2021 Legacy MCAS Technical Report

9/13/22

Prepared by Cognia and the
Massachusetts Department of Elementary and Secondary Education

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CHAPTER 1. OVERVIEW

1.1 Purposes of the MCAS

This is the 2021 **Legacy** MCAS Technical Report, which is a companion to the 2021 **Next Generation** MCAS Technical report available at www.doe.mass.edu/mcas/tech/?section=techreports. While several hundred legacy tests are expected to be administered in 2022 and 2023, this will be the final edition of the annual Legacy technical report that describes the technical specifications for the first version of MCAS. While many psychometric qualities will continue, the paper-and-pencil-based version of the state tests first administered in 1998 has been replaced by online tests reported with new standards for grade-level expectations and scaled scores from 440 to 560.

The Massachusetts Comprehensive Assessment System (MCAS) was developed in response to provisions in the Massachusetts Education Reform Act of 1993, which established greater and more equitable funding to schools, accountability for student learning, and statewide standards and assessments for students, educators, schools, and districts. The Act specifies that the testing program must

- assess all students who are educated with Massachusetts public funds in designated grades, including students with disabilities and English learner (EL) students;
- measure performance based on the learning standards in the Massachusetts curriculum frameworks (the current Massachusetts curriculum frameworks are posted on the Massachusetts Department of Elementary and Secondary Education [DESE] website at www.doe.mass.edu/frameworks/current.html); and
- report on the performance of individual students, schools, districts, and the state.

The Massachusetts Education Reform Act also stipulates that students earn a Competency Determination (CD) by passing grade 10 tests in English language arts (ELA), mathematics, and science and technology/engineering (STE) as one condition of eligibility for a Massachusetts high school diploma.

To fulfill the requirements of the Act, the MCAS is designed to

- measure student, school, and district performance in meeting the state's learning standards as detailed in the Massachusetts curriculum frameworks;
- provide measures of student achievement that will lead to improvements in student outcomes; and
- help determine ELA, mathematics, and STE competency for the awarding of high school diplomas.

Additionally, MCAS results are used to fulfill federal requirements by contributing to school and district accountability determinations.

1.2 Purpose of This Report

The purpose of this 2021 Legacy MCAS Technical Report is to document the technical quality and characteristics of the legacy MCAS operational tests that were administered in 2021: the STE tests in high school. The report presents evidence of the validity and reliability of test score interpretations, and

describes modifications made to the MCAS program in 2021. A companion document, the 2021 Next-Generation MCAS and MCAS-Alt Technical Report, provides information regarding the next-generation MCAS tests administered in 2021 in grades 3–8 and 10 ELA and mathematics and grades 5 and 8 STE.

Technical reports for previous testing years are made available by the DESE at www.doe.mass.edu/mcas/tech/?section=techreports. The previous technical reports, as well as other documents referenced in this report, provide additional background information about the MCAS program, its development, and administration.

This report is primarily intended for experts in psychometrics and educational measurement. It assumes a working knowledge of measurement concepts, such as reliability and validity, as well as statistical concepts of correlation and central tendency. For some sections, the reader is presumed to have basic familiarity with advanced topics in measurement and statistics, such as item response theory (IRT) and factor analysis.

1.3 Organization of This Report

This report provides detailed information regarding test design and development, scoring, and analysis and reporting of 2021 legacy MCAS results at the student, school, district, and state levels. This detailed information includes, but is not limited to, the following:

- an explanation of test administration
- an explanation of equating and scaling of tests
- statistical and psychometric summaries
    - item analyses
    - reliability evidence
    - validity evidence

In addition, the appendices contain detailed item-level and summary statistics related to each 2021 legacy MCAS test and its results.

Chapter 1 of this report provides a brief overview of what is documented within the report, including updates made to the MCAS program during 2021. Chapter 2 explains the guiding philosophy, purposes, uses, components, and validity of the MCAS. Chapter 3 covers test design and development, test administration, scoring, and analysis and reporting of results for the tests, including information about characteristics of test items, how scores were calculated, the reliability of the scores, how scores were reported, and the validity of results. Numerous appendices, which appear after Chapter 3, are referenced throughout the report.

1.4 Current Year Updates

In 2017, Massachusetts began a transition from the legacy paper-based MCAS tests (administered since 1998) to next-generation MCAS tests administered primarily via computer. The 2021 MCAS administration marked a continuation of that transition.

Table 1-1 shows which MCAS tests were administered at each grade level in spring 2021 and whether the tests were next-generation (NG) or legacy (L) assessments. As the table shows, legacy MCAS tests continued to be used in 2021 for all high school STE assessments.

Table 1-1. Spring 2021 MCAS Tests Administered, by Grade Level

Content Area	Grade Level								Retest
	3	4	5	6	7	8	9	10	
English Language Arts	NG	NG	NG	NG	NG	NG		NG	L*
Mathematics	NG	NG	NG	NG	NG	NG		NG	L*
Science and Technology/Engineering			NG			NG	L*	L*	

**Students may take one of four high school STE tests offered in biology, chemistry, introductory physics, and technology/engineering in grade 9 or grade 10. Results of the grades 9 and 10 tests are summarized and reported in grade 10.*

Because of the continuing transition, DESE has again, in 2021, published two separate technical reports for the MCAS assessments. This document focuses on the legacy MCAS assessments administered in high school STE and the retests in grade 10 ELA and mathematics.

The 2021 Legacy MCAS Technical Report will be the final document focused on the legacy MCAS. Legacy tests are expected to be offered for high school biology in February 2022 and for high school chemistry and technology/engineering in June 2022 and 2023, but a separate Legacy MCAS Technical Report will not be published for 2022.

Background information and technical information about the next-generation MCAS assessments is documented in the 2021 Next-Generation MCAS and MCAS-Alt Technical Report.

Chapter 2. The State Assessment System: Legacy

2.1 Guiding Philosophy

The MCAS program plays a central role in helping all stakeholders in the Commonwealth's education system—students, parents, teachers, administrators, policy leaders, and the public—understand the successes and challenges in preparing students for higher education, work, and engaged citizenship.

Since the first administration of the MCAS tests in 1998, DESE has gathered evidence from many sources, suggesting that the assessment reforms introduced in response to the Massachusetts Education Reform Act of 1993 have been an important factor in raising the academic expectations of all students in the Commonwealth and in making the educational system in Massachusetts one of the country's best.

The MCAS testing program has been an important component of education reform in Massachusetts for over 15 years. The program continues to evolve with the introduction of next-generation tests.

2.2 Alignment to the Massachusetts Curriculum Frameworks

All items included on the MCAS tests are developed to measure the standards contained in the Massachusetts curriculum frameworks. Each test item correlates and is aligned to at least one standard in a curriculum framework. All learning standards defined in the frameworks are addressed by and incorporated into the local curriculum and instruction, whether they are assessed on the MCAS or not.

2.3 Uses of MCAS Results

MCAS results are used for a variety of purposes. Official uses of results from the legacy MCAS tests include the following:

- determining school and district progress toward the goals set by the state and federal accountability systems;
- providing information to support program evaluation at the school and district levels;
- determining whether high school students have demonstrated the knowledge and skills required to earn a Competency Determination (CD)—one requirement for earning a high school diploma in Massachusetts;
- helping to determine the recipients of scholarships, including the John and Abigail Adams Scholarship; and
- providing diagnostic information to help all students reach higher levels of performance.

2.4 Validity of MCAS

Validity information for the MCAS assessments is provided throughout this technical report. Although validity is considered a unified construct, the various types of validity evidence contained in this report includes information on

- test design and development;
- administration;
- scoring;
- technical evidence of test quality (classical item statistics, differential item functioning, item response theory statistics, reliability, dimensionality, decision accuracy and consistency); and
- reporting.

Validity information is described in detail in section 3.8 of this report.

Chapter 3. MCAS

3.1 Overview

MCAS tests have been administered to students in Massachusetts since 1998. In 1998, English language arts (ELA), mathematics, and science and technology/engineering (STE) were assessed at grades 4, 8, and 10. In subsequent years, additional grades and content areas were added to the testing program. Following the initial administration of each new test, performance standards were set.

Public school students in the graduating class of 2003 were the first students required to earn a Competency Determination (CD) in ELA and mathematics as a condition for receiving a high school diploma. Students in the class of 2010 and beyond are required to earn a CD in ELA, mathematics, and STE.

The MCAS program is managed by DESE staff with assistance and support from the assessment contractor, Cognia. Massachusetts educators play a key role in the MCAS through service on a variety of committees related to the development of MCAS test items, the development of MCAS performance level descriptors, and the setting of performance standards. The program is supported by a six-member national Technical Advisory Committee (TAC) as well as measurement specialists from the Center for Assessment and Boston College.

More information about the MCAS program is available at www.doe.mass.edu/mcas/.

3.2 Legacy Test Design and Development

The June 2021 legacy MCAS test administration comprised high school STE end-of-course tests in biology, chemistry, introductory physics, and technology/engineering. A legacy February 2021 biology test was also administered. This test could be taken as a retest or as a first experience of MCAS STE for transfer students or students in block-scheduled science classes who completed their biology class in January.

The grade 10 ELA and mathematics retests offered to students in the classes of 2022 and prior in spring and November 2021 were also legacy tests (next-generation tests and retests were offered to the class of 2023 at the same times). These retests are typically given to students who have not yet met the CD requirements for high school graduation. However, students could take the retests for scholarship purposes for this retest administration only. Further, because students in the classes of 2020 to 2022 were granted modified CD requirements by the Board of Elementary and Secondary Education, students in these classes may not have had to pass an MCAS ELA or mathematics test or retest. More information can be found at www.doe.mass.edu/mcas/graduation.html and in Appendix A.

All legacy tests were paper-based tests; no computer-equivalent tests were available.

3.2.1 Test Specifications

3.2.1.1 Criterion-Referenced Test

Items used on the MCAS are developed specifically for Massachusetts and are aligned to Massachusetts content standards. These content standards are the basis for the reporting categories developed for each content area and are used to help guide the development of test items. The MCAS assesses only the content and skills described in the Massachusetts curriculum frameworks. All items on the STE legacy high school tests were coded to standards in the *2006 Massachusetts Science and*

Technology/Engineering Curriculum Framework. In June 2021, the biology and introductory physics tests were also coded to the standards in the *2016 Massachusetts Science and Technology/Engineering Curriculum Framework*.

The grade 10 ELA and mathematics retests were coded to standards in the 2001/2004 and 2011 ELA curriculum frameworks and the 2000/2004 and 2011 mathematics curriculum frameworks.

3.2.1.2 Legacy Item Types

The types of items used on the legacy MCAS tests, and their functions are described below.

- Multiple-choice items are used to provide breadth of coverage within a content area. Multiple-choice items make efficient use of limited testing time and allow for coverage of a wide range of knowledge and skills. Each multiple-choice item requires that students select the single best answer from four response options, and each item is aligned to one content standard. The items are machine-scored; correct responses are worth one score point, and incorrect and blank responses are assigned zero score points. Blank responses are coded to be discernable from incorrectly marked responses.

- Four-point open-response items require students to use higher-order thinking—including skills such as evaluation, analysis, and summarization—to construct satisfactory responses. Open-response items are distributed across the reporting categories. Open-response items are hand-scored by scorers trained in the specific requirements of each question. Students may receive up to four points per open-response item. Totally incorrect and blank responses receive a score of zero. Blank responses are coded to be discernable from incorrectly marked responses.

- One-point short-answer items are used as part of the mathematics retest to assess students' skills and abilities to work with brief, well-structured problems that have one or a very limited number of solutions (e.g., mathematical computations). The advantage of this type of item is that it requires students to demonstrate knowledge and skills by generating, rather than selecting, an answer. One-point short-answer items are hand-scored and assigned one point (correct) or zero points (blank or incorrect). The blanks are coded to be discernable from the incorrect responses.

- Writing prompts are administered to all students in grade 10 as part of the ELA retest. The writing assessment consists of two sessions. During the first session, students write a draft composition. In the second session, students write a final composition based on that draft.

3.2.1.3 Descriptions of Test Designs

The MCAS assessments are structured using both common and matrix items.

Common Items

Identical common items are administered to all students. Student scores are based on their performance on the common items only.

Matrix Items

The matrix portions of the STE tests are typically composed of field-test items that do not count toward student scores. In 2021, there were no field-test items, but each test form had matrix items to ensure consistency of the testing experience across all the high school STE tests.

The ELA and mathematics retests included no matrix items.

3.2.1.4 Test Design and Blueprints

High School STE

Each of the four high school STE tests focuses on one subject (biology, chemistry, introductory physics, or technology/engineering). Students in grade 9 who are enrolled in one of these subjects are eligible but not required to take the subject test in that subject. Typically, all students are required to take one of the four subject tests by the time they complete grade 10. However, the Board of Elementary and Secondary Education approved modified Competency Determination (CD) requirements due to the cancellation of testing opportunities during the COVID-19 pandemic. The modified CD for STE is in place for the classes of 2020–2023. More information about the modified CD requirements can be found here: www.doe.mass.edu/mcas/graduation.html and in Appendix A. Students were eligible to take the June and February 2021 tests for scholarship purposes.

Reporting categories for each test are listed in Table 3-1.

Table 3-1. High School STE Reporting Categories by Content Area

Reporting Categories	Approximate % of Points (+/- 5%)
Biology	
Biochemistry & Cell Biology	25
Genetics	20
Anatomy & Physiology	15
Ecology	20
Evolution & Biodiversity	20
Total	**100**
Chemistry	
Properties of Matter & Thermochemistry	25
Atomic Structure & Periodicity	25
Bonding & Reactions	30
Solutions, Equilibrium, & Acid-Base Theory	20
Total	**100**
Introductory Physics	
Motion & Forces	40
Heat & Heat Transfer	15
Waves & Radiation	25
Electromagnetism	20
Total	**100**
Technology/Engineering	
Engineering Design	20
Construction & Manufacturing	20
Fluid & Thermal Systems	30
Electrical & Communications Systems	30
Total	**100**

Tables 3-2 and 3-3 list the distribution of common and matrix items in each test.

Table 3-2. Distribution of STE Common and Matrix Items by Grade and Item Type for High School

Grade	Test	# of Forms	Positions per Form: Common MC	Common OR	Matrix MC	Matrix OR
HS	Biology	1	40	5	12	2
	Chemistry	1	40	5	20	2
	Introductory Physics	1	40	5	12	2
	Technology/Engineering	1	40	5	20	2

ELA Retest

The grade 10 ELA retest is made up of a reading comprehension portion (three sessions, each approximately 45 minutes in length) and a composition portion. There are three long passages and three short passages with a total of 52 common points. Each long passage item set includes eight multiple-choice items and one 4-point open-response item. The three short passages include a combined total of twelve multiple-choice items and one 4-point open-response item. The composition portion of the ELA retest consists of one writing prompt with a total value of 20 points (12 points for topic development and 8 points for standard English conventions). The composition score accounts for 28% of a student's total raw score for ELA.

Mathematics Retest

The grade 10 mathematics retest includes multiple-choice, short-answer, and open-response items. Short-answer items require students to perform a computation or solve a simple problem. Open-response items are more complex. Multiple-choice and short-answer items are each worth 1 point; open-response items are worth 4 points.

Table 3-3. Distribution of Retest Common and Matrix Items by Grade and Item Type for High School

Grade	Test	# of Forms	Positions per Form: Common MC	Common OR	Common SA	Common WP	Matrix MC	Matrix OR
HS	ELA	1	36	4	N/A	1	N/A	N/A
	Mathematics	1	32	6	4	N/A	N/A	N/A

3.2.1.5 Cognitive Skills for STE Tests

The high school STE test items are coded using revised Bloom's cognitive descriptions. A list of the cognitive skills can be found in Appendix B. Each item on a STE test is assigned a cognitive skill according to the cognitive demand of the item. Cognitive skills are not synonymous with difficulty. The cognitive skill describes each item based on the complexity of the mental processing a student must use to answer the item correctly. Only one cognitive skill is designated for each common item.

3.2.1.6 Use of Calculators, Formula Sheets, and Rulers

STE Tests

Formula sheets are provided to students taking the high school chemistry, introductory physics, and technology/engineering tests. These sheets contain reference information that students may need to answer certain test items. Students taking the chemistry test also receive a copy of the Periodic Table of the Elements to use during the test.

Students taking the technology/engineering test receive an MCAS ruler. The use of calculators is allowed for all the STE tests, although the high school biology tests are designed to be taken without the aid of a calculator.

Mathematics Retest

The second session of the grade 10 mathematics retest is a calculator session. All items included in this session are either calculator neutral (calculators are permitted but not required to answer the question) or calculator active (students are expected to use a calculator to answer the question). Each student taking the retest had access to a calculator with at least four functions and a square root key.

Reference sheets are provided to students taking the grade 10 mathematics retest. These sheets contain information, such as formulas, that students may need to answer certain items. The reference sheets are published each year.

3.2.2 Item and Test Development Process

Table 3-4 provides a high-level view of the item and test development process in chronological order.

Table 3-4. Overview of Test Development Process

Development Step	Detail of the Process
Select reading passages (for ELA only)	Contractor's content specialists find potential passages and present them to DESE for initial approval; DESE-approved passages go to Assessment Development Committees (ADCs) composed of experienced educators, and then to a Bias and Sensitivity Review Committee (Bias) for review and recommendations. ELA items are not developed until the passages have been reviewed by an ADC and Bias. With the ADC and Bias recommendations, DESE makes the final determination as to which passages will be used. (See Appendix C for committee members).
Develop items	Contractor's content specialists and subcontractors develop draft items in ELA, mathematics, and STE aligned to specific Massachusetts standards.
DESE and educator review of items	DESE content specialists review and edit items prior to presenting the items to ADCs. ADCs review items and make recommendations. Bias and Sensitivity Committee reviews items and makes recommendations. DESE test developers make final decisions based on recommendations from ADCs and Bias.
Expert review of items	Experts from higher education and practitioners review all field-test items for content accuracy. Each item is reviewed by at least two independent expert reviewers.
Benchmark open-response items and compositions	DESE and contractor content specialists meet to determine appropriate benchmark papers for training of scorers of field-tested open-response items and compositions. Scoring rubrics and notes are reviewed and edited during benchmarking meetings based on a representative sample of student responses collected during field-testing. During the scoring process, the contractor contacts DESE content specialists with any unforeseen issues.
Item statistics meeting	ADCs review field-test statistics and recommend items for the common-eligible status, for re-field-testing (with edits), or for rejection. Bias also reviews items with elevated differential item functioning (DIF) statistics and recommends items to become common-eligible or to be rejected.
Test construction	Before test construction, DESE provides target performance-level cut scores to the contractor. The contractor proposes a set of common items (items that count toward student scores) and sets of matrix items. The common set of items is delivered to DESE content specialists with proposed cut scores, including Test Characteristic Curves (TCCs) and Test Information Functions (TIFs). DESE content specialists and editorial staff review and edit the proposed common items and sets of matrix items. Contractor and DESE content specialists and editorial staff meet to review edits and changes to tests. Psychometricians provide statistical information about the effect of any proposed changes to the common form.
Operational test items	Approved common-eligible items become part of the common item set and are used to determine individual student scores.
Released common items	For February and Spring 2021, no items from the high school STE tests were released. In addition, the mathematics and ELA retests are not released.

3.2.2.1 Item Development

All items used on the MCAS tests are developed specifically for Massachusetts and are directly linked to the Massachusetts curriculum frameworks. The content standards contained within the frameworks are the basis for the reporting categories developed for each content area and are used to guide the development of assessment items. See section 2.2 for specific content standard alignment.

Item Development and Review

DESE ITEM REVIEW

All items and scoring guides are reviewed by the DESE content specialists before presentation to the ADCs for review. DESE evaluates the new items for the following characteristics:

- **Alignment**: Are the items aligned to the standards? Is there a better standard to which the item could be aligned?
- **Content**: Does the item show a depth of understanding of the subject?
- **Contexts**: Are contexts used when appropriate? Are they realistic?
- **Grade-level appropriateness**: Are the content, language, and contexts appropriate for the grade level?
- **Distractors**: Have the distractors for multiple-choice items been chosen based on common sources of error? Are they plausible?
- **Mechanics**: How well are the items written? Do they follow the conventions of item writing?

DESE content specialists, in consultation with Cognia test developers, then discuss and revise the proposed item sets in preparation for Assessment Development Committee (ADC) review.

ADC ITEM REVIEW

Once DESE has reviewed new items and scoring guides and requested changes have been made, the materials are submitted to content ADCs for further review. Committees review new items using the characteristics described above and provide insight into how standards are interpreted across the state.

Committees choose one of the following recommendations regarding each new item:

- accept,
- accept with edits (may include suggested edits), or
- reject.

All ADC committee recommendations remain with the item.

BIAS AND SENSITIVITY COMMITTEE ITEM REVIEW

All items also undergo scrutiny by the Bias and Sensitivity Review Committee. The committee reviews all items after they have been reviewed by the ADCs. (If an ADC rejects an item, the item does not go to the Bias and Sensitivity Review Committee.) The Bias and Sensitivity Review Committee chooses one of the following recommendations regarding each item:

- accept
- accept with edits (including the issues they have identified and their suggested edits), or
- reject (including their reasoning).

All Bias and Sensitivity Committee review comments are kept with the item.

Once the Bias and Sensitivity Review Committee has made its recommendations and DESE has determined whether to act on the recommendations, DESE-approved items become “field-test eligible” and move to the next step in the development process.

EXTERNAL CONTENT EXPERT ITEM REVIEW

When items are selected to be included on the field-test portion of the MCAS, they are submitted to expert reviewers for their feedback. The task of the expert reviewers is to consider the accuracy of the content of items. Each item is reviewed by two independent expert reviewers. All expert reviewers for MCAS hold a doctoral degree (either in the content they are reviewing or in the field of education) and are affiliated with institutions of higher education in either teaching or research positions. Each expert reviewer has been approved by DESE. Expert reviewers comment solely on the accuracy of the item content and are not expected to comment on grade-level appropriateness, mechanics of items, or other ancillary aspects.

3.2.2.2 Item Editing

DESE content specialists review the recommendations of the ADC and Bias committees and expert reviewers and determine whether to accept the suggested edits. The items are also reviewed and edited by DESE and Cognia editors to ensure adherence to style guidelines in *The Chicago Manual of Style*, to MCAS-specific style guidelines, and to sound testing principles. According to these principles, all items should:

- demonstrate correct grammar, punctuation, usage, and spelling;
- be written in a clear, concise style;
- contain unambiguous explanations that tell students what is required to attain a maximum score;
- be written at a reading level that allows students to demonstrate their knowledge of the subject matter being tested; and
- exhibit high technical quality regarding psychometric characteristics.

3.2.2.3 Field-Testing Items

Items that have made it through the reviews listed above are approved for field-testing. Field-test items appear in the matrix portion of the test. Each item is answered by a minimum of 1,500 students (except where noted), resulting in enough responses to yield reliable performance data.

3.2.2.4 Scoring of Field-Test Items

Each field-tested multiple-choice item is machine scored. Short-answer and open-response items are hand scored. To train scorers, DESE works closely with the scoring staff to refine the rubrics and scoring

notes and to select benchmark papers that exemplify different score points and the variations within each score point. See section 3.4 for additional information on scorers and scoring.

3.2.2.5 Data Review of Field-Test Items

Data Review by DESE

The DESE content specialists review all item statistics prior to making them available to the ADCs for review. Items with statistics that indicate the item did not perform as expected are closely reviewed to ensure that the item is not flawed.

Data Review by ADCs

The ADCs meet to review the items with their field-test statistics. ADCs consider the following when reviewing field-test item statistics:

- item difficulty (or mean score for polytomous items)
- item discrimination
- Differential Item Functioning (DIF) (see sub-groups listed below)
- distribution of scores across answer options and score points
- distribution of answer options and score points across quartiles

The ADCs make one of the following recommendations regarding each field-tested item:

- accept
- edit and field-test again (This is for mathematics and STE items only. Because ELA items are passage-based, items cannot be field-tested again individually. To address this matter, more than twice the number of items needed for the test are field-tested in ELA.)
- reject

If an item is significantly edited after it has been field-tested, the item cannot be used in the common portion of the test until it has been field-tested again. If the ADC recommends editing an item based on the item statistics, the newly edited item returns to the field-test-eligible pool to be field-tested again.

Data Review by the Bias and Sensitivity Review Committee

The Bias and Sensitivity Review Committee also reviews the statistics for the field-tested items. The committee reviews only the items that the ADCs have accepted. The Bias and Sensitivity Review Committee pays special attention to items that show DIF when comparing the following subgroups of test-takers:

- female/male,
- black/white,
- Hispanic/white, and

- EL and former EL who have been transitioned out of EL for fewer than two years/native English speakers and former EL who have been transitioned from EL for two or more years.

The Bias and Sensitivity Review Committee considers whether DIF seen in items is a result of item bias or is the result of uneven access to curriculum and makes recommendations to DESE regarding the disposition of items based on the committee's item statistics. DESE makes the final decision regarding the Bias and Sensitivity Review Committee recommendations.

3.2.2.6 Item Selection and Operational Test Assembly

Cognia test developers propose a set of previously field-tested items to be used in the common portion of the test. Test developers work closely with psychometricians to ensure that the proposed tests meet the statistical requirements set forth by DESE. In preparation for meeting with the DESE content specialists, the test developers at Cognia consider the following criteria in selecting sets of items to propose for the common portion of the test:

- **Content coverage/match to test design and blueprints.** The test designs and blueprints stipulate a specific number of items per item type for each content area. Item selection for the embedded field test is based on the depth of items in the existing pool of items that are eligible for the common portion of the test. Should a certain standard have few items aligned to it, then more items aligned to that standard will be field-tested to ensure a range of items aligned to that standard are available for use.

- **Item difficulty and complexity.** Item statistics drawn from the data analysis of previously field-tested items are used to ensure similar levels of difficulty and complexity from year to year as well as high-quality psychometric characteristics. Since 2011, items can be reused if they have not been released. When an item is reused in the common portion of the test, the latest usage statistics accompany that item.

- **"Clueing" items**. Items are reviewed for any information that might "clue" or help the students answer another item within the same testing session.

The test developers then distribute the items into test forms. During assembly of the test forms, the following criteria are considered:

- **Key patterns.** The sequence of keys (correct answers) is reviewed to ensure that the key order appears random.

- **Option balance.** Items are balanced across forms so that each form contains a roughly equivalent number of key options (As, Bs, Cs, and Ds).

- **Page fit**. Item placement is modified to ensure the best fit and arrangement of items on any given page.

- **Facing-page issues.** For multiple-choice items associated with a stimulus (reading passages and high school biology modules) and for multiple-choice items with large graphics, consideration is given to whether those items need to begin on a left- or right-hand page and to the nature and amount of material that needs to be placed on facing pages. These considerations serve to minimize the amount of page flipping required of students.

- **Relationships among forms**. Although field-test items differ from form to form, these items must take up the same number of pages in all forms so that sessions begin on the same page in every

form. Therefore, the number of pages needed for the longest form often determines the layout of all other forms.

- **Visual appeal.** The visual accessibility of each page is always taken into consideration, including such aspects as the amount of "white space," the density of the test, and the number of graphics.

3.2.2.7 Operational Test Draft Review

The proposed operational test is delivered to DESE for review. The DESE content specialists consider the proposed items, make recommendations for changes, and then meet with Cognia content specialists and psychometricians to construct the final versions of the tests.

3.2.2.8 Special Edition Test Forms

Students with Disabilities

MCAS is accessible to students with disabilities through the provision of special edition test forms and the availability of a range of accommodations for students taking the standard tests. To be eligible to receive a special edition test form, a student must have a disability that is documented either in an individualized education program (IEP) or in a 504 plan. All 2021 MCAS legacy operational tests and retests were available in the following special editions for students with disabilities:

- **Large-print—**Form 1 of the operational test was translated into a large-print edition. The large-print edition contains all common and matrix items found in Form 1.

- **Braille—**This form included only the common items found in the operational test. If an item indicates bias toward students with visual disabilities (e.g., if it includes a complex graphic that a student taking the Braille test could not reasonably be expected to comprehend as rendered), then simplification of the graphic is considered, with appropriate rewording of the item text, as necessary. If a graphic such as a photograph cannot be rendered in Braille, or if the graphic is not needed for the student to respond to the item, the graphic is replaced with descriptive text or a caption or eliminated altogether. Three-dimensional shapes that are rendered in two dimensions in print are rendered on the Braille test as "front view," "top view," and/or "side view," and are accompanied where necessary by a three-dimensional wooden or plastic manipulative wrapped in a Braille-labeled plastic bag.

  Modifications to original test items for the Braille version of the test are made only when necessary, as determined by the Braille test subcontractor, blind consumers, and DESE staff, and only when they do not provide clues or assistance to the student or change what the item is measuring. When successful modification of an item or graphic is not possible, all or part of the item is omitted, and may be replaced with a similar item.

- **Electronic text reader CD**—Test versions were offered on a CD for students with disabilities who require a read-aloud function, using locally installed Kurzweil-3000 software. This edition contained only the common items found in the operational test. The items were not modified and were read aloud to the student as they appear in the standard test booklet. For items or passages that included graphics, the captions and words in the graphics were read aloud verbatim to the student. Students typically use headphones with this format but may also be tested individually in a separate setting to minimize distractions to other students (from hearing what is being read aloud).

- **American Sign Language DVD edition**—The grade 10 MCAS mathematics test is available to students who are deaf or hard-of-hearing in an American Sign Language DVD edition, which contains only the common items found in the operational test.

Appendix D details student accommodations that did not require a special test form. After testing was completed, DESE received a list with the number of students who participated in 2021 legacy MCAS with each accommodation. No identifying information was provided (in keeping with confidentiality practices).

Spanish-Speaking Students

Spanish/English editions of the March and November mathematics retests in grade 10 were available for Spanish-speaking EL students who had been enrolled in school in the continental United States for fewer than three years and could read and write in Spanish at or near grade level. The Spanish/English editions of the mathematics retests were not made available in any other special format.

3.3 Test Administration

3.3.1 Test Administration Schedule

The legacy MCAS tests for high school STE were administered during June in spring 2021. In addition, a biology test was administered in February 2021. Because of a modification to the state's competency determination (CD) requirements for graduation, only grade 9 students and former students were eligible to participate in the February biology administration, as well as in one of the four tests administered in June (students in grades 10–12 were eligible for a modified CD, for which students completed relevant coursework in lieu of participating in MCAS testing).

The 2021 MCAS administration also included retest opportunities in ELA and mathematics for students in grades 11 and 12 and former students who exited high school and who did not previously pass one or both grade 10 tests.

Table 3-5 shows the complete 2020–2021 legacy MCAS test administration schedule. See Part III of the legacy *Principal's Administration Manual* for information about scheduling test administration, including make-up sessions for students who were absent on the day of testing.

Table 3-5. High School End-of-Course STE and Retest Test Administration Windows

Content Area	Sessions	Prescribed Test Administration Windows*	Deadline for Return of Materials to Contractor
Biology	Session 1 Session 2	February 8–26	March 1
STE (Biology, Chemistry, Introductory Physics, Technology/Engineering)	Session 1 Session 2	June 1–11	June 15
ELA Spring Retest	Composition Reading Sessions 1 & 2 Reading Session 3	May 3–June 4	June 17
Mathematics Spring Retest	Session 1 Session 2	May 3–June 4	June 17
ELA November Retest	Composition Reading Sessions 1 & 2 Reading Session 3	November 16 November 17 November 18	November 23
Mathematics November Retest	Session 1 Session 2	November 9 November 10	November 23

**In 2021, in recognition of challenges presented by Covid and health and safety protocols, testing windows were used for the high school tests for the first time.*

3.3.2 Security Requirements

Principals were responsible for ensuring that all test administrators complied with the requirements and instructions contained in the administration-specific legacy *Test Administrator's Manuals*. In addition, other administrators, educators, and staff within the school were responsible for complying with the same requirements. Schools and school staff who violated the test security requirements were subject to numerous possible sanctions and penalties, including delays in reporting of test results, the invalidation of test results, the removal of school personnel from future MCAS administrations, and possible licensure consequences for licensed educators.

Full security requirements, including details about responsibilities of principals and test administrators, examples of testing irregularities, guidance for establishing and following a document tracking system, and lists of approved and unapproved resource materials, can be found in the spring 2021 *Principal's Administration Manual,* the January[1] 2021 *Principal's Administration Manual*, the winter/spring 2021 *Principal's Administration Manual*, and the 2021 *Test Administrator's Manuals*.

3.3.3 Participation Requirements

In spring 2021, students educated with Massachusetts public funds were required by state and federal laws to participate in MCAS testing. The 1993 Massachusetts Education Reform Act mandates that **all** students in the tested grades who are educated with Massachusetts public funds participate in the MCAS, including the following groups of students:

[1] *The Department had planned a special high school administration in January 2021, which was subsequently canceled. The January manuals were then repurposed to serve as the manuals for the legacy ELA and Mathematics tests in the spring.*

- students enrolled in public schools
- students enrolled in charter schools
- students enrolled in innovation schools
- students enrolled in a Commonwealth of Massachusetts Virtual School
- students enrolled in educational collaboratives
- students enrolled in private schools receiving special education that is publicly funded by the Commonwealth, including approved and unapproved private special education schools within and outside Massachusetts
- students enrolled in institutional settings receiving educational services
- students in military families
- students in the custody of either the Department of Children and Families (DCF) or the Department of Youth Services (DYS)
- students with disabilities
- English learner (EL) students
- students who have been expelled but receive educational services from a district
- foreign exchange students who are coded as #11 under "Reason for Enrollment" in the Student Information Management System (SIMS)

Students were eligible to participate in the 2021 high school STE tests according to the following criteria, which were posted online:

- Students in grade 9 (class of 2024) were required to take a high school STE test by the end of grade 10 and earn a passing score on one of the four STE tests to meet their CD requirement to earn a high school diploma in addition to meeting all local graduation requirements. Schools were required to make this testing opportunity available to students.
- Grade 9 students were encouraged to participate in an STE test if they were enrolled in a course that aligns to one of the four tests. Parents/guardians, in consultation with principals and other school personnel, had the option to request that their child participate in testing at grade 10 instead.
- Students in the classes of 2020–2023 were eligible for the modified CD in STE.

To certify that all eligible students were offered the opportunity to participate in testing and to certify that test security protocols were met, principals were required to complete the online Principal's Certification of Proper Test Administration (PCPA) following each test administration. For a summary of participation rates, see the 2021 MCAS Participation Report on DESE's School and District Profiles website, at profiles.doe.mass.edu/statereport/participation.aspx.

3.3.4 Administration Procedures

It was the principal's responsibility to coordinate the school's 2021 MCAS test administration. This included the following responsibilities:

- understanding and enforcing test security requirements and test administration protocols
- reviewing plans for maintaining test security with the superintendent
- ensuring that all eligible high school students are given the opportunity to participate in testing
- coordinating the school's test administration schedule and ensuring that legacy tests in 2020–2021 were administered during prescribed windows
- ensuring that accommodations are properly provided and that transcriptions, if required for any accommodation, are done appropriately (Accommodation frequencies during 2021 testing can be found in Appendix E. For a list of test accommodations, see Appendix D.)
- completing and ensuring the accuracy of information provided on the PCPA
- monitoring DESE's website (www.doe.mass.edu/mcas/) throughout the school year for important updates
- reading the Student Assessment Update emails throughout the year for important information
- providing DESE with correct contact information to receive important notices during test administration

More details about test administration procedures, including ordering test materials, scheduling test administration, designating and training qualified test administrators, identifying testing spaces, meeting with students, providing accurate student information, and accounting for and returning test materials, can be found in the *s*pring 2021 *Principal's Administration Manual*, the winter/spring 2021 *Principal's Administration Manual*, and the January 2021 *Principal's Administration Manual*.

The MCAS program is supported by the MCAS Service Center, which includes a toll-free telephone line and email answered by staff members who provide support to schools and districts. The MCAS Service Center operates weekdays from 7:00 a.m. to 5:00 p.m. (Eastern Time), Monday through Friday.

