 766.99 | 28.26     | ≥48,040 | 738.57 | 32.34     |
|   | Autism                        | ≥300   | 717.22 | 31.43     | ≥49,150 | 739.51 | 32.54     |
|   | Deaf-Blindness                | <50    | NR     | NR        | ≥49,450 | 739.38 | 32.58     |
|   | Developmental Delay           | ≥50    | 710.17 | 26.46     | ≥49,400 | 739.41 | 32.57     |
|   | Emotional Disturbance         | ≥110   | 712.81 | 29.14     | ≥49,330 | 739.44 | 32.56     |
|   | HI—Deaf                       | <50    | NR     | NR        | ≥49,430 | 739.39 | 32.57     |
|   | HI—Hard-of-Hearing            | ≥50    | 724.04 | 27.27     | ≥49,400 | 739.39 | 32.58     |
|   | Mild Mental Disability        | ≥300   | 693.33 | 16.06     | ≥49,140 | 739.66 | 32.45     |
|   | Moderate Mental Disability    | <50    | NR     | NR        | ≥49,440 | 739.39 | 32.57     |
|   | Orthopedic Impairment         | <50    | NR     | NR        | ≥49,400 | 739.38 | 32.58     |
|   | Other Health Impairment       | ≥1,060 | 712.81 | 27.69     | ≥48,380 | 739.96 | 32.43     |
|   | Specific Learning Disability  | ≥2,910 | 710.90 | 22.91     | ≥46,540 | 741.16 | 32.26     |
|   | Speech or Language Impairment | ≥670   | 735.05 | 29.81     | ≥48,780 | 739.44 | 32.61     |
|   | Traumatic Brain Injury        | <50    | NR     | NR        | ≥49,430 | 739.39 | 32.58     |
|   | Visual Impairment             | <50    | NR     | NR        | ≥49,410 | 739.38 | 32.58     |
|   | Other                         | <50    | NR     | NR        | ≥49,450 | 739.38 | 32.58     |
|   | HI—Hearing Impairment         | <50    | NR     | NR        | ≥49,450 | 739.38 | 32.58     |
| Unknown   | <50                           | NR     | NR     | ≥49,450   | 739.38  | 32.58  |           |