3.4 Scoring

For paper-based tests (including all legacy tests), Cognia scanned each MCAS student answer booklet into an electronic imaging system called iScore—a secure server-to-server interface designed by Cognia. For computer-based tests (next-generation tests only), images of the student answers were transferred to iScore from the test administration platform and sorted at the item level.

Student identification information, demographic information, school contact information, and student answers to multiple-choice items were converted to alphanumeric format. This information was not visible to scorers. Digitized student responses to constructed-response items were sorted into specific content areas, grade levels, and items before being scored.

3.4.1 Machine-Scored Items

Student responses to multiple-choice items were machine-scored by applying a scoring key to the captured responses. Correct answers were assigned a score of one point; incorrect answers were assigned a score of zero points. Student responses with multiple marks and blank responses were also assigned zero points.

3.4.2 Hand-Scored Items

Once responses to hand-scored items were sorted into item-specific groups, they were scored one item at a time by scorers within each group. However, if there was a need to see a student's responses across all the hand-scored items, scoring leadership had access to the student's entire answer booklet. Details on the procedures used to hand-score student responses are provided later in this document.

3.4.2.1 Scoring Operations and Staff

The iScore database, its operation, and its administrative controls were all based in Dover, New Hampshire, and all MCAS item responses were scored applying a virtual scoring model maintaining the same stringent quality control measures that were applied in a center-based scoring environment.

The following staff members were involved with scoring the 2021 MCAS responses:

- The **Scoring Project Manager** oversaw communication and coordination of MCAS scoring across all scoring sites, scheduling of activities, and oversight of contractual work.
- The **iScore Operations Manager** coordinated all technical aspects associated with scoring.
- **Scoring Operations Managers** provided logistical coordination.
- **Scoring Content Specialists** ensured consistency of content area benchmarking and scoring across all grade levels and monitored the quality and accuracy of scoring.
- **Several Scoring Supervisors**, selected from a pool of experienced **Scoring Team Leaders (STLs)**, participated in training, scoring, and cleanup activities for specified content areas and grade levels. Scoring Supervisors monitored and performed read-behinds on STLs.
- **STLs**, selected from a pool of skilled and experienced scorers, monitored and performed read-behinds on scorers of their respective teams. STLs generally monitored between 5 and 11 scorers.

3.4.2.2 Benchmarking Meetings

No Legacy items underwent the benchmarking process or were discussed in benchmarking meetings. All Legacy scoring materials had been approved by DESE during prior years.

3.4.2.3 Scorer Recruitment and Qualifications

MCAS scorers, a diverse group of individuals with a wide range of backgrounds, ages, and experiences, were recruited by Cognia's HR department with support from a temporary employment agency, Kelly Services. All MCAS scorers were required to hold a four-year baccalaureate. Additionally, scorers had to have either a degree related to the content area being scored, or two classes related to the content area being scored with demonstrated experience in scoring the content area. Additional stipulations are that teachers, tutors, and administrators (e.g., principals, guidance counselors) who were under contract or

employed by or in Massachusetts schools, and people under 18 years of age, were not eligible to score MCAS responses.

Cognia verified that all leadership staff and scorers working on high school MCAS Legacy items were returning associates with demonstrated prior scoring experience on MCAS high school items in the respective content area.

3.4.2.4 Methodology for Scoring Hand-Scored Polytomous Items

The legacy MCAS tests included polytomous items requiring students to generate written responses. Polytomous items included open-response items requiring a longer or more complex response, with assigned scores of 0–4.

Scorers could assign a score-point value to a response or, if not, designate the response as one of the following:

- Blank: The written response form is completely blank.
- Unreadable: The text on the scorer's computer screen is too faint to see accurately.
- Wrong Location: The response seems to be a legitimate answer to a different question.

Responses initially marked as "Unreadable" or "Wrong Location" were resolved by scoring leadership and iScore staff by matching all responses with the correct item or by pulling the actual answer booklet to look at the student's original work.

Scorers could also flag a response as a "Crisis" response, which would be sent to scoring leadership for immediate attention. A response could be flagged as a "Crisis" response if it indicated:

- perceived, credible desire to harm self or others;
- perceived, credible, and unresolved instances of mental, physical, or sexual abuse;
- presence of dark thoughts or serious depression;
- sexual knowledge well beyond the student's developmental age;
- ongoing, unresolved misuse of legal/illegal substances (including alcohol);
- knowledge of or participation in real, unresolved criminal activity; or
- direct or indirect request for adult intervention/assistance (e.g., crisis pregnancy, doubt about how to handle a serious problem at home).

3.4.2.5 Single-Scoring, Double-Blind Scoring, and Read-Behind Scoring

Student responses were double-blind scored (each response was independently read and scored by two different scorers) for all high school operational items.

Double-Blind Scoring

In double-blind scoring, neither scorer knew whether the response had been scored before, and if it had been scored, what score it had been given. A double-blind response with discrepant scores between the two scorers (i.e., a difference greater than one point if there are three or more score points) was sent to

the arbitration queue and read by an STL or a Scoring Supervisor. For a double-blind response with adjacent scores within one point of each other, the higher score was used.

Read-Behind Scoring

In addition to the 100% double-blind scoring, STLs, at random points throughout the scoring shift, engaged in read-behind scoring for each of the scorers at his or her table. This process involved STLs viewing responses recently scored by a particular scorer and, without knowing the scorer's score, assigning his or her own score to that same response. The STL would then compare scores and advise or counsel the scorer as necessary.

Table 3-6 illustrates how the rules were applied for instances when the two read-behind or two double-blind scores were not an exact match.

Table 3-6. Read-Behind and Double-Blind Resolution Charts

Double-Blind Scoring* of 4-Point Item			
Scorer #1	Scorer #2	Scoring Leadership Resolution	Final
4	4	--	4
4	1	2	2
0	1	--	1
2	4	3	3
1	2	--	2
2	0	2	2

** If double-blind scores are adjacent (only 1 point different), the higher score is used as the final score. If two scores are neither exact nor adjacent, the resolution score is used as the final score.*

3.4.2.6 Scorer Training

Scoring content specialists had overall responsibility for ensuring that scorers scored responses consistently, fairly, and according to the approved scoring guidelines. Scoring materials were carefully compiled and checked for consistency and accuracy. The timing, order, and manner in which the materials were presented to scorers were planned and carefully standardized to ensure that all scorers had the same training environment and scoring experience, regardless of scoring location, content, grade level, or item scored.

Cognia used a range of methods to train scorers to score MCAS hand-scored items. The training methods were:

- live group training via Zoom;
- recording of live group training;
- pre-recorded interactive modules.

Scorers started the training process by receiving an overview of the MCAS; this general orientation included the purpose and goal of the testing program and any unique features of the test and the testing population. Scorer training for a specific item to be scored always started with a thorough review and discussion of the scoring guide, which consisted of the task, the scoring rubric, and any specific scoring notes for that task. All scoring guides were previously approved by the DESE during field-test benchmarking meetings and used without any additions or deletions.

As part of training, prospective scorers carefully reviewed three different sets of actual student responses, many of which had been used to train scorers when the item was a field-test item:

- **Anchor sets** are DESE-approved sets consisting of three sample responses at each score point. Each response is a typical response, rather than an unusual or uncommon one; is solid, rather than controversial; and has a true score, meaning that this response has a precise score that will not be changed. Anchor sets are used to exemplify each score point.

- **Practice sets** include unusual, discussion-provoking responses, illustrating the range of responses encountered in operational scoring (e.g., exceptionally creative approaches; extremely short or disorganized responses; responses that demonstrate attributes of both higher-score anchor papers and lower-score anchor papers; and responses that show traits of multiple score points). Practice sets are used to refine the scorers' understanding of how to apply the scoring rules across a wide range of responses.

- **Qualifying sets** consist of 10 responses that are clear, typical examples of each of the score points. Qualifying sets are used to determine if scorers are able to score consistently according to the DESE-approved scoring rubric.

Meeting or surpassing the minimum acceptable standard on an item's qualifying set was an absolute requirement for scoring student responses to that item. An individual scorer must have attained a scoring accuracy rate of 70% exact and 90% exact-plus-adjacent agreement (at least 7 out of the 10 were exact score matches and either zero or one discrepant) on either of two potential qualifying sets.

3.4.2.7 Leadership Training

Scoring content specialists also had overall responsibility for ensuring that scoring leadership (scoring supervisors and STLs) continued their history of scoring consistently, fairly, and only according to the approved scoring guidelines. Once they had completed their item-specific leadership training, scoring leadership was required to meet or surpass a qualification standard of at least 80% exact and 90% exact-plus-adjacent.

3.4.2.8 Monitoring of Scoring Quality Control

Once MCAS scorers met or exceeded the minimum standard on a qualifying set and were allowed to begin scoring, they were constantly monitored throughout the entire scoring window to ensure they scored student responses as accurately and consistently as possible. If a scorer fell below the minimum standard on any of the quality-control tools, the scorer was counseled or retrained. Scorers were required to meet or exceed the minimum standard of 70% exact and 90% exact-plus-adjacent agreement on the following:

- recalibration sets (Recals);

- embedded responses;

- read-behind scoring (RBs); and

- compilation reports, an end-of-shift report with recalibration sets and RBs.

Recals given to scorers at the very beginning of a scoring shift consisted of a set of five responses representing various scores. If scorers had an exact score match on at least four of the five responses, and were at least adjacent on the fifth response, they were allowed to begin scoring operational responses. Scorers who had discrepant scores, or only two or three exact score matches, were retrained and, if approved by the STL, given extra monitoring assignments such as additional RBs and allowed to

begin scoring. Scorers who had zero or one out of the five exact were typically reassigned to another item or sent home for the day.

Embedded responses were approved by the scoring content specialist and loaded into iScore for blind distribution to scorers at random points during the scoring of their first 100 operational responses. While the number of embedded Committee Review Responses (CRRs) ranged from 5 to 30, depending on the item, for most items MCAS scorers received 10 of these previously scored responses during the first day of scoring an item. Scorers who fell below the 70% exact and 90% exact-plus-adjacent accuracy standard were counseled and, if approved by the STL, given extra monitoring assignments (such as additional RBs), and allowed to resume scoring.

RBs involved responses that were first read and scored by a scorer, then read and scored by an STL. STLs would, at various points during the scoring shift, command iScore to forward the next one, two, or three responses to be scored by a particular scorer. After the scorer scored each response, and without knowing the score given by the scorer, the STL would submit his or her own score to the response and then compare his or her score to the scorer's score. RBs were performed at least 10 times for each full-time day shift scorer and at least five times for each evening shift and partial-day shift scorer. Scorers who fell below the 70% exact and 90% exact-plus-adjacent score match standard were counseled, given extra monitoring assignments such as additional RBs, and allowed to resume scoring if they demonstrated the ability to meet the scoring standards after the intervention.

Double-blind scoring involved responses scored independently by two different scorers. While scorers were aware that some of the responses they scored were going to be scored by others, they had no way of knowing what responses would be scored by another scorer, or if they were the first, second, or only scorer. Double-blind scoring served as an indicator for agreement of scoring between two scorers.

Compilation reports displayed all the statistics for each scorer, including the percentage of exact, adjacent, and discrepant scores on the Recals, as well as that scorer's percentage of exact, adjacent, and discrepant scores on the RBs. As the STL conducted RBs, the scorers' overall percentages on the compilation reports were automatically calculated and updated. If the compilation report at the end of the scoring shift listed any individuals who were still below the 70% exact and 90% exact-plus-adjacent standard, their scores for that day were voided. Responses with voided scores were returned to the scoring queue for other scorers to score.

If a scorer fell below standard on the end-of-shift compilation report, and therefore had his or her scores voided on three separate occasions, the scorer was automatically dismissed from scoring that item. If a scorer was repeatedly dismissed from scoring MCAS items within a grade and content area, the scorer was not allowed to score any additional items within that grade and content area. If a scorer was dismissed from multiple grade/content areas, the scorer was dismissed from the project.

3.4.2.9 Interrater Consistency for Operational Items

As described above, double-blind scoring was one of the processes implemented to ensure valid and reliable hand-scoring of items and, as such, provide evidence of scoring stability. All the open-response and composition items were double-scored on the high school test.

A summary of the interrater consistency statistics for operational items is presented in Table 3-7. Results in the table are organized by content area and grade. The table shows the number of score categories (number of possible scores for an item type), the number of included scores, the percent exact agreement, percent adjacent agreement, correlation between the first two sets of scores, and the percent of responses that required a third score. This same information is provided at the item level in Appendix F.

Table 3-7. Summary of Interrater Consistency Statistics for Operational Items, Organized across Items by Content Area and Grade

Content Area	Grade	Number of		Percentage*		Correlation	% Third Scores
		Score Categories	Included Scores	Exact	Adjacent		
Biology	HS	5	176,194	69.45	27.37	0.87	3.17
Chemistry	HS	5	79	87.34	11.39	0.94	1.27
Introductory Physics	HS	5	56,067	65.98	30.55	0.86	3.47
Technology/Engineering	HS	5	1,752	72.15	25.17	0.83	2.68

**Values may not total 100% due to rounding.*

3.5 Classical Item Analysis

As noted in Brown (1983), "A test is only as good as the items it contains." A complete evaluation of a test's quality must include an evaluation of each item. Both *Standards for Educational and Psychological Testing* (AERA et al., 2014) and the *Code of Fair Testing Practices in Education* (Joint Committee on Testing Practices, 2004) include standards for identifying quality items. Items should assess only knowledge or skills that are identified as part of the domain being tested and should avoid assessing irrelevant factors. Items should also be unambiguous and free of grammatical errors, potentially insensitive content or language, and other confounding characteristics. In addition, items must not unfairly disadvantage students—in particular, racial, ethnic, or gender groups.

Both qualitative and quantitative analyses have been conducted to ensure that MCAS items meet these standards. Qualitative analyses are described in earlier sections of this chapter; this section focuses on quantitative evaluations. Statistical evaluations are presented in four parts: (1) difficulty indices, (2) item-test correlations, (3) DIF statistics, and (4) dimensionality analyses. The item analyses presented here are based on the statewide administration of the legacy MCAS in spring 2021. Note that the information presented in this section is based on the items common to all forms, since those are the items on which student scores are calculated. (Item analyses, not included in this report, have also been performed for field-test items; the statistics are used during the item review process and during form assembly for future administrations.)

3.5.1 Classical Difficulty and Discrimination Indices

All multiple-choice and open-response items are evaluated in terms of item difficulty according to standard classical test theory practices. Difficulty is defined as the average proportion of points achieved on an item and is measured by obtaining the average score on an item and dividing it by the maximum possible score for the item. Multiple-choice items are scored dichotomously (correct vs. incorrect), so, for these items, the difficulty index is simply the proportion of students who correctly answered the item. Open-response items are scored polytomously, meaning that a student can achieve scores other than just 0 or 1 (e.g., 0, 1, 2, 3, or 4 for a 4-point open-response item). By computing the difficulty index as the average proportion of points achieved, the indices for the different item types are placed on a similar scale, ranging from 0.0 to 1.0 regardless of the item type. Although this index is traditionally described as a measure of difficulty, it is properly interpreted as an easiness index, because larger values indicate easier items. An index of 0.0 indicates that all students received no credit for the item, and an index of 1.0 indicates that all students received full credit for the item (i.e., all the item points).

Items that are answered correctly by almost all students provide little information about differences in student abilities, but they do indicate knowledge or skills that have been mastered by most students.

Similarly, items that are correctly answered by very few students provide little information about differences in student abilities, but they may indicate knowledge or skills that have not yet been mastered by most students. In general, to provide the best measurement, difficulty indices should range from near-chance performance (0.25 for four-option multiple-choice items or essentially zero for open-response items) to 0.90, with the majority of items generally falling between 0.40 and 0.70. However, on a standards-referenced assessment such as the MCAS, it may be appropriate to include some items with very low or very high item difficulty values to ensure sufficient content coverage.

A desirable characteristic of an item is for higher-ability students to perform better on the item than lower-ability students. The correlation between student performance on a single item and total test score is a commonly used measure of this item characteristic. Within classical test theory, the item-test correlation is referred to as the item's discrimination because it indicates the extent to which successful performance on an item discriminates between high and low scores on the test. For 2021 legacy MCAS open-response items, the item discrimination index used was the Pearson product-moment correlation; for multiple-choice items, the corresponding statistic is commonly referred to as a point-biserial correlation. The theoretical range of these statistics is -1.00 to 1.00, with a typical observed range for multiple-choice items from 0.20 to 0.60.

Discrimination indices can be thought of as measures of how closely an item assesses the same knowledge and skills assessed by the other items contributing to the criterion total score on the assessment. When an item has a high discrimination index, it means that students selecting the correct response are students with higher total scores, and students selecting incorrect responses are associated with lower total scores. Given this definition, an item can discriminate between low-performing examinees and high-performing examinees. Very low or negative point-biserial coefficients computed after field-testing new items can help identify items that are flawed and should not be considered for the operational tests.

A summary of the item difficulty and item discrimination statistics for each grade and content area combination is presented in Table 3-8. Note that the statistics are presented for all items as well as by item type, multiple-choice (MC) and open-response (OR). The mean difficulty (*p*-value) and discrimination values shown in the table are within generally acceptable and expected ranges and are consistent with results obtained in previous administrations.

Table 3-8. Summary of Item Difficulty and Discrimination Statistics by Content Area and Grade

Content Area	Grade	Item Type	Number of Items	*p*-Value		Discrimination	
				Mean	Standard Deviation	Mean	Standard Deviation
Biology	HS	ALL	45	0.68	0.13	0.42	0.13
		MC	40	0.70	0.11	0.39	0.09
		OR	5	0.48	0.09	0.69	0.05
Chemistry*	HS	ALL	45	--	--	--	--
		MC	40	--	--	--	--
		OR	5	--	--	--	--
Introductory Physics	HS	ALL	45	0.64	0.15	0.44	0.12
		MC	40	0.66	0.15	0.41	0.08
		OR	5	0.51	0.08	0.69	0.04
Technology/ Engineering	HS	ALL	45	0.55	0.17	0.34	0.13
		MC	40	0.58	0.16	0.31	0.11
		OR	5	0.35	0.07	0.53	0.09

**Item difficulty and discrimination statistics cannot be reported for Chemistry because the sample size of students was too small in 2021.*

A comparison of indices across grade levels is complicated because these indices are population dependent. Direct comparisons would require that either the items or students were common across groups. Since that is not the case, it cannot be determined whether differences in performance across grade levels are explained by differences in student abilities, differences in item difficulties, or both.

Difficulty indices for multiple-choice items tend to be higher (indicating that students performed better on these items) than the difficulty indices for open-response items because multiple-choice items can be answered correctly by simply identifying rather than providing the correct answer, and also by guessing. Similarly, discrimination indices for the 4-point open-response items tend to be larger than those for the dichotomous items because of the greater variability of the former (i.e., the partial credit these items allow) and the tendency for correlation coefficients to be higher, given less range restriction on the correlates. Note that these patterns are an artifact of item type, so when interpreting classical item statistics, comparisons should be made only among items of the same type.

In addition to the item difficulty and discrimination summaries presented above, these same statistics were also calculated at the item level along with item-level score point distributions. These classical statistics, item difficulty and discrimination, are provided in Appendix G for each item. On these legacy MCAS items, the item difficulty and discrimination indices are within generally acceptable and expected ranges. Very few items were answered correctly at near-chance or near-perfect rates. Similarly, the positive discrimination indices indicate that students who performed well on individual items tended to perform well overall. There are a small number of items with discrimination indices below 0.20, but none were negative. While it is acceptable to include items with low discrimination values or with very high or very low item difficulty values when their content is needed to ensure that the content specifications are appropriately covered, there were very few such cases on the 2021 legacy MCAS. Item-level score point distributions are provided for open-response items in Appendix H; for each item, the percentage of students who received each score point is presented.

3.5.2 DIF

The *Code of Fair Testing Practices in Education* (Joint Committee on Testing Practices, 2004) explicitly states that subgroup differences in performance should be examined when sample sizes permit and that actions should be taken to ensure that differences in performance are attributable to construct-relevant, rather than irrelevant, factors. *Standards for Educational and Psychological Testing* (AERA et al., 2014) includes similar guidelines. As part of the effort to identify such problems, psychometricians evaluated the 2021 legacy MCAS items in terms of DIF statistics.

For the 2021 legacy MCAS, the standardization DIF procedure (Dorans & Kulick, 1986) was employed to evaluate subgroup differences. (Subgroup differences denote significant group-level differences in performance for examinees with equivalent achievement levels on the test.) The standardization DIF procedure is designed to identify items for which subgroups of interest perform differently, beyond the impact of differences in overall achievement. The DIF procedure calculates the difference in item performance for two groups of students (at a time) matched for achievement on the total test. Specifically, average item performance is calculated for students at every total score. Then an overall average is calculated, weighting the total score distribution so that it is the same for the two groups.

For all content areas in high school STE, DIF statistics were calculated for all subgroups that include at least 50 students. To enable calculation of DIF statistics for the limited English proficient/formerly limited English proficient (LEP/FLEP) comparison, the minimum was set at 50 for all grade levels.

When differential performance between two groups occurs on an item (i.e., a DIF index in the “low” or “high” categories explained below), it may or may not be indicative of item bias. Course-taking patterns or differences in school curricula can lead to low or high DIF, but for construct-relevant reasons. However, if

subgroup differences in performance can be traced to differential experience (such as geographical living conditions or access to technology), the inclusion of such items is reconsidered during the item review process.

Computed DIF indices have a theoretical range from -1.0 to 1.0 for multiple-choice items, and the index is adjusted to the same scale for open-response items. Dorans and Holland (1993) suggested that index values between -0.05 and 0.05 denote negligible DIF. The majority of 2021 legacy MCAS items fell within this range. Dorans and Holland further stated that items with values between -0.10 and -0.05 and between 0.05 and 0.10 (i.e., "low" DIF) should be inspected to ensure that no possible effect is overlooked, and that items with values outside the -0.10 to 0.10 range (i.e., "high" DIF) are more unusual and should be examined very carefully before being used again operationally.[2]

For the 2021 legacy MCAS administration, DIF analyses were conducted for all subgroups (as defined in the No Child Left Behind Act) for which the sample size was adequate. Six subgroup comparisons were evaluated for DIF:

- male compared with female,
- white compared with African American/black,
- white compared with Hispanic or Latino,
- not economically disadvantaged compared with economically disadvantaged,
- not LEP-FLEP compared with LEP-FLEP[3], and
- without disabilities compared to with disabilities.

The tables in Appendix I present the number of items classified as either "low" or "high" DIF, in total and by group favored. Overall, a moderate number of items exhibited low DIF and several exhibited high DIF; the numbers were consistent with results obtained in previous administrations of the test.

3.5.3 Dimensionality Analysis

Because tests are constructed with multiple content area subcategories and their associated knowledge and skills, the potential exists for a large number of dimensions being invoked beyond the common primary dimension. Generally, the subcategories are highly correlated with each other; therefore, the primary dimension they share typically explains an overwhelming majority of variance in test scores. In fact, the presence of just such a dominant primary dimension is the psychometric assumption that provides the foundation for the unidimensional item response theory (IRT) models that are used for calibrating, linking, scaling, and equating the 2021 legacy MCAS test forms.

The purpose of dimensionality analysis is to investigate whether violation of the assumption of test unidimensionality is statistically detectable and, if so, (a) the degree to which unidimensionality is violated and (b) the nature of the multidimensionality. Dimensionality analyses were performed on common items

[2] DIF for items is evaluated initially at the time of field-testing. If an item displays high DIF, it is flagged for review by a Cognia content specialist. The content specialist consults with the DESE to determine whether to include the flagged item in a future operational test administration. All DIF statistics are reviewed by the ADCs at their statistical reviews.

[3] LEP = limited English proficient/English learners, FLEP = formerly limited English proficient/English learners who have been transitioned from EL for two or more years.

for the legacy MCAS high school Biology, Chemistry, Introductory Physics, and Technology/Engineering tests administered during spring 2021. The results for these analyses are reported below, including a comparison with the results from 2018.

The dimensionality analyses were conducted using the nonparametric IRT-based methods DIMTEST (Stout, 1987; Stout, Froelich, & Gao, 2001) and DETECT (Zhang & Stout, 1999). Both methods use as their basic statistical building block the estimated average conditional covariances for item pairs. A conditional covariance is the covariance between two items conditioned on true score (expected value of observed score) for the rest of the test, and the average conditional covariance is obtained by averaging over all possible conditioning scores. When a test is strictly unidimensional, all conditional covariances are expected to take on values within random noise of zero, indicating statistically independent item responses for examinees with equal expected scores. Nonzero conditional covariances are essentially violations of the principle of local independence, and such local dependence implies multidimensionality. Thus, nonrandom patterns of positive and negative conditional covariances are indicative of multidimensionality.

DIMTEST is a hypothesis-testing procedure for detecting violations of local independence. The data are first randomly divided into a training sample and a cross-validation sample. Then an exploratory analysis of the conditional covariances is conducted on the training sample data to find the cluster of items that displays the greatest evidence of local dependence. The cross-validation sample is then used to test whether the conditional covariances of the selected cluster of items display local dependence, conditioning on total score on the non-clustered items. The DIMTEST statistic follows a standard normal distribution under the null hypothesis of unidimensionality.

DETECT is an effect-size measure of multidimensionality. As with DIMTEST, the data are first randomly divided into a training sample and a cross-validation sample (these samples are drawn independently of those used with DIMTEST). The training sample is used to find a set of mutually exclusive and collectively exhaustive clusters of items that best fit a systematic pattern of positive conditional covariances for pairs of items from the same cluster and negative conditional covariances for pairs composed of items from different clusters. Next, the clusters from the training sample are used with the cross-validation sample data to average the conditional covariances: Within-cluster conditional covariances are summed; from this sum the between-cluster conditional covariances are subtracted; this difference is divided by the total number of item pairs; and this average is multiplied by 100 to yield an index of the average violation of local independence for an item pair. DETECT values less than 0.2 indicate very weak multidimensionality (or near unidimensionality); values of 0.2 to 0.4, weak to moderate multidimensionality; values of 0.4 to 1.0, moderate to strong multidimensionality; and values greater than 1.0, very strong multidimensionality (Roussos & Ozbek, 2006).

DIMTEST and DETECT were applied to the common items of the four legacy MCAS tests administered during spring 2021. The data for each grade were split into a training sample and a cross-validation sample. For high school science tests, there were over 55,000 students for biology, over 15,000 for introductory physics, over 1,800 for technology/engineering, and over 400 for chemistry. Because DIMTEST had an upper limit of 24,000 students, the training and cross-validation samples for the tests that had over 24,000 students were limited to 12,000 each, randomly sampled from the total sample. DETECT, on the other hand, had an upper limit of 500,000 students, so every training sample and cross-validation sample used all the available data. After randomly splitting the data into training and cross-validation samples, DIMTEST was applied to each dataset to see if the null hypothesis of unidimensionality would be rejected. DETECT was then applied to each dataset for which the DIMTEST null hypothesis was rejected in order to estimate the effect size of the multidimensionality.

3.5.3.1 DIMTEST Analyses

The results of the DIMTEST analyses indicated that the null hypothesis was rejected at a significance level of 0.05 for every dataset except for high school chemistry. The nonrejection for chemistry was likely due to the combined effects of the presence of weak multidimensionality (as evidenced in analyses from years prior to spring 2013) and small sample size (the sample size dropped from about 2,300 in spring 2008 to about 800 in spring 2016). Because strict unidimensionality is an idealization that almost never holds exactly for a given dataset, the statistical rejections in the DIMTEST results were not surprising. Indeed, because of the very large sample sizes (over 14,000) involved in six of the datasets, DIMTEST would be expected to be sensitive to even quite small violations of unidimensionality.

3.5.3.2 DETECT Analyses

Next, DETECT was used to estimate the effect size for the violations of local independence for all the tests. Table 3-9 below displays the multidimensionality effect-size estimates from DETECT.

Table 3-9. Multidimensionality Effect Sizes by Grade and Content Area

Content Area	Grade	Multidimensionality Effect Size		
		2018	2019	2021*
Biology	HS	0.08	0.08	0.10
Chemistry	HS	0.07	0.08	0.18
Introductory Physics	HS	0.08	0.05	0.10
Technology/Engineering	HS	0.10	0.11	0.12
Average		**0.0825**	**0.08**	**0.12**

**Testing not conducted in 2020 due to COVID-19.*

The DETECT values indicate weak multidimensionality for all the tests for the 2021 legacy MCAS forms. Also shown in Table 3-9 are the values reported in last year's dimensionality analyses. 2019's results are similar to those from this year. Although the DETECT values are slightly greater than in previous administrations, the interpretation is like previous years in that multidimensionality is generally weak.

In summary, for the 2021 dimensionality analyses, the violations of local independence, as evidenced by the DETECT effect sizes, were weak in all cases. Thus, these effects do not seem to warrant any changes in test design or scoring. In addition, the magnitude of the violations of local independence have been consistently low over the years and continue to be low despite the small increases in effect size for 2021.

3.6 MCAS IRT Scaling and Equating

The purpose of equating is to ensure that scores obtained from different forms of a test are equivalent to each other. Equating may be used if multiple test forms are administered in the same year, as well as to equate one year's forms to those given in the previous year. Equating ensures that students are not advantaged or disadvantaged because the test form they took is easier or harder than those taken by other students.

All MCAS 2021 high school STE tests used item pre-equating methodology[4] as described in Kolen and Brennan (2014). Item pre-equating allows the raw to scaled score conversion to be produced before the form is administered, which in turn allows for faster reporting and turnaround times. In item pre-equating, new forms are built from a pool of pre-existing IRT-calibrated items. Those items were calibrated in previous field-test administrations, where the field-test items were included on the same form as the operational items. The operational items were used as a set of common items for transforming the item parameters of the field-test items so that they would be on the same theta scale as the IRT-calibrated item pool. This allows for the item pool to be expanded continually.

However, with pre-equating, a number of cautions need to be taken into consideration. Kolen and Brennan (2014) state that to ensure that items behave the same on each administration the items should appear in the same contexts and positions operationally as they did non-operationally. Thus, care was taken to avoid significant shifts in position and context during the construction of the test forms.

Item parameters for the 2021 operational administration were calibrated after the 2018 MCAS operational administration. As such, no new calibrations were run for the 2021 operational items on these pre-equated tests prior to the reporting of scores. Raw score to scaled score lookups are displayed in Appendix J.

Typically, post-equating procedures were implemented after the operational administration to check the drift of the pre-equated item parameters and update them when needed. However, given that the 2021 administration is the last year of the legacy MCAS program for the four high school science tests, post-equating was not conducted.

3.6.1 IRT

All MCAS items were calibrated using IRT. IRT uses mathematical models to define a relationship between an unobserved measure of student performance, usually referred to as theta (θ), and the probability ($P(\theta)$) of getting a dichotomous item correct or of getting a particular score on a polytomous item (Hambleton, Swaminathan, & Rogers, 1991; Hambleton & Swaminathan, 1985). In IRT, it is assumed that all items are independent measures of the same construct (i.e., of the same θ). Another way to think of θ is as a mathematical representation of the latent trait of interest. Several common IRT models are used to specify the relationship between θ and $P(\theta)$ (Hambleton & van der Linden, 1997; Hambleton & Swaminathan, 1985). The process of determining the mathematical relationship between θ and $P(\theta)$ is called *item calibration*. After items are calibrated, they are defined by a set of parameters that specify a nonlinear, monotonically increasing relationship between θ and $P(\theta)$. Once the item parameters are known, an estimate of θ for each student can be calculated. This estimate, $\hat{\theta}$, is considered to be an estimate of the student's true score or a general representation of student performance. IRT has characteristics that may be preferable to those of raw scores for equating purposes because it specifically models examinee responses at the item level and facilitates equating to an IRT-based item pool (Kolen & Brennan, 2014).

For the 2021 legacy MCAS, the graded-response model (GRM) was used for polytomous items (Nering & Ostini, 2010) for all grade and content area combinations. The three-parameter logistic (3PL) model was used for dichotomous items for all grade and content area combinations except high school technology/engineering, which used the one-parameter logistic (1PL) model (Hambleton & van der

[4] Only one item in biology was post-equated because of an update in the scoring rubric after field-test administration. Post-equating was conducted by fixing the parameters of the remaining items and freely estimating the parameter for the one item.

Linden, 1997; Hambleton, Swaminathan, & Rogers, 1991). The 1PL model was chosen for high school technology/engineering because there was concern that the tests might have too few examinees to support the 3PL model in future administrations.

The 3PL model for dichotomous items can be defined as:

$$P_i(\theta_j) = P(U_i = 1|\theta_j) = c_i + (1 - c_i)\frac{\exp[Da_i(\theta_j - b_i)]}{1+\exp[Da_i(\theta_j - b_i)]},$$

where
U indexes the scored response on an item,
i indexes the items,
j indexes students,
α represents item discrimination,
b represents item difficulty,
c is the pseudo guessing parameter,
θ is the student proficiency, and
D is a normalizing constant equal to 1.701.
For high school technology/engineering, this reduces to the following:

$$P_i(\theta_j) = P(U_i = 1|\theta_j) = \frac{\exp[D(\theta_j - b_i)]}{1+\exp[D(\theta_j - b_i)]}.$$

In the GRM for polytomous items, an item is scored in k + 1 graded categories that can be viewed as a set of k dichotomies. At each point of dichotomization (i.e., at each threshold), a two-parameter model can be used to model the probability that a student's response falls at or above a particular ordered category, given θ. This implies that a polytomous item with k + 1 categories can be characterized by k item category threshold curves (ICTCs) of the two-parameter logistic form:

$$P^*_{ik}(\theta_j) = P(U_i \geq k|\theta_j) = \frac{\exp[Da_i(\theta_j - b_i + d_{ik})]}{1+\exp[Da_i(\theta_j - b_i + d_{ik})]},$$

where
U indexes the scored response on an item,
i indexes the items,
j indexes students,
k indexes threshold,
θ is the student ability,
α represents item discrimination,
b represents item difficulty,
d represents threshold, and
D is a normalizing constant equal to 1.701.

After computing k ICTCs in the GRM, k + 1 item category characteristic curves (ICCCs), which indicate the probability of responding to a particular category given θ, are derived by subtracting adjacent ICTCs:

$$P_{ik}(\theta_j) = P(U_i = \mathrm{k}|\theta_j) = P^*_{ik}(\theta_j) - P^*_{i(k+1)}(\theta_j),$$

where
i indexes the items,
j indexes students,
k indexes threshold,
θ is the student ability,
P_{ik} represents the probability that the score on item *i* falls in category k, and
P^*_{ik} represents the probability that the score on item *i* falls at or above the threshold k ($P^*_{i0} = 1$ and $P^*_{i(m+1)} = 0$).

The GRM is also commonly expressed as:

$$P_{ik}(\theta_j) = \frac{\exp[Da_i(\theta_j - b_i + d_k)]}{1+\exp[Da_i(\theta_j - b_i + d_k)]} - \frac{\exp[Da_i(\theta_j - b_i + d_{k+1})]}{1+\exp[Da_i(\theta_j - b_i + d_{k+1})]}.$$

Finally, the item characteristic curve (ICC) for a polytomous item is computed as a weighted sum of ICCCs, where each ICCC is weighted by a score assigned to a corresponding category. The expected score for a student with a given theta is expressed as:

$$E(U_i|\theta_j) = \sum_k^{m+1} w_{ik} P_{ik}(\theta_j),$$

where w_{ik} is the weighting constant and is equal to the number of score points for score category *k* on item *i*.

Note that for a dichotomously scored item, $E(U_i|\theta_j) = P_i(\theta_j)$. For more information about item calibration and determination, see Lord and Novick (1968), Hambleton and Swaminathan (1985), or Baker and Kim (2004).

3.6.2 IRT Results

The tables in Appendix K give the IRT item parameters and standard errors of all operational scoring items on the 2021 MCAS tests by grade and content area. Note that the standard errors for the parameters are equal to zero because the parameter's value was fixed in the pre-equating described above. In addition, Appendix L contains graphs of the TCCs and TIFs, which are defined below.