| Special Education Classification Scale-Score Means and Standard Deviations: English Language Arts |                               |        |        |           |         |        |           |
|---|-------------------------------|--------|--------|-----------|---------|--------|-----------|
| Grade   | Group                         | Yes    |        |           | No      |        |           |
|   |                               | N      | Mean   | Std. Dev. | N       | Mean   | Std. Dev. |
| 7   | Gifted                        | ≥1,040 | 796.05 | 27.07     | ≥45,310 | 740.84 | 37.97     |
|   | Talented                      | ≥1,410 | 774.42 | 30.87     | ≥44,950 | 741.07 | 38.42     |
|   | Autism                        | ≥260   | 713.64 | 37.46     | ≥46,090 | 742.25 | 38.58     |
|   | Deaf-Blindness                | <50    | NR     | NR        | ≥46,360 | 742.08 | 38.64     |
|   | Developmental Delay           | <50    | NR     | NR        | ≥46,350 | 742.09 | 38.63     |
|   | Emotional Disturbance         | ≥160   | 703.20 | 34.92     | ≥46,190 | 742.22 | 38.58     |
|   | HI—Deaf                       | <50    | NR     | NR        | ≥46,340 | 742.10 | 38.63     |
|   | HI—Hard-of-Hearing            | ≥50    | 720.26 | 35.45     | ≥46,310 | 742.11 | 38.63     |
|   | Mild Mental Disability        | ≥220   | 680.21 | 20.16     | ≥46,130 | 742.39 | 38.46     |
|   | Moderate Mental Disability    | <50    | NR     | NR        | ≥46,350 | 742.09 | 38.63     |
|   | Orthopedic Impairment         | <50    | NR     | NR        | ≥46,310 | 742.10 | 38.63     |
|   | Other Health Impairment       | ≥1,020 | 706.12 | 31.78     | ≥45,330 | 742.90 | 38.39     |
|   | Specific Learning Disability  | ≥2,680 | 702.60 | 28.16     | ≥43,670 | 744.51 | 37.87     |
|   | Speech or Language Impairment | ≥420   | 735.87 | 36.19     | ≥45,940 | 742.14 | 38.65     |
|   | Traumatic Brain Injury        | <50    | NR     | NR        | ≥46,350 | 742.10 | 38.63     |
|   | Visual Impairment             | <50    | NR     | NR        | ≥46,320 | 742.10 | 38.63     |
|   | Other                         | <50    | NR     | NR        | ≥46,350 | 742.09 | 38.63     |
|   | HI—Hearing Impairment         | <50    | NR     | NR        | ≥46,360 | 742.08 | 38.64     |
|   | Unknown                       | <50    | NR     | NR        | ≥46,360 | 742.08 | 38.64     |
| 8   | Gifted                        | ≥1,280 | 801.63 | 27.17     | ≥49,540 | 744.17 | 37.57     |
|   | Talented                      | ≥1,580 | 777.10 | 33.74     | ≥49,240 | 744.61 | 38.13     |
|   | Autism                        | ≥300   | 720.19 | 40.07     | ≥50,520 | 745.77 | 38.35     |
|   | Deaf-Blindness                | <50    | NR     | NR        | ≥50,820 | 745.62 | 38.41     |
|   | Developmental Delay           | <50    | NR     | NR        | ≥50,820 | 745.62 | 38.42     |
|   | Emotional Disturbance         | ≥170   | 705.28 | 29.61     | ≥50,640 | 745.76 | 38.37     |
|   | HI—Deaf                       | <50    | NR     | NR        | ≥50,800 | 745.64 | 38.41     |
|   | HI—Hard-of-Hearing            | ≥50    | 728.43 | 39.71     | ≥50,770 | 745.64 | 38.41     |
|   | Mild Mental Disability        | ≥210   | 688.72 | 21.71     | ≥50,610 | 745.86 | 38.29     |
|   | Moderate Mental Disability    | <50    | NR     | NR        | ≥50,820 | 745.62 | 38.41     |
|   | Orthopedic Impairment         | ≥60    | 732.00 | 41.80     | ≥50,760 | 745.63 | 38.41     |
|   | Other Health Impairment       | ≥1,160 | 711.98 | 31.52     | ≥49,660 | 746.40 | 38.21     |
|   | Specific Learning Disability  | ≥2,900 | 706.71 | 26.68     | ≥47,920 | 747.97 | 37.75     |
|   | Speech or Language Impairment | ≥300   | 737.35 | 36.35     | ≥50,520 | 745.67 | 38.42     |
|   | Traumatic Brain Injury        | <50    | NR     | NR        | ≥50,810 | 745.62 | 38.42     |
|   | Visual Impairment             | <50    | NR     | NR        | ≥50,800 | 745.62 | 38.41     |
|   | Other                         | <50    | NR     | NR        | ≥50,820 | 745.62 | 38.41     |
|   | HI—Hearing Impairment         | <50    | NR     | NR        | ≥50,820 | 745.62 | 38.41     |
|   | Unknown                       | <50    | NR     | NR        | ≥50,820 | 745.62 | 38.41     |

Table 10.27 Special Education Classification Scale-Score Means and Standard Deviations: Mathematics