TCCs display the expected (average) raw score associated with each θ_j value between -4.0 and 4.0. Mathematically, the TCC is computed by summing the ICCs of all items that contribute to the raw score. Using the notation introduced in section 3.6.1, the expected raw score at a given value of θ_j is

$$E(X|\theta_j) = \sum_{i=1}^{n} E(U_i|\theta_j),$$

where
i indexes the items (and *n* is the number of items contributing to the raw score),
j indexes students (here, θ_j runs from -4 to 4), and
$E(X|\theta_j)$ is the expected raw score for a student of ability θ_j.

The expected raw score monotonically increases with θ_j, consistent with the notion that students of high ability tend to earn higher raw scores than students of low ability. Most TCCs are "S-shaped": They are flatter at the ends of the distribution and steeper in the middle.

The TIF displays the amount of statistical information that the test provides at each value of θ_j. Information functions depict test precision across the entire latent trait continuum. There is an inverse relationship between the information of a test and its standard error of measurement (SEM). For long tests, the SEM at a given θ_j is approximately equal to the inverse of the square root of the statistical information at θ_j (Hambleton, Swaminathan, & Rogers, 1991), as follows:

$$SEM(\theta_j) = \frac{1}{\sqrt{I(\theta_j)}}.$$

Compared to the tails, TIFs are often higher near the middle of the θ distribution where most students are located. This is by design. Test items are often selected with middle difficulty levels and high discriminating powers so that test information is maximized for the majority of candidates who are expected to take a test.

3.6.3 Achievement Standards

Cutpoints for all MCAS tests were set via standard setting in 2007, establishing the theta cuts used for reporting each year. These theta cuts are presented in Table 3-10. The operational θ-metric cut scores will remain fixed throughout the assessment program unless standards are reset. Also shown in the table are the cutpoints on the reporting score scale (*2007 Standard Setting Report*).

Table 3-10. Cut Scores on the Theta Metric and Reporting Scale by Content Area and Grade

Content Area	Grade	Theta			Scaled Score				
		Cut 1	Cut 2	Cut 3	Min	Cut 1	Cut 2	Cut 3	Max
Biology	HS	-1.436	-0.554	0.686	200	220	240	260	280
Chemistry	HS	-0.134	0.425	1.150	200	220	240	260	280
Introductory Physics	HS	-0.714	0.108	1.133	200	220	240	260	280
Technology/ Engineering	HS	-0.366	0.201	1.300	200	220	240	260	280

Appendix M shows achievement level distributions by content area and grade. Results are shown for each of the last four years.

3.6.4 Reported Scaled Scores

Because the θ scale used in IRT calibrations is not understood by most stakeholders, reporting scales were developed for the MCAS. The reporting scales are linear transformations of the underlying θ scale within each performance level. Student scores on the MCAS tests are reported in even-integer values from 200 to 280. Because there are four separate transformations (one for each achievement level), shown in Table 3-11, a 2-point difference between scaled scores in the *Failing* level does not mean the same thing as a 2-point difference in the *Needs Improvement* level. Because the scales differ across achievement levels, it is not appropriate to calculate means and standard deviations with scaled scores.

By providing information that is more specific about the position of a student's results, scaled scores supplement achievement level scores. Students' raw scores (i.e., total number of points) on the 2021 MCAS tests were translated to scaled scores using a data analysis process called scaling. Scaling simply converts from one scale to another. In the same way that a given temperature can be expressed on either

the Fahrenheit or Celsius scale, or the same distance can be expressed in either miles or kilometers, student scores on the 2021 MCAS tests can be expressed in raw or scaled scores.

It is important to note that converting from raw scores to scaled scores does not change students' achievement level classifications. Given the relative simplicity of raw scores, it is fair to question why scaled scores for the MCAS are reported instead of raw scores. The answer is that scaled scores make the reporting of results consistent. To illustrate, standard setting typically results in different raw cut scores across content areas. The raw cut score between *Needs Improvement* and *Proficient* could be, for example, 35 in grade 3 mathematics but 33 in grade 4 mathematics, yet both of these raw scores would be transformed to scaled scores of 240. It is this uniformity across scaled scores that facilitates the understanding of student performance. The psychometric advantage of scaled scores over raw scores comes from their being linear transformations of θ. Since the θ scale is used for equating, scaled scores are comparable from one year to the next. Raw scores are not.

The scaled scores are obtained by a simple translation of ability estimates ($\hat{\theta}$) using the linear relationship between threshold values on the θ metric and their equivalent values on the scaled score metric. Students' ability estimates are based on their raw scores and are found by mapping through the TCC. Scaled scores are calculated using the linear equation

$$SS = m\hat{\theta} + b,$$

where
m is the slope and
b is the intercept.

A separate linear transformation is used for each grade and content area combination and for each achievement level. Table 3-11 shows the slope and intercept terms used to calculate the scaled scores for each grade, content area, and achievement level. Note that the values in Table 3-11 will not change unless the standards are reset.

Appendix J contains raw score to scaled score look-up tables. The tables show the scaled score equivalent of each raw score for this year and last year. Appendix N contains scaled score distribution graphs for each grade and content area. These distributions were calculated using the sparse data matrix files that were used in the IRT calibrations.

Table 3-11. Scaled Score Slopes and Intercepts by Content Area and Grade

Content Area	Grade	Cut Score Index	Theta Cut	Scaled Score	Slope	Intercept
Biology	HS	1	-4.000	200	0.924	200.000
		2	-3.000	212	5.393	227.745
		3	-1.436	220	22.689	252.581
		4	-0.554	240	16.126	248.942
		5	0.686	260	8.642	254.074
Chemistry	HS	1	-4.000	200	0.774	200.000
		2	-3.000	207	4.532	220.607
		3	-0.134	220	35.778	224.794
		4	0.425	240	27.586	228.276
		5	1.150	260	10.811	247.568
Introductory Physics	HS	1	-4.000	200	0.909	200.000
		2	-3.000	210	6.015	228.373
		3	-1.392	220	24.516	254.128
		4	-0.576	240	19.660	251.330
		5	0.441	260	7.815	256.554
Technology/ Engineering	HS	1	-4.000	200	0.794	200.000
		2	-3.000	201	7.370	222.697
		3	-0.366	220	35.273	232.910
		4	0.201	240	18.198	236.342
		5	1.300	260	11.765	244.706

3.7 MCAS Reliability

Although an individual item's performance is an important factor in evaluating an assessment, a complete evaluation must also address the way items grouped in a set function together and complement one another. Tests that function well provide a dependable assessment of a student's level of ability. Just like the measurement of physical properties, such as temperature, any measurement tool contains some amount of measurement error, which leads to different results if the measurement were taken multiple times. The quality of items, as the tools to measure the latent ability, determines the degree to which a given student's score can be higher or lower than his or her true ability on a test.

There are a number of ways to estimate an assessment's reliability. The approach that was implemented to assess the reliability of the 2021 legacy MCAS tests is the α coefficient of Cronbach (1951). This approach is most easily understood as an extension of a related procedure, the split-half reliability. In the split-half approach, a test is split in half, and students' scores on the two half-tests are correlated. To estimate the correlation between two full-length tests, the Spearman-Brown correction (Spearman, 1910; Brown, 1910) is applied. If the correlation is high, this is evidence that the items complement one another and function well as a group, suggesting that measurement error is minimal. The split-half method requires psychometricians to select items that contribute to each half-test score. This decision may have an impact on the resulting correlation since each different possible split of the test into halves will result in a different correlation. Cronbach's α eliminates the item selection by comparing individual item variances to total test variance, and it has been shown to be the average of all possible split-half correlations. Along with the split-half reliability, Cronbach's α is referred to as a coefficient of internal consistency. The term "internal" indicates that the index is measured internal to each test of interest, using data that come only from the test itself (Anastasi & Urbina, 1997). The formula for Cronbach's α is given as follows:

$$a = \frac{n}{n-1}\left[1 - \frac{\sum_{i=1}^{n} \sigma^2_{(Y_i)}}{\sigma^2_x}\right],$$

where
i indexes the item,
n is the total number of items,
$\sigma^2_{(Y_i)}$ represents individual item variance, and
σ^2_x represents the total test variance.

3.7.1 Reliability and Standard Errors of Measurement

Table 3-12 presents descriptive statistics, Cronbach's α coefficient, and raw score SEMs for each content area and grade. (Statistics are based on common items only.) The raw score SEM is calculated by the definition of reliability:

$$SEM = \sqrt{\sigma^2_x(1-\alpha)}$$

Table 3-12 shows that the reliability estimates range from 0.88 to 0.92. These estimates are within acceptable ranges and are consistent with results obtained in previous administrations of the tests.

Table 3-12. Raw Score Descriptive Statistics, Cronbach's Alpha, and SEMs by Content Area and Grade

Content Area	Grade	Number of Students	Raw Score			Alpha	SEM
			Maximum	Mean	Standard Deviation		
Biology	HS	36,383	60	37.39	12.22	0.91	3.59
Chemistry	HS	16	60	29.69	10.76	0.89	3.53
Introductory Physics	HS	11,563	60	36.40	12.71	0.92	3.59
Technology/ Engineering	HS	372	60	30.13	10.10	0.88	3.49

Because of the dependency of the alpha coefficients on the test-taking population and the test characteristics, cautions need be taken when making inferences about the quality of one test by comparing its reliability to that of another test from a different grade or content area. To elaborate, reliability coefficients are highly influenced by sample characteristics such as the range of individual differences in the group (i.e., variability of the sample), average ability level of the sample that took the exams, test designs, test difficulty, test length, ceiling or floor effect, and influence of guessing. Hence, "the reported reliability coefficient is only applicable to samples similar to that on which it was computed" (Anastasi & Urbina, 1997, p. 107).

3.7.2 Subgroup Reliability

The reliability coefficients discussed in the previous section were based on the overall population of students who took the 2021 legacy MCAS tests. Appendix O presents reliabilities for various subgroups of interest. Cronbach's α coefficients were calculated using the formula defined above based only on the members of the subgroup in question in the computations; values are calculated only for subgroups with 10 or more students. The reliability coefficients for subgroups range from 0.83 to 0.93 across the tests,

with a median of 0.90 and a standard deviation of 0.02, indicating that reliabilities are generally within a reasonable range.

For several reasons, the subgroup reliability results should be interpreted with caution. First, inherent differences between grades and content areas preclude valid inferences about the reliability of a test based on statistical comparisons with other tests. Second, reliabilities are dependent not only on the measurement properties of a test but also on the statistical distribution of the studied subgroup. For example, Appendix O shows that subgroup sample sizes may vary considerably, which results in natural variation in reliability coefficients. Alternatively, α, which is a type of correlation coefficient, may be artificially depressed for subgroups with little variability (Draper & Smith, 1998). Third, there is no industry standard to interpret the strength of a reliability coefficient, and this is particularly true when the population of interest is a single subgroup.

3.7.3 Reporting Subcategory Reliability

Reliabilities were calculated for the reporting subcategories within the 2021 legacy MCAS content areas, which are described in section 3.2. Cronbach's α coefficients for subcategories were calculated via the same formula defined previously using just the items of a given subcategory in the computations. Results are presented in Appendix O. The reliability coefficients for the reporting subcategories range from 0.42 to 0.83, with a median of 0.69 and a standard deviation of 0.10. Because they are based on a subset of items rather than the full test, subcategory reliabilities were typically lower than were overall test score reliabilities, approximately to the degree expected based on classical test theory (Haertel, 2006), and interpretations should take this into account. Qualitative differences among grades and content areas once again preclude valid inferences about the reliability of the full test score based on statistical comparisons among subtests.

3.7.4 Reliability of Achievement Level Categorization

The accuracy and consistency of classifying students into achievement levels are critical components of a standards-based reporting framework (Livingston & Lewis, 1995). For the 2021 legacy MCAS tests, students were classified into one of four achievement levels: *Failing*, *Needs Improvement*, *Proficient*, or *Advanced*.

Cognia conducted decision accuracy and consistency (DAC) analyses to determine the statistical accuracy and consistency of the classifications. This section explains the methodologies used to assess the reliability of classification decisions and gives the results of these analyses.

Accuracy refers to the extent to which achievement classifications based on test scores match the classifications that would have been assigned if the scores did not contain any measurement error. Accuracy must be estimated because errorless test scores do not exist. Consistency measures the extent to which classifications based on test scores match the classifications based on scores from a second, parallel form of the same test. Consistency can be evaluated directly from actual responses to test items if two complete and parallel forms of the test are administered to the same group of students. In operational testing programs, however, such a design is usually impractical. Instead, techniques have been developed to estimate both the accuracy and consistency of classifications based on a single administration of a test. The Livingston and Lewis (1995) technique was used for the 2021 legacy MCAS tests because it is easily adaptable to all types of testing formats, including mixed formats.

The DAC estimates reported in Tables 3-13 and 3-14 make use of "true scores" in the classical test theory sense. A true score is the score that would be obtained if a test had no measurement error. True scores cannot be observed and so must be estimated. In the Livingston and Lewis (1995) method, estimated true scores are used to categorize students into their "true" classifications.

For the 2021 legacy MCAS tests, after various technical adjustments (described in Livingston & Lewis, 1995), a four-by-four contingency table of accuracy was created for each content area and grade, where cell [*i,j*] represented the estimated proportion of students whose true score fell into classification i (where i = 1 to 4) and observed score fell into classification j (where j = 1 to 4). The sum of the diagonal entries (i.e., the proportion of students whose true and observed classifications matched) signified overall accuracy.

To calculate consistency, true scores were used to estimate the joint distribution of classifications on two independent, parallel test forms. Following statistical adjustments (per Livingston & Lewis, 1995), a new four-by-four contingency table was created for each content area and grade and populated by the proportion of students who would be categorized into each combination of classifications according to the two (hypothetical) parallel test forms. Cell [*i,j*] of this table represented the estimated proportion of students whose observed score on the first form would fall into classification i (where i = 1 to 4) and whose observed score on the second form would fall into classification j (where j = 1 to 4). The sum of the diagonal entries (i.e., the proportion of students categorized by the two forms into exactly the same classification) signified overall consistency.

Cognia also measured consistency on the 2021 legacy MCAS tests using Cohen's (1960) coefficient κ (kappa), which assesses the proportion of consistent classifications after removing the proportion of consistent classifications that would be expected by chance. It is calculated using the following formula:

$$\kappa = \frac{(\text{Observed agreement}) - (\text{Chance agreement})}{1 - (\text{Chance agreement})} = \frac{\sum_i C_{ii} - \sum_i C_{i.} C_{.i}}{1 - \sum_i C_{i.} C_{.i}},$$

where

$C_{i.}$ is the proportion of students whose observed achievement level would be level *i* (where *i* = 1–4) on the first hypothetical parallel form of the test;

$C_{.i}$ is the proportion of students whose observed achievement level would be level *i* (where *i* = 1–4) on the second hypothetical parallel form of the test; and

C_{ii} is the proportion of students whose observed achievement level would be level *i* (where *i* = 1–4) on both hypothetical parallel forms of the test.

Because κ is corrected for chance, its values are lower than other consistency estimates.

3.7.5 Decision Accuracy and Consistency Results

Results of the DAC analyses described above are provided in Table 3-13. The table includes overall accuracy indices with consistency indices displayed in parentheses next to the accuracy values, as well as overall kappa values. It is important to note that the DAC results for chemistry are based on the small sample of students (N=16) who took the test in this administration. DAC calculations are not likely appropriate for use with such a small sample size, which is the likely reason for the aberrative consistency and accuracy statistics in this subject. For subjects other than chemistry, overall ranges for accuracy (0.64–0.80), consistency (0.72–0.73), and kappa (0.60) indicate that the vast majority of students were classified accurately and consistently with respect to measurement error and chance. Accuracy and consistency values conditional on achievement level are also given. For these calculations, the denominator is the proportion of students associated with a given achievement level. For example, the conditional accuracy value is 0.72 for *Needs Improvement* for grade 10 Biology. This figure indicates that among the students whose true scores placed them in this classification, 72% would be expected to be in this classification when categorized according to their observed scores. Similarly, a consistency value of 0.59 indicates that 59% of students with observed scores in the *Needs Improvement* level would be expected to score in this classification again if a second, parallel test form were taken.

For some testing situations, the greatest concern may be decisions around achievement level thresholds. For example, for tests associated with the Every Student Succeeds Act (ESSA), the primary concern is distinguishing between students who are proficient and those who are not yet proficient. In this case, accuracy at the *Needs Improvement/Proficient* threshold is critically important, which summarizes the percentage of students who are correctly classified either above or below the particular cutpoint. Table 3-14 provides accuracy and consistency estimates for the 2021 legacy MCAS tests at each cutpoint, as well as false positive and false negative decision rates. (A false positive is the proportion of students whose observed scores were above the cut and whose true scores were below the cut. A false negative is the proportion of students whose observed scores were below the cut and whose true scores were above the cut.)

Once again disregarding the chemistry content area, the accuracy and consistency indices at the *Needs Improvement/Proficient* threshold range from 0.83–0.96 and 0.84–0.95. The false positive and false negative decision rates at the *Needs Improvement/Proficient* threshold both range from 1–14% across all tests. These results indicate that nearly all students were correctly classified with respect to being above or below the *Needs Improvement/Proficient* cutpoints.

Table 3-13. Summary of Decision Accuracy (and Consistency) Results by Content Area and Grade—Overall and Conditional on Achievement Level

Content Area	Grade	Overall	Kappa	Conditional on Achievement Level			
				Failing	*Needs Improvement*	*Proficient*	*Advanced*
Biology	HS	0.80 (0.72)	0.60	0.73 (0.56)	0.72 (0.59)	0.77 (0.68)	0.82 (0.76)
Chemistry	HS	0.40 (-.013)	0.10	0.50 (0.50)	0.36 (0.27)	0.33 (0.38)	0.53 (0.50)
Introductory Physics	HS	0.80 (0.72)	0.60	0.38 (0.18)	0.80 (0.72)	0.78 (0.70)	0.81 (0.73)
Technology/ Engineering	HS	0.64 (0.73)	0.60	1.00 (1.00)	0.77 (0.68)	0.68 (0.67)	0.70 (0.87)

Table 3-14. Summary of Decision Accuracy (and Consistency) Results by Content Area and Grade—Conditional on Cutpoint

Content Area	Grade	*Failing / Needs Improvement*			*Needs Improvement / Proficient*			*Proficient / Advanced*		
		Accuracy (consistency)	False		Accuracy (consistency)	False		Accuracy (consistency)	False	
			Pos	Neg		Pos	Neg		Pos	Neg
Biology	HS	0.99 (0.98)	0.01	0.01	0.96 (0.95)	0.01	0.02	0.94 (0.91)	0.03	0.03
Chemistry	HS	0.93 (0.93)	0.06	0.02	0.80 (0.74)	0.15	0.05	0.52 (0.51)	0.31	0.17
Introductory Physics	HS	0.99 (0.98)	0.00	0.01	0.96 (0.94)	0.02	0.03	0.94 (0.92)	0.03	0.03
Technology/ Engineering	HS	1.00 (1.00)	0.00	0.00	0.83 (0.84)	0.03	0.14	0.88 (0.90)	0.02	0.10

The above indices are derived from Livingston and Lewis's (1995) method of estimating DAC. Livingston and Lewis discuss two versions of the accuracy and consistency tables. A standard version performs calculations for forms parallel to the form taken. An "adjusted" version adjusts the results of one form to match the observed score distribution obtained in the data. The tables use the standard version for two reasons: (1) This "unadjusted" version can be considered a smoothing of the data, thereby decreasing the variability of the results; and (2) for results dealing with the consistency of two parallel forms, the unadjusted tables are symmetrical, indicating that the two parallel forms have the same statistical properties. This second reason is consistent with the notion of forms that are parallel (i.e., it is more intuitive and interpretable for two parallel forms to have the same statistical distribution).

As with other methods of evaluating reliability, DAC statistics that are calculated based on small groups can be expected to be lower than those calculated based on larger groups. For groups as small as this administration's chemistry test, the results may even be improbable or out of range. For this reason, the values presented in Tables 3-13 and 3-14 should be interpreted with caution. In addition, it is important to remember that it is inappropriate to compare DAC statistics across grades and content areas.

3.7.6 Reporting of Results

The MCAS tests are designed to measure student achievement on the Massachusetts content standards. Consistent with this purpose, results on the MCAS were reported in terms of achievement levels, which describe student achievement in relation to these established state standards. There are four achievement levels: *Failing*, *Needs Improvement*, *Proficient*, and *Advanced*. Students receive a separate achievement level classification in each content area. In 2021, the only legacy tests administered were for high school STE: Introductory Physics, Biology, Chemistry, and Technology/Engineering. Students in grade 9 taking only a science test received only a legacy *Parent/Guardian Report*. In grades 10 and higher, students taking science tests received reports on the redesigned *Parent/Guardian Report* template. Reports are generated at the student level. *Parent/Guardian Reports* and student results labels are printed and mailed to districts for distribution to schools. The details of the reports are presented in the sections that follow. See Appendix P for a sample *Parent/Guardian Report*.

The DESE also provides numerous reports to districts, schools, and teachers through its Edwin Analytics reporting system. Section 3.8.5 provides more information about the Edwin Analytics system, along with examples of commonly used reports.

3.7.7 Parent/Guardian Report

For students in grade 9 taking only a high school STE test, the legacy *Parent/Guardian Report* is a standalone single page (11" x 17") report with a center fold. New in 2021, the grade 9 *Parent/Guardian Report* was available online in Pearson Access Next (PAN). One black-and-white copy of the report is printed. The report is designed to present parents/guardians with a detailed summary of their child's MCAS performance. In 2021, the achievement level summary was not reported on the *Parent/Guardian Report*. The high school February biology test results and the ELA and mathematics retest results are reported as legacy tests as in the past. The *Parent/Guardian Report* for the February biology is similar to the spring grade 9 *Parent/Guardian Report*. The spring grade 9 *Parent/Guardian Report* uses the same back-page image as the *Parent/Guardian Report* for next-generation spring non-STE grades. The ELA and mathematics results for all tested grades, except the retests, are reported according to the redesigned next-generation reports. The ELA and Mathematics Retest *Parent/Guardian Report* is a different design from the spring tests. It is a combined ELA and Mathematics report. The scale on the retest uses the legacy scale of 200–280. In 2021, a special administration of the ELA and Mathematics High School Legacy test was administered in the spring. The *Parent/Guardian Report* for this administration followed the design used for the November 2019 administration.

The front page of the *Parent/Guardian Report* for students with results for only a high school STE test provides student identification information, including student name, grade, birth date, Student ID (SASID), school name, and district name. The front page also presents the Commissioner's letter to parents/guardians, general information about the test, and website information for parent/guardian resources. The inside of the report contains the achievement level, scaled score, and standard error of the scaled score for the science test taken by the student. If the student does not receive a scaled score, the reason is displayed under the heading "Achievement Level." Information concerning the student's performance on individual test questions, a sub-content area summary for the content area, and a note

stating whether a student has met the graduation requirement for science also appear on the inside of the report.

A student results label is produced for each student receiving a *Parent/Guardian Report*. The following information appears on the label:

- student name
- grade
- birth date
- test date
- student ID (SASID)
- school code
- school name
- district name
- student's scaled score and achievement level (or the reason the student did not receive a score)

One copy of each student label is shipped with the *Parent/Guardian Reports*.

3.7.8 Analysis and Reporting Business Requirements

To ensure that MCAS results are processed and reported accurately, a document defining analysis and reporting business requirements is prepared each year. The analysis and reporting business requirements are observed in the analyses of the MCAS test data and in reporting results. These requirements also guide data analysts in identifying students to be excluded from school-, district-, and state-level summary computations, if applicable. The *Analysis and Reporting Business Requirements* document is included in Appendix Q.

3.7.9 Quality Assurance

Quality-assurance measures are implemented throughout the process of analysis and reporting at Cognia. The data processors and data analysts perform routine quality-control checks of their computer programs. When data are handed off to different units within the data team, the sending unit verifies that the data are accurate before handoff. Additionally, when a unit receives a dataset, the first step is to verify the accuracy of the data. Once report designs have been approved by the DESE, reports are run using demonstration data to test the application of the analysis and reporting business requirements. These reports are then approved by the DESE.

Another type of quality-assurance measure used at Cognia is parallel processing. One data analyst is responsible for writing all programs required to populate the student-level and aggregate reporting tables for the administration. Each reporting table is assigned to a second data analyst who uses the analysis and reporting business requirements to independently program the reporting table. The production and quality-assurance tables are compared; when there is 100% agreement, the tables are released for report generation.

The third aspect of quality control involves procedures to check the accuracy of reported data. Using a sample of schools and districts, the quality-assurance group verifies that the reported information is

correct. The selection of sample schools and districts for this purpose is very specific because it can affect the success of the quality-control efforts. There are two sets of samples selected that may not be mutually exclusive. The first set includes samples that satisfy all the following criteria:

- one-school district,
- two-school district,
- multi-school district,
- private school,
- special school (e.g., a charter school),
- small school that does not have enough students to report aggregations, and
- school with excluded (not tested) students.

The second set of samples includes districts or schools that have unique reporting situations that require the implementation of an analysis and reporting business requirement. This set is necessary to ensure that each requirement is applied correctly.

The quality-assurance group uses a checklist to implement its procedures. Once the checklist is completed, sample reports are circulated for review by psychometric and program management staff. The appropriate sample reports are then sent to the DESE for review and signoff.

3.8 MCAS Validity

One purpose of this report is to describe the technical and reporting aspects of the MCAS program that support valid score interpretations. According to the *Standards for Educational and Psychological Testing* (AERA et al., 2014), considerations regarding establishing intended uses and interpretations of test results—and conforming to these uses—are of paramount importance regarding valid score interpretations. These considerations are addressed in this section.

Many sections of this technical report provide evidence of validity, including sections on test design and development, test administration, scoring, scaling, and equating, item analysis, reliability, and score reporting. Taken together, this technical report provides a comprehensive presentation of validity evidence associated with the MCAS program.

3.8.1 Test Content Validity Evidence

Test content validity demonstrates how well the assessment tasks represent the curriculum and standards for each content area and grade level. Content validation is informed by the item development process, including how the test blueprints and test items align to the curriculum and standards. Viewed through the lens provided by the standards, evidence based on test content is described in section 3.2. The following are all components of validity evidence based on test content: item alignment with Massachusetts curriculum framework content standards; item bias, sensitivity, and content appropriateness review processes; adherence to the test blueprint; use of multiple item types; use of standardized administration procedures, with accommodated options for participation; and appropriate test administration training. As discussed earlier, all MCAS items are aligned by Massachusetts education stakeholders to specific Massachusetts curriculum framework content standards, and they undergo several rounds of review for content fidelity and appropriateness.

3.8.2 Response Process Validity Evidence

Response process validity evidence pertains to information regarding the cognitive processes used by examinees as they respond to items on an assessment. The basic question posed is: Are examinees responding to the test items as intended? This type of validity evidence is explicitly specified in the *Standards for Educational and Psychological Testing* (AERA et al., 2014; Standard 1.12).

Response process validity evidence can be gathered via cognitive interviews and/or focus groups with examinees. It is particularly important to collect this type of information prior to introducing a new test or test format, or when introducing new item types to examinees.

3.8.3 Internal Structure Validity Evidence

Evidence of test validity based on internal structure is presented in great detail in the discussions of item analyses, scaling, equating, and reliability in sections 3.5 through 3.7. Technical characteristics of the internal structure of the assessments are presented in terms of classical item statistics (item difficulty, item-test correlation), DIF analyses, dimensionality analyses, reliability, SEM, and IRT parameters and procedures. Each test is equated to the previous year's test in that grade and content area to preserve the meaning of scores over time. In general, item difficulty and discrimination indices were within acceptable and expected ranges. Very few items were answered correctly at near-chance or near-perfect rates. Similarly, the positive discrimination indices indicate that most items were assessing consistent constructs, and students who performed well on individual items tended to perform well overall. See the individual sections for more complete results of the different analyses.

3.8.4 Validity Evidence in Relationships to Other Variables

Massachusetts has accumulated a substantial amount of evidence of the criterion-related validity of the MCAS tests. This evidence shows that MCAS test results are correlated strongly with relevant measures of academic achievement.

3.8.5 Efforts to Support the Valid Use of MCAS Data

The DESE takes many steps to support the intended uses of MCAS data. (The intended uses are listed in section 2.3 of this report.) This section will examine some of the reporting systems and policies designed to address each use.

1. Determining school and district progress toward the goals set by the state and federal accountability systems

MCAS results and student growth percentiles are used as two categories of information in the DESE's accountability formulas for schools and districts.[5] The accountability formulas also consider the following variables when making accountability determinations for schools and districts: the rate of assessment participation, graduation rates (for high schools and districts), and student demographic group. Information on the state's accountability system is available on the DESE website at: www.doe.mass.edu/accountability/.

As documented on the accountability web page above, the DESE carefully weighs all available evidence prior to rendering accountability decisions for schools and districts. No school, for instance, is placed in

[5] *Accountability for educators is addressed in the DESE's Educator Evaluation Framework documents, available here: www.doe.mass.edu/edeval/.*

Level 4 or 5 without an agency-wide review of data, including (but not limited to) four years of assessment data. Assignment to a lower accountability level comes with increased involvement between the DESE and the local education agencies (LEAs). The different levels of engagement are explained in the State's System of Support, presented here: www.doe.mass.edu/accountability/. Among the supports, districts with schools in Level 3 get assistance with data analysis from one of the six regional District and School Assistance Centers (DSACs). The supports for LEAs in Levels 4 and 5 and documented outcomes associated with these supports are available here: www.doe.mass.edu/turnaround/howitworks/.

2. Providing information to support program evaluation at the school and district levels
3. Determining whether high school students have demonstrated the knowledge and skills required to earn a Competency Determination (CD)—one requirement for earning a high school diploma in Massachusetts

No student can be reported as a high school graduate in Massachusetts without first earning a CD. The typical path to earning a CD is to pass three MCAS high school exams—an ELA exam, a mathematics exam, and one of four STE exams. Most examinees in the state (around 90%, in a typical year) score *Needs Improvement* or higher on all three exams on their first try.[6] Examinees who have not earned a CD are given many opportunities to retake the exams during the retest and spring test administrations, with no limit to reexaminations. Examinees who are not awarded a CD may also appeal the decision. The DESE has instituted a rigorous appeals process that can afford some examinees the opportunity to demonstrate their competency on the state standards through the successful completion of high school course work. (Additional information on the appeals process can be found at www.doe.mass.edu/mcasappeals/.) Finally, students with significant disabilities who are unable to take the MCAS exams can participate in the MCAS-Alt program, which allows students to submit a portfolio of work that demonstrates their proficiency on the state standards.

4. Helping to determine the recipients of scholarships, including the John and Abigail Adams Scholarship

The same initial grade 10 test scores used to enforce the CD requirement are also used to award approximately 18,000 tuition waivers each year that can be used at Massachusetts public colleges (www.doe.mass.edu/scholarships/adams/default.html). The tuition waivers, which do not cover school fees, are granted to the top 25% of students in each district based on their MCAS scores. Students with *Advanced* MCAS scores may also apply for the Stanley Z. Koplik Certificate of Mastery with Distinction award (www.doe.mass.edu/scholarships/mastery/).

5. Providing diagnostic information to help all students reach higher levels of performance

Each year, student-level data from each test administration are shared with parents/guardians and school and district stakeholders in personalized *Parent/Guardian Reports*. The current version of the *Parent/Guardian Report* (see the sample provided in Appendix P) was designed with input from groups of parents. These reports contain scaled scores and achievement levels, as well as norm-referenced student growth percentiles. They also contain item-level data broken down by standard. The reports include links that allow parents and guardians to access the released test items on the DESE website.

[6] *To earn a CD, students must either score* Proficient *or higher on the grade 10 MCAS ELA and mathematics tests or score* Needs Improvement *on these tests and fulfill the requirements of an EPP. Students must also score* Needs Improvement *or higher on one of the four high school STE tests. Approximately 70% of examinees earn their CD by scoring* Proficient *or higher on the ELA and mathematics exams and* Needs Improvement *or higher on a STE exam.*

The DESE's secure data warehouse, Edwin Analytics, provides users with more than 150 customizable reports that feature achievement data and student demographics, geared toward educators at the classroom, school, and district levels. All reports can be filtered by year, grade, subject, and student demographic group. In addition, Edwin Analytics gives users the capacity to generate their own reports with user-selected variables and statistics. Edwin Analytics provides educators the capacity to use state-level data for programmatic and diagnostic purposes. These reports can help educators review patterns in the schools and classrooms that students attended in the past or make plans for the schools and classrooms to which the students are assigned in the coming year. The DESE monitors trends in report usage in Edwin Analytics. Between June and November (the peak reporting season for MCAS), over one million reports are run in Edwin Analytics, with approximately 400,000 reports generated in August when schools review their preliminary assessment results in preparation for the return to school. Examples of two of the most popular reports are provided below.

An example of the *MCAS School Results by Standards Report* is shown in Figure 3-1. This report indicates the mean percentage of possible points earned by students in the school, the district, and the state on MCAS items assessing particular standards/topics. The reporting of total possible points provides educators with a sense of how reliable the statistics are, based on the number of test items/test points. The School/State Diff column shows the difference between the school and state columns, which allows educators to compare their school results to the state results. Filters provide educators with the capacity to compare student results across nine demographic categories, which include gender, race/ethnicity, economically disadvantaged status, and special education status.

Figure 3-1. Example of School Results by Standards Report—Mathematics, Grade 7

All Students **Students :** (161)

Standards: MA 2017 Standards **Show results with <10 students :** No

	Possible Points	School % Possible Points	District % Possible Points	State % Possible Points	School/ State Diff
Mathematics					
All items	54	48%	48%	47%	1
Question Type					
Constructed Response	16	48%	49%	48%	1
Short Answer	14	41%	42%	39%	2
Selected Response	24	52%	51%	51%	1
Domain / Cluster					
Expressions and Equations	**14**	**47%**	**48%**	**47%**	**-1**
Solve real-life and mathematical problems using numerical and algebraic expressions and equations.	10	54%	54%	52%	2
Use properties of operations to generate equivalent expressions.	4	28%	31%	36%	-8
Geometry	**8**	**42%**	**43%**	**44%**	**-2**
Draw	2	39%	44%	47%	-9
Solve real-life and mathematical problems involving angle measure	6	43%	43%	43%	0
Ratios and Proportional Relationships	**11**	**55%**	**54%**	**53%**	**2**
Analyze proportional relationships and use them to solve real-world and mathematical problems.	11	55%	54%	53%	2
Statistics and Probability	**11**	**36%**	**36%**	**37%**	**0**
Draw informal comparative inferences about two populations.	3	29%	30%	32%	-2
Investigate chance processes and develop	6	36%	35%	36%	0
Use random sampling to draw inferences about a population.	2	48%	45%	47%	2
The Number System	**10**	**62%**	**59%**	**54%**	**8**
Apply and extend previous understandings of operations with fractions to add	10	62%	59%	54%	8

NOTE: MCAS results are suppressed for group counts of less than 10.

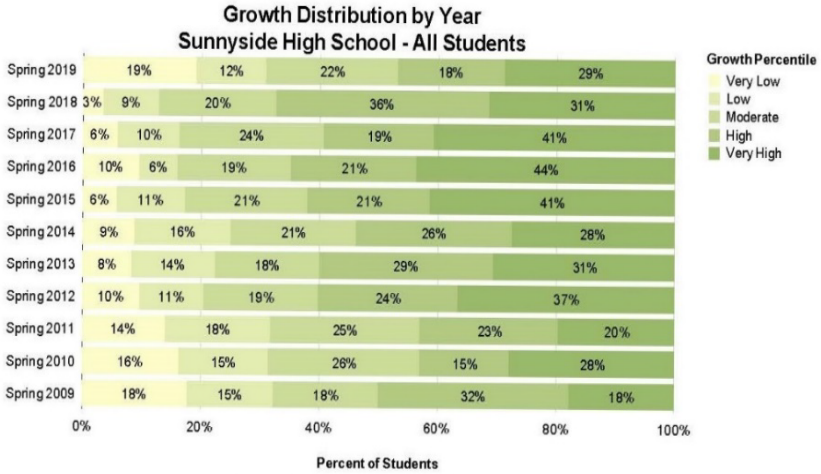
School results only include students enrolled in the school since Oct.1.

An example of the *MCAS Growth Distribution Report* is shown in Figure 3-2. This report presents the distribution of students by student growth percentile band across years, alongside the median student growth percentile and percentage of students scoring *Proficient* or *Advanced* on MCAS exams for each year. Teachers, schools, and districts use this report to monitor student growth from year to year. As in the report above, all demographic filters can be applied to examine results within student groups.

The assessment data in Edwin Analytics are also available on the DESE public website through the school and district profiles (profiles.doe.mass.edu). In both locations, stakeholders can click on links to view released assessment items, the educational standards they assess, and the rubrics and model student work at each score point. The public is also able to view each school's progress toward the performance goals set by the state and federal accountability system.

The high-level summary provided in this section documents the DESE's efforts to promote uses of state data that enhance student, educator, and LEA outcomes while reducing less-beneficial unintended uses of the data. Collectively, this evidence documents the DESE's efforts to use MCAS results for the purposes of program and instructional improvement and as a valid component of school accountability.

Figure 3-2. Example of Growth Distribution Report—ELA, Grade 10



Vertical lines at 20%, 40%, 60%, 80% and 100% represent the Statewide distribution for very low, low, moderate, high and very high growth.

Test	# Very Low	# Low	# Moderate	# High	# Very High	Median SGP	Mean SGP	# Students (SGP)	% Proficient or Higher	% Meeting or Exceeding Expectations	# Students (Ach. Level)
Spring 2019	18	11	21	17	27	58.5	55.0	94		65	95
Spring 2018	3	8	17	31	27		66.6	86	99		88
Spring 2017	5	9	21	16	35	70.5		86	100		86
Spring 2016	9	6	18	20	41	71.5		94	99		94
Spring 2015	5	10	18	18	36	73.0		87	99		87
Spring 2014	7	13	17	21	22	65.0		80	95		83
Spring 2013	7	12	15	25	26	67.0		85	100		86
Spring 2012	9	10	18	22	34	70.0		93	98		93
Spring 2011	15	19	27	25	21	53.0		107	85		109
Spring 2010	14	13	22	13	24	51.0		86	74		87
Spring 2009	11	9	11	20	11	60.5		62	88		69
Spring 2008									81		43

Aggregate student growth percentile (SGP) is not calculated if the number of students with SGP is less than 20.

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Appendices

APPENDIX A
MODIFIED COMPETENCY DETERMINATION—FAQS

Modified Competency Determination–Frequently Asked Questions

The purpose of this document is to provide clarification on the process that the Massachusetts Department of Elementary and Secondary Education (DESE) will use to determine whether certain high school students meet modified competency determination requirements.

Background

In response to the suspension of in-person instruction and the cancellation of the spring 2020 MCAS assessments due to the COVID-19 emergency, the Board of Elementary and Secondary Education (BESE) voted to temporarily modify the competency determination (CD) requirement for certain high school students.[1] Under this change, certain students may earn their CD through successful completion of a relevant Department-identified high school course, according to the criteria below:

- **For students in grade 12 in the 2019-2020 school year** (at the time of the April 2020 BESE vote), as well as other actively enrolled students who were on track to graduate in the 2019-2020 school year, the CD will be awarded in each subject as follows:
    - *For English language arts and mathematics* – upon district certification that the student earned credit for a course aligned to the curriculum frameworks in the relevant subject matter and has demonstrated competency in that subject.
    - *For science and technology/engineering* – upon district certification that the student earned credit for a course aligned to the curriculum frameworks in the relevant subject matter and has demonstrated competency in one of the four tested disciplines (biology, chemistry, introductory physics, and technology/engineering) during their high school career.
- **For students in the classes of 2021 and 2022,** the CD will be awarded in each subject as follows:
    - *For English language arts and mathematics* – upon district certification that the student earned full credit for a relevant course aligned to the appropriate curriculum framework in that subject matter and has demonstrated competency in that subject.
    - *For science and technology/engineering* – upon demonstration that the student earned credit for a course in the relevant subject matter and demonstrated competency in one of the four tested disciplines (biology, chemistry, introductory physics, technology/engineering) during their high school career.
- **For students in the class of 2023**, the CD in science and technology/engineering shall be awarded upon demonstration that the student earned credit for a course in the relevant subject matter and demonstrated competency in one of the four tested disciplines (biology, chemistry, introductory physics, technology/engineering) during their high school career.

Frequently Asked Questions

Accessing the Competency Determination Tool

Is the modified CD process required?

Yes. All districts that will graduate students in 2022 have students who are eligible for the modified CD due to the cancellation of the 2020 MCAS assessments, and therefore must use this tool to submit information to DESE for review. Districts will not be able to issue diplomas to students who have not earned their CD via MCAS testing or this modified process.

[1] The BESE voted to modify CD requirements on four occasions: April 2020 (in ELA, mathematics, and science for students in grade 12 and those who were on track to graduate in 2020); May 2020 (in science only for students in the classes of 2021-2023); January 2021 (in ELA and mathematics for students in the class of 2021); and April 2021 (in ELA and mathematics for students in the class of 2022).

How do I report CD information to DESE?
The Department created the 'Competency Determination' application in the Security Portal, which districts must use to submit the required information.

Can I provide the required information to DESE in a different way (e.g., via email, in a dropbox, over the phone, etc.)?
No. Data must be submitted through the Security Portal's 'Competency Determination' tool, which includes a final certification by the district's Superintendent.

How do I access the 'Competency Determination' tool?
To access the 'Competency Determination' application in the Security Portal, each district must assign the *Competency Determination* security role to the individual(s) who will be responsible for submitting and certifying data. This role must be assigned in Directory Administration, by the district's Directory Administrator.

Who should be given access to the tool?
The *Competency Determination* security role should be assigned as follows:

- **For each school**, the role should be assigned to the individual(s) who will be responsible for reviewing and verifying course and credit information for each eligible student. Individuals assigned the *Competency Determination* security role for a school will only be able to see student-level information for students enrolled in that school. An individual may be assigned the role for more than one school, if appropriate.
- **For each district**, the role should be assigned to the Superintendent and any other individual(s) who require access to student-level data for eligible students in all district schools, including students educated in out-of-district settings. To formally submit the data to DESE, at least one person (the Superintendent) should be assigned the *Competency Determination* security role for the district. Only individuals with the district-level role will be able to submit the final certification for the entire district.

How does the *Competency Determination* security role work?
The role allows individuals to access the 'Competency Determination' application in the Security Portal. It can be assigned at the school level, the district level, or both. Depending on the level of access, users have different permissions:

- **When assigned at the school level**, users will only see data for the school(s) to which they have been granted access. School-level users can enter and confirm information for individual students but are not able to submit the final district-level certification to DESE. There is no overall school-level certification. An individual may be assigned the role for more than one school, and multiple individuals may be assigned the role for a single school.
- **When assigned at the district level**, users will see data for all district schools that have eligible students, as well as for any eligible out-of-district students. District-level users can enter information for any student or school. Only district-level users can submit the single, final certification for the district as a whole, and only if data has been entered completely for all schools. There is no overall school-level certification.

Student Eligibility

Which students are included in the tool?
The modified CD collection tool has been designed to collect data for two groups of students: those eligible for the modified CD in ELA, mathematics, and science (i.e., the classes of 2020-2022), and those eligible for the modified CD in science only (i.e., the class of 2023). The Department identifies eligible

students using Student Information Management System (SIMS) and Student Course Schedule (SCS) data which has been submitted to DESE by districts. For the May 2022 modified CD collection period, DESE is collecting course information for eligible students in the classes of 2020, 2021, and 2022 only, based on March 2022 SIMS. Information for students in the class of 2023 will be collected at a later time. See the Modified CD Eligibility table at the end of this document for details.

Is the modified CD an option for students with Individualized Education Programs (IEPs)?
Yes. Certain students with IEPs are eligible for the modified CD if they meet the eligibility criteria outlined in this document. Districts may graduate students with IEPs if those students: (1) have received a Free and Appropriate Public Education (FAPE), (2) have completed all local graduation requirements, and (3) have earned their CD. See *Administrative Advisory SPED 2018-2: Secondary Transition Services and Graduation with a High School Diploma* for further information on graduation requirements for students with IEPs. See the question below for specific information on students with IEPs enrolled beyond grade 12.

Excellent two-way communication with students and parents is particularly important when the student is about to exit from school. Districts should always communicate with families and confirm in writing via the IEP or the IEP Notice of Proposed School District Action (N1) that families are aware of the upcoming graduation or aging out date. Districts should contact parents to let them know that they have applied for the modified CD and to offer a Team meeting to discuss further. As described later in this document, IEP page 8 of the MA IEP forms ("Additional Information" and "Response" sections) or an N1 reflecting the student's graduation date and the parent's agreement must be submitted through the 'Competency Determination' tool during an open collection window. Districts are also reminded of their obligation to provide the student and/or parent(s) with a Summary of Student Performance (SOP) as required by 34 CFR 300.305(e)(3). Schools and districts must be prepared to provide the SOP to DESE upon request.

Are out-of-district students included?
Yes. All eligible students who are educated in out-of-district settings are included in the tool, under a single "Out of District" section that can be accessed by individuals with the district-level security role. Districts are responsible for submitting information for their out-of-district students and should communicate with their students' outplacement settings to determine whether each eligible student has fulfilled the modified CD coursework requirements, in addition to following the guidelines stated in the previous question.

Are SP students (students with IEPs enrolled beyond grade 12) included?
Students reported as SP in SIMS may be eligible for the modified CD if they have an anticipated graduation date prior to October 1, 2022, as noted in their most recent signed IEP. A student reported as SP whose anticipated graduation date on their current, signed IEP is on or after October 1, 2022, is eligible for the modified CD only if the IEP Team reconvenes and agrees to change the graduation date to a new date prior to October 1, 2022.

Excellent two-way communication with students and parents is particularly important when the student is about to exit from school. Districts should always communicate with families and confirm in writing via the IEP or N1 that families are aware of the upcoming graduation or aging out date. Districts should contact parents to let them know that they have applied for the modified CD and to offer a Team meeting to discuss further. As described later in this document, IEP page 8 of the MA IEP forms ("Additional Information" and "Response" sections) or an N1 reflecting the new date and the parent's agreement must be submitted through the Competency Determination tool during an open collection window. Districts are also reminded of their obligation to provide the student and/or parent(s) with a Summary of Student

Performance (SOP) as required by 34 CFR 300.305(e)(3). Schools and districts must be prepared to provide the SOP to DESE upon request.

What about students who transferred in on or after March 1, 2022?
Eligible students who transferred into a Massachusetts public school on or after March 1, 2022 will be included in a future modified CD collection.

What about students who earned their certificate of attainment during the 2021-2022 school year, and were reported as such in March 2022 SIMS?
These students are included in the current modified CD collection.

What about students who finished high school without a diploma prior to the 2019-2020 school year, are no longer enrolled, but were planning on taking the MCAS tests this year?
In accordance with the BESE vote, these students are not eligible for the modified CD.

How are students with Educational Proficiency Plans (EPPs) considered this year? They did not have an opportunity to take the spring EPP test. Does completing local requirements satisfy EPP requirements?
The EPP is not required for students in the classes of 2020-2022, who are eligible for the modified CD. It will be required in school year 2021-2022 for subsequent classes.

Can I add or delete students to/from the tool?
No. The Department has prepopulated the student lists based on eligibility, which was determined using data that districts submitted to DESE in previous SIMS collection periods.

We believe a student should be on our list of eligible students, but they are not included in the 'Competency Determination' tool in the Security Portal. How can our district fix this?
Please review all student eligibility information provided in this document. If you still believe that a student was omitted from your eligibility list, contact DESE's Office of Data Analysis and Reporting at data@doe.mass.edu.

Changes to the Tool

The tool looks different from previous rounds. What has changed?
In each school's section and in the out-of-district section, students have been divided into the following three groups:

1. *Data review and bulk confirmation*: Students on this list have earned full credit in at least two eligible courses in each required subject, according to the district's SCS submission. Users should review the student-level data on this page and may confirm all students at once using the "Select All" checkbox. Course and credit information for individual students can be edited as needed.
2. *Data entry and individual confirmation:* Students on this list have earned full credit in only one eligible course in a required subject or are missing course and/or credit information. Users should review the student-level data on this page and update and/or provide course and credit information where needed. Data must be confirmed for each individual student; there is no "Select All" option.
3. *SP document upload and individual confirmation:* Students on this list are in grade SP (enrolled beyond grade 12). Users should review the student-level data on this page, update and/or provide course and credit information where needed and upload the required documentation for

students who are being submitted for the CD. Data must be confirmed for each individual student; there is no "Select All" option.

Data for all students in each of the three sections must be reviewed, and if necessary, updated or provided for each school and for the out-of-district section in order to submit the final certification to DESE.

Why did you make changes to the tool this year?
By adding students in the class of 2022 to the collection, each school's student list grew substantially. The tool was updated in an effort to streamline the confirmation and submission process.

Entering Data

What student-level information is included in the tool?
Where possible, DESE has prepopulated the tool using student-level information that has previously been submitted and certified by the district through the SIMS and SCS data collections. Prepopulated data include the name, date of birth, SASID, and class/graduation year for each student who has not yet earned the CD in one or more subjects; for each subject (ELA, mathematics, and science), an indication of whether the student has already earned the CD; and, for the subject(s) in which the student has not yet earned a CD, relevant course and credit information that DESE has on file (if any).

What information am I required to provide?
For the subject(s) in which a student has not yet earned a CD, the district must review and certify the prepopulated course and credit information, or make changes as needed. In some instances, the tool may display incorrect course and/or credit information for a student, based on inaccurate data that was previously submitted to DESE by the district. In these cases, the district should correct the information as needed. Alternatively, DESE may not have any course information for a student. In those cases, no course information is prepopulated, and the district must select the appropriate course from the dropdown menu and indicate whether full credit was earned. If a student did not complete or earn credit in any of the eligible courses (and therefore would not earn the CD in that subject), the district should choose "No Course Taken" from the dropdown menu.

Additionally, districts with special education students enrolled beyond grade 12 (reported as 'SP' in SIMS) must indicate whether each SP student in the tool has an anticipated graduation date before October 1, 2022. For each eligible SP student who will graduate before October 1, the district must provide all required course and credit information, and must also upload one of the following two documents into the 'Competency Determination' tool:

- Page 8 of the MA IEP forms ("Additional Information" and "Response" sections) of the student's most recent signed IEP. This signed page of the IEP should include information about the student's anticipated graduation date and indicate student and/or parent agreement **with a student and/or parent signature**. Please submit the signature page *as one document attached to Page 8* if the signature is not at the bottom of Page 8.
- IEP Notice of Proposed School District Action (N1). The N1 form may be submitted in lieu of Page 8 of the student's IEP if it contains up-to-date information about the student's anticipated graduation date and indicates student and/or parent agreement.

Which courses meet the modified CD requirements?
The Department has identified specific courses in ELA, mathematics, and science that fulfill the modified CD requirements. The list of courses was made available to districts in May 2020 and is also available in

the 'Competency Determination' application in the Security Portal. Districts should report course information in the tool based on NCES course codes, not local course codes or names.

If a student did not earn full credit in a prepopulated grade 12 course, can we use eligible course information from an earlier grade?
Yes. The subject-specific dropdowns include eligible courses from grades 9 through 12.

What if there are students in the tool that have not yet met CD coursework requirements?
You must submit information for all students included in the tool. If a student has not yet met CD coursework requirements, that should be indicated in the tool by selecting "No Course Taken" from the course dropdown menu, selecting "No" under *Full Credit Earned*, and checking the confirmation checkbox.

I entered data for my high school. Why can't I certify and submit it to DESE?
To certify and submit the data to DESE, data must be confirmed and saved for each student in the school list(s) and for each student in the out-of-district list. The out-of-district list will only appear in the tool for users who have been assigned the *Competency Determination* security role for the district. Additionally, only users who have been assigned the role for the district are allowed to certify and submit the data to DESE.

Can I change data after it has been certified by the district?
Data may be saved (but not certified) at any time. However, once the final certification has been submitted by the district, data cannot be changed.

Modified Competency Determination Requirements and MCAS Appeals

Does this process replace the MCAS appeals process?
No. While many students are expected to be certified by their district through the modified CD process, MCAS appeals continue to be available for students who meet eligibility requirements who may not be eligible for certification by the district for the grade 12 CD modification. For example, appeals may be appropriate for students who were not enrolled in a course authorized by DESE to receive a CD; or students with disabilities in special programs and those in programs beyond grade 12.

If I already filed an MCAS appeal, should I disregard that application?
No. Both the appeals and modified CD processes may yield a CD. If an appeal was submitted and the student is also included in the modified CD process, DESE will accept whichever is the higher result. Please see above.

Timeline for Awarding the Competency Determination

What is the timeframe for submitting this information to DESE?
The Round 10 (May) modified CD collection window opens on May 4, 2022 and closes on May 24, 2022.

Will DESE implement a process to review compliance with the guidelines established for the modified competency determination?
Yes. The Department has established a process for reviewing documentation provided by districts for compliance with the guidelines of the modified CD. This process includes an examination of various factors such as the percentage of students a school or district submits for consideration. Additionally, relevant documentation for students with disabilities may be requested and reviewed.

When will DESE notify districts about final competency determination decisions?
For eligible students reported during the May 2022 modified CD collection window, DESE will begin reviewing the information submitted by districts after the application closes and intends to make final CD decisions in late May 2022.

Does submitting this information to DESE mean that a student will automatically be awarded the CD?
No. Providing this data to DESE does not constitute the awarding of the CD. The Department will notify districts about the award of the CD, and at that time the students will be eligible to receive a Massachusetts high school diploma if the school district determines they meet local graduation requirements and, in the case of students with IEPs, have been provided FAPE.

If DESE awards the CD to a student, does that mean the student automatically earns their diploma?
No. Diplomas are issued by the district, not by DESE. If DESE awards the CD to a student through this modified process, the student must still meet all other local graduation requirements and have been provided FAPE by the district before the district issues a diploma.

If DESE cannot issue CD determinations prior to my school's graduation, does this mean that these students cannot participate in the ceremonies?
This is a local decision. These students may be eligible to participate in graduation ceremonies (for example, as certificate of attainment earners) if the district determines that they have met local graduation requirements; however, they may not receive a diploma unless DESE awards the CD.

Should students who meet state and local graduation requirements after DESE has issued final CD decisions be reported as graduates in the next SIMS collection?
Yes. Students can be reported as graduates in the next SIMS collection if the district receives confirmation from DESE that the CD has been awarded in all three subjects and the student meets local graduation requirements.

Contact Information and Resources

Topic	Email	Resources
Modified CD	data@doe.mass.edu	• List of accepted courses: https://www.doe.mass.edu/mcas/accepted-courses.xlsx • Modified CD tool demonstration video: https://www.youtube.com/watch?v=6sbfC8Fbuac
MCAS testing	mcas@doe.mass.edu	https://www.doe.mass.edu/mcas/
MCAS performance appeals	mcasappeals@doe.mass.edu	https://www.doe.mass.edu/mcasappeals/
Graduation requirements	mcas@doe.mass.edu	https://www.doe.mass.edu/mcas/graduation.html

Modified Competency Determination (CD) Eligibility

Students in the Classes of 2020-2022

Students who were enrolled in grade 12 during the 2019-2020 school year, students who were on track to graduate in 2020, and students in the classes of 2021 and 2022 are eligible for the modified CD in ELA, mathematics, and science. See the MCAS Graduation Requirements website for more information.

Round (Collection period opens)	Class/ graduation year(s)	Subject(s)	Notes
Round 1 (June 2020)	2020	English language arts (ELA), mathematics, science	Students were included if they were on track to graduate at the end of the 2019-2020 school year
Round 2 (August 2020)	2020	ELA, mathematics, science	Students were included if: • They were not previously included in the June 2020 collection; • They were included in the June 2020 collection but had not yet met coursework requirements in one or more subjects; or • They were on track to graduate at the end of the 2019-2020 school year
Round 3 (December 2020)	2020	ELA, mathematics, science	Students were included if: • They were not previously included in the June or August 2020 collections; • They were included in the June or August 2020 collections but had not yet met coursework requirements in one or more subjects; or • They were on track to graduate at the end of the 2019-2020 school year
	2021	Science	Grade 12 students were included if they were not reported in grade 12 in a previous school year but had not yet met coursework requirements in science
Round 4 (March 2021)	2020	ELA, mathematics, science	SP students were included if they were included in the December 2020 collection but had not yet met coursework requirements in one or more subjects
	2021	ELA, mathematics, science	Students were included if: • They were included in the December 2020 collection but had not yet met coursework requirements in science; or • They became eligible for the modified CD in ELA and/or mathematics following the January 2021 BESE vote
Round 5 (May 2021)	2020 & 2021	ELA, mathematics, science	Grade 12 and SP students were included if they were included in the March 2021 collection but had not yet met coursework requirements in one or more subjects
Round 6 (June 2021)	2020 & 2021	ELA, mathematics, science	Grade 12 and SP students were included if they were included in the May 2021 collection but had not yet met coursework requirements in one or more subjects

Round (Collection period opens)	Class/ graduation year(s)	Subject(s)	Notes
Round 7 (August 2021)	2020 & 2021	ELA, mathematics, science	Grade 12 and SP students were included if they were included in the June 2021 collection but had not yet met coursework requirements in one or more subjects
Round 8 (October 2021)	2020, 2021, & 2022	ELA, mathematics, science	Students are included if: • They were included in the August 2021 collection, but had not yet met coursework requirements in one or more subjects; • They were reported as enrolled in grade 10 in 2020 end-of-year SIMS and were still enrolled as of 2021 end-of-year SIMS; • They were reported as enrolled in grade 11 in 2021 end-of-year SIMS; or • They were members of the graduation classes of 2020, 2021, or 2022, were still enrolled in 2021 end-of-year SIMS, and have not yet met coursework requirements in one or more subjects
Round 9 (January 2022)	2020, 2021, & 2022	ELA, mathematics, science	Students will be included if: • They were included in the October 2021 collection, but have not yet met coursework requirements in one or more subjects; or • They are enrolled in grade 12 or SP in October 2021 SIMS
Round 10 (May 2022)	2020, 2021, & 2022	ELA, mathematics, science	• They were included in the January 2022 collection and still enrolled in March 2022 SIMS, but have not yet met coursework requirements in one or more subjects; or • They are enrolled in grade 12 or SP in March 2022 SIMS

Students in the Class of 2023

Students in the class of 2023 are eligible for the modified CD in science only. See the MCAS Graduation Requirements website for more information.

Round (Collection period opens)	Class/ graduation year(s)	Subject	Notes
TBD	2023	Science	Students who remain enrolled at the time of data collection and are in the original 2023 graduation class will be eligible, even if retained while in high school.

APPENDIX B
COGNITIVE SKILL DESCRIPTIONS

Cognitive Skill Descriptions for Science and Technology/Engineering MCAS

Only one cognitive skill will be designated for a common item, although several skills may apply to a single item. The lists below are general examples, but they are not a complete list. Depending upon how the item is written, these descriptions may not always apply.

Cognitive Skill	Description
Remembering	• **Identify or define a basic concept or term with little or no context** • Recall facts with little or no context *Does the item require recalling or remembering facts or definitions?*
Understanding	• **Describe, explain, or identify typical classroom examples for a science or tech/eng concept** • Recognize and differentiate representations and descriptions of familiar models *Does the item require the recognition or a description of a familiar concept?*
Applying	• **Describe, explain, or identify a science or tech/eng concept presented in a novel situation** • Draw conclusions by comparing and contrasting information in novel situations • Draw conclusions by interpreting information/data (including simple graphs and tables) or make predictions based on data • Solve quantitative problems where an equation must be rearranged to solve the problem • Describe or explain multiple processes or system components in a novel situation *Does the item require drawing conclusions based on novel information or solving complex problems?*
Analyzing	• **Critically examine and interpret data** or maps to draw conclusions based on given information (Note: An item with a graph/diagram/table/map is not necessarily analyzing—it depends on how the information needs to be interpreted.) *Does the item require critical examination of information to make conclusions?*
Creating	• **Generate** an explanation or conclusion by combining **two or more science or technology/engineering concepts** in a novel situation • **Construct** models, graphs, charts, drawings, or diagrams **and generate explanations** or conclusions based on the information • Propose solutions to scientific or engineering problems based on given criteria/constraints *Does the item require the synthesis of different concepts or skills to generate a solution?*

The information above was provided by the Massachusetts Department of Elementary & Secondary Education.

APPENDIX C
LEGACY MCAS COMMITTEE MEMBERSHIP

Science & Technology/Engineering Committee Members

Table C-1. Assessment Development Committee Members—High School Biology

Name		Affiliation	District
Bottcher	Arlyn	Dartmouth High School	Dartmouth
Bruell	Carol	Chelmsford High School	Chelmsford
Curtin	Lisa	Somerville High School	Somerville
Davidson	Tom	West Springfield High School	West Springfield
Drummond	Jillian	Foxborough High School	Foxborough
Dube	Jennifer	Greater Lawrence Technical School	Greater Lawrence Regional Technical High School
Fitch-Tewfik	Jennifer	Southeastern Regional	Southeastern Regional School District
Genovese	Elizabeth	Chelsea High School	Chelsea
Hannon	Kelly	Watertown High School	Watertown
Menice	Constance	Westford Academy	Westford
Nagelin	AnnMarie	Mystic Valley Regional Charter School	Mystic Valley Regional Charter School
St.Amand	Ronald	District	Springfield

Table C-2. Assessment Development Committee Members—High School Introductory Physics

Name		Affiliation	District
Copen	Joshua	High School of Science and Technology	Springfield
DiBiasio	Kenneth	Tantasqua Regional High School	Tantasqua and Union 61 Districts
Eckels	Marna	Dearborn STEM Academy	Boston
Flanagan	Erin Marie	Wachusett Regional High School	Wachusett Regional
Foster	Gita	Weston High School	Weston
Jumper	Kevin	Southeastern	Southwa
Lidington	Kathryn	Hull High School	Hull
Morey	Shannon	Abbott Lawrence Academy at Lawrence HS	Lawrence Public Schools
Newton	Kristin	Cambridge Rindge and Latin School	Cambridge
Shapiro	David	Natick High School	Natick
Snyder	Joshua	North Brookfield Jr/Sr High School	North Brookfield
Winston	Amy	Newton North HS	Newton

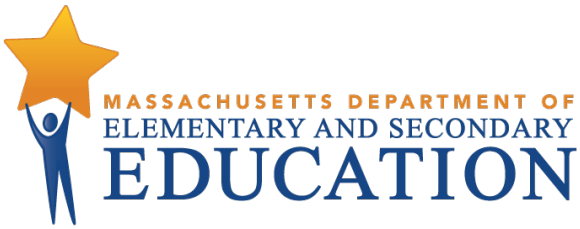
Bias and Sensitivity Committee Members

Table C-3. Bias and Sensitivity Committee Members

Name		District
Amatul	Mahmud	Cambridge (Retired)
Byrd	Brandon	Barnstable Public Schools
Callahan	Judy	Pittsfield
Chaffee	Sydney	Codman Academy Charter
Charbonneau	Nichole	Old Rochester
Cordero	Carlos	Lawrence
Cunningham	Cedric Allen	Springfield Central High School
Dancy	Christopher	Needham Public Schools
Ernst	Amanda	Lowell
Heng	Veasna	Edward Boland Elementary
Jean	Pierre	Boston
Magee	Meka	Amherst-Pelham
Martin	Paula	Community College
Miller	Tammi	Seekonk
Mitchell	Mary	Lynn
Obremski	John	Everett Public Schools
Reardon	Maria	Natick
Reyes	Celeste	Worcester
Strus	Jinnee	Gardner
Tahiliani	Priya	Everett Public Schools
Walia	Sneha	Boston Latin Academy
Williams	Anna	Lynn

APPENDIX D

ACCESSIBILITY FEATURES AND TEST ACCOMMODATIONS



Accessibility and Accommodations Manual for the 2020–2021 MCAS Tests and Retests

Including Participation Requirements for Students with Disabilities and English Learners

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Updated: January 2021

This document was prepared by the
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Purpose of This Manual

The Massachusetts Department of Elementary and Secondary Education is providing you with the *Accessibility and Accommodations Manual for the 2020–2021 MCAS Tests and Retests.* The accessibility and accommodations policies in this manual will apply to students taking all MCAS tests and retests.

Educators will need to become familiar with the MCAS accessibility and accommodations policies since they provide guidance on the use of individualized supports for student participation in MCAS. Test coordinators and administrators should also review this manual to determine those accessibility features and accommodations that must be documented for each student in the Student Registration/Personal Needs Profile (SR/PNP) (the procedure used by schools to register students for MCAS), and to receive the necessary accommodated test editions.

This manual provides guidance and information about:

- MCAS participation requirements for students with disabilities, students who are English learners (ELs), and ELs with disabilities; and which students with disabilities should be considered for an alternate assessment; and
- the availability, selection, and use of
    - *universal accessibility features*, which provide tools and supports for *all* students;
    - *designated accessibility features* intended for *all* students, but which must be authorized by the principal; and
    - *test accommodations* for students with disabilities and students who are ELs.

Schools may request guidance from the Department throughout the year as they plan for the use of test accommodations and other supports for the students who need them. Please contact Student Assessment Services at mcas@doe.mass.edu or 781-338-3625 with any questions.

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I. Overview of MCAS Accessibility and Accommodations

A. Introduction

All students, including students with disabilities and ELs, will be required to participate in all MCAS assessments that are scheduled for students in their grade, including

- students enrolled in public schools
- students enrolled in charter schools
- students enrolled in innovation schools, including virtual schools
- students enrolled in educational collaboratives
- students enrolled in approved and unapproved private special education schools and programs within and outside Massachusetts
- students receiving educational services in institutional settings
- students in the custody of the Department of Children and Families (DCF)
- students in the custody of the Department of Youth Services (DYS)

Students must participate in grade-level tests that correspond with the grade in which they are reported to the Department's Student Information Management System (SIMS).

Selection of accessibility features and accommodations should proceed according to the test format (computer or paper) to be used by the student. The assessment options indicated on the following pages are based upon (a) accommodations research; (b) generally accepted practices and procedures currently in use for statewide assessments; (c) "legacy" MCAS accommodations policies; and (d) the recommendations of Massachusetts stakeholders who were members of the MCAS Accessibility and Accommodations Work Group.

The application of universal design principles to the MCAS assessments, in conjunction with the accessibility and accommodations policies described in this manual, are intended to reduce barriers to participation in the MCAS assessments for *all* students, not just students with disabilities and English learners. While many computer-based accessibility features are unique to online testing, others can be applied to paper-based testing for students who are unable to take tests on a computer. In addition, increased flexibility for local administrators has been incorporated in test administration procedures in response to input and requests from local educators for greater autonomy in determining the testing conditions within their schools.

To assist schools in providing and tracking the use of accessibility features and accommodations during testing, the Department recommends that test coordinators develop a table or spreadsheet prior to test administration that lists **where**, **when**, and **with whom** students will be testing, and which accessibility features and accommodations each student will need, to ensure that students receive all accessibility features and/or accommodations to which they are entitled.

B. What's New and Notable for School Year 2020–2021?

- Accommodated editions of **computer-based** tests will be available, including text-to-speech, screen reader, compatible assistive technology, and American Sign Language (ASL) video editions of grade 10 (and grade 11) mathematics. Accommodated **paper-based** test forms will be available in large-print, Braille, and Spanish-English for the grade 10 and grade 11 mathematics tests.
- High school Science Technology and Engineering tests will continue to be administered only as "legacy" **paper-based** tests, with paper-based accommodated forms available.
- Computer-based "web extensions" will be available in **spring 2021** for students who use the **speech-to-text** and/or **word prediction** accommodations, and this is listed in their IEP and/or 504 plan. Web extensions are described on pages 20, 24, 25, and 29 of this manual and in greater detail in the Department' *Guidelines for Using Assistive Technology as an MCAS Test Accommodation*.
- An **alternative cursor/mouse** will be available for selection by all students on computer-based tests. See page 4 for details.
- **Pre-approved graphic organizers and supplemental mathematics and STE reference sheets** (available here) have recently been revised to reflect input from educators and curriculum experts.
- Appendix A has been added describing the ***Procedures for Scribing and Transcribing Student Responses***.
- A new *MCAS Grade-Level and Competency Manual* has been developed for students who will participate in MCAS through this option. This information is no longer included in the *Educator's Manual for MCAS-Alt*.
- Updated computer- and paper-based practice tests are available, including accommodated editions. Students using accommodated forms, including text-to-speech and the new "web extensions," should become familiar with these features and the basic functionality of the computer-based testing platform (TestNav) prior to testing. The Department encourages each student to take online practice tests and also view the student tutorial prior to actual test administration. Narrated training modules are also available.
- Decisions about test participation for each student with a disability (including ELs with disabilities) must be made by the IEP team and listed in the student's IEP, or be included in a 504 plan, for each content area test. Decisions include the following:
    - Which **accommodations** the student needs to participate in MCAS testing, according to the policies outlined in this manual.
    - Whether the student with a disability (or recently-arrived EL) requires a **paper- rather than a computer-based test**, and if so, in which subjects.
    - The **EL accommodations** listed in Section VI of this manual must be considered for all English learners (ELs) with or without disabilities. Accommodations

decisions must be made by an informal team of adults familiar with the EL student and documented in writing using the sample (or similar) form provided in Appendix B.
    - If **accessibility features** are needed by a student with a disability, the Department encourages listing these to guarantee that they will be provided on the test.

- The following must be provided to *all* students on MCAS tests, including students with disabilities and ELs:
    - Untimed test sessions until the end of the school day, as needed
    - Blank scratch paper (including blank, lined, or graph paper)
    - Assistance as needed from a test administrator in using the computer-based testing platform

Accessibility features and accommodations for MCAS tests are listed in the following categories:

- **Universal Accessibility Features** (UF): Tools and supports that are available to *all* students, either on the computer-based tests or their paper-based equivalents (see pp. 4–5).
- **Designated Accessibility Features** (DF): Flexible test administration procedures that may be used with *any* student at the discretion of the principal (or designee). These include changes in the location of test settings, group size, seating of students, and scheduling of test administrations (see p. 5–6).
- **Accommodations** (A): Specific supports available only to students with disabilities and English learners. Team members and educators responsible for developing IEPs and 504 plans must make decisions regarding which accommodations to provide and list these in the plan of each student (see pp. 16–22). We encourage districts to list accommodations for EL students using the sample form entitled Documentation of MCAS Accommodations for an EL Student (in Appendix B) which must be kept on file at the school.
- **"Special Access" Accommodations** (SAs): Formerly called *nonstandard accommodations*, these may be provided to students who meet certain guidelines and criteria (see pp. 22–25).
- **English Learner Accommodations** (EL): Several accommodations are available to ELs who do not have disabilities. See pp. 28–31 for details and a description of the relative suitability of each accommodation for students at beginning, intermediate, and advanced levels of English proficiency.

Accessibility and accommodations policies will also be described in the *MCAS Principal's Administration Manual* (PAM), available this winter.

II. Accessibility Features for All Students

A. Universal Accessibility Features (UFs)

Universal Accessibility Features are tools and supports that are available to *all* students on the MCAS tests that are either built into the MCAS computer-based test platform or provided by a test administrator on the computer- or paper-based test. Although most universal accessibility features will be available on the day of the test to *any* student who wishes to use them, some *must* be **requested in advance** in the Student Registration/Personal Needs Profile (SR/PNP), the student registration system located in PearsonAccess^{next} (PAN). The "*(SR/PNP)*" designation in Table 1 below refers to an accessibility feature or accommodation that must be documented and/or requested in the SR/PNP prior to the start of testing.