| Special Education Classification Scale-Score Means and Standard Deviations: Mathematics |                               |        |        |           |         |        |           |
|---|-------------------------------|--------|--------|-----------|---------|--------|-----------|
| Grade   | Group                         | Yes    |        |           | No      |        |           |
|   |                               | N      | Mean   | Std. Dev. | N       | Mean   | Std. Dev. |
| 3   | Gifted                        | ≥710   | 791.30 | 22.77     | ≥48,680 | 735.87 | 32.57     |
|   | Talented                      | ≥570   | 761.19 | 28.74     | ≥48,820 | 736.38 | 33.06     |
|   | Autism                        | ≥450   | 715.46 | 34.23     | ≥48,930 | 736.86 | 33.04     |
|   | Deaf-Blindness                | <50    | NR     | NR        | ≥49,390 | 736.66 | 33.12     |
|   | Developmental Delay           | ≥720   | 712.26 | 30.17     | ≥48,670 | 737.03 | 33.02     |
|   | Emotional Disturbance         | ≥50    | 711.14 | 27.28     | ≥49,340 | 736.69 | 33.11     |
|   | HI—Deaf                       | <50    | NR     | NR        | ≥49,370 | 736.67 | 33.11     |
|   | HI—Hard-of-Hearing            | ≥50    | 727.52 | 33.51     | ≥49,340 | 736.67 | 33.12     |
|   | Mild Mental Disability        | ≥400   | 696.21 | 20.07     | ≥48,990 | 736.99 | 33.00     |
|   | Moderate Mental Disability    | <50    | NR     | NR        | ≥49,380 | 736.67 | 33.11     |
|   | Orthopedic Impairment         | <50    | NR     | NR        | ≥49,340 | 736.68 | 33.11     |
|   | Other Health Impairment       | ≥650   | 715.43 | 30.69     | ≥48,740 | 736.95 | 33.06     |
|   | Specific Learning Disability  | ≥2,110 | 714.46 | 24.79     | ≥47,280 | 737.66 | 33.09     |
|   | Speech or Language Impairment | ≥1,760 | 739.78 | 32.57     | ≥47,630 | 736.55 | 33.13     |
|   | Traumatic Brain Injury        | <50    | NR     | NR        | ≥49,390 | 736.66 | 33.12     |
|   | Visual Impairment             | <50    | NR     | NR        | ≥49,360 | 736.67 | 33.12     |
|   | Other                         | <50    | NR     | NR        | ≥49,380 | 736.67 | 33.11     |
|   | HI—Hearing Impairment         | <50    | NR     | NR        | ≥49,390 | 736.66 | 33.12     |
|   | Unknown                       | <50    | NR     | NR        | ≥49,390 | 736.66 | 33.12     |
| 4   | Gifted                        | ≥930   | 791.73 | 23.08     | ≥48,030 | 735.30 | 32.18     |
|   | Talented                      | ≥910   | 760.01 | 29.13     | ≥48,050 | 735.93 | 32.85     |
|   | Autism                        | ≥410   | 719.07 | 33.30     | ≥48,550 | 736.53 | 32.90     |
|   | Deaf-Blindness                | <50    | NR     | NR        | ≥48,960 | 736.38 | 32.94     |
|   | Developmental Delay           | <50    | NR     | NR        | ≥48,930 | 736.40 | 32.94     |
|   | Emotional Disturbance         | ≥70    | 716.16 | 34.52     | ≥48,880 | 736.41 | 32.93     |
|   | HI—Deaf                       | <50    | NR     | NR        | ≥48,940 | 736.39 | 32.94     |
|   | HI—Hard-of-Hearing            | ≥50    | 724.69 | 26.32     | ≥48,910 | 736.39 | 32.95     |
|   | Mild Mental Disability        | ≥430   | 696.35 | 16.25     | ≥48,530 | 736.74 | 32.84     |
|   | Moderate Mental Disability    | <50    | NR     | NR        | ≥48,950 | 736.39 | 32.94     |
|   | Orthopedic Impairment         | ≥50    | 729.25 | 32.23     | ≥48,910 | 736.39 | 32.94     |
|   | Other Health Impairment       | ≥890   | 713.08 | 26.56     | ≥48,070 | 736.81 | 32.89     |
|   | Specific Learning Disability  | ≥2,640 | 712.65 | 21.99     | ≥46,320 | 737.73 | 32.95     |
|   | Speech or Language Impairment | ≥1,290 | 738.09 | 33.45     | ≥47,660 | 736.33 | 32.93     |
|   | Traumatic Brain Injury        | <50    | NR     | NR        | ≥48,950 | 736.38 | 32.94     |
|   | Visual Impairment             | <50    | NR     | NR        | ≥48,920 | 736.38 | 32.95     |
|   | Other                         | <50    | NR     | NR        | ≥48,960 | 736.38 | 32.94     |
|   | HI—Hearing Impairment         | <50    | NR     | NR        | ≥48,960 | 736.38 | 32.94     |
|   | Unknown                       | <50    | NR     | NR        | ≥48,960 | 736.38 | 32.94     |