Table 1. *Universal Accessibility Features* Available to All Students

#	Computer-Based Testing	Paper-Based Testing
UF1	**Highlighter tool** Four highlighter colors are offered: blue, pink, green, and orange	**Highlighter** Colored highlighters and/or colored pencils may be used by students taking paper-based tests. See *Principal's Administration Manual* for details.
UF2 *(SR/PNP)*	**Alternative background and font color** The student can select a color combination for text and background. 	**Colored overlays or tinted lens(es)**
UF3	**Magnifier or Zoom tool** Magnifier tool enlarges part of the screen; Zoom tool enlarges or reduces the entire screen by pressing Ctrl + or Ctrl -	**Magnification tool/device** or low-vision aid
UF4 *(SR/PNP)*	**NEW for Spring 2021** **Alternate Cursor/Mouse Pointer tool**	**Enlarged pencil/modified writing instrument**

#	Computer-Based Testing	Paper-Based Testing
	The student can select an enlarged and colored cursor.  **Medium Sized White, Large Sized White, Extra-Large Sized White**  **Extra-Large Green, Extra-Large Yellow, Extra-Large Black** **Note:** Pointers are not shown in actual size which will differ according to the size of the student's computer screen.	
UF5	**Line reader tool** Masks text so only part of the text can be viewed at one time	**Tracking device**, such as a straight edge or similar tool
UF6 *(SR/PNP)*	**Answer masking** Student selects which answer choices will be shown on the screen	**Mask text or answer(s)** using a blank card or cutout
UF7	**Answer eliminator** Student marks an "X" through each answer option he or she believes is incorrect	**Use a pencil to eliminate answer choices** in test booklet (not answer bubbles)
UF8	**Item flag/bookmark**	**Use a blank place marker** to mark a question for later review (Note: post-its are *not* allowed)
UF9	**Audio aid** (e.g., amplification device) (**Note**: smartphones may not be used)	**Audio aid** (e.g., amplification device) (Note: smartphones may not be used)

#	Computer-Based Testing	Paper-Based Testing
UF10	**Notepad** for notes or calculations	**Scratch paper** is required for all students
UF11	**Test administrator reads aloud selected words** (or **signs selected words**, in the case of a student who is Deaf or Hard-of-Hearing) on the Mathematics and/or Science and Technology/Engineering (STE) tests, as requested by the student. The student may point to a **word or phrase** that he or she needs read aloud or signed. Test administrator quietly reads aloud or signs the selected word to the student. Students using this feature may be tested alongside other students in groups of any size.	
UF12	**Test administrator redirects student's attention to the test** without coaching or assisting the student to answer any questions (e.g., test administrator reminds student to stay focused; it is not permissible to say, "Add more to your response" or "Make sure to answer all questions.")	
UF13	**Test administrator reads aloud, repeats, or clarifies *general test administration directions* from the Test Administration Manual scripts** to student, as needed.	

B. Designated Accessibility Features (DFs)

Although most students will be tested in their regular classrooms according to the guidelines and schedule intended for all students, principals have the flexibility to test *any* student, including non-disabled and non-EL students, using the designated accessibility features described in Table 2, as long as all requirements for testing conditions, test security, and staffing are met.

It is advisable, although not required, to include designated accessibility features in the Individualized Education Plan (IEP) or 504 plan of a student with a disability who requires them.

Table 2.

***Designated Accessibility Features* available to any student, at the principal's discretion**

#	Designated Accessibility Feature
DF1	**Small group test administration** (May include up to a total of 10 students.)
DF2	**Individual (one-to-one) test administration** (Student must be tested in a separate setting.)
DF3	**Frequent brief supervised breaks**
DF4	**Separate or alternate test location**
DF5	**Seating in a specified area** of the testing room, including the use of a study carrel
DF6	**Adaptive or specialized furniture** (e.g., seating, desk, or lighting)
DF7	**Noise buffer,** such as noise-canceling earmuffs/headphones or white noise (**Note:** music or other recordings may *not* be played, unless granted as a *unique accommodation* by the Department. See pp. 14-15)
DF8	**Familiar test administrator**
DF9	**Student reads test aloud to self**: Student must be tested in a separate setting, unless a low-volume device (e.g., a Whisperphone™) is used.
DF10	**Specific time of day**
DF11	**"Stop Testing" policy**: The student should be given the opportunity to attempt each test session). If the student does not appear to be responding to test questions after a period of 15–20 minutes, the test administrator may ask if the student is finished. If so, the test administrator may collect the student's test materials and the student can either sit quietly or be excused from the test setting.

III. MCAS Participation Requirements for Students with Disabilities

A. Background

The information in this manual is intended to guide decision-making by Individualized Education Program (IEP) teams and 504 plan coordinators as to *how* a student with a disability will participate in MCAS. Students with disabilities are required to participate in all MCAS assessments scheduled for students in their grade. Students with significant cognitive disabilities who are unable to take the standard tests, even with accommodations, must take the MCAS Alternate Assessment (MCAS-Alt).

B. Definition of a Student with a Disability

For the purpose of MCAS participation, a student with a disability is defined as a student with an approved Individualized Education Program (IEP) provided under the Individuals with Disabilities Education Improvement Act of 2004 and the Massachusetts General Laws, Chapter 71B; or a plan provided under Section 504 of the Rehabilitation Act of 1973 (i.e., a "504 plan").

C. Participation Requirements for Students with Disabilities

State and federal education laws mandate that *all* students with disabilities who are educated with Massachusetts public funds participate in annual statewide assessments, including students enrolled in public schools, educational collaboratives, and approved and unapproved private special education schools, and students in the custody of the Department of Children and Families (DCF) or the Department of Youth Services (DYS).

Students with disabilities must participate in grade-level tests that correspond with the grade in which they are reported in the Department's Student Information Management System (SIMS).

Only a student's IEP team can make decisions about which test accommodations are appropriate for the student and whether the student should take the standard or alternate assessment. Assessment decisions for students with disabilities are made on an annual basis in each content area for each student and must be listed in the IEP. If the student has a 504 plan rather than an IEP, then the 504 plan must also include this information. The principal is responsible for ensuring that each student is assessed using the test format and accommodations listed in the student's IEP or 504 plan.

English Learners (ELs) with Disabilities

EL students, both with and without disabilities, must participate in all MCAS assessments required for students in their grade, regardless of the number of years they have been enrolled in U.S. schools, with one exception: **EL students who first enrolled in a U.S. school after March 1, 2020**, are *not required* to take the spring 2021 MCAS ELA tests, although schools have the *option* to assess first-year EL students in ELA.

EL students with disabilities are entitled to receive test accommodations and to participate in the MCAS Alternate Assessment (MCAS-Alt), as determined by their IEP team or 504 plan. See additional information on the participation of EL students in MCAS beginning on page 26

Students Diagnosed with Concussions

The Department has issued guidelines and MCAS testing policies for students who are returning to school after being diagnosed with a concussion. Please refer to this information before making decisions about MCAS testing for a student who has had a concussion.

D. Decision-Making Guidelines for MCAS Participation

This section provides guidelines for IEP team members and staff who develop 504 plans to determine how each student with a disability will participate in MCAS.

The student's IEP team or 504 plan coordinator should address the questions below and consider options 1, 2, and 3 in the chart on pages 8-10:

- Can the student demonstrate knowledge and skills, either fully or partially, on the **standard MCAS test under routine conditions**?
- Can the student demonstrate knowledge and skills, either fully or partially, on the **standard MCAS test with accommodations**? If so, which accommodations are necessary for the student to participate?
- If no to the above questions, see the options below to determine whether the student should take the **alternate assessment** (MCAS-Alt).

  (**Note: Alternate assessments** are intended only for students with significant cognitive disabilities who are unable to take standard MCAS tests, even with accommodations.

The student's IEP team or 504 plan coordinator must make a separate decision for each subject scheduled for assessment. A student may take the standard test in one subject and the alternate assessment in another. These decisions may be revised each time the team convenes.

Characteristics of Student's Instructional Program and Local Assessment	Recommended Participation in MCAS
OPTION 1	
If the student is a) generally able to demonstrate knowledge and skills on a computer- or paper-based test, either with or without test accommodations, ***and*** is b) working on learning standards **at or near grade-level expectations,** ***or*** is c) working on learning standards that have been modified and are **somewhat below grade-level expectations** due to the nature of the student's disability,	***Then*** the student should take the computer- or paper-based **MCAS test**, either with or without accommodations.

Characteristics of Student's Instructional Program and Local Assessment	Recommended Participation in MCAS
OPTION 2	
If the student is a) an individual with a **significant cognitive disability**, ***and*** is b) **generally unable** to demonstrate knowledge and skills on a computer- or paper-based test, even with accommodations, ***and*** is c) working on learning standards that have been **substantially modified** due to a *significant cognitive disability*, ***and*** is d) receiving **intensive, individualized instruction** in order to acquire, generalize, and demonstrate knowledge and skills,	***Then*** the student should take the **MCAS Alternate Assessment (MCAS-Alt)** in this subject**.**

E. Further Guidance on Designating Students for the MCAS-Alt (Option 2)

IEP teams should **not** designate a student for an alternate assessment solely because he/she:

- is frequently absent from school;
- has not received instruction in the general curriculum;
- has a particular disability (e.g., all students with intellectual disabilities should not automatically be designated for the MCAS-Alt);
- is placed in a program or classroom where it is expected that students will take the MCAS-Alt;
- has taken an alternate assessment in the past (since this is an annual decision);
- has previously failed the MCAS test;
- is an English learner;
- is economically disadvantaged ;
- is a child in foster care;
- requires assistive technology or an augmentative communication system that has not been provided;
- attends a school in which the IEP team may have been influenced to designate the student for an alternate assessment in order to receive disproportionate credit toward the school's accountability rating.

Please refer to the Commissioner's memorandum regarding MCAS-Alt eligibility criteria.

Characteristics of Student's Instructional Program and Local Assessment	Recommended Participation in MCAS
OPTION 3	
If the student is a) working on learning standards **at or near grade-level expectations** ***and*** is b) **sometimes able** to take a computer- or paper-based test, either without or with one or more test accommodation(s) ***but*** c) has a **complex and significant disability*** that does not allow the student to fully demonstrate knowledge and skills on a computer- or paper-based test of this duration, * See Section F for examples of complex and significant disabilities for which the student may require an alternate assessment.	***Then*** the student should take the computer- or paper-based **MCAS test**, if possible, with necessary accommodations. ***However*** the team may recommend that the student submit a "grade-level" or "competency" portfolio when the severity and complexity of the disability prevent the student from demonstrating knowledge and skills on the computer- or paper-based MCAS test, even with the use of accommodations.

F. Students with Complex and Significant Disabilities Who May Require a "Grade-Level" or "Competency" Portfolio (Option 3)

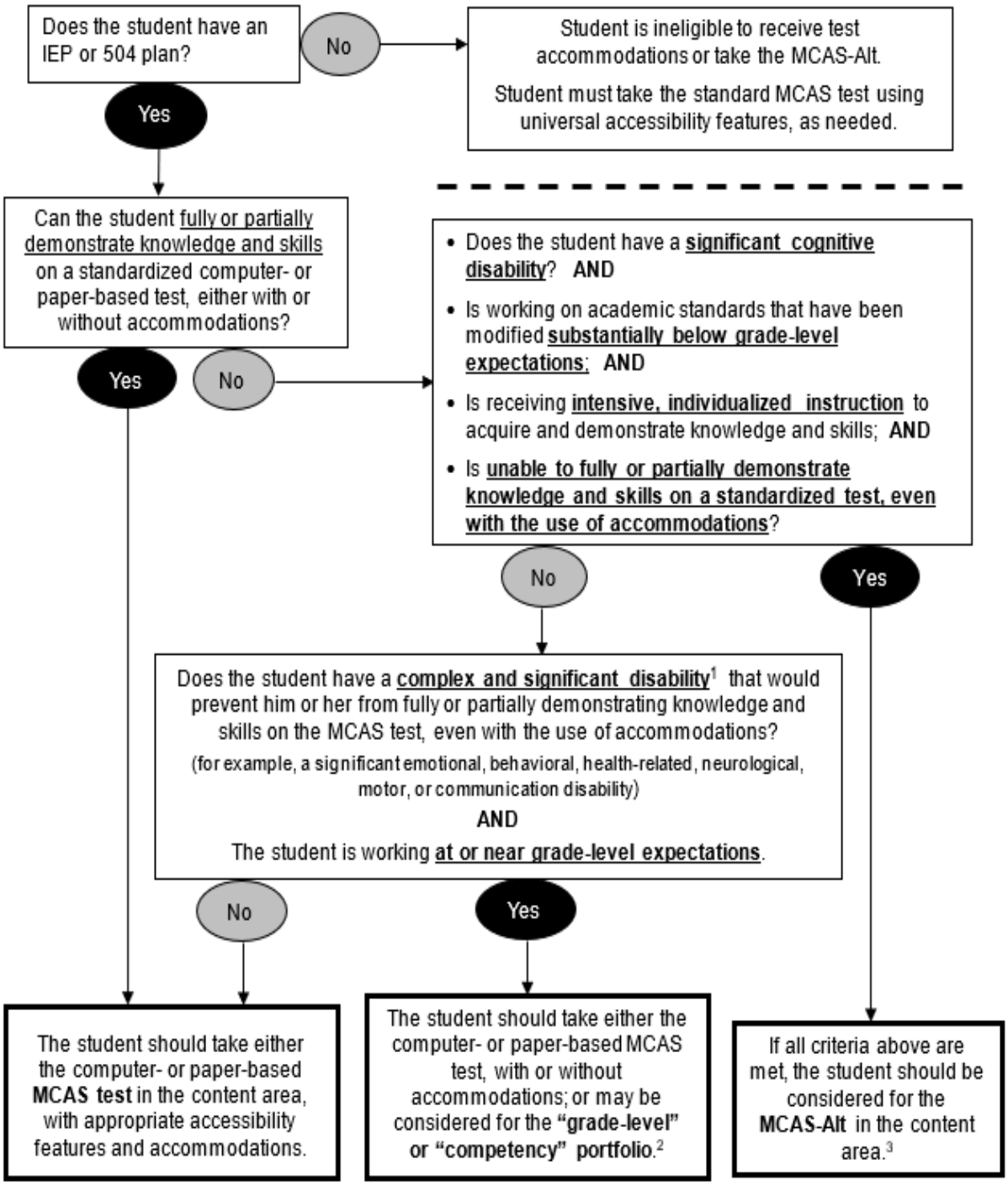
When the nature and complexity of a student's disability present significant barriers or challenges to standardized computer- or paper-based testing, even with the use of accommodations; and the student is working at or close to grade-level expectations, the student's IEP team or 504 plan coordinator may determine that the student should participate either in the "grade-level" (grades 3–8) or "competency" (high school) portfolio in one or more subjects. More information on "grade-level" and "competency" portfolios is available in the MCAS Grade-Level and Competency Manual.

The following examples are provided to expand the team's understanding of students who may be appropriate for the "grade-level" or "competency" portfolios in unique circumstances:

- a student with a significant emotional, behavioral, or other disability, who is unable to maintain sufficient concentration to participate in standard MCAS testing, even with accommodations;
- a student with a significant health-related disability, neurological disorder, or other complex disability, who cannot meet the demands of a prolonged test administration;
- a student with a significant motor, communication, or other disability, who requires more time than is reasonable or available for testing, even with the allowance of extended time (i.e., the student is unable to complete a test session in a single school day).

G. Decision-Making Tool for MCAS Participation by Students with Disabilities

The decision chart shown below may be used by IEP teams and 504 plan coordinators to make annual decisions regarding appropriate student participation in MCAS. Make separate decisions in *each content area* being assessed: ELA, mathematics, and science and technology/engineering.


Does the student have an IEP or 504 plan?
No
Student is ineligible to receive test accommodations or take the MCAS-Alt.
Student must take the standard MCAS test using universal accessibility features, as needed.
Yes
Can the student fully or partially demonstrate knowledge and skills on a standardized computer- or paper-based test, either with or without accommodations?
Yes
No
• Does the student have a significant cognitive disability? AND
• Is working on academic standards that have been modified substantially below grade-level expectations; AND
• Is receiving intensive, individualized instruction to acquire and demonstrate knowledge and skills; AND
• Is unable to fully or partially demonstrate knowledge and skills on a standardized test, even with the use of accommodations?
No
Yes
Does the student have a complex and significant disability[1] that would prevent him or her from fully or partially demonstrating knowledge and skills on the MCAS test, even with the use of accommodations?
(for example, a significant emotional, behavioral, health-related, neurological, motor, or communication disability)
AND
The student is working at or near grade-level expectations.
No
Yes
The student should take either the computer- or paper-based MCAS test in the content area, with appropriate accessibility features and accommodations.
The student should take either the computer- or paper-based MCAS test, with or without accommodations; or may be considered for the "grade-level" or "competency" portfolio.[2]
If all criteria above are met, the student should be considered for the MCAS-Alt in the content area.[3]

IV. MCAS Accommodations for Students with Disabilities

A. Background and Purpose

The information in this section is intended to guide decision-making regarding the selection, use, and evaluation of accommodations for MCAS testing. As required by 34 CFR 300.160, the state is providing districts with these guidelines for the provision of appropriate accommodations on the MCAS tests, and stipulating that IEP teams and 504 plan coordinators carefully identify and select only those accommodations for each assessment that are needed by the student and do not invalidate the score. IEP teams should be trained annually on these guidelines. Please read the following information carefully.

B. Accommodations for Students with Disabilities

1. Purpose of Test Accommodations

A test accommodation is a change in the way a test is administered or the way in which a student responds to test questions. Test accommodations are intended to accomplish the following:

- offset the effects of the student's disability and remove barriers to participation in the assessment
- provide the necessary conditions for a student to demonstrate knowledge and skills effectively on statewide assessments
- provide the opportunity to report test results for students who require accommodations
- provide test results that are comparable to those of students who did not receive accommodations
- yield results that do not affect the validity or reliability of the interpretation of scores for their intended purposes

Based on the information and guidance found on the following pages, the IEP or 504 plan for each student with a disability must be reviewed and revised as needed, either during routinely scheduled meetings prior to testing or through the IEP amendment process. The principal is responsible for ensuring that each student is provided with the test accommodations listed in his or her IEP or 504 plan during testing. It is also advisable (though not required) to list the *designated accessibility features* (see Table 2) in the plans of students to ensure these will be provided.

Use of test accommodations should never replace appropriate and rigorous instruction based on grade-level standards in the subject being tested.

2. Eligibility for Test Accommodations

ELIGIBLE: students with disabilities served by an IEP or 504 plan

The right of a student with a disability to receive allowable accommodations on MCAS tests is protected by both federal and state laws. The student's IEP or 504 plan must specify precisely which MCAS accommodation(s) he or she will receive, and the IEP must be approved by the parent/guardian (or student over 18) before an accommodation may be used by the student. Similarly, a student's 504 plan must already be in place or under development. In cases where a 504 plan is under development, the school personnel responsible for writing the plan must have already met and agreed upon the necessary MCAS accommodation(s) before the accommodation may be provided.

NOT ELIGIBLE: students <u>without</u> documented disabilities and students with disabilities who are <u>not</u> served by an IEP or 504 plan

A student who does not have a documented disability and is not served by either an IEP or 504 plan is not eligible to receive accommodations on MCAS tests, regardless of whether the student already receives support or accommodations during classroom instruction.

3. General Requirements for Use of Test Accommodations

The use of accommodations is based on the individual needs of a student with a disability and may only be provided when all of the following conditions have been met:

a) The student **has a disability** that is documented in an IEP or 504 plan and **requires the use of one or more accommodations** to participate in MCAS testing.

   AND

b) The accommodation is listed in this manual (or prior written approval has been obtained from the Department for a unique accommodation); the **accommodation is listed** in the student's IEP under "State- and District-Wide Assessment;" and the **IEP has been signed** by the student's parent(s)/guardian(s) prior to the date of test administration; or is listed as an MCAS accommodation in a 504 plan developed for the student.

   AND

c) The student **uses the accommodation routinely** (with rare exceptions) during classroom instruction and assessment in the subject, both before and after the MCAS test is administered, and the student is **comfortable and familiar** with its use. Use of an accommodation during routine instruction does not *necessarily* qualify a student to receive the same accommodation during MCAS testing; for example, the student must

meet additional criteria to receive a ***special access*** **accommodation** on an MCAS test.

AND

d) If a ***special access*** **accommodation** will be provided, the student meets all of the criteria to receive the accommodation, as shown in Table 5.

IEP teams must reconvene at least annually and determine which accommodations will be needed for state- and district-wide assessments.

Accommodations may **not**

- alter, explain, simplify, paraphrase, or eliminate any test question, reading passage, writing prompt, or multiple-choice answer option;
- provide verbal or nonverbal clues or suggestions that hint at or give away the correct response to the student;
- contradict test administration requirements or result in a violation of test security; for example:
  - test questions may not be modified, reordered, or reformatted in any way for any student;
  - paper-based tests may not be photocopied, photographed, scanned, altered, or duplicated;
  - screen shots of computer-based tests may not be taken or reproduced;
  - English-language dictionaries are allowed **only** for legacy ELA Composition retest sessions. English-language dictionaries are **not** permitted for any student on next-generation MCAS tests.

If the above conditions have been met and the accommodation is listed in the IEP or 504 plan, the accommodation(s) **must be provided** to the student during MCAS testing. If an accommodation is provided that does not meet the conditions stated above or that is not listed in a student's plan, the student's test score may be **invalidated**.

In the event a student was provided a test accommodation that was *not* listed in his or her IEP or 504 plan, or if a student was *not* provided a test accommodation listed in his or her plan, the school should immediately contact the Department at 781-338-3625 or by email at mcas@doe.mass.edu.

4. Updating IEPs and 504 Plans

IEPs and 504 plans should be updated as needed for all students with disabilities prior to the spring 2021, and other test and retest, MCAS administrations throughout the year to reflect the most current needs of each student, and policies and accommodations described in this manual. Proper notation of accommodations in students' IEPs and 504 plans will ensure that students receive all the necessary supports to which they are entitled.

Virtually all students are expected to take the next-generation MCAS tests using the computer-based testing platform (TestNav) and be given an opportunity to view the tutorial and take online practice tests prior to test administration.

5. If a Student Refuses an Accommodation

If a student refuses to use an accommodation listed in his or her plan during testing, the school should document in writing that the student refused the accommodation and keep the documentation on file at the school. The student should be told that the accommodation will remain available during testing should they need it. The student should *not* be asked to sign an agreement acknowledging that they have refused an accommodation, nor should they be asked to waive their right to receive an accommodation that is listed in their IEP or 504 plan. A sample form (optional) for documenting a student's refusal of an accommodation is available in Appendix C.

If a student refuses an accommodation, and the IEP team agrees that the listed accommodation is no longer needed by the student, the accommodation should be removed from the plan at the next scheduled meeting (or listed in the plan "as requested by the student"). Written approval must be obtained from the parent/guardian (or student over 18 years of age) for new or amended IEPs before a change in accommodations can go into effect.

Similarly, 504 plans must reflect only those accommodations that are required by the student as determined by the educators familiar with the student. Consent by the parent/guardian is *not* required for a new or amended 504 plan, although the parent/guardian must be notified of any changes.

6. Unique Accommodations Requests

If a student with a disability or an English learner requires an accommodation that is not listed in Tables 1–6, the school may request approval from the Department for the use of the unique accommodation.

Unique accommodations may **not** accomplish any of the following:

- fundamentally change the test or the construct being measured by the test,
  OR
- assist the student to obtain the answers to test questions,
  OR
- violate test security requirements.

The school may request approval (via email) for use of a unique accommodation by submitting the request to mcas@doe.mass.edu at least two weeks prior to testing. If approved by the Department, the IEP or 504 plan of the student must be amended.

7. Process for Selecting and Evaluating MCAS Accessibility Features and Accommodations for Students with Disabilities

Accommodations are intended to offset the effects of a disability to allow a student to participate effectively in MCAS testing. When selecting testing accommodations, educators should consider the following:

- ***Determine the learning challenges*** *the student is experiencing.*
  - *Look at the student's classroom performance, not just the nature or type of disability.*
- ***Brainstorm the use of various accommodations and universal and designated accessibility features*** *with IEP team members and other adults familiar with the student.*
  - *What supports were used successfully with students who have similar learning profiles?*
- ***Try out the accessibility features and accommodation(s)*** *in different instructional and assessment settings and make adjustments as needed.*
  - *Be sure the student is comfortable using the accessibility feature or accommodation and becomes familiar with its use.*
- ***Evaluate whether the accessibility feature or accommodation addresses the student's need.***
  - *If not, revise the plan to provide accommodation(s) and supports accordingly.*
- ***If the accessibility feature or accommodation addresses the challenge****,*
  - *determine whether the accessibility feature or accommodation is allowed for MCAS testing in the subject (see Tables 1–5 elsewhere in this manual); and*
  - *develop or amend the IEP or 504 plan accordingly, listing each accommodation (required) or accessibility feature (optional) for the specific MCAS test(s).*

8. Description of MCAS Accommodations

Tables 3–5 list the MCAS accommodations available to students with disabilities on the computer-based test, and where applicable, the comparable accommodation on the paper-based test. **Note:** the paper-based accommodations described below also apply to legacy MCAS retests. MCAS accommodations are grouped into the following categories:

- **Test Presentation:** allowable changes to the format in which the test is presented to the student (Table 3);
- **Response:** allowable changes to the procedures, supports, or devices used to facilitate a student's response to test questions (Table 4); and
- **Special Access:** accommodations intended for a small number of students to offset the

effects of a disability that would otherwise severely limit or prevent their participation in the assessment, and that may somewhat impact the interpretation of the test results (Table 5); and

- **EL accommodations:** available to all ELs with and without disabilities on MCAS tests (Table 6)

Note: Accommodations listed with the "*(SR/PNP)*" designation in the tables below must be identified in the Student Registration/Personal Needs Profile for each student in PearsonAccess^{next}.

Table 3. *Test Presentation Accommodations* for Students with Disabilities

Test Presentation Accommodations		
#	**Computer-Based Test**	**Paper-Based Test**
A1 *(SR/PNP)*	**Paper-based edition** of the MCAS test may be administered as an accommodation to a student who is unable to use a computer or take the computer-based test due to a disability. (**Note:** This must be listed as an accommodation in the student's IEP or 504 plan)	N/A
A2 *(SR/PNP)*	N/A (See UF3 and UF4 on page 4 for information on screen magnification and alternate cursor/mouse.)	**Large print** (approximately 18-point font size on 11x17-inch paper) • All responses in the large-print booklet **must be transcribed** verbatim from the large-print booklet to the student's combined test & answer booklet (or standard answer booklet for legacy tests) and returned according to instructions in the PAM, so student will receive credit for his or her work. • Large-print special instructions will accompany the large-print test. • Students may either use the **large-print booklet** to respond to test questions, in which case the answers will need to be transcribed, either by the student (at the time of testing) or a test administrator (anytime during the test window); **OR** the student may write answers directly in the **combined test & answer booklet**. IEPs and 504 plans should indicate how students taking the large-print test will record their answers.

<table>
<tr><th colspan="3">Test Presentation Accommodations</th></tr>
<tr><th>#</th><th>Computer-Based Test</th><th>Paper-Based Test</th></tr>
<tr><td rowspan="2">A3.1
(SR/PNP)

A3.2
(SR/PNP)</td><td>A3.1 – Screen reader: ONLY for a student who is blind or visually impaired and uses the assistive technology program JAWS or NVDA
If the student will use a screen reader, a separate hard-copy Braille edition test with the appropriate Braille graphics must also be ordered for the student.
All answers must be entered onscreen, either by the student or test administrator.</td><td>A3.2 – Braille edition (hard copy)
All answers must be either scribed or transcribed verbatim into the student's combined test & answer booklet and returned according to instructions in the PAM so the student will receive credit for his or her work.
Braille special instructions will accompany the Braille test.
See Appendix D for a schedule of the transition to Unified English Braille (UEB).</td></tr>
<tr><td colspan="2">Previewing Braille test content by test administrators: Under secure conditions supervised by the principal, Braille test administrators may review Braille test materials up to four days prior to testing once they are received by the school for the purpose of preparing to orient the student. Test materials may not be removed from the school. Braille test administrators who review the test prior to testing will be asked to sign non-disclosure agreements.</td></tr>
<tr><td>A4.1
(SR/PNP)
and
A4.2
(SR/PNP)</td><td>A4.1 – Text-to-speech (TTS) digital text read aloud on the computer-based MCAS Mathematics and Science and Technology/ Engineering tests
TTS may be used either with or without headphones.
If a TTS-enabled version of the computer-based test is used with headphones, the student may be tested in a typical-size group. If student will not use headphones, student must be tested individually in a separate setting.
Students should view the tutorial and take an online TTS practice test prior to testing. If the student is unable to use the TTS feature, but has this accommodation listed in his or her plan, a human reader may be substituted.
TTS for ELA is a special access accommodation (SA 1.1). See Table 5 for guidelines and criteria to receive this accommodation.</td><td>A4.2 – Kurzweil 3000 electronic text reader
Kurzweil 3000 test editions are available for the following tests:
High school legacy STE tests (Chemistry and Technology/Engineering;
High School Biology and Introductory Physics tests, ONLY if legacy paper-based-based versions will be administered in June 2021 (schools will be notified in winter 2021)
February 2021 high school Biology test
Legacy ELA Composition retest
Legacy ELA Reading Comprehension retest (special access accommodation SA 1.3 – see Table 5)
Legacy Mathematics retest
Kurzweil 3000 tests are in read-only format. Responses must be recorded in the student’s combined test & answer booklet.
Kurzweil 3000 special instructions will be sent to the school with the test.</td></tr>
</table>

Test Presentation Accommodations		
#	**Computer-Based Test**	**Paper-Based Test**
A5 *(SR/PNP)*	**Human read-aloud** for the Mathematics and Science and Technology/Engineering computer- or paper-based tests • A human reader may either read aloud 1) the **computer-based test** logged in to a nearby computer or sitting next to the student; or 2) the **paper-based test**. • The test must be administered in a **separate setting**, either **individually** or to a **small group of 2–5 students** (or up to 10 students for the legacy ELA Composition retest), all of whom are being provided the human read-aloud accommodation. • The entire test must be read word-for-word, exactly as it appears. The test administrator may not provide assistance to the student regarding the meanings of words, intent of any test item, or responses to test items. The test administrator should read with emphasis only when indicated by bold or italicized text. (Note: Reading aloud **selected words** on the Mathematics and/or Science and Technology/Engineering (STE) tests, as requested by the student, is UF10.) • For students who require text read aloud, IEP teams should consider whether TTS is preferable to a human reader (or vice versa) and list this in each student's IEP or 504 plan (e.g., "text-to-speech is preferable, but human reader is acceptable"). • Test administrators who review the test, including human readers, will be asked to sign non-disclosure agreements. • **Note: Reading aloud the ELA tests or legacy ELA Reading Comprehension retest** is a *special access* accommodation (SA1). See Table 5 for guidelines and criteria to receive this accommodation.	
A6.1 *(SR/PNP)*	**Human signer** for the Mathematics, Science and Technology/Engineering tests, and ELA test questions (but NOT reading passages) • The test must be signed exactly as it appears. The signer may not provide assistance to the student regarding the meaning of words, intent of any test item, or responding to test questions. The signer may finger-spell key words in addition to providing the sign for a term. The signer may sign emphasis only when indicated by bold or italicized text. • The test must be administered in a **separate setting**, either **individually** or to a **small group of 2–5 students**, all of whom are receiving the human signer accommodation. • **Note:** If preferred, selected words, phrases, or sections of the Mathematics and/or Science and Technology/Engineering test(s) may be signed to the student, as requested, rather than signing the entire test. • **Signing the ELA reading passages and legacy ELA Reading Comprehension retest passages** is a special access accommodation (SA2). See Table 5 for guidelines and criteria to receive this accommodation. • **Previewing test content by human signers**: Under secure conditions supervised by the principal, interpreters may review test materials up to four days prior to testing once they become available, either online or shipped to the school, for the purpose of preparing to sign the test. Test materials may not be removed from the school nor	

Test Presentation Accommodations		
#	**Computer-Based Test**	**Paper-Based Test**
	accessed online outside of the school. Test administrators and interpreters who review the test prior to testing will be asked to sign non-disclosure agreements.	
A6.2 *(SR/PNP)*	**ASL video** edition of the computer-based spring 2021 MCAS grade 10 Mathematics, spring 2021 Grade 11 Mathematics, and An embedded ASL video is built into these computer-based tests. • Students may turn on, off, pause, and control the signing speed of the ASL video. The size of the ASL video may be adjusted (using the "control + or -" keys) and it may be moved around on the computer screen. • Students should view the tutorial and take **online ASL practice tests** prior to testing to become familiar with all of the features of the ASL video player. If the student is unable to use the ASL video, but has this accommodation listed in his or her plan, a human signer may be substituted.	N/A (See A6.1 for Human Signer)
A7	**Human signer for <u>test directions only</u>** for a student who is Deaf or Hard-of-Hearing	
A8	**Track test items** by assisting the student to move from one test question to the next	

Table 4. *Response Accommodations* for Students with Disabilities

Response Accommodations		
#	**Computer-Based Test**	**Paper-Based Test**
A9 *(SR/PNP)*	**Use a Department approved graphic organizer, checklist, or supplemental reference sheet** for ELA, Mathematics, and/or Science and Technology/Engineering tests **Only the approved ELA organizers and supplemental mathematics reference sheets made available by the Department may be used as accommodations on ELA and Mathematics tests.** Graphic organizers *without* text may also be used without Department approval by students who have this accommodation listed in their IEP or 504 plan. **Notes:** • Approved graphic organizers and supplemental reference sheets are available on the Department's website. These have been developed for use on next-generation MCAS tests based on: the most current versions of the curriculum framework standards measured by the tests; the MCAS test design; expectations for how student essays and	

<table>
<tr><th colspan="2">Response Accommodations</th></tr>
<tr><td></td><td>
text-based responses will be scored; and previously approved versions and proposed changes submitted by schools.

A student may use no more than three different approved graphic organizers or two supplemental reference sheets per test session.
For Science and Technology/Engineering tests in grades 5, 8, and high school, a student may use a sample reference sheet, if available, or submit a customized reference sheet for Department approval (see Appendix E)
Individualized graphic organizers and reference sheets for the following tests ONLY may be submitted to the Department for approval according to the schedule below.

<table>
<tr><th>Test Administration Date</th><th>MCAS Test</th><th>Reference Sheet Submission Deadline</th></tr>
<tr><td>February 2021</td><td>February Biology</td><td>January 8, 2021</td></tr>
<tr><td>April 2021</td><td>Grades 5 and 8 STE</td><td>February 26, 2021</td></tr>
<tr><td>June 2021</td><td>High School STE</td><td>April 23, 2021</td></tr>
</table>
For the tests/retests listed in the table above:

Students may continue to use individualized ELA graphic organizers, supplemental mathematics reference sheets and checklists, and individualized STE reference sheets provided they have been submitted and approved by the Department prior to testing.
All individualized organizers, checklists, and reference sheets submitted for approval must be accompanied by a completed cover sheet (see Appendix E).
Individualized mathematics reference sheets approved prior to the 2018–2019 school year must be resubmitted for approval for use on the 2020–2021 retests and STE tests.

Notes on the use of graphic organizers for ELA <u>retests:</u>

The student may use no more than three different graphic organizers per test session.
Graphic organizers and checklists may not include definitions, specific examples, or sentence starters.

Notes on the use of individualized reference sheets for Mathematics <u>retests</u>:

The reference sheet must:

be developed in response to the student’s specific learning needs;
be no more than 3 pages in length; and
conform to the Approval Guide for Individualized Mathematics Reference Sheets.

</td></tr>
<tr><td>A10.1
(SR/PNP)
and
A10.2
(SR/PNP)</td><td>
Scribe responses for the Mathematics, Science and Technology/Engineering tests, and/or legacy ELA Reading Comprehension retest using either:

human scribe (A10.1) who will record the student’s responses verbatim (i.e., as dictated by the student) at the time of testing, either onscreen (computer-based test) or in the student’s combined test & answer booklet (paper-based test). The student must be tested in a separate setting. Test administrators (and/or sign interpreters) who review the test will be asked to sign non-disclosure agreements. (See Appendix A for specific guidance on providing the scribe accommodation)

</td></tr>
</table>

<table>
<tr><th colspan="3">Response Accommodations</th></tr>
<tr><td></td><td colspan="2">If a student is unable to use his or her hand or arm at the time of testing due to a recent fracture, injury, or recovery from surgery, the scribe accommodation may be provided
○ if this is listed in a 504 plan or an approved IEP (Department approval is not required);
OR
○ in cases where a 504 plan is under development, and the staff responsible for writing the plan have already met and agreed upon the need for the scribe accommodation before providing it to the student.

• speech-to-text (A10.2); a speech recognition program or device that converts spoken to written language (other than a smartphone) used to generate responses to test questions.

NEW for Spring 2021 Students using the speech-to-text accommodation will be able to use a speech-to-text “web extension” that functions within TestNav. This compatible assistive technology will allow students to dictate their responses directly into the computer-based test without using a separate, adjacent (external) device.
The web extension for speech-to-text will function only on the computer-based grades 5 and 8 STE tests; the high school Biology test; and (if listed in a student’s IEP or 504 plan as a special access accommodation) the ELA tests. The web extension for speech-to-text does not function on mathematics or Introductory Physics computer-based tests due to incompatibility with the Equation Editor answer box used for open responses. Refer to the Guidelines for Using Assistive Technology as an MCAS Test Accommodation for a step-by-step guide to accessing and using this feature.</td></tr>
<tr><td>A11</td><td>N/A</td><td>Responses recorded by student on special paper, rather than in the combined test & answer booklet.
• Responses must be transcribed into the student’s combined test & answer booklet by a test administrator anytime during the test window.
• If the student transcribes his or her own responses, then transcription must occur during the test session and be completed on the day in which the test session began.</td></tr>
<tr><td>A12
(SR/PNP)</td><td>N/A</td><td>Typed responses
• Responses must be printed out, one per page, and inserted in the student’s combined test & answer booklet with all required information on each page (see the Principal’s Administration Manual).
• Transcription of typed responses into the combined test & answer booklet is NOT required.
• After printing out, responses must be deleted from the word processor or device.</td></tr>
<tr><td>A13</td><td colspan="2">Student records responses on a recording device (other than a smartphone) for the purpose of playing back and transcribing recorded segment(s). Student may use text-to-speech</td></tr>
</table>

Response Accommodations		
	software or an audio recording device. Responses must be deleted from any external devices once they have been transcribed into the student's combined test & answer booklet.	
A14	**Responses signed onto video (for a student who is Deaf or Hard-of Hearing)**, then transcribed by the student onscreen or into the answer booklet during playback. The video must be deleted after transcription.	
A15	**Monitor placement of responses** in the appropriate area onscreen or in the combined & answer test booklet by the test administrator	
A16	**Refreshable Braille Display/Braille note-taker** (specific external device used in conjunction with screen reader for student who is blind or has a vision impairment). A hard-copy edition of the Braille test must also be ordered.	**Braille note-taker** (specific external device used in conjunction with hard-copy Braille test) Note: Braille notes should be returned with the school's nonscorable shipment.
A17	**Braille writer** (specific external device used in conjunction with screen reader and hard-copy Braille test)	**Braille writer** (specific external device used in conjunction with the hard-copy Braille test). A printout of each response may be generated and inserted in the student's answer booklet, with all required information on each page (also see the Principal's Administration Manual).

A note regarding the transcription of student responses: The process of transcribing a student's responses onscreen or into his or her combined test & answer booklet by a test administrator (e.g., from the large print answer booklet) may occur at any time during the testing window, and must be monitored and supervised by the principal, test coordinator, or another test administrator. Details on transcribing responses are provided in Appendix A.

9. *Special Access Accommodations* for Students with Disabilities

Special access (formerly called "nonstandard") accommodations are intended for use by a *very small number of students* who would not otherwise be able to access the test because a disability severely limits or prevents them from performing the skill in question. Teams must exercise caution when considering whether a student requires a special access accommodation, since these accommodations may alter part of what the test is designed to measure. Teams must carefully review the guidelines and criteria described for each special access accommodation listed in Table 5.

Test results for students who took the test using special access accommodations must be interpreted with caution by parents and schools who should not infer that the student has expertise in the skill being accommodated. A notation will accompany the results of students who use a *special access* accommodation.

The Department will review each district's rate of use of special access accommodations. To ensure that IEP teams and 504 plan coordinators carefully review and apply appropriate criteria for use of special access accommodations, districts must do the following:

- train members of IEP teams and 504 plan coordinators on the guidelines for the selection and use of accommodations, including *special access* accommodations, listed in Table 5; and
- revise the IEPs and 504 plans of students with disabilities as needed.

Although test accommodations should generally be consistent with accommodations used for instruction, **the use of a *special access* accommodation during instruction does not automatically qualify a student to receive the same accommodation on an MCAS test**, unless the student meets the guidelines and criteria described on the following pages.

IEP and 504 teams are encouraged to make consistent, appropriate, and defensible decisions regarding the use of *special access* accommodations for each student based on locally administered diagnostic assessments, and to amend the IEPs and 504 plans of students who have been previously designated for special access accommodations, but who do not meet the criteria listed in Table 5.

Table 5. *Special Access Accommodations* for Students with Disabilities

Special Access Accommodations	
#	**Computer- and Paper-Based Tests**
SA1.1 *(SR/PNP)* and SA1.2 *(SR/PNP)* and SA1.3 *(SR/PNP)*	**Text-to-speech** (SA1.1) **or Human read-aloud** (SA1.2) **for next-generation ELA tests; or Kurzweil 3000** (SA1.3) **electronic text reader or Human read-aloud** (SA1.2) **for the legacy ELA Reading Comprehension retest**, including oral presentation of test questions, response options, and passages. • text-to-speech may be used either with or without headphones; • a human reader may either read aloud 1) the **computer-based test** logged in to a nearby computer or sitting next to the student; or 2) the **paper-based test**. This accommodation is intended for a small number of students with disabilities that **severely limit or prevent them from reading**, as documented in locally administered diagnostic evaluations. The student must meet all of the following criteria: • be **virtually unable to read**, even after varied and repeated attempts to teach the student to do so (i.e., the student is at the very beginning stages of learning to read, and not simply reading below grade level), as determined by locally administered diagnostic evaluations; and • receive **ongoing intervention** to learn the skill of reading; and • use this accommodation routinely (except during instruction in learning to read).

Special Access Accommodations	
#	**Computer- and Paper-Based Tests**
	The human read aloud (SA1.2) may also be provided to a student who is blind or has a visual impairment and uses a screen reader and/or has not yet learned (or is unable to use) Braille on the tests and retests listed above. If the student will use a screen reader, a separate hard copy Braille test edition will be sent to the school to allow the student to access the appropriate Braille graphics (see accommodation A3.1). The student • may be tested in a typical-sized group if using text-to-speech *with* headphones; • must be tested individually in a separate setting if text-to-speech will be used *without* headphones; and • may be tested in a group of up to five students if a human reader will be used.
SA2 *(SR/PNP)*	**Human Signer for next-generation ELA tests or legacy ELA Reading Comprehension retest**, including reading passages, questions, and answer options, for a student who is Deaf or Hard-of-Hearing This accommodation is intended for students who are Deaf or Hard-of-Hearing, and who are **severely limited or prevented from reading**, as documented in locally administered diagnostic evaluations. The student must meet all of the following criteria: • be **virtually unable to read** (i.e., decode text), even after varied and repeated attempts to teach the student to do so (i.e., the student is at the very beginning stages of learning to read, and not simply reading below grade level), due to a documented disability and/or history of early and prolonged lack of exposure to and use of language; and • uses this accommodation routinely, except during reading instruction; and • receives ongoing intervention to learn the skill. The student must be tested in a group of no more than five students, unless approval is obtained from the Department to increase the group size in rare circumstances.
SA3.1 *(SR/PNP)* and SA3.2 *(SR/PNP)*	**Scribe responses on the ELA test or ELA Composition retest**, using either: • **a human scribe** (SA3.1) who records the student's responses verbatim during testing (See Appendix A for guidelines on scribing student responses) OR • **speech-to-text** (SA3.2), a speech recognition program that converts spoken language to written text, used under the direct supervision of a test administrator to generate responses to test questions **NEW for Spring 2021** Students using the speech-to-text *special access* accommodation for the ELA test or ELA Composition retest will be able to use a speech-to-text "web extension" that functions within TestNav. This compatible assistive technology will allow students to dictate their responses directly into the computer-based test without using a separate adjacent (external) device. Refer to *Guidelines for Using Assistive Technology as an MCAS Test Accommodation* for a step-by-step guide on accessing and using this feature. These accommodation are intended for a student who either: 1. has a **language-processing (or other) disability** and requires the dictation of virtually all written responses to a scribe or an electronic speech-to-text conversion device to

Special Access Accommodations	
#	**Computer- and Paper-Based Tests**
	generate responses. OR 2. who is unable to use his or her hand or arm at the time of testing due to a **fracture, severe injury, or recovery from surgery.** In this case, the accommodation must either be a. listed in a 504 plan or an approved IEP (additional approval by the Department is *not* required); OR b. in cases where a 504 plan is under development, school personnel responsible for writing the plan must have already met and agreed upon the necessary MCAS accommodation(s) before a student may be provided the accommodation(s).
SA4 *(SR/PNP)*	**Calculation device or other mathematics tool** (including addition/subtraction or multiplication/division tables; or manipulatives) on the *non-calculator session* of the Mathematics test or retest This accommodation is intended for a small number of students with documented disabilities that **severely limit or prevent them from performing basic calculations** without a calculation device or other mathematics tool, as documented in locally administered diagnostic evaluations, even after varied and repeated attempts to teach the student to do so. The student must meet all of the following criteria: • be **virtually unable to calculate** (i.e., unable to perform single-digit addition, subtraction, multiplication, or division without a calculation device or other mathematics tool); and • uses the calculation device or tool during routine instruction in mathematics; and • receives ongoing intervention to learn the skill. The student's IEP or 504 plan must specify which calculation device or tool will be used (e.g., calculator or multiplication table). Manipulatives and other mathematics tools (excluding calculators and arithmetic tables) must be approved by the Department prior to their use on MCAS tests. Please contact Student Assessment Services at 781-338-3625 or mcas@doe.mass.edu to request approval.
SA5 *(SR/PNP)*	**Spell-checker for the ELA test or ELA Composition retest**, including an external spell-checking device for the paper-based test; or in conjunction with the typed response accommodation for the paper-based test This accommodation is intended for a small number of students with disabilities that **severely limit or prevent them from spelling correctly**, even after varied and repeated attempts to teach the student to do so. The student must meet all of the following criteria: • be **virtually unable to spell simple words** (i.e., at the beginning stages of learning how to spell), as documented by locally-administered diagnostic evaluations; and • produces understandable written work only when provided this accommodation, which the student uses during routine instruction; and • receives ongoing intervention to learn the skill. The student may *not* use grammar check or access the internet during the test.

Special Access Accommodations	
#	**Computer- and Paper-Based Tests**
SA6 *(SR/PNP)*	**Word prediction for the ELA test and ELA Composition retest**: Word prediction provides a student with a bank of frequently or recently used words after the student keyboards the first few letters of a word. **NEW for Spring 2021** Students using the word prediction *special access* accommodation for the ELA test or ELA Composition retest will be able to use a word prediction "web extension" that functions within TestNav. This compatible assistive technology will allow students to use word prediction assistive technology within TestNav without using a separate, adjacent (external) device. Refer to the *Guidelines for Using Assistive Technology as an MCAS Test Accommodation* for a step-by-step guide on accessing and using this feature**.** For paper-based tests, a word prediction application must be used at a separate external computer station and a test administrator or the student must transcribe the selected word(s) on the student's onscreen test or into the student's answer booklet. (See Appendix A for information and guidelines on transcribing student responses.) This accommodation is intended for a small number of students who: 1. have a disability that **severely limits or prevents them from recalling and processing language** in order to generate written responses; AND 2. can access written expression only through the use of word prediction software, application, or device during routine instruction in order to generate written responses. Test administrators who review the test will be asked to sign non-disclosure agreements. During testing, internet access must be turned off/restricted; and functions that *automatically* select words for the student must be turned off.

V. MCAS Participation Requirements for Students Who Are English Learners (ELs)

EL students must participate in all MCAS tests scheduled for their grades, regardless of the language program and/or services they are receiving or the amount of time they have been in the United States, with one exception: Spring 2021 ELA testing is *optional* for EL students who enrolled in U.S. schools **after March 1, 2020** and who were not reported in the March 2020 SIMS report. ELA testing is also optional for EL students from Puerto Rico who are in their first year of enrollment in a Massachusetts school.

Schools may elect to administer the MCAS ELA tests to first-year ELs and *must* administer the ACCESS for ELLs test to first-year and all other EL students, even those who have opted out of English language programs and services. **First-year EL students *must* also participate in MCAS Mathematics and Science and Technology/Engineering tests**, although results will be reported for diagnostic purposes only and students' results will not be included in school and district summary results or in state accountability reporting. For first-year ELs who participate in ELA testing, results will be provided at the school level and will be used for Competency Determination purposes for grade 10 students.

EL Participation Requirements for Spring 2021 MCAS Tests

	Content Area Test		
	ELA	**Mathematics**	**Science and Tech/Eng**
First-Year EL Students[1]	*Optional*[2]	Required	Required
All Other Students	Required	Required	Required

[1] Results for first-year EL students are **not** included in MCAS school and district summary results.

[2] Optional, provided that the student has participated in ACCESS for ELLs testing.

Questions regarding the **identification screening, placement, and reclassification of EL students** should be directed to the Office of English Language Acquisition and Academic Achievement at 781-338-3584 or via email at el@doe.mass.edu. For additional details, refer to the Guidance on Identification, Assessment, Placement, and Reclassification of English Learners.

Foreign Exchange Students

Foreign exchange students who are coded in SIMS as #11 under "Reason for Enrollment" in grades 3–8 and 10, and who are determined to be English learners, are required to participate in the MCAS tests specified for the grade in which they are reported. These students are also required to participate in ACCESS for ELLs testing if they are reported in SIMS as English learners.

VI. MCAS Accessibility and Accommodations for EL Students

In addition to the accessibility features listed elsewhere in this manual that are available to English learners, several accommodations are also available to ELs, as described in Table 6. Table 7 describes the relative suitability of each accommodation for students who are at beginning, intermediate, and advanced levels of English proficiency.

A. Individuals Involved in Selecting Accessibility Features and Accommodations for EL Students

Decisions about which universal and designated accessibility features, and which accommodations, are appropriate for an EL student should be made by a group of educators familiar with the student. The decisions of the decision-making team must be documented using either the sample form for **Documentation of MCAS Accommodations for an EL Student** provided in Appendix B, or using a similar, locally designed form.

Individuals involved in the decision-making process may include any of the following:

- the student
- the student's English as a Second Language (ESL) educator
- school administrator (principal/assistant principal)
- general educator (content area teacher)
- special educator (if appropriate)
- parent or guardian

Decision-making teams are encouraged to determine appropriate accessibility features and accommodations for EL students as early as possible in the school year to ensure that the student is familiar with their use. The student should not be introduced to an accessibility feature or accommodation on the day of the assessment. Accessibility features and accommodations are intended to remove barriers and allow EL students to demonstrate their knowledge and skills more effectively.

B. Guidelines for Selecting and Evaluating Accessibility Features and Accommodations for EL Students

Because a student's level of English language proficiency is transitional and the student's linguistic needs will differ from one year to the next, universal and designated accessibility features and accommodations should be examined and revised annually as the EL student makes progress toward attaining English proficiency.

1. Decision-Making Procedures

The following procedures may be used to make appropriate decisions regarding the selection of accessibility features and accommodations for EL students:

- After examining the range of supports allowed on MCAS tests that may help the EL student access the curriculum and take assessments more effectively, the student's classroom teacher should ask him- or herself the following:
    - *Has a particular accessibility feature and/or accommodation been used successfully in the past to assist students in similar situations and at similar English proficiency levels?*

- After trying out the selected supports during routine instruction to determine whether they meet the student's needs, the teacher should ask him- or herself the following questions:
    - *Does the feature and/or accommodation help the student overcome the barrier posed by his or her developing English language proficiency?*
    - *Is the student comfortable using the feature or accommodation?*

- The teacher should observe the student using the accessibility feature or accommodation in the classroom (or if possible, across different classrooms and school settings) and inform members of the decision-making team which accessibility features or accommodations seem appropriate and effective.

- Based on the accessibility feature(s) and/or accommodations listed in this manual that were used successfully in the classroom, the teacher can select the appropriate features and/or accommodations for use on the MCAS tests.

- The teacher should document the final decisions on the use of specific accessibility features or accommodations, either on the sample form provided in Appendix B or using a similar locally developed form and maintain this information in the student's file.

2. Involving Students in Selecting and Using Accommodations

The more an EL student is involved in the accommodation selection process, the more likely the accommodations are to be accepted and used by the student. As students' English proficiency increases, and especially as students reach adolescence and the desire to be more independent increases, students can help determine when the support is no longer useful. Students are likely to increase their self-advocacy abilities over time and ensure that they receive the selected supports during testing. Teachers and other adults should play a role in assisting students to advocate on their own behalf regarding their need for and use of accessibility features and accommodations.

It is important to introduce the use of selected features and accommodations as early as possible in the school year to familiarize students with their use and determine their effectiveness. Accommodations should never be provided for the first time on a statewide assessment.

C. Accommodations for Students Who Are English Learners (ELs)

In addition to universal features and designated features available to all students, the accommodations listed in Table 6 are available to all ELs, either with or without disabilities, on MCAS tests.

Note that *some* EL accommodations must be **requested in advance** in the Student Registration/Personal Needs Profile (SR/PNP) in PearsonAccess^{next}. The names of accommodations and the process for their selection are identical to accommodations for students with disabilities, although the EL accommodations have unique codes (e.g., EL1.).

Table 6. Accommodations for Students Who Are Els

English Learner Education: https://www.doe.mass.edu/ele

#	Accommodations for EL Students
EL1 *(SR/PNP)*	**Paper-based editions** of the next-generation tests may be administered to a first-year EL student (i.e., a student in his or her first calendar year of enrollment in a U.S. school) with a low level of English proficiency, or an EL who has little or no familiarity with technology. (Note: Administering the ELA test to a first-year EL student is *optional*)
EL2	**Approved Bilingual Word-to-Word Dictionary and Glossary** (English/Native language) (Note: this accommodation is also available to former ELs)
EL3.1 *(SR/PNP)* and EL3.2 *(SR/PNP)* and EL3.3 *(SR/PNP)*	**Text-to-speech (TTS)** (EL3.1) for next-generation computer-based Mathematics, grades 5 and 8 Science and Technology/Engineering, and/or high school Biology or Introductory Physics (STE); or **Human read-aloud** (EL 3.2) for next-generation computer-based or paper-based Mathematics; Science and Technology/Engineering tests; legacy Mathematics or ELA *Composition* retests; or **Kurzweil 3000** (EL3.3) for legacy paper-based Mathematics retests, ELA Composition retests, and/or legacy high school Science and Technology/Engineering tests • If administering the paper-based test with a human reader, the test must be read word for word in English, exactly as written. The test administrator may not provide assistance to the student regarding the translation or meaning of words. The test administrator should read with emphasis only when indicated by bold or italicized text. • If a human reader is used, the test must be administered in a separate setting either **individually** or to a **group of 2–5 students** all of whom are receiving the human reader accommodation. • A student using the TTS-enabled English-only edition of the computer-based test with **headphones** may be tested in a typical-size group. If *not* using headphones, then student must be tested in a separate setting.

#	Accommodations for EL Students
	Note: Reading aloud **selected words** on the Mathematics and/or Science and Technology/ Engineering tests is UF10. (See Table 1.)
EL4.1 *(SR/PNP)* and EL4.2 *(SR/PNP)*	**Scribe or speech-to-text** for Mathematics test responses, STE test responses, and/or legacy ELA *Reading Comprehension* retest responses, consisting either of: • **human scribe** (EL4.1), who records student's responses verbatim *at the time of testing*. See Appendix A for specific guidance on providing the scribe accommodation; or • a **speech-to-text** (EL4.2) program that converts spoken language to written text, used under the direct supervision of a test administrator to generate responses to test questions. **NEW for Spring 2021** Students using the speech-to-text accommodation will be able to use a speech-to-text "web extension" that functions within TestNav. This assistive technology is compatible with TestNav and will allow students to dictate their responses directly into the computer-based test without using a separate adjacent (external) device. The web extension for speech-to-text is only available for ELs on the computer-based grades 5 and 8 STE tests and the high school Biology test. **It is not available to ELs on the ELA tests; nor does the speech-to-text web extension function on the mathematics and Introductory Physics computer-based tests** due to incompatibility with the Equation Editor answer box used for open responses on those tests. Refer to the *Guidelines for Using Assistive Technology as an MCAS Test Accommodation* for a step-by-step guide to accessing and using this feature.
EL5	**Test administrator reads aloud/repeats/clarifies general administration directions in English** (from the Test Administration Manual scripts)
EL6	**Test administrator reads aloud/repeats/clarifies general administration directions** (from the Test Administration Manual scripts) **in student's native language**, if native language speaker is available
EL7	**Spanish-English** version of the Grade 10 Mathematics test or retest (and spring 2021 grade 11 mathematics test) • Spanish-English tests are available in computer- and paper-based formats; legacy retests are paper-based only. Paper-based tests consist of English-Spanish facing pages (side-by-side); and computer-based tests consist of "stacked" Spanish text above English text. • Intended for Spanish-speaking EL students who have been in the U.S. less than 3 years. Student may respond either in Spanish or English. (Note: For all other MCAS test versions, students must respond in English.)

Table 7 provides guidance regarding the suitability of EL accommodations based on the English language proficiency (ELP) level of the student.

Table 7. Guidance on Selecting Accommodations for English Learners

KEY for Table 7:

- ● **Highly recommended** for use by English learners at this ELP level
- ⊙ **Recommended** for use by English learners at this ELP level
- ○ **May not be appropriate** for students at this ELP level

#	Accommodation	Most Likely to Benefit English Language Learners at the Following		
		Beginning	Intermediate	Advanced
EL1	**Paper-based editions** of the next-generation tests may be administered to a first-year EL student (i.e., in the first calendar year of enrollment in a U.S. school) with a low level of English proficiency and/or no familiarity with technology.	⊙	○	○
EL2	Approved **bilingual word-to-word dictionary** and glossary (English/Native Language)	○	●	●
EL3.1 and EL3.2	**Text-to-speech** (EL3.1) for the next-generation computer-based Mathematics or Science Technology/Engineering (STE) tests (in English *only);* OR **Human read-aloud** (EL3.2) for Mathematics, STE, or legacy ELA Composition retest	●	⊙	○
EL4.1 and EL4.2	**Human scribe** (EL4.1) or **speech-to-text** (EL4.2) for Mathematics and/or Science and Technology/ Engineering test responses, or legacy ELA Reading Comprehension retest	●	⊙	○
EL5	Test administrator reads aloud/repeats/clarifies general administration **directions in English**	●	⊙	○
EL6	Test administrator reads aloud/repeats/clarifies general administration **directions in student's native language**	●	⊙	○
EL7	**Spanish-English** version of the Grade 10 Mathematics test or retest	●	⊙	○

Appendix A

Procedures for Scribing and Transcribing Student Responses

A human scribe (A10.1, EL4.1, SA3.1) or speech-to-text (A10.2, EL4.2, SA3.2) are accommodations that allow students to either provide their responses orally to a test administrator who will write or keyboard the responses directly onscreen (or into the student's test booklet) or into a speech recognition device that translates spoken words into digital text. Students who receive this accommodation may respond to test questions either through:

- verbal dictation to a human scribe
- a speech-to-text device or other augmentative/assistive communication device (e.g., picture/word board)
- signing (e.g., American Sign Language, signed English, Cued Speech),
- gesturing or pointing
- eye-gazing

Guidelines for Administering the Human Scribe Accommodation (A10.1, EL4.1, SA3.1)

- A scribe may administer this accommodation only to **one student at a time** during a test session. The student must be tested in a separate setting.
- If scribing responses into a paper-based test booklet, the scribe must produce legible text. For computer-based tests, the scribe will type directly into the student's computer-based test.
- The scribe must transcribe the student's responses verbatim and may not prompt, correct, or question the student regarding the content of the responses.
- The scribe may request that the student restate (or sign) words, phrases, or sentences, as needed. The scribe may not edit or alter the student's dictated response in any way.
- A student using a scribe must be given the same opportunities as other students to plan and draft a written response. The scribe may write an outline, plan, or draft as directed by the student, and must record the draft response or outline exactly as dictated.

Additional guidance for scribing next-generation ELA tests and legacy ELA composition retests (SA3.1):

- When scribing, the scribe may assume that each sentence begins with an upper-case letter and ends with a period. All other capitalization, punctuation, and paragraph breaks are the responsibility of the student.
- After the student has finished dictating his or her response(s), the scribe must:
    - ask the student to review the draft and make any necessary edits, including

capitalization, punctuation, spelling, and paragraph breaks.
- either allow the student to make edits independently or direct the scribe to make the edits.
- not assist the student in making decisions during the editing process.

Guidelines for Transcribing Student Responses

Circumstances may occur during test administration that may require a test administrator to **transcribe** a student's responses into a combined test & answer booklet, answer booklet, or onscreen. Transcribing responses by a test administrator may occur at any time until the end of the test window under secure conditions supervised by the principal (or designee). These situations may include:

- answers recorded in the wrong section of, or in an incorrect, combined test & answer booklet, answer booklet, or computer-based test.
- a student took the test using a special test format requiring that answers be transcribed; e.g., Braille, large print. (Braille responses must be transcribed by persons fluent in Braille).
- a student uses speech-to-text software, or augmentative communication, or an assistive technology device (**that is not compatible with TestNav**) and prints responses for transcription by a test administrator.
- A student recorded answers on blank paper, instead of in the required combined test & answer booklet, answer booklet of computer-based test, as an accommodation.
- The combined test & answer booklet or document becomes unusable; e.g., torn, wrinkled, or contaminated.

In cases where a student's responses must be transcribed *after* test administration is completed, the following steps must be followed:

- at least two persons must be present during any transcription of a student's responses. At least one of the individuals must be an authorized test administrator; the other a principal or designee.
- the student's response must be transcribed verbatim into the combined test & answer booklet (or separate answer booklet for legacy tests) or computer-based test.
- the student's original printed responses must either be securely shredded or returned with the school's nonscorable materials.

APPENDIX B

Sample Form

Documentation of MCAS Accommodations for an EL Student

Use this form or a locally developed form to document the selection of **MCAS accessibility features and accommodations** for each EL student. Available accessibility features and accommodations are listed in the *Accessibility and Accommodations Manual for the 2020–2021 MCAS Tests/Retests*. This form or the locally developed form should be completed within 60 days of the start of school year or student's date of enrollment and must be **updated annually**. If the EL is a student with a disability, accommodations decisions for EL students with disabilities must also be documented in the student's IEP or 504 plan.

Student Name: _____

School Year: _____

Grade: _____SASID: _____

School: _____District:_____

Name of staff and others who determined the test accommodations and features for the student:

Teacher(s)

_____
_

Others (including student and/or parent)

_____

_____
__

If the **parent** and/or **student** were not part of the decision-making process, then they should be notified of the features and accommodations the student will receive on the tests.

Directions: Indicate below the **accessibility features and accommodations** that will be provided to the student on MCAS tests.

Accessibility Feature or Accommodation Needed by the EL Student for Testing	Notes/Comments
(Continue on additional pages as needed.)	

APPENDIX C

Sample Form (Optional)

Student Accommodation Refusal

If a student refuses an accommodation listed in his or her IEP or 504 plan, the school should document in writing that the student refused the accommodation, and the accommodation must be offered and remain available to the student during testing.

This form can be completed and placed in the student's file, and a copy sent to the parent. IEP teams, 504 plan coordinators, and educators making MCAS accommodations decisions for ELs should consider this information when making future accommodations decisions for the student. Use of this form is encouraged, but not required.

Student Name: _____ **Date**: _____

Grade: _____ SASID: _____

School: _____

District: _____

MCAS Test: _____

Test Administrator: _____

Accommodation(s) refused by student _____

_____

Reason for refusal: _____

_____

_____

Comments:

_____

_____

Keep this form on file at the school.
Do *not* submit this form with your school's test materials.

APPENDIX D

Timeline for the Transition of MCAS tests to Unified English Braille (UEB)

The state's transition to Unified English Braille (full UEB/UEB Technical) from English Braille American Edition (EBAE) and Nemeth Code will continue according to the calendar shown below for school years 2020–2021 and 2021–2022. UEB symbol sheets will be provided with MCAS UEB Braille test materials. All tests listed below are "next generation" unless noted as "legacy."

School Year	
Fall 2020–Spring 2021	**Fall 2021–Spring 2022**

EBAE with Nemeth Code:
• Spring 2021 ELA and Mathematics (Grade 11 and Retests - legacy)
• March 2021 ELA and Mathematics Retests (legacy)
 	
UEB Technical (full UEB):
• Spring 2021 ELA and Mathematics (Grade 11 and Retests - legacy)
• February Biology
• Spring 2021: All grades 3–8 and grade 10 MCAS tests, including:
  ○ ELA and Mathematics
  ○ Biology and Intro Physics
  ○ Chemistry and Tech/Eng
	UEB Technical (full UEB):
	• November 2021 ELA and Mathematics Retests
	• February 2022 Biology and Introductory Physics
	• March 2022 ELA and Mathematics Retests
	• Spring 2022: All grades 3–8 and grade 10 MCAS tests, including:
	  ○ ELA and Mathematics
	  ○ Biology and Intro Physics

APPENDIX E

Submitting Customized Materials for Approval
for MCAS Science and Technology/Engineering Tests and ELA and Mathematics Retests

Instructions: This cover sheet must accompany all requests for approval to use customized materials for accommodation A9. Customized material may *only* be used on MCAS STE tests in grades 5, 8, and high school; and legacy mathematics and ELA retests. Please complete and submit this form to the Department's Student Assessment Services Office by email to mcas@doe.mass.edu.

Please submit a **separate cover sheet for each content area** (English Language Arts, Mathematics, or Science and Technology/ Engineering).

Materials submitted after the deadline(s) shown below may not be reviewed before the testing window begins.

Responses will be sent approximately ten school days after a request is received. Please contact the Student Assessment Services Unit at 781-338-3625 with any questions. Retain documentation on file for three years.

Contact Information

Name:	Date:
School Name:	District Name:
Telephone Number:	Fax Number:
Email:	Resubmittal (Check one): ☐ Yes ☐ No

Accommodation A9 Customized Materials Submitted

Place a check mark next to each material being submitted for approval.

☐ Legacy ELA Graphic Organizer	☐ Legacy Math Reference Sheet
☐ Legacy STE or Other Checklist	☐ STE Reference Sheet

MCAS TEST ADMINISTRATION

Place a check mark next to each test administration for which the material will be used. (Submission deadline in parentheses)

☐ May Legacy retests (4/2/2021)	☐ February Biology (1/8/2021)
☐ High School STE (4/23/2021)	☐ Grades 5 and 8 STE (2/26/2021)

Principal or Designee Statement

The principal or designee of the school must sign below to acknowledge the following:
I have reviewed the Department's policy for administering customized materials for accommodation A9 .