| Special Education Classification Scale-Score Means and Standard Deviations: Mathematics |                               |        |        |           |         |        |           |
|---|-------------------------------|--------|--------|-----------|---------|--------|-----------|
| Grade   | Group                         | Yes    |        |           | No      |        |           |
|   |                               | N      | Mean   | Std. Dev. | N       | Mean   | Std. Dev. |
| 5   | Gifted                        | ≥1,090 | 785.98 | 22.86     | ≥47,800 | 731.65 | 30.46     |
|   | Talented                      | ≥1,190 | 755.79 | 28.58     | ≥47,700 | 732.30 | 31.21     |
|   | Autism                        | ≥400   | 715.06 | 27.71     | ≥48,490 | 733.02 | 31.35     |
|   | Deaf-Blindness                | <50    | NR     | NR        | ≥48,890 | 732.87 | 31.36     |
|   | Developmental Delay           | ≥110   | 713.15 | 23.51     | ≥48,780 | 732.92 | 31.36     |
|   | Emotional Disturbance         | ≥110   | 713.53 | 28.82     | ≥48,780 | 732.92 | 31.35     |
|   | HI—Deaf                       | <50    | NR     | NR        | ≥48,870 | 732.88 | 31.36     |
|   | HI—Hard-of-Hearing            | ≥60    | 730.10 | 34.60     | ≥48,830 | 732.88 | 31.36     |
|   | Mild Mental Disability        | ≥430   | 700.34 | 14.35     | ≥48,460 | 733.16 | 31.32     |
|   | Moderate Mental Disability    | <50    | NR     | NR        | ≥48,890 | 732.88 | 31.36     |
|   | Orthopedic Impairment         | <50    | NR     | NR        | ≥48,850 | 732.88 | 31.37     |
|   | Other Health Impairment       | ≥1,010 | 713.35 | 23.07     | ≥47,880 | 733.28 | 31.38     |
|   | Specific Learning Disability  | ≥2,810 | 711.77 | 19.21     | ≥46,080 | 734.16 | 31.50     |
|   | Speech or Language Impairment | ≥950   | 736.43 | 32.59     | ≥47,940 | 732.80 | 31.33     |
|   | Traumatic Brain Injury        | <50    | NR     | NR        | ≥48,890 | 732.88 | 31.36     |
|   | Visual Impairment             | <50    | NR     | NR        | ≥48,850 | 732.89 | 31.36     |
|   | Other                         | <50    | NR     | NR        | ≥48,890 | 732.88 | 31.36     |
|   | HI—Hearing Impairment         | <50    | NR     | NR        | ≥48,890 | 732.87 | 31.36     |
|   | Unknown                       | <50    | NR     | NR        | ≥48,890 | 732.87 | 31.36     |
| 6   | Gifted                        | ≥1,150 | 783.95 | 22.98     | ≥48,230 | 729.02 | 30.09     |
|   | Talented                      | ≥1,400 | 751.47 | 27.31     | ≥47,980 | 729.69 | 30.96     |
|   | Autism                        | ≥300   | 715.99 | 31.25     | ≥49,090 | 730.40 | 31.05     |
|   | Deaf-Blindness                | <50    | NR     | NR        | ≥49,390 | 730.31 | 31.08     |
|   | Developmental Delay           | ≥50    | 706.25 | 24.36     | ≥49,340 | 730.34 | 31.07     |
|   | Emotional Disturbance         | ≥110   | 707.91 | 25.49     | ≥49,270 | 730.36 | 31.07     |
|   | HI—Deaf                       | <50    | NR     | NR        | ≥49,370 | 730.32 | 31.07     |
|   | HI—Hard-of-Hearing            | ≥50    | 718.40 | 24.67     | ≥49,340 | 730.32 | 31.08     |
|   | Mild Mental Disability        | ≥300   | 690.23 | 13.90     | ≥49,080 | 730.56 | 30.99     |
|   | Moderate Mental Disability    | <50    | NR     | NR        | ≥49,380 | 730.32 | 31.07     |
|   | Orthopedic Impairment         | <50    | NR     | NR        | ≥49,340 | 730.32 | 31.08     |
|   | Other Health Impairment       | ≥1,060 | 708.83 | 24.11     | ≥48,330 | 730.78 | 31.05     |
|   | Specific Learning Disability  | ≥2,910 | 705.93 | 20.07     | ≥46,470 | 731.84 | 31.01     |
|   | Speech or Language Impairment | ≥670   | 727.90 | 29.76     | ≥48,710 | 730.34 | 31.09     |
|   | Traumatic Brain Injury        | <50    | NR     | NR        | ≥49,370 | 730.32 | 31.08     |
|   | Visual Impairment             | <50    | NR     | NR        | ≥49,350 | 730.31 | 31.08     |
|   | Other                         | <50    | NR     | NR        | ≥49,380 | 730.31 | 31.07     |
|   | HI—Hearing Impairment         | <50    | NR     | NR        | ≥49,390 | 730.31 | 31.08     |
|   | Unknown                       | <50    | NR     | NR        | ≥49,390 | 730.31 | 31.08     |