Name:	Signature (or Electronic Signature):	Date:

Approval/Denial of Request – For Department Use Only

Database number:	Date Received	Date of Response	☐ Email	☐ Fax
☐ Approved	☐ Approved with Changes	☐ Denied	Date Reviewed	

APPENDIX E
ACCOMMODATION FREQUENCIES

Table E-1. Numbers of Students with IEPs/504 Plans Tested with and without Accommodations by Content Area and Grade*

Content Area	Grade	Total Number of Students Tested	Total Number of Students with IEPs/504 Plans Tested with Accommodations	Total Number of Students with IEPs/504 Plans Tested without Accommodations
Biology	9	36,465	5,112	3,178
	10	120	35	51
	Total	**36,585**	**5,147**	**3,229**
Chemistry	9	14	0	2
	10	2	0	1
	Total	**16**	**0**	**3**
Introductory Physics	9	11,589	1,688	1,156
	10	4	1	2
	Total	**11,593**	**1,689**	**1,158**
Technology/Engineering	9	373	119	44
	10	--	0	0
	Total	**373**	**119**	**44**

**Includes English Learners with IEPs/504 Plans.*

Table E-2. Numbers of English Learners (ELs) without Disabilities Tested with and without EL Accommodations by Content Area and Grade

Content Area	Grade	Total Number of ELs Tested with EL Accommodations	Total Number of ELs Tested without EL Accommodations
Biology	9	64	1,272
	10	0	6
	Total	**64**	**1,278**
Chemistry	9	0	0
	10	0	0
	Total	**0**	**0**
Introductory Physics	9	20	336
	10	0	0
	Total	**20**	**336**
Technology/Engineering	9	0	14
	10	0	0
	Total	**0**	**14**

Table E-3. Numbers of Students with IEPs/504 Plans Tested with Accommodations by Accommodation Type and Grade—High School Biology

Accommodation Description	Grade 9	Grade 10
Large Print Test Edition	27	1
Braille Test Edition	2	0
Human Read-Aloud	962	9
Human Signer	1	0
Kurzweil Text Reader	9	0
Human Scribe	167	8
Speech-to-Text	74	0
Typed Responses	230	3
Reference Sheet	4,934	28
Total*	**6,406**	**49**

**The totals may differ from those in Table D-1 because individual students may have more than one accommodation.*

Table E-4. Numbers of Students with IEPs/504 Plans Tested with Accommodations by Accommodation Type and Grade—High School Chemistry

Accommodation Description	Grade 9	Grade 10
Large Print Test Edition	0	0
Braille Test Edition	0	0
Human Read-Aloud	0	0
Human Signer	0	0
Kurzweil Text Reader	0	0
Human Scribe	0	0
Speech-to-Text	0	0
Typed Responses	0	0
Reference Sheet	0	0
Total*	**0**	**0**

**The totals may differ from than those in Table D-1 because individual students may have more than one accommodation.*

Table E-5. Numbers of Students with IEPs/504 Plans Tested with Accommodations by Accommodation Type and Grade—High School Introductory Physics

Accommodation Description	Grade 9	Grade 10
Large Print Test Edition	12	0
Braille Test Edition	1	0
Human Read-Aloud	287	1
Human Signer	12	0
Kurzweil Text Reader	3	0
Human Scribe	45	0
Speech-to-Text	9	0
Typed Responses	88	0
Reference Sheet	1,627	1
Total*	**2,084**	**2**

**The totals may differ from those in Table D-1 because individual students may have more than one accommodation.*

Table E-6. Numbers of Students with IEPs/504 Plans Tested with Accommodations by Accommodation Type and Grade—High School Technology/Engineering

Accommodation Description	Grade 9	Grade 10
Large Print Test Edition	0	0
Braille Test Edition	0	0
Human Read-Aloud	30	0
Human Signer	0	0
Kurzweil Text Reader	2	0
Human Scribe	14	0
Speech-to-Text	2	0
Typed Responses	1	0
Reference Sheet	117	0
Total*	**166**	**0**

**The totals may differ from those in Table D-1 because individual students may have more than one accommodation.*

Table E-7. Numbers of English Learners without Disabilities Tested with EL Accommodations by Accommodation Type and Grade—High School Biology

Accommodation Description	Grade 9	Grade 10
Human Read-Aloud	63	0
Kurzweil Text Reader	0	0
Human Scribe	3	0
Speech-to-Text	22	0
Total	**88**	**0**

Table E-8. Numbers of English Learners without Disabilities Tested with EL Accommodations by Accommodation Type and Grade—High School Chemistry

Accommodation Description	Grade 9	Grade 10
Human Read-Aloud	0	0
Kurzweil Text Reader	0	0
Human Scribe	0	0
Speech-to-Text	0	0
Total	**0**	**0**

Table E-9. Numbers of English Learners without Disabilities Tested with EL Accommodations by Accommodation Type and Grade—High School Introductory Physics

Accommodation Description	Grade 9	Grade 10
Human Read-Aloud	20	0
Kurzweil Text Reader	0	0
Human Scribe	2	0
Speech-to-Text	0	0
Total	**22**	**0**

Table E-10. Numbers of English Learners without Disabilities Tested with EL Accommodations by Accommodation Type and Grade—High School Technology/Engineering

Accommodation Description	Grade 9	Grade 10
Human Read-Aloud	0	0
Kurzweil Text Reader	0	0
Human Scribe	0	0
Speech-to-Text	0	0
Total	**0**	**0**

APPENDIX F
INTERRATER CONSISTENCY

Table F-1. Item-Level Interrater Consistency Statistics—High School Biology

Item Number	Number of Score Categories	Number of Responses Scored Twice	Percent Exact	Percent Adjacent	Correlation	Percent of Third Scores
SC249014	5	35,298	63.48	32.45	0.78	4.07
SC299885	5	35,733	68.45	26.48	0.85	5.06
SC313503	5	35,286	71.65	25.54	0.90	2.80
SC316265	5	35,004	74.57	23.59	0.90	1.83
SC316277	5	34,873	69.17	28.79	0.86	2.03

Table F-2. Item-Level Interrater Consistency Statistics—High School Chemistry

Item Number	Number of Score Categories	Number of Responses Scored Twice	Percent Exact	Percent Adjacent	Correlation	Percent of Third Scores
SC261486	5	16	81.25	18.75	0.96	0.00
SC288234	5	16	81.25	18.75	0.86	0.00
SC288237	5	15	93.33	0.00	0.90	6.67
SC300145	5	16	81.25	18.75	0.94	0.00
SC309496	5	16	100.00	0.00	1.00	0.00

Table F-3. Item-Level Interrater Consistency Statistics—High School Introductory Physics

Item Number	Number of Score Categories	Number of Responses Scored Twice	Percent Exact	Percent Adjacent	Correlation	Percent of Third Scores
SC208408	5	11,137	64.43	31.42	0.86	4.14
SC208480	5	11,306	64.20	32.54	0.82	3.25
SC247003	5	11,270	65.07	30.91	0.85	4.03
SC261144	5	11,188	68.97	28.28	0.86	2.75
SC280932	5	11,166	67.24	29.61	0.87	3.15

Table F-4. Item-Level Interrater Consistency Statistics—High School Technology/Engineering

Item Number	Number of Score Categories	Number of Responses Scored Twice	Percent Exact	Percent Adjacent	Correlation	Percent of Third Scores
SC279914	5	367	56.40	40.33	0.79	3.27
SC299306	5	335	81.79	17.91	0.89	0.30
SC300263	5	355	59.72	34.93	0.72	5.35
SC305095	5	351	78.06	18.80	0.81	3.13
SC306842	5	344	86.34	12.50	0.92	1.16

APPENDIX G
ITEM-LEVEL CLASSICAL STATISTICS

Table G-1. Item-Level Classical Test Theory Statistics—High School Biology

N	Item Number	Type	Difficulty	Discrimination	Percent Omitted
36321	SC294789	MC	0.80	0.55	0
36333	SC299729	MC	0.68	0.36	0
36321	SC299763	MC	0.78	0.37	0
36320	SC299770	MC	0.45	0.40	0
36335	SC299872	MC	0.84	0.45	0
36336	SC299873	MC	0.70	0.48	0
36335	SC299876	MC	0.76	0.30	0
36336	SC299880	MC	0.72	0.26	0
36334	SC299885	OR	0.55	0.67	1
36320	SC301338	MC	0.84	0.48	0
36320	SC304864	MC	0.66	0.43	0
36321	SC310173	MC	0.64	0.30	0
36336	SC310202	MC	0.60	0.22	0
36383	SC313498	MC	0.81	0.38	0
36340	SC316091	MC	0.91	0.28	0
36321	SC316103	MC	0.81	0.42	0
36338	SC316108	MC	0.71	0.26	0
36336	SC316124	MC	0.77	0.42	0
36318	SC316277	OR	0.46	0.71	3
36336	SC305789	MC	0.54	0.37	0
36340	SC313417	MC	0.68	0.39	0
36321	SC299775	MC	0.71	0.42	0
36321	SC304917	MC	0.75	0.44	0
36268	SC249014	OR	0.33	0.66	1
36226	SC273303	MC	0.71	0.29	0
36269	SC294816	MC	0.76	0.50	0
36269	SC299827	MC	0.59	0.27	0
36229	SC304859	MC	0.70	0.51	0
36271	SC304992	MC	0.56	0.45	0
36269	SC305775	MC	0.51	0.28	0
36229	SC310073	MC	0.68	0.31	0
36228	SC312656	MC	0.51	0.44	0
36229	SC313311	MC	0.59	0.54	0
36270	SC313479	MC	0.73	0.3	0
36217	SC313503	OR	0.50	0.76	1
36225	SC314805	MC	0.70	0.42	1
36269	SC316102	MC	0.73	0.42	0
36264	SC316183	MC	0.85	0.44	0
36229	SC316186	MC	0.76	0.57	0
36383	SC316205	MC	0.92	0.32	0
35813	SC316265	OR	0.54	0.65	1
36270	SC634349124	MC	0.73	0.38	0
36229	SC304892	MC	0.72	0.35	0
36229	SC316925	MC	0.61	0.32	0
36225	SC310725	MC	0.48	0.33	0

Table G-2. Item-Level Classical Test Theory Statistics—High School Chemistry

N	Item Number	Type	Difficulty	Discrimination	Percent Omitted
0	SC246829	MC	--	--	--
0	SC258948	MC	--	--	--
0	SC260896	MC	--	--	--
0	SC261167	MC	--	--	--
0	SC261461	MC	--	--	--
0	SC273193	MC	--	--	--
0	SC281183	MC	--	--	--
0	SC281315	MC	--	--	--
0	SC287950	MC	--	--	--
0	SC288237	OR	--	--	--
0	SC294590	MC	--	--	--
0	SC294649	MC	--	--	--
0	SC294698	MC	--	--	--
0	SC294712	MC	--	--	--
0	SC294715	MC	--	--	--
0	SC298318	MC	--	--	--
0	SC299698	MC	--	--	--
0	SC300073	MC	--	--	--
0	SC300076	MC	--	--	--
0	SC300170	MC	--	--	--
0	SC304361	MC	--	--	--
0	SC305195	MC	--	--	--
0	SC309496	OR	--	--	--
0	SC208259	MC	--	--	--
0	SC244914	MC	--	--	--
0	SC246788	MC	--	--	--
0	SC246844	MC	--	--	--
0	SC252681	MC	--	--	--
0	SC258936	MC	--	--	--
0	SC261170	MC	--	--	--
0	SC261486	OR	--	--	--
0	SC275886	MC	--	--	--
0	SC281321	MC	--	--	--
0	SC281922	MC	--	--	--
0	SC287291	MC	--	--	--
0	SC288229	MC	--	--	--
0	SC288234	OR	--	--	--
0	SC294598	MC	--	--	--
0	SC294670	MC	--	--	--
0	SC294705	MC	--	--	--
0	SC298979	MC	--	--	--
0	SC300095	MC	--	--	--
0	SC300129	MC	--	--	--
0	SC300141	MC	--	--	--
0	SC300145	OR	--	--	--

NOTE: 0 percent omit rate represents very small omit percentages, which are small enough to be rounded to 0. Blank represents the omit percentage is exactly 0.

Table G-3. Item-Level Classical Test Theory Statistics—High School Introductory Physics

N	Item Number	Type	Difficulty	Discrimination	Percent Omitted
11,562	SC206583	MC	0.81	0.46	0
11,560	SC207946	MC	0.61	0.34	0
11,563	SC211087	MC	0.83	0.42	0
11,558	SC226037	MC	0.67	0.49	0
11,560	SC226114	MC	0.47	0.48	0
11,563	SC246865	MC	0.34	0.33	1
11,560	SC246889	MC	0.69	0.47	0
11,555	SC247003	OR	0.45	0.61	2
11,562	SC261110	MC	0.58	0.53	1
11,562	SC261147	MC	0.69	0.37	0
11,562	SC261497	MC	0.65	0.43	0
11,562	SC261513	MC	0.36	0.41	0
11,562	SC266493	MC	0.71	0.39	0
11,558	SC266502	MC	0.58	0.34	0
11,559	SC272658	MC	0.56	0.28	0
11,559	SC272683	MC	0.59	0.29	0
11,562	SC272740	MC	0.35	0.34	1
11,560	SC280446	MC	0.72	0.43	0
11,558	SC280471	MC	0.70	0.45	0
11,563	SC280869	MC	0.78	0.37	0
11,562	SC280932	OR	0.45	0.71	2
11,562	SC287308	MC	0.81	0.48	0
11,563	SC288373	MC	0.80	0.26	0
11,546	SC208333	MC	0.48	0.41	0
11,563	SC208378	MC	0.85	0.33	0
11,561	SC208408	OR	0.45	0.71	2
11,546	SC208480	OR	0.61	0.71	1
11,547	SC208523	MC	0.79	0.45	0
11,560	SC230911	MC	0.88	0.37	0
11,562	SC241706	MC	0.75	0.36	0
11,546	SC251772	MC	0.76	0.49	0
11,546	SC251781	MC	0.82	0.42	0
11,563	SC252042	MC	0.83	0.41	0
11,563	SC253604	MC	0.62	0.44	0
11,562	SC258346	MC	0.76	0.49	0
11,547	SC258348	MC	0.57	0.46	0
11,441	SC261144	OR	0.57	0.71	1
11,547	SC272656	MC	0.64	0.54	0
11,563	SC272665	MC	0.76	0.46	0
11,547	SC272735	MC	0.69	0.54	0
11,547	SC280461	MC	0.50	0.35	0
11,563	SC280808	MC	0.53	0.21	0
11,547	SC288357	MC	0.69	0.51	0
11,563	SC288367	MC	0.64	0.49	0
11,546	SC288368	MC	0.38	0.39	0

Table G-4. Item-Level Classical Test Theory Statistics—Technology/Engineering

N	Item Number	Type	Difficulty	Discrimination	Percent Omitted
371	SC206772	MC	0.40	0.47	1
371	SC208126	MC	0.56	0.39	1
371	SC268467	MC	0.89	0.32	1
371	SC279914	OR	0.48	0.51	1
371	SC287802	MC	0.60	0.09	1
371	SC290764	MC	0.20	0.11	1
371	SC294349	MC	0.48	0.33	1
371	SC294386	MC	0.54	0.28	1
371	SC294402	MC	0.65	0.39	1
371	SC297426	MC	0.55	0.44	1
371	SC299265	MC	0.45	0.43	1
371	SC299352	MC	0.75	0.10	1
371	SC300288	MC	0.85	0.36	1
371	SC300295	MC	0.40	0.44	1
371	SC300305	MC	0.45	0.34	1
371	SC305095	OR	0.31	0.64	3
371	SC305145	MC	0.64	0.41	1
371	SC306801	MC	0.65	0.37	1
371	SC306803	MC	0.46	0.30	1
372	SC309909	MC	0.76	0.18	2
371	SC310038	MC	0.84	0.21	1
371	SC310045	MC	0.53	0.29	1
371	SC310314	MC	0.54	0.31	1
371	SC221684	MC	0.57	0.32	1
371	SC271562	MC	0.35	0.35	1
371	SC273146	MC	0.56	0.24	1
372	SC281930	MC	0.84	0.12	1
371	SC283463	MC	0.79	0.42	0
371	SC289975	MC	0.69	0.31	0
371	SC293186	MC	0.52	0.34	1
371	SC294343	MC	0.71	0.41	0
371	SC294344	MC	0.48	0.48	1
371	SC294413	MC	0.42	0.31	1
371	SC299306	OR	0.30	0.48	5
371	SC299351	MC	0.64	0.22	0
371	SC300263	OR	0.36	0.41	2
371	SC300267	MC	0.81	0.17	0
371	SC300286	MC	0.51	0.30	1
371	SC300330	MC	0.40	0.19	1
371	SC305105	MC	0.73	0.44	0
371	SC305143	MC	0.57	0.41	0
371	SC305151	MC	0.33	0.33	0
364	SC306842	OR	0.32	0.60	1
371	SC310010	MC	0.51	0.45	0
371	SC310015	MC	0.52	0.22	0

APPENDIX H
ITEM-LEVEL SCORE DISTRIBUTIONS

Table H-1. Item-Level Score Distributions for SR and OR Items–High School Biology

Item Number	Total Possible Points	Total	Percent of Students at Score Point				
			0	1	2	3	4
SC299885	4	36,334	15.21	13.17	21.48	32.23	17.11
SC316277	4	36,318	13.37	24.98	29.93	18.89	10.17
SC249014	4	36,268	23.14	38.36	21.33	12.44	3.38
SC313503	4	36,217	18.63	16.29	24.11	23.47	16.01
SC316265	4	35,813	12.24	19.95	23.40	24.01	19.41

Table H-2. Item-Level Score Distributions for SR and OR Items–High School Chemistry

Item Number	Total Possible Points	Total	Percent of Students at Score Point				
			0	1	2	3	4
SC288237	4	16	31.25	43.75	6.25	--	--
SC309496	4	16	18.75	56.25	12.50	--	--
SC261486	4	15	13.33	20.00	20.00	20.00	20.00
SC288234	4	15	--	13.33	53.33	26.67	--
SC300145	4	14	21.43	7.14	28.57	35.71	7.14

Table H-3. Item-Level Score Distributions for SR and OR Items–High School Introductory Physics

Item Number	Total Possible Points	Total	Percent of Students at Score Point				
			0	1	2	3	4
SC247003	4	11,555	18.86	20.35	26.67	21.15	11.16
SC280932	4	11,562	18.90	21.34	23.58	23.82	10.32
SC208408	4	11,561	22.01	17.78	26.64	15.97	15.46
SC208480	4	11,546	6.21	11.95	27.52	34.81	18.49
SC261144	4	11,441	8.06	16.62	27.83	28.83	17.80

Table H-4. Item-Level Score Distributions for SR and OR Items–High School Technology / Engineering

Item Number	Total Possible Points	Total	Percent of Students at Score Point				
			0	1	2	3	4
SC279914	4	371	12.13	22.10	31.00	27.22	6.74
SC305095	4	371	22.37	32.61	34.77	5.93	1.08
SC299306	4	371	23.45	32.35	32.08	5.12	2.43
SC300263	4	371	24.26	22.64	33.69	16.17	1.08
SC306842	4	364	26.37	34.89	23.35	13.19	1.37

APPENDIX I
DIFFERENTIAL ITEM FUNCTIONING RESULTS

Table I-1. Number of Items Classified as "Low" or "High" DIF, Overall and by Group Favored – High School Biology

Group		Item Type	Number of Items	Number "Low"			Number "High"		
Reference	Focal			Total	Favoring		Total	Favoring	
					Reference	Focal		Reference	Focal
Male	Female	MC	40	5	4	1	0	0	0
		OR	5	0	0	0	0	0	0
Students without Disabilities	Students with Disabilities	MC	40	0	0	0	0	0	0
		OR	5	1	1	0	0	0	0
Not LEPFLEP	LEPFLEP	MC	40	1	1	0	0	0	0
		OR	5	0	0	0	0	0	0
Not Economically Disadvantaged	Economically Disadvantaged	MC	40	0	0	0	0	0	0
		OR	5	0	0	0	0	0	0
White	African American	MC	40	1	0	1	0	0	0
		OR	5	0	0	0	0	0	0
	Hispanic	MC	40	0	0	0	0	0	0
		OR	5	0	0	0	0	0	0

Table I-2. Number of Items Classified as "Low" or "High" DIF, Overall and by Group Favored – High School Chemistry

Group		Item Type	Number of Items	Number "Low"			Number "High"		
Reference	Focal			Total	Favoring		Total	Favoring	
					Reference	Focal		Reference	Focal
Male	Female	MC	32	0	0	0	0	0	0
		OR	4	0	0	0	0	0	0
Students without Disabilities	Students with Disabilities	MC	32	0	0	0	0	0	0
		OR	4	0	0	0	0	0	0
Not LEPFLEP	LEPFLEP	MC	32	0	0	0	0	0	0
		OR	4	0	0	0	0	0	0
Not Economically Disadvantaged	Economically Disadvantaged	MC	32	0	0	0	0	0	0
		OR	4	0	0	0	0	0	0
White	African American	MC	32	0	0	0	0	0	0
		OR	4	0	0	0	0	0	0
	Hispanic	MC	32	0	0	0	0	0	0
		OR	4	0	0	0	0	0	0

Table I-3. Number of Items Classified as "Low" or "High" DIF, Overall and by Group Favored – High School Introductory Physics

Group		Item Type	Number of Items	Number "Low"			Number "High"		
Reference	Focal			Total	Favoring		Total	Favoring	
					Reference	Focal		Reference	Focal
Male	Female	MC	40	5	3	2	0	0	0
		OR	5	0	0	0	0	0	0
Students without Disabilities	Students with Disabilities	MC	40	3	2	1	0	0	0
		OR	5	0	0	0	0	0	0
Not LEPFLEP	LEPFLEP	MC	40	4	1	3	0	0	0
		OR	5	0	0	0	0	0	0
Not Economically Disadvantaged	Economically Disadvantaged	MC	40	0	0	0	0	0	0
		OR	5	0	0	0	0	0	0
White	African American	MC	40	3	3	0	0	0	0
		OR	5	0	0	0	0	0	0
	Hispanic	MC	40	1	1	0	0	0	0
		OR	5	0	0	0	0	0	0

Table I-4. Number of Items Classified as "Low" or "High" DIF, Overall and by Group Favored – High School Technology/Engineering

Group		Item Type	Number of Items	Number "Low"			Number "High"		
Reference	Focal			Total	Favoring		Total	Favoring	
					Reference	Focal		Reference	Focal
Male	Female	MC	40	11	6	5	8	7	1
		OR	5	1	0	1	0	0	0
Students without Disabilities	Students with Disabilities	MC	40	11	7	4	5	3	2
		OR	5	2	1	1	0	0	0
Not LEPFLEP	LEPFLEP	MC	40	0	0	0	0	0	0
		OR	5	0	0	0	0	0	0
Not Economically Disadvantaged	Economically Disadvantaged	MC	40	8	6	2	1	1	0
		OR	5	1	1	0	0	0	0
White	African American	MC	40	0	0	0	0	0	0
		OR	5	0	0	0	0	0	0
	Hispanic	MC	40	0	0	0	0	0	0
		OR	5	0	0	0	0	0	0

APPENDIX J
RAW TO SCALED SCORE LOOK-UP TABLES

Table J-1. Raw to Scaled Score Look-Up Table—High School Biology

Raw Score	Theta	Information	SE (Scaled Score)	Scale Score		Achievement Levels	
				2021	2019	2021	2019
0	-12.649	0.000	10.000	200	200	1	1
1	-11.878	0.000	10.000	200	200	1	1
2	-11.107	0.000	10.000	202	200	1	1
3	-10.336	0.000	10.000	202	200	1	1
4	-9.565	0.000	10.000	204	200	1	1
5	-8.794	0.000	10.000	204	200	1	1
6	-8.023	0.001	10.000	206	200	1	1
7	-7.252	0.002	10.000	206	200	1	1
8	-6.481	0.006	10.000	208	200	1	1
9	-5.710	0.020	10.000	208	200	1	1
10	-4.939	0.066	10.000	210	200	1	1
11	-4.169	0.226	10.000	210	200	1	1
12	-3.272	0.956	5.517	212	204	1	1
13	-2.807	1.988	3.826	212	208	1	1
14	-2.511	3.119	3.054	214	210	1	1
15	-2.291	4.289	2.604	216	212	1	1
16	-2.114	5.461	2.308	216	214	1	1
17	-1.964	6.612	2.098	218	216	1	1
18	-1.833	7.724	1.941	218	218	1	1
19	-1.715	8.789	2.324	218	218	1	1
20	-1.607	9.800	3.005	220	220	2	2
21	-1.507	10.753	3.666	220	222	2	2
22	-1.413	11.643	4.312	220	224	2	2
23	-1.324	12.466	4.944	222	226	2	2
24	-1.239	13.218	5.567	224	228	2	2
25	-1.157	13.892	6.087	226	230	2	2
26	-1.077	14.487	5.961	228	232	2	2
27	-0.999	14.999	5.858	230	234	2	2
28	-0.923	15.431	5.776	232	236	2	2
29	-0.847	15.783	5.711	234	236	2	2
30	-0.773	16.060	5.560	236	238	2	2
31	-0.699	16.269	5.286	236	240	2	3
32	-0.625	16.412	5.023	238	242	2	3
33	-0.552	16.494	4.769	240	242	3	3
34	-0.478	16.515	4.523	242	244	3	3
35	-0.403	16.478	4.284	242	246	3	3
36	-0.328	16.380	4.052	244	246	3	3
37	-0.252	16.225	4.003	244	248	3	3
38	-0.175	16.014	4.030	246	250	3	3
39	-0.097	15.755	4.063	248	250	3	3

continued

Raw Score	Theta	Information	SE (Scaled Score)	Scale Score		Achievement Levels	
				2021	2019	2021	2019
40	-0.017	15.453	4.102	248	252	3	3
41	0.065	15.116	4.148	250	254	3	3
42	0.148	14.752	4.199	252	256	3	3
43	0.234	14.365	4.255	252	256	3	3
44	0.322	13.960	4.316	254	258	3	3
45	0.412	13.539	4.383	256	260	3	4
46	0.506	13.100	4.094	258	260	3	4
47	0.603	12.643	3.791	258	262	3	4
48	0.705	12.163	3.480	260	262	4	4
49	0.811	11.653	3.160	262	264	4	4
50	0.923	11.103	2.830	262	266	4	4
51	1.041	10.501	2.667	264	266	4	4
52	1.169	9.832	2.756	264	268	4	4
53	1.307	9.084	2.867	266	270	4	4
54	1.460	8.240	3.011	266	270	4	4
55	1.633	7.289	3.201	268	272	4	4
56	1.834	6.216	3.466	270	274	4	4
57	2.080	4.996	3.867	272	276	4	4
58	2.408	3.571	4.573	274	280	4	4
59	2.942	1.839	6.373	280	280	4	4
60	4.000	0.392	10.000	280	280	4	4

Note. Theta below -6 is truncated to -6.

Table J-2. Raw to Scaled Score Look-Up Table—High School Chemistry

Raw Score	Theta	Information	SE (Scaled Score)	Scale Score		Achievement Levels	
				2021	2019	2021	2019
0	-22.588	0.000	10.000	200	200	1	1
1	-20.425	0.000	10.000	200	200	1	1
2	-18.263	0.000	10.000	202	202	1	1
3	-16.100	0.000	10.000	202	202	1	1
4	-13.938	0.000	10.000	204	204	1	1
5	-11.775	0.001	10.000	204	204	1	1
6	-9.613	0.002	10.000	204	204	1	1
7	-7.450	0.009	10.000	206	206	1	1
8	-5.288	0.053	10.000	206	206	1	1
9	-3.076	0.703	5.405	206	206	1	1
10	-2.273	1.875	3.309	210	210	1	1
11	-1.870	2.970	2.629	212	212	1	1
12	-1.595	4.128	2.230	214	214	1	1
13	-1.385	5.400	1.950	214	214	1	1
14	-1.216	6.765	1.742	216	216	1	1
15	-1.072	8.183	1.584	216	216	1	1
16	-0.948	9.621	1.461	216	216	1	1
17	-0.837	11.053	1.363	216	216	1	1
18	-0.737	12.459	1.284	218	218	1	1
19	-0.645	13.826	1.219	218	218	1	1
20	-0.559	15.144	1.165	218	218	1	1
21	-0.478	16.403	1.119	218	218	1	1
22	-0.401	17.599	1.080	218	218	1	1
23	-0.328	18.725	1.627	220	220	2	2
24	-0.258	19.777	2.602	220	220	2	2
25	-0.189	20.753	3.559	220	220	2	2
26	-0.123	21.651	4.501	220	220	2	2
27	-0.059	22.471	5.431	222	222	2	2
28	0.005	23.213	6.351	224	224	2	2
29	0.067	23.878	7.265	228	226	2	2
30	0.128	24.468	7.233	230	228	2	2
31	0.189	24.983	7.158	232	230	2	2
32	0.249	25.423	7.003	234	232	2	2
33	0.309	25.788	6.713	236	234	2	2
34	0.369	26.075	6.433	238	238	2	2
35	0.429	26.279	6.164	240	240	3	3
36	0.489	26.396	5.905	242	240	3	3
37	0.549	26.421	5.655	244	242	3	3
38	0.610	26.348	5.415	246	244	3	3
39	0.671	26.170	5.392	246	246	3	3
40	0.734	25.886	5.422	248	248	3	3
41	0.797	25.491	5.464	250	250	3	3
42	0.862	24.986	5.519	252	250	3	3
43	0.928	24.373	5.588	254	252	3	3
44	0.996	23.655	5.237	256	254	3	3

continued

Raw Score	Theta	Information	SE (Scaled Score)	Scale Score		Achievement Levels	
				2021	2019	2021	2019
45	1.067	22.840	4.717	258	256	3	3
46	1.139	21.936	4.188	260	258	4	3
47	1.215	20.956	3.648	260	260	4	4
48	1.294	19.913	3.093	262	262	4	4
49	1.377	18.824	2.521	262	262	4	4
50	1.464	17.705	2.569	264	262	4	4
51	1.557	16.569	2.656	264	264	4	4
52	1.656	15.420	2.753	266	266	4	4
53	1.763	14.240	2.865	266	266	4	4
54	1.881	12.982	3.000	268	268	4	4
55	2.013	11.561	3.180	270	270	4	4
56	2.166	9.859	3.443	270	270	4	4
57	2.355	7.753	3.883	274	274	4	4
58	2.616	5.173	4.753	276	276	4	4
59	3.080	2.241	7.221	280	280	4	4
60	4.000	0.429	10.000	280	280	4	4

Note. Theta below -6 is truncated to -6.

Table J-3. Raw to Scaled Score Look-Up Table—High School Introductory Physics

Raw Score	Theta	Information	SE (Scaled Score)	Scale Score		Achievement Levels	
				2021	2019	2021	2019
0	-11.156	0.000	10.000	200	200	1	1
1	-10.439	0.000	10.000	200	200	1	1
2	-9.721	0.000	10.000	202	200	1	1
3	-9.003	0.001	10.000	202	200	1	1
4	-8.285	0.001	10.000	204	200	1	1
5	-7.567	0.003	10.000	204	200	1	1
6	-6.850	0.007	10.000	206	200	1	1
7	-6.132	0.019	10.000	206	200	1	1
8	-5.414	0.051	10.000	208	200	1	1
9	-4.696	0.152	10.000	208	200	1	1
10	-3.955	0.501	8.496	210	200	1	1
11	-3.160	1.752	4.545	210	204	1	1
12	-2.779	3.032	3.454	212	208	1	1
13	-2.518	4.298	2.901	214	210	1	1
14	-2.317	5.534	2.557	214	212	1	1
15	-2.151	6.720	2.320	216	214	1	1
16	-2.009	7.842	2.148	216	216	1	1
17	-1.883	8.892	2.017	218	216	1	1
18	-1.770	9.871	1.914	218	218	1	1
19	-1.666	10.786	2.115	218	218	1	1
20	-1.569	11.649	2.834	218	220	1	2
21	-1.478	12.473	3.524	220	222	2	2
22	-1.392	13.269	4.189	220	224	2	2
23	-1.310	14.045	4.830	222	226	2	2
24	-1.232	14.808	5.451	224	228	2	2
25	-1.156	15.558	6.055	226	230	2	2
26	-1.083	16.295	6.073	228	232	2	2
27	-1.011	17.014	5.943	230	232	2	2
28	-0.942	17.710	5.826	232	234	2	2
29	-0.874	18.374	5.719	232	236	2	2
30	-0.807	19.000	5.624	234	238	2	2
31	-0.741	19.579	5.392	236	240	2	3
32	-0.676	20.106	5.168	238	242	2	3
33	-0.612	20.573	4.955	240	242	3	3
34	-0.547	20.973	4.753	240	244	3	3
35	-0.483	21.303	4.560	242	246	3	3
36	-0.419	21.557	4.377	244	246	3	3
37	-0.355	21.733	4.217	244	248	3	3
38	-0.291	21.827	4.208	246	250	3	3
39	-0.225	21.839	4.207	246	250	3	3
40	-0.159	21.770	4.214	248	252	3	3
41	-0.092	21.618	4.228	250	254	3	3
42	-0.024	21.387	4.251	250	256	3	3
43	0.046	21.078	4.282	252	256	3	3
44	0.118	20.691	4.322	254	258	3	3

continued

Raw Score	Theta	Information	SE (Scaled Score)	Scale Score		Achievement Levels	
				2021	2019	2021	2019
45	0.191	20.229	4.371	256	260	3	4
46	0.267	19.691	4.124	256	260	3	4
47	0.346	19.075	3.706	258	262	3	4
48	0.429	18.380	3.278	260	262	4	4
49	0.515	17.602	2.837	260	262	4	4
50	0.606	16.736	2.382	262	264	4	4
51	0.702	15.775	1.968	262	264	4	4
52	0.806	14.712	2.038	262	266	4	4
53	0.919	13.532	2.125	264	266	4	4
54	1.044	12.216	2.236	264	268	4	4
55	1.184	10.734	2.385	266	270	4	4
56	1.348	9.049	2.598	268	270	4	4
57	1.551	7.118	2.929	268	272	4	4
58	1.823	4.908	3.528	270	276	4	4
59	2.277	2.436	5.007	274	280	4	4
60	4.000	0.149	10.000	280	280	4	4

Note. Theta below -6 is truncated to -6.

Table J-4. Raw to Scaled Score Look-Up Table—High School Technology/Engineering

Raw Score	Theta	Information	SE (Scaled Score)	Scale Score		Achievement Levels	
				2021	2019	2021	2019
0	-4.229	0.254	10.000	200	200	1	1
1	-2.818	2.626	4.548	202	202	1	1
2	-2.391	5.072	3.272	206	206	1	1
3	-2.133	7.353	2.718	206	208	1	1
4	-1.944	9.481	2.394	208	208	1	1
5	-1.792	11.466	2.177	210	210	1	1
6	-1.665	13.318	2.019	210	210	1	1
7	-1.554	15.047	1.900	212	212	1	1
8	-1.454	16.660	1.806	212	212	1	1
9	-1.364	18.164	1.729	212	212	1	1
10	-1.281	19.564	1.666	214	214	1	1
11	-1.204	20.866	1.613	214	214	1	1
12	-1.131	22.074	1.569	214	214	1	1
13	-1.062	23.192	1.530	214	216	1	1
14	-0.996	24.223	1.497	216	216	1	1
15	-0.933	25.170	1.469	216	216	1	1
16	-0.872	26.034	1.444	216	216	1	1
17	-0.813	26.818	1.423	216	218	1	1
18	-0.756	27.523	1.405	218	218	1	1
19	-0.701	28.150	1.389	218	218	1	1
20	-0.646	28.701	1.376	218	218	1	1
21	-0.593	29.174	1.364	218	218	1	1
22	-0.540	29.572	1.493	218	220	1	2
23	-0.488	29.894	2.197	220	220	2	2
24	-0.437	30.141	2.898	220	220	2	2
25	-0.386	30.312	3.599	220	220	2	2
26	-0.335	30.408	4.300	222	222	2	2
27	-0.284	30.428	5.005	222	224	2	2
28	-0.234	30.373	5.713	224	226	2	2
29	-0.183	30.242	6.414	226	228	2	2
30	-0.132	30.036	6.436	228	230	2	2
31	-0.081	29.755	6.466	230	232	2	2
32	-0.029	29.398	6.506	232	234	2	2
33	0.023	28.967	6.489	234	236	2	2
34	0.076	28.461	6.080	236	238	2	2
35	0.130	27.882	5.672	238	240	2	3
36	0.185	27.230	5.263	240	240	3	3
37	0.241	26.506	4.852	240	242	3	3
38	0.299	25.712	4.439	242	242	3	3
39	0.358	24.850	4.022	242	244	3	3
40	0.419	23.921	3.721	244	244	3	3
41	0.483	22.930	3.800	246	246	3	3
42	0.549	21.881	3.890	246	248	3	3
43	0.618	20.777	3.992	248	248	3	3
44	0.691	19.625	4.108	248	250	3	3
45	0.768	18.431	4.239	250	252	3	3

continued

Raw Score	Theta	Information	SE (Scaled Score)	Scale Score		Achievement Levels	
				2021	2019	2021	2019
46	0.849	17.205	4.387	252	252	3	3
47	0.935	15.956	4.556	254	254	3	3
48	1.028	14.695	4.747	256	256	3	3
49	1.128	13.433	4.641	256	258	3	3
50	1.236	12.184	4.496	258	260	3	4
51	1.355	10.956	4.348	260	262	4	4
52	1.486	9.759	4.196	262	262	4	4
53	1.632	8.597	4.041	264	264	4	4
54	1.797	7.471	4.304	266	266	4	4
55	1.986	6.384	4.656	268	268	4	4
56	2.208	5.336	5.093	270	272	4	4
57	2.478	4.316	5.663	274	274	4	4
58	2.827	3.260	6.516	278	278	4	4
59	3.353	1.964	8.394	280	280	4	4
60	4.000	0.858	10.000	280	280	4	4

Note. Theta below -6 is truncated to -6.