| Special Education Classification Scale-Score Means and Standard Deviations: Mathematics |                               |        |        |           |         |         |           |
|---|-------------------------------|--------|--------|-----------|---------|---------|-----------|
| Grade   | Group                         | Yes    |        |           | No      |         |           |
|   |                               | N      | Mean   | Std. Dev. | N       | Mean    | Std. Dev. |
| 7   | Gifted                        | ≥1,150 | 778.25 | 23.15     | ≥49,940 | 729.10  | 26.97     |
|   | Talented                      | ≥1,600 | 749.58 | 25.17     | ≥49,490 | 729.59  | 27.72     |
|   | Autism                        | ≥280   | 716.25 | 27.68     | ≥50,810 | 730.29  | 27.85     |
|   | Deaf-Blindness                | <50    | NR     | NR        | ≥51,100 | 730.21  | 27.86     |
|   | Developmental Delay           | <50    | NR     | NR        | ≥51,100 | 730.22  | 27.86     |
|   | Emotional Disturbance         | ≥160   | 708.24 | 26.16     | ≥50,930 | 730.29  | 27.84     |
|   | HI—Deaf                       | <50    | NR     | NR        | ≥51,080 | 730.22  | 27.86     |
|   | HI—Hard-of-Hearing            | ≥50    | 724.26 | 29.41     | ≥51,050 | 730.22  | 27.86     |
|   | Mild Mental Disability        | ≥260   | 692.71 | 14.15     | ≥50,840 | 730.41  | 27.79     |
|   | Moderate Mental Disability    | <50    | NR     | NR        | ≥51,090 | 730.22  | 27.86     |
|   | Orthopedic Impairment         | ≥50    | 715.63 | 29.61     | ≥51,050 | 730.23  | 27.86     |
|   | Other Health Impairment       | ≥1,140 | 707.86 | 22.43     | ≥49,960 | 730.73  | 27.77     |
|   | Specific Learning Disability  | ≥3,080 | 705.40 | 19.30     | ≥48,010 | 731.81  | 27.57     |
|   | Speech or Language Impairment | ≥440   | 726.38 | 26.63     | ≥50,650 | 730.25  | 27.87     |
|   | Traumatic Brain Injury        | <50    | NR     | NR        | ≥51,090 | 730.22  | 27.86     |
|   | Visual Impairment             | <50    | NR     | NR        | ≥51,060 | 730.22  | 27.87     |
|   | Other                         | <50    | NR     | NR        | ≥51,100 | 730.22  | 27.86     |
|   | HI—Hearing Impairment         | <50    | NR     | NR        | ≥51,100 | 730.21  | 27.86     |
|   | Unknown                       | <50    | NR     | NR        | ≥51,100 | 730.21  | 27.86     |
|   | 8                             | Gifted | ≥560   | 787.51    | 32.69   | ≥44,420 | 723.50    |
| Talented  |                               | ≥1,140 | 747.57 | 32.20     | ≥43,840 | 723.69  | 35.16     |
| Autism  |                               | ≥280   | 708.42 | 35.82     | ≥44,700 | 724.40  | 35.26     |
| Deaf-Blindness  |                               | <50    | NR     | NR        | ≥44,980 | 724.30  | 35.29     |
| Developmental Delay   |                               | <50    | NR     | NR        | ≥44,980 | 724.30  | 35.29     |
| Emotional Disturbance   |                               | ≥170   | 690.94 | 28.75     | ≥44,810 | 724.43  | 35.25     |
| HI—Deaf   |                               | <50    | NR     | NR        | ≥44,960 | 724.31  | 35.29     |
| HI—Hard-of-Hearing  |                               | <50    | NR     | NR        | ≥44,940 | 724.32  | 35.29     |
| Mild Mental Disability  |                               | ≥210   | 680.60 | 20.75     | ≥44,770 | 724.51  | 35.22     |
| Moderate Mental Disability  |                               | <50    | NR     | NR        | ≥44,980 | 724.30  | 35.29     |
| Orthopedic Impairment   |                               | ≥50    | 719.20 | 33.79     | ≥44,930 | 724.31  | 35.29     |
| Other Health Impairment   |                               | ≥1,130 | 699.49 | 29.78     | ≥43,850 | 724.94  | 35.19     |
| Specific Learning Disability  |                               | ≥2,860 | 695.96 | 25.61     | ≥42,120 | 726.23  | 35.03     |
| Speech or Language Impairment   |                               | ≥280   | 718.84 | 34.84     | ≥44,700 | 724.34  | 35.29     |
| Traumatic Brain Injury  |                               | <50    | NR     | NR        | ≥44,980 | 724.31  | 35.29     |
| Visual Impairment   |                               | <50    | NR     | NR        | ≥44,960 | 724.31  | 35.28     |
| Other   |                               | <50    | NR     | NR        | ≥44,980 | 724.31  | 35.29     |
| HI—Hearing Impairment   |                               | <50    | NR     | NR        | ≥44,990 | 724.30  | 35.29     |
| Unknown   | <50                           | NR     | NR     | ≥44,990   | 724.30  | 35.29   |           |

## 10.5 Mode Effect Study

It is also important to evaluate fairness in test administration in addition to evaluating fairness by examining performance among subgroups. The 2022 LEAP 2025 ELA and mathematics tests were administered as both paper-based tests (PBTs) and computer-based tests (CBTs) for grade 3. The *Standards* indicate that results across different testing modes should be comparable. The mode comparability for the 2022 LEAP 2025 CBT and PBT in grades 3 and 4 was investigated using the following steps:

- The mode effect study was performed using the CBT as the focal group and the PBT as the reference group.
- The study was based on equivalent groups design. Equivalent PBT students that match CBT students were selected using propensity score matching (PSM).
- At the item level, DIF analysis was performed using the PSM samples.
- At the test level, ESs based on difference scores of scale scores between the CBT and the PBT were used to examine the mode effect.
- Similar to PARCC's decision to not apply a mode adjustment, the LDOE also decided to not apply any mode adjustment to the LEAP 2025.

### 10.5.1 Mode Study by Propensity Score Matching

The CBT was administered to a smaller number of students than the PBT in grade 3; therefore, the CBT was designated as the focal group for PSM (Rosenbaum & Rubin, 1983) and the PBT was considered the reference group. That is, all CBT students and their matching PBT students were selected using covariates (matching variables), such as the 2019 LEAP 2025 ELA and mathematics scale scores and the 2022 bio-demographic information, such as gender, ethnicity, economically disadvantaged, accommodations, and ELL. Only scale scores of the grade 3 students who took the 2019 PBT were used in this study as there are no LEAP 2025 grade 2 tests. Therefore, school means from the 2019 grade 3 tests were used to match with 2022 LEAP 2025 grade 3 school means.

Table 10.28 shows the number of equivalent CBT and PBT students matched by the PSM method. Only 2022 grade 3 students who have bio-demographic information of the spring 2022 administration and spring 2019 school means were included in the matching. In the spring 2022 administration, 16,157 students took mathematics CBT form and 16,210 students took ELA CBT form. About 33,000 students took PBT form.

For mathematics, of the 33,237 PBT students, 15,265 were selected (a number equivalent to the number of CBT students) by considering all covariates. For ELA, of the 33,259 PBT students, 15,269 were selected by considering all covariates.

**Table 10.28 Number of Students Used for Propensity Score Matching**

| Content     | Grade | CBT     | PBT     |          |
|-------------|-------|---------|---------|----------|
|             |       | Total*  | Total*  | Selected |
| Mathematics | 3     | ≥16,150 | ≥33,230 | ≥15,260  |
| ELA         | 3     | ≥16,210 | ≥33,250 | ≥15,260  |

\*Total: Number of students who have information for all covariates

At the item level, DIF analysis was performed using the MH statistic by Holland and Thayer (1988). There were unique items in each ELA CBT and PBT forms, and these items were dropped from analysis. Table 10.29 shows the number of mode DIF items flagged using the same rules that are used in NAEP. For mathematics, there were two C+ items. There was one item each in C+ and B- for ELA. The negative sign indicates the CBT item was more difficult than the same PBT item.

**Table 10.29 2022 LEAP 2025 Mode DIF Statistics: Number of Flagged Items**

| Content     | Grade | N of Items | DIF |   |    |   |
|-------------|-------|------------|-----|---|----|---|
|             |       |            | -C  | C | -B | B |
| Mathematics | 3     | 43         |     | 2 |    |   |
| ELA         | 3     | 20         |     | 1 | 1  |   |

Item raw scores of matched CBT and PBTY students were used, and their difference item scores were calculated. ESs of the difference item scores were calculated as follows:

$$ES = (CBT \text{ Mean} - PBT \text{ Mean}) / \sqrt{(CBT \text{ VAR} + PBT \text{ VAR})/2}, \text{ where } VAR = SD^2.$$

Table 10.30 (mathematics) and Table 10.31 (ELA) show the mean item scores and standard deviations for the CBT and PBT administrations for the flagged items. When a flag criterion of  $|0.2|$ , which can be considered a small difference criterion, was applied, 3 items were flagged for mathematics and 1 item was flagged for ELA. LDOE and DRC content experts did not find any mode-difference evidence for the flagged items. Therefore, these flagged items were treated as mode-neutral items.

**Table 10.30 Mode Study Scale Score Differences and Effect Size: Mathematics Grade 3**

| Item ID | PBT  |           | CBT  |           | Mean Diff PBS-CBT | ES   | Flag >  0.2 |
|---------|------|-----------|------|-----------|-------------------|------|-------------|
|         | Mean | Std. Dev. | Mean | Std. Dev. |                   |      |             |
| 981736  | 1.32 | 1.23      | 0.98 | 1.13      | 0.34              | 0.29 | YES         |
| 981744  | 0.88 | 1.14      | 0.66 | 1.00      | 0.22              | 0.20 | YES         |
| 981747  | 2.29 | 1.88      | 1.88 | 1.65      | 0.41              | 0.23 | YES         |

**Table 10.31 Mode Study Scale Score Differences and Effect Size: ELA Grade 3**

| Item ID | PBT  |           | CBT  |           | Mean Diff<br>PBS-CBT | ES   | Flag> 0.2 |
|---------|------|-----------|------|-----------|----------------------|------|-----------|
|         | Mean | Std. Dev. | Mean | Std. Dev. |                      |      |           |
| 982123  | 1.50 | 0.81      | 1.17 | 0.94      | 0.32                 | 0.37 | YES       |

## 10.6 Summary

In summary, the overall purpose of this chapter is to address fairness concerns that are relevant to the administration of LEAP 2025 assessments. The information in this chapter addresses multiple best practices of the testing industry and is particularly related to the following 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 3.3** Those responsible for test development should include relevant subgroups in validity, reliability/precision, and other preliminary studies used when constructing the test (64).

**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).

**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 (65).

**Standard 3.16** When credible research indicates that test scores for some relevant subgroups are differentially affected by construct-irrelevant characteristics of the test or of the examinees, when legally permissible, test users should use the test only for those subgroups for which there is sufficient evidence of validity to support score interpretations for the intended uses (70).



## Appendix A—Accommodated Print and Braille Creation

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### ***Guidelines for Accommodated Print and Braille***

Louisiana believes that all students requiring test accommodations should be presented with the same rigor as students taking tests without accommodations. To ensure this, Louisiana accommodates the operational test form for each test administration, allowing all students to take the same items regardless of the need for an accommodated presentation. Careful consideration is given to all items that are used for Louisiana assessments for their ability to be faithfully represented in accommodated print (AP) and/or braille formats. Fairness for all populations, item integrity, and student-item interaction for technology-enhanced (TE) items are all factors when selecting the items that will appear on a Louisiana form. TE items are modified so that students who interact with an item on an AP or braille form will have a similar and equivalent experience to students who interact with that same item in the online environment. This maintains both the rigor and the content being assessed. Some examples of the modification process are provided below.

- Drag-and-drop items in the online environment require a student to place the answer options in an interactive table. For the AP and braille forms, the student is presented with a table with the same information as the interactive table (column or row headers, any completed cells, and blank spaces) and the answer options are listed below the table (similar to the online form in which the options are listed either below or to the right of the table). The directions are modified to ask the student to write the correct answer in its corresponding box. Students are also able to circle the text and draw arrows to indicate where it should be placed or add labels to the answer choices and write only the label in the box, as long as the intended response is clear to the test administrator who will transcribe the answers into the online system.
- Matching items in the online environment require a student to select a checkbox in one or more columns for each of multiple rows. In the AP and braille forms, the student is provided with a table and asked to mark an X in the correct places.
- Highlight-text items or item parts in the online environment require a student to click on the selected text, which highlights the selected word, phrase, or sentence. In the AP and braille forms, the text is presented in the same format and the student is asked to circle the answer. Where only certain words or phrases are selectable in the online system, those options are underlined in the AP and braille forms to indicate which words and/or phrases the student should select from.
- Drop-down menu items in the online environment have answer options in a drop-down menu format, oftentimes as part of a complete sentence. The AP and braille forms display the item with a blank line in place of the drop-down menu in the sentence, with all the answer options for the drop-down menu presented vertically below the sentence. The directions are then modified to ask the student to circle the word/phrase that belongs in the blank.
- Short answer items in the online environment require a student to type the answer in a box. In the AP and braille forms, a box is provided for the student to write the response.
- Keypad input items in the online environment require a student to enter a numeric response including all rational and irrational numbers as well as expressions and equations. In the AP and braille forms, a box is provided for the student to write the response.
- Graphing items, including coordinate planes, number lines, line plots, and bar graphs, in the online environment require a student to complete a graph by plotting points, adding Xs to create a line plot, or

raising/lowering bars to create a bar graph or histogram. In the AP and braille forms, the student is provided with the same coordinate plane, number line, line plot, or bar graph as in the online item, including titles, axis labels, and keys, and is asked to complete the graph.

Displaying items similarly in accommodated print and braille forms and in the online environment (and allowing students to interact with the items in a similar manner) maintains item integrity by assessing a similar construct in a similar manner regardless of where a student encounters an item. This provides students who are unable to access the assessment online with an assessment at the same level of rigor as the online test.

AP forms are thoroughly reviewed by DRC and LDOE content experts, and braille forms are reviewed by an outside third-party braille expert. Students respond to their accommodated print and braille test using the same online test as used by the general population, either through use of a scribe or by themselves if able. This ensures a valid and reliable assessment for students who are unable to participate in the online assessment.

## Appendix B—Transadaptation Process for Spanish Mathematics Forms

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For English Learners, the LDOE offers the mathematics assessments in Spanish for both computer-based tests (CBT) in all grades and paper-based tests (PBT) in grades 3 and 4 only to mirror the English language forms, the text-to-speech (TTS) for CBT and large print and human voice audio CDs for PBT forms. The Spanish language versions of the test were developed through transadaptation. Transadaptation takes into consideration the grade-level appropriateness of the words and sentence structures used and the linguistic and cultural differences that exist between speakers of two different languages. Accounting for these differences allows experts to ensure that a Spanish language version of an item will measure the same construct as the English-language version of the item at the same level of rigor. The item is therefore expected to measure the achievement of English learners in the same way that the English version of the item does for native speakers of English.

Once the operational form was approved in English, DRC provided item IDs for acquired items to New Meridian, who then identified which of those items had previously appeared on a Spanish transadapted form. Once New Meridian identified the items that had previously been transadapted and provided the transadaptations of those items, DRC identified the English version of all items that had not been previously transadapted (either because they were Louisiana-owned items that would appear in field-test positions or because they were acquired items that had not been previously used on a Spanish-language form by PARCC). These items were then provided to the Spanish transadaptation subcontractor for initial transadaptation. DRC's Spanish Test Development Team reviewed the previously transadapted items to ensure consistency between those items transadapted as part of the PARCC assessments and those transadapted specifically for Louisiana. The team provided guidance to the translator conducting the initial transadaptation in grade-level and culturally appropriate ways. Upon completion of the transadaptation by the subcontractor, DRC's Spanish Test Development team conducted reviews by native Spanish speakers for content and grade-level appropriateness of the transadaptation. The team also conducted an editorial review. At least two members of DRC's Spanish Test Development team compared each English item to the Spanish transadaptation to ensure that the transadaptation:

- was accurate;
- contained grade-appropriate wording;
- contained answer choices that were reasonably parallel;
- did not introduce ambiguity into the Spanish version;
- contained graphics that were clearly transadapted;
- did not alter current teaching and learning practices in the content area; and
- remained free of gender, ethnic, cultural, socioeconomic, and regional bias.

The Spanish Test Development team then reconciled any discrepancies and submitted the transadaptations to a senior Spanish Test Development team member for resolution. After approval by the senior Spanish Test Development team member, the item moved forward to be imported into DRC's item banking system.

Both previously transadapted items and newly transadapted items were imported into DRC's item banking system and formatted for online use. Each Spanish item was paired with the corresponding English item in the item bank, and the Spanish item was formatted. Graphics for the item were then finalized for review. The

finalized transadaptation was then compared to the Spanish version of the item in the DRC assessment system and the English version of the item, and all changes were verified.

DRC's Spanish Test Development team then used the final, approved communication assistance scripts in English to transadapt descriptions of graphics as necessary. These descriptions were used when preparing the TTS forms for review. Scripting the TTS forms and reviewing the finalized Spanish forms were conducted by native Spanish speakers at DRC prior to submitting the forms to the LDOE for a translation review by a third-party translation vendor. The vendor reviewed the transadapted forms and provided feedback to the LDOE and DRC. Experienced DRC Spanish Test Development team members and the translation vendor resolved any issues, and DRC made modifications as necessary. The forms were then approved by both DRC and the LDOE translation vendor.

## Appendix C—LEAP 2025 Spring 2022 Handscoring/AI Documentation

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## Appendix D—Quality Control References

| Related Information                                  |  | Related Chapter/Source                      |
|--|--|---|
| <b>Test Materials</b>                                |  |   |
| Item development quality procedures                  | Content alignment<br>Cognitive complexity<br>Difficult<br>Bias, fairness, and sensitivity<br>Technical design                | Chapter 3                                   |
| Form development quality procedures                  | Test specifications<br>Review of statistical quality of items  | Chapter 3                                   |
| <b>Test Administration</b>                           |  |   |
| Test administration training and procedures          | Training and monitoring of test administrators<br>Security Checklists<br>Test Security Measurements                          | Chapter 4                                   |
| Monitoring test administrations                      | LDOE site audits<br>Data Forensics Analysis<br>Response-Change Analysis<br>Web Monitoring<br>Plagiarism Detection            | Chapter 4                                   |
| <b>Scoring</b>                                       |  |   |
| Scorer recruitment, training and security procedures | Recruitment and interview process<br>Security<br>Training process, including material development and qualifying procedures. | Chapter 5<br>Appendix C                     |
| Monitoring scoring quality                           | Inter-rater reliability studies<br>Validity<br>Reader monitoring   | Chapter 5<br>Appendix C                     |
| <b>Psychometric Processes</b>                        |  |   |
| Psychometric quality procedures                      | Specifications document for operational analysis   | Internal document between DRC and the LDOE. |
| Monitoring psychometric quality                      | Key verification<br>Calibration<br>Scoring table generation<br>Psychometric quality checks on the data                       | Chapter 6                                   |
| Performance-Level Setting                            | Quality-controlled procedures for performance-level setting<br>Derivation of the cut scores                                  | Chapter 8                                   |

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