APPENDIX K
ITEM RESPONSE THEORY PARAMETERS

Table K-1. IRT Parameters for Dichotomous Items – High School Biology

Item Number	Parameters and Measures of Standard Error					
	a	*SE (a)*	*b*	*SE (b)*	*c*	*SE (c)*
299775	0.85894	0.06690	-0.54606	0.10716	0.25884	0.04645
304892	0.70697	0.04065	-0.21641	0.09400	0.38396	0.02776
304917	0.96874	0.06285	-0.44432	0.07247	0.18696	0.03550
305789	0.54375	0.02881	-0.39607	0.11156	0.17186	0.03576
310725	1.02017	0.08421	0.50071	0.05547	0.24747	0.02298
313417	0.72126	0.02993	-0.74671	0.07664	0.16177	0.03119
316925	0.73545	0.03857	0.31273	0.06026	0.27095	0.02022
63434912	0.57119	0.02517	-0.96513	0.10562	0.12299	0.03817
273303	0.83361	0.09250	0.04286	0.12935	0.48595	0.03774
294789	1.62584	0.06540	-0.88262	0.03149	0.21065	0.02161
294816	1.28158	0.07689	-0.67368	0.04443	0.32509	0.02049
299729	1.15821	0.09238	0.16656	0.06390	0.35783	0.02661
299763	1.07087	0.05911	-0.45173	0.06375	0.45167	0.02491
299770	0.83326	0.06951	0.57361	0.06491	0.17690	0.02531
299827	1.24516	0.12308	0.85335	0.05226	0.37013	0.01767
299872	1.14097	0.08259	-1.32117	0.09500	0.26561	0.05250
299873	0.89644	0.06375	-0.64297	0.09463	0.21123	0.04464
299876	0.43793	0.04478	-1.07359	0.29626	0.26090	0.07921
299880	0.47465	0.05155	-0.39254	0.23890	0.23804	0.06773
301338	1.21435	0.07915	-1.21947	0.07573	0.18934	0.04606

Item Number	Parameters and Measures of Standard Error					
	a	*SE (a)*	*b*	*SE (b)*	*c*	*SE (c)*
304859	1.07032	0.06713	-0.88806	0.07130	0.16098	0.03944
304864	0.82379	0.05811	-0.56588	0.09122	0.17921	0.04121
304992	0.95002	0.07960	0.39261	0.06252	0.25052	0.02587
305775	0.89722	0.09103	0.81831	0.07530	0.35122	0.02427
310073	0.67094	0.05956	-0.68479	0.16149	0.27112	0.05992
310173	0.53678	0.06311	-0.06241	0.20126	0.31022	0.05613
310202	0.38059	0.03770	-0.81764	0.25899	0.17680	0.06572
312656	0.94196	0.07515	0.41188	0.05910	0.21115	0.02493
313311	1.29838	0.08752	0.04137	0.04868	0.26322	0.02432
313479	0.74894	0.06499	0.22315	0.10653	0.57782	0.02327
313498	0.76792	0.03900	-1.05220	0.09825	0.25912	0.04216
314805	0.90818	0.06086	-0.72423	0.08559	0.17497	0.04264
316091	0.67744	0.03666	-2.03845	0.15992	0.23499	0.07173
316102	0.98951	0.04249	-0.91570	0.05939	0.21409	0.03103
316103	1.15626	0.05142	-1.10445	0.05732	0.26321	0.03261
316108	0.41599	0.02941	-0.77122	0.20211	0.17405	0.05675
316124	1.84366	0.09162	-0.38781	0.03192	0.44656	0.01730
316183	0.96546	0.04157	-1.29509	0.06765	0.19474	0.03646
316186	1.28223	0.04694	-0.95459	0.03622	0.12457	0.02228
316205	0.98224	0.05329	-1.59028	0.10323	0.35961	0.05000

Table K-2. IRT Parameters for Polytomous Items – High School Biology

Item Number	Parameters and Measures of Standard Error													
	a	*SE (a)*	*b*	*SE (b)*	*c*	*SE (c)*	*D1*	*SE (D1)*	*D2*	*SE (D2)*	*D3*	*SE (D3)*	*D4*	*SE (D4)*
249014	1.14358	0.03163	0.52956	0.02355	1.76061	0.03708	0.32385	0.02990	-0.44755	0.03570	-1.63691	0.06799	0.00000	0.00000
299885	0.84280	0.02257	-0.33780	0.02927	1.34663	0.05154	0.70995	0.04201	-0.32941	0.03629	-1.72717	0.04390	0.00000	0.00000
313503	1.19875	0.03244	-0.26821	0.02146	1.29071	0.04558	0.58573	0.03368	-0.39347	0.02809	-1.48297	0.03274	0.00000	0.00000
316265	1.02547	0.02248	-0.37538	0.01984	1.36687	0.04119	0.49279	0.02947	-0.39137	0.02533	-1.46828	0.02822	0.00000	0.00000
316277	1.14182	0.02379	0.10228	0.01762	1.54014	0.03465	0.51932	0.02435	-0.56015	0.02371	-1.49931	0.03146	0.00000	0.00000

Table K-3. IRT Parameters for Dichotomous Items – High School Chemistry

Item Number	Parameters and Measures of Standard Error					
	a	*SE (a)*	*b*	*SE (b)*	*c*	*SE (c)*
208259	0.95338	0.09849	-0.96485	0.15353	0.25813	0.06711
244914	1.11472	0.22090	0.11770	0.17360	0.19825	0.07373
246788	1.06992	0.11189	-0.29988	0.10672	0.23537	0.04540
246829	0.73002	0.16870	0.67329	0.24968	0.25634	0.07889
246844	1.25212	0.24329	-0.51306	0.20611	0.25089	0.09191
252681	1.68352	0.22251	0.78691	0.05724	0.27011	0.02317
258936	1.14929	0.13765	0.25044	0.08933	0.27297	0.03548
258948	1.20030	0.18371	-0.52159	0.15834	0.30801	0.06713
260896	0.89771	0.20183	0.37973	0.23519	0.28025	0.08831
261167	0.26948	0.04671	0.45265	0.22588	0.00000	0.00000
261170	1.10916	0.23611	0.37473	0.18942	0.29023	0.07993
261461	1.32948	0.34383	0.55151	0.17350	0.45106	0.04614
273193	1.03443	0.25961	1.12460	0.16564	0.22282	0.06473
275886	1.41955	0.24561	0.39121	0.10963	0.15399	0.05222
281183	0.97416	0.28960	1.40714	0.20220	0.31355	0.06166
281315	0.85995	0.16595	0.02130	0.21654	0.23182	0.08021
281321	0.83855	0.23805	1.11723	0.23870	0.29676	0.07676
281922	1.09808	0.16197	0.12542	0.11746	0.15183	0.04109
287291	1.45870	0.26669	0.69270	0.09890	0.12911	0.04552
287950	1.00408	0.24951	0.70938	0.21775	0.40864	0.07240

Item Number	Parameters and Measures of Standard Error					
	a	*SE (a)*	*b*	*SE (b)*	*c*	*SE (c)*
288229	1.48374	0.34268	0.98158	0.11603	0.25887	0.05630
294590	1.22655	0.24373	0.27707	0.16890	0.24151	0.07528
294598	1.04182	0.21572	0.35051	0.17834	0.20656	0.07189
294649	0.91556	0.20814	0.73193	0.19193	0.24638	0.07094
294670	0.62840	0.12612	0.01003	0.20101	0.00000	0.00000
294698	0.64557	0.12561	-0.93513	0.31633	0.00000	0.00000
294705	1.56625	0.27485	0.05464	0.12607	0.18559	0.06300
294712	0.57996	0.00000	-0.80011	0.00000	0.00000	0.00000
294715	0.96799	0.20772	0.20823	0.20888	0.20642	0.07892
298318	1.18800	0.26776	1.09260	0.12300	0.14313	0.05260
298979	0.73379	0.13304	-0.56507	0.21438	0.00000	0.00000
299698	1.02961	0.23025	0.09836	0.22867	0.24221	0.08937
300073	0.94904	0.20315	0.10358	0.21931	0.22282	0.08070
300076	1.49322	0.30850	-0.32985	0.18171	0.23024	0.08133
300095	1.73515	0.37724	-0.06113	0.15694	0.25144	0.08210
300129	1.49125	0.34385	0.50953	0.15734	0.27453	0.08369
300141	0.77543	0.13823	-0.52933	0.22244	0.00000	0.00000
300170	1.28579	0.25678	-0.01466	0.17407	0.20286	0.07127
304361	1.01420	0.24299	-0.52482	0.30878	0.28728	0.10148
305195	1.62499	0.29546	0.63732	0.09944	0.14367	0.05030

Table K-4. IRT Parameters for Polytomous Items – High School Chemistry

Item Number	Parameters and Measures of Standard Error													
	a	*SE (a)*	*b*	*SE (b)*	*D0*	*SE (D0)*	*D1*	*SE (D1)*	*D2*	*SE (D2)*	*D3*	*SE (D3)*	*D4*	*SE (D4)*
261486	0.91393	0.06025	0.48882	0.06964	0.77440	0.00000	0.60531	0.00000	-0.15038	0.00000	-1.22934	0.00000	0.00000	0.00000
288234	1.07757	0.07709	0.13765	0.07252	1.93197	0.00000	0.52057	0.00000	-0.76495	0.00000	-1.68758	0.00000	0.00000	0.00000
288237	1.57058	0.11487	1.24727	0.04838	0.99015	0.00000	0.06953	0.00000	-0.36048	0.00000	-0.69920	0.00000	0.00000	0.00000
300145	1.47622	0.10429	0.45698	0.05295	1.26504	0.00000	0.55524	0.00000	-0.45276	0.00000	-1.36752	0.00000	0.00000	0.00000
309496	1.67252	0.11460	0.85205	0.04504	1.27747	0.00000	0.28046	0.00000	-0.43393	0.00000	-1.12400	0.00000	0.00000	0.00000

Table K-5. IRT Parameters for Dichotomous Items – High School Introductory Physics

Item Number	Parameters and Measures of Standard Error					
	a	*SE (a)*	*b*	*SE (b)*	*c*	*SE (c)*
206583	0.98884	0.08316	-1.17596	0.10706	0.19350	0.05175
207946	0.89364	0.09212	-0.42741	0.10331	0.22871	0.04088
208333	0.98109	0.10735	-0.01069	0.07212	0.18546	0.02702
208378	0.81950	0.06727	-1.68404	0.14288	0.19158	0.06258
208523	1.18737	0.11063	-0.87775	0.09161	0.28488	0.04367
211087	1.25183	0.11990	-1.06049	0.09341	0.33162	0.03997
226037	1.68235	0.17539	-0.38217	0.05658	0.30081	0.02544
226114	1.26319	0.14581	0.33745	0.05835	0.15688	0.01925
230911	0.94847	0.08630	-1.90657	0.16602	0.25795	0.07976
241706	0.70579	0.07799	-0.79893	0.15131	0.22631	0.05110
246865	1.45081	0.17090	0.47493	0.05326	0.18078	0.01590
246889	1.18982	0.12519	-0.20204	0.06786	0.26513	0.02617
251772	1.10300	0.09424	-1.44941	0.10226	0.18401	0.05015
251781	0.83097	0.07170	-1.97344	0.14624	0.17241	0.06407
252042	1.14116	0.10690	-1.48220	0.11631	0.25252	0.05647
253604	1.10723	0.13030	-0.53685	0.09910	0.33705	0.03706
258346	1.00888	0.08337	-0.92544	0.08922	0.17912	0.04087
258348	1.24069	0.12537	-0.20340	0.06636	0.26210	0.02847
261110	1.53588	0.13629	-0.20959	0.04758	0.20703	0.02203
261147	0.60037	0.01238	-1.63880	0.02536	0.00000	0.00000
261497	0.63151	0.06684	-0.93762	0.17221	0.20369	0.05724
261513	1.27681	0.13601	0.44178	0.05313	0.15254	0.01821
266493	0.65988	0.07287	-0.78068	0.16754	0.21780	0.05758
266502	0.75390	0.09488	-0.21913	0.13172	0.26986	0.04386
272656	1.17980	0.09896	-0.48830	0.06549	0.19123	0.02972
272658	0.53281	0.07130	-0.32847	0.21165	0.22508	0.06027
272665	0.97466	0.09487	-0.65832	0.10402	0.26493	0.04172
272683	0.80189	0.10588	0.12647	0.11620	0.30350	0.03725
272735	1.49363	0.12839	-0.72609	0.06341	0.27533	0.03342
272740	1.04995	0.12468	0.58767	0.06619	0.17271	0.02003
280446	1.14634	0.10781	-0.54963	0.08259	0.28286	0.03741
280461	1.19296	0.15669	0.32431	0.07787	0.38249	0.02482
280471	1.39982	0.14360	-0.11198	0.06257	0.33893	0.02644
280808	0.62234	0.11517	0.51297	0.17432	0.32451	0.04647
280869	0.75122	0.07237	-1.36293	0.17697	0.25645	0.06870
287308	1.27873	0.10668	-0.91004	0.08055	0.21143	0.04505
288357	1.52418	0.11449	-0.66362	0.05003	0.17165	0.02847
288367	0.98266	0.08081	-0.79837	0.08600	0.15018	0.04066
288368	1.22761	0.11708	0.29094	0.05235	0.16195	0.01999
288373	0.87013	0.13373	-0.36899	0.18151	0.53128	0.04681

Table K-6. IRT Parameters for Polytomous Items – High School Introductory Physics

Item Number	Parameters and Measures of Standard Error													
	a	*SE (a)*	*b*	*SE (b)*	*D0*	*SE (D0)*	*D1*	*SE (D1)*	*D2*	*SE (D2)*	*D3*	*SE (D3)*	*D4*	*SE (D4)*
208408	1.28941	0.03381	-0.23310	0.02211	1.30971	0.00000	0.52214	0.00000	-0.51820	0.00000	-1.31365	0.00000	0.00000	0.00000
208480	1.18991	0.03057	-0.48162	0.02293	1.11793	0.00000	0.45448	0.00000	-0.26798	0.00000	-1.30443	0.00000	0.00000	0.00000
247003	0.97573	0.02480	-0.31518	0.02773	1.38483	0.00000	0.51590	0.00000	-0.35973	0.00000	-1.54100	0.00000	0.00000	0.00000
261144	1.03838	0.02548	-0.75089	0.02632	1.76712	0.00000	0.55914	0.00000	-0.55077	0.00000	-1.77549	0.00000	0.00000	0.00000
280932	1.34870	0.03363	-0.29239	0.02017	1.25950	0.00000	0.41283	0.00000	-0.32579	0.00000	-1.34655	0.00000	0.00000	0.00000

Table K-7. IRT Parameters for Dichotomous Items – High School Technology/Engineering

Item Number	Parameters and Measures of Standard Error					
	a	*SE (a)*	*b*	*SE (b)*	*c*	*SE (c)*
206772	1.00000	0.00000	0.20235	0.00000	0.00000	0.00000
208126	1.00000	0.00000	-0.38680	0.00000	0.00000	0.00000
221684	1.00000	0.00000	-0.33859	0.00000	0.00000	0.00000
268467	1.00000	0.00000	-1.17747	0.00000	0.00000	0.00000
271562	1.00000	0.00000	0.05481	0.00000	0.00000	0.00000
273146	1.00000	0.00000	-0.07880	0.00000	0.00000	0.00000
281930	1.00000	0.00000	-0.98260	0.00000	0.00000	0.00000
283463	1.00000	0.00000	-0.39180	0.00000	0.00000	0.00000
287802	1.00000	0.00000	-0.93747	0.00000	0.00000	0.00000
289975	1.00000	0.00000	-0.28144	0.00000	0.00000	0.00000
290764	1.00000	0.00000	0.18539	0.00000	0.00000	0.00000
293186	1.00000	0.00000	-0.26690	0.00000	0.00000	0.00000
294343	1.00000	0.00000	-0.53545	0.00000	0.00000	0.00000
294344	1.00000	0.00000	-0.16114	0.00000	0.00000	0.00000
294349	1.00000	0.00000	-0.26272	0.00000	0.00000	0.00000
294386	1.00000	0.00000	0.16608	0.00000	0.00000	0.00000
294402	1.00000	0.00000	-0.40674	0.00000	0.00000	0.00000
294413	1.00000	0.00000	-0.20177	0.00000	0.00000	0.00000
297426	1.00000	0.00000	-0.34261	0.00000	0.00000	0.00000
299265	1.00000	0.00000	-0.36517	0.00000	0.00000	0.00000

Item Number	Parameters and Measures of Standard Error					
	a	*SE (a)*	*b*	*SE (b)*	*c*	*SE (c)*
299351	1.00000	0.00000	-0.60778	0.00000	0.00000	0.00000
299352	1.00000	0.00000	-1.04127	0.00000	0.00000	0.00000
300267	1.00000	0.00000	-1.11449	0.00000	0.00000	0.00000
300286	1.00000	0.00000	-0.05338	0.00000	0.00000	0.00000
300288	1.00000	0.00000	-0.78008	0.00000	0.00000	0.00000
300295	1.00000	0.00000	-0.09151	0.00000	0.00000	0.00000
300305	1.00000	0.00000	-0.23498	0.00000	0.00000	0.00000
300330	1.00000	0.00000	0.44306	0.00000	0.00000	0.00000
305105	1.00000	0.00000	-0.32278	0.00000	0.00000	0.00000
305143	1.00000	0.00000	-0.16283	0.00000	0.00000	0.00000
305145	1.00000	0.00000	-0.16214	0.00000	0.00000	0.00000
305151	1.00000	0.00000	0.30886	0.00000	0.00000	0.00000
306801	1.00000	0.00000	-0.31594	0.00000	0.00000	0.00000
306803	1.00000	0.00000	-0.19518	0.00000	0.00000	0.00000
309909	1.00000	0.00000	-0.92489	0.00000	0.00000	0.00000
310010	1.00000	0.00000	-0.23407	0.00000	0.00000	0.00000
310015	1.00000	0.00000	-0.07669	0.00000	0.00000	0.00000
310038	1.00000	0.00000	-1.21882	0.00000	0.00000	0.00000
310045	1.00000	0.00000	0.03279	0.00000	0.00000	0.00000
310314	1.00000	0.00000	-0.14797	0.00000	0.00000	0.00000

Table K-8. IRT Parameters for Polytomous Items – High School Technology/Engineering

Item Number	Parameters and Measures of Standard Error													
	a	*SE (a)*	*b*	*SE (b)*	*D0*	*SE (D0)*	*D1*	*SE (D1)*	*D2*	*SE (D2)*	d3	SE(d3)	d4	SE(d4)
279914	1.00000	0.00000	0.02394	0.00000	1.27180	0.00000	0.53861	0.00000	-0.34279	0.00000	-1.46762	0.00000	0.00000	0.00000
299306	1.00000	0.00000	0.92824	0.00000	1.81531	0.00000	0.62137	0.00000	-0.67764	0.00000	-1.75904	0.00000	0.00000	0.00000
300263	1.00000	0.00000	0.26238	0.00000	1.07805	0.00000	0.53070	0.00000	-0.30267	0.00000	-1.30607	0.00000	0.00000	0.00000
305095	1.00000	0.00000	0.63078	0.00000	1.61474	0.00000	0.70941	0.00000	-0.76942	0.00000	-1.55473	0.00000	0.00000	0.00000
306842	1.00000	0.00000	1.06119	0.00000	1.68667	0.00000	0.50256	0.00000	-0.41119	0.00000	-1.77804	0.00000	0.00000	0.00000

APPENDIX L

TEST CHARACTERISTIC CURVES AND TEST INFORMATION FUNCTIONS

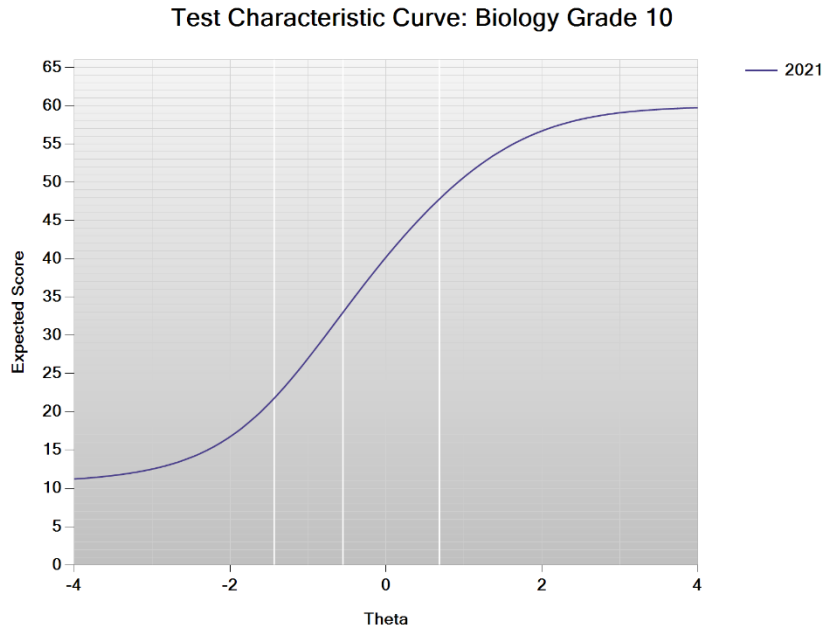


Figure L-1. Test Characteristic Curve – High School Biology

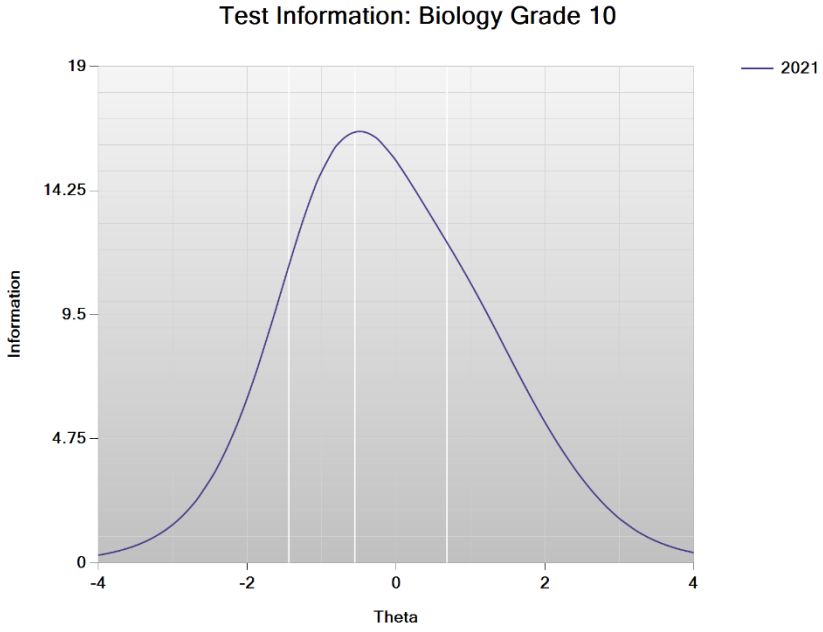


Figure L-2. Test Information Function – High School Biology

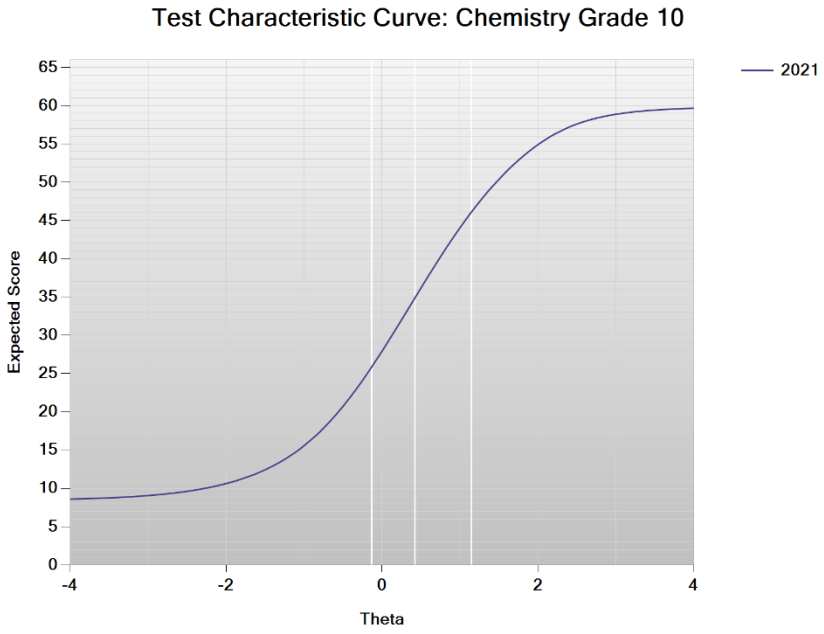


Figure L-3. Test Characteristic Curve – High School Chemistry

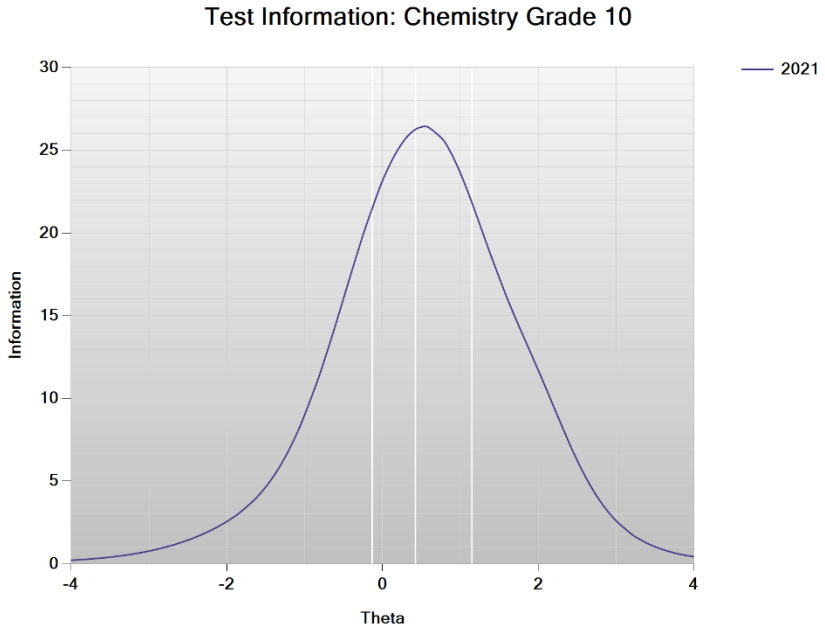


Figure L-4. Test Information Function – High School Chemistry

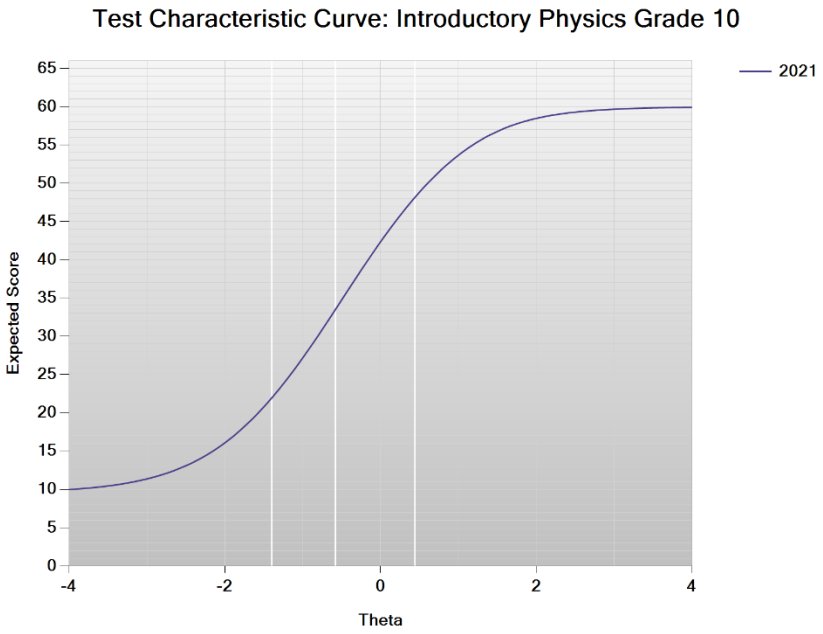


Figure L-5. Test Characteristic Curve – High School Introductory Physics

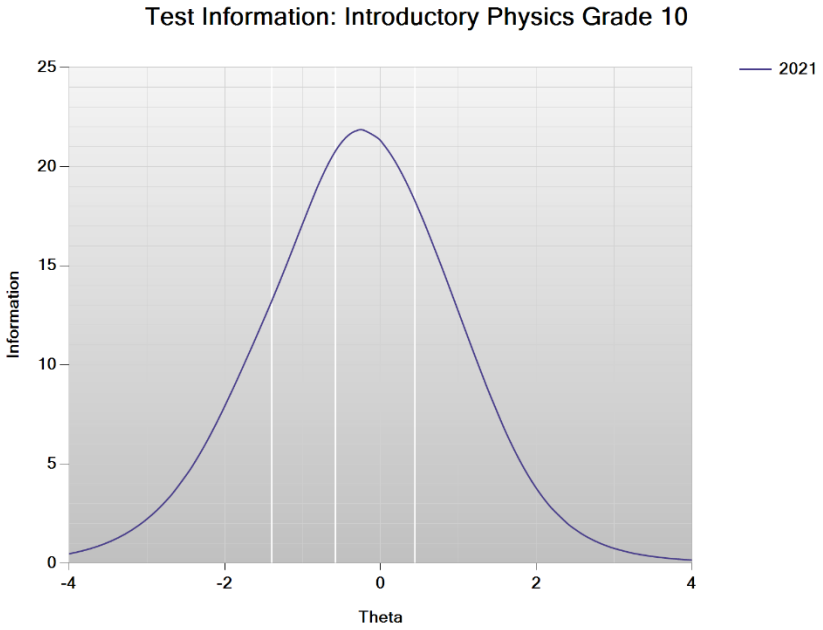


Figure L-6. Test Information Function – High School Introductory Physics

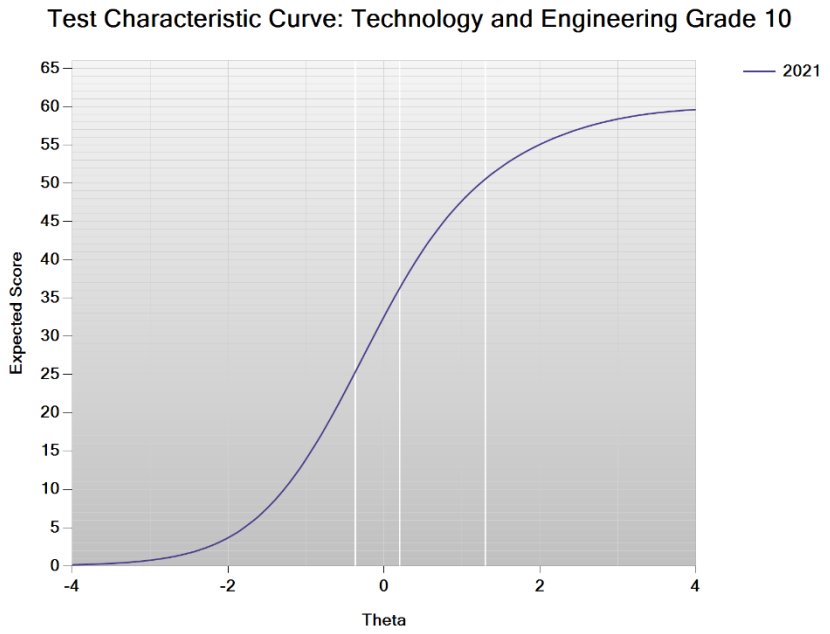


Figure L-7. Test Characteristic Curve – High School Technology/Engineering

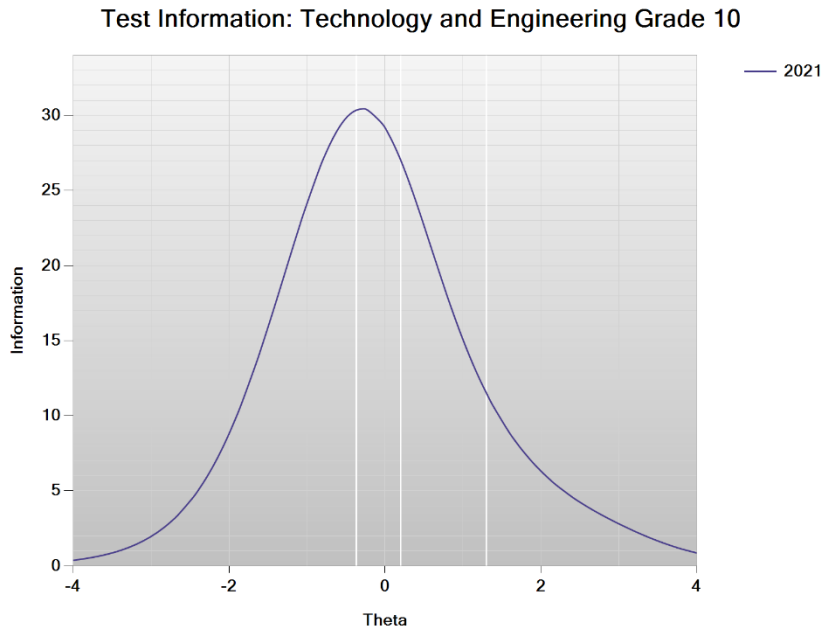


Figure L-8. Test Information Function – High School Technology/Engineering

APPENDIX M
ACHIEVEMENT LEVEL SCORE DISTRIBUTIONS

Table M-1. Achievement Level Distributions –High School Biology

Achievement Level	Percent in Level					
	2021*	2019	2018	2017	2016	2015
4	11.73	26.7	25.7	31.7	31.3	25.2
3	21.98	41.3	42.4	38.4	39.0	42.9
2	42.65	19.8	21.2	20.1	19.6	21.4
1	23.64	12.1	10.6	9.8	10.2	10.5

**Testing was not conducted in 2020 due to Covid-19.*

Table M-2. Achievement Level Distributions –High School Chemistry

Achievement Level	Percent in Level					
	2021*	2019	2018	2017	2016	2015
4	27.78	22.6	23.2	22.9	22.7	25.0
3	27.78	28.3	22.2	31.7	25.5	35.3
2	38.89	18.6	26.0	18.8	21.2	21.2
1	5.56	30.5	28.6	26.6	30.6	18.6

**Testing was not conducted in 2020 due to Covid-19.*

Table M-3. Achievement Level Distributions –High School Introductory Physics

Achievement Level	Percent in Level					
	2021*	2019	2018	2017	2016	2015
4	13.63	35.1	35.1	29.2	25.6	29.1
3	24.23	37.2	36.9	41.3	41.0	39.8
2	38.92	18.1	18.8	19.2	23.6	21.9
1	23.23	9.6	9.1	10.3	9.9	9.2

**Testing was not conducted in 2020 due to Covid-19.*

Table M-4. Achievement Level Distributions –High School Technology/Engineering

Achievement Level	Percent in Level					
	2021*	2019	2018	2017	2016	2015
4	24.93	4.6	8.4	8.7	5.9	7.1
3	42.09	45.6	44.4	41.0	44.5	41.1
2	32.44	33.3	30.2	34.7	33.8	36.8
1	0.54	16.5	17.0	15.5	15.8	15.0

**Testing was not conducted in 2020 due to Covid-19.*

APPENDIX N

CUMULATIVE SCALED SCORE DISTRIBUTION GRAPHS

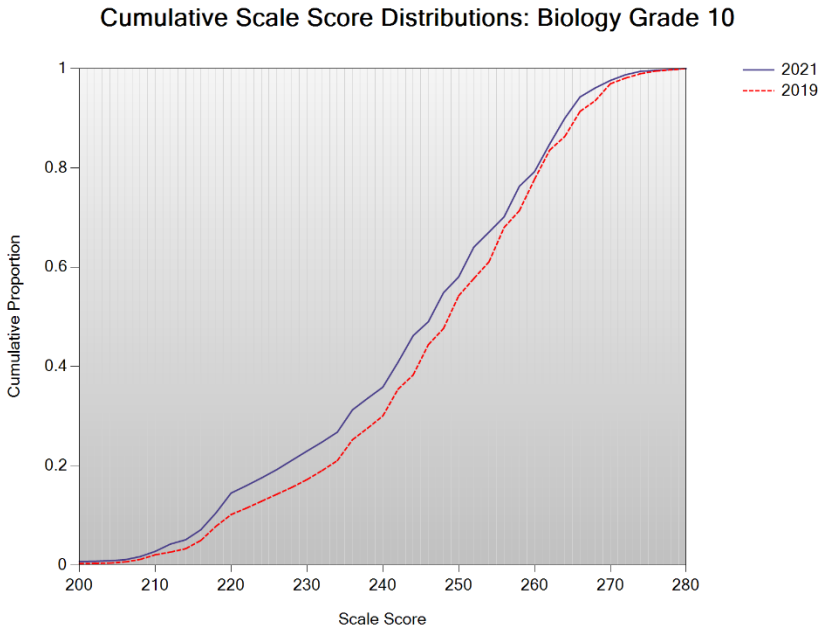


Figure N-1. Cumulative Distribution Graph – High School Biology

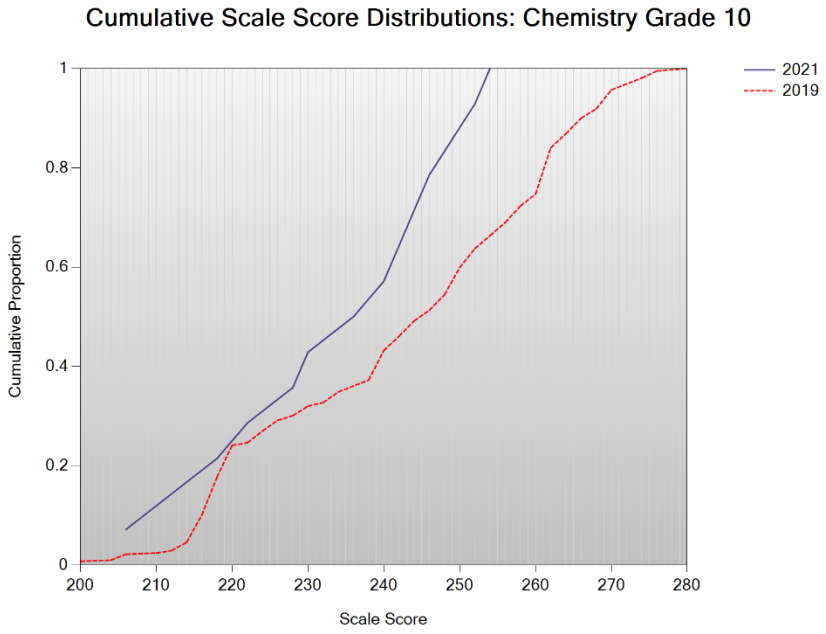


Figure N-2. Cumulative Distribution Graph – High School Chemistry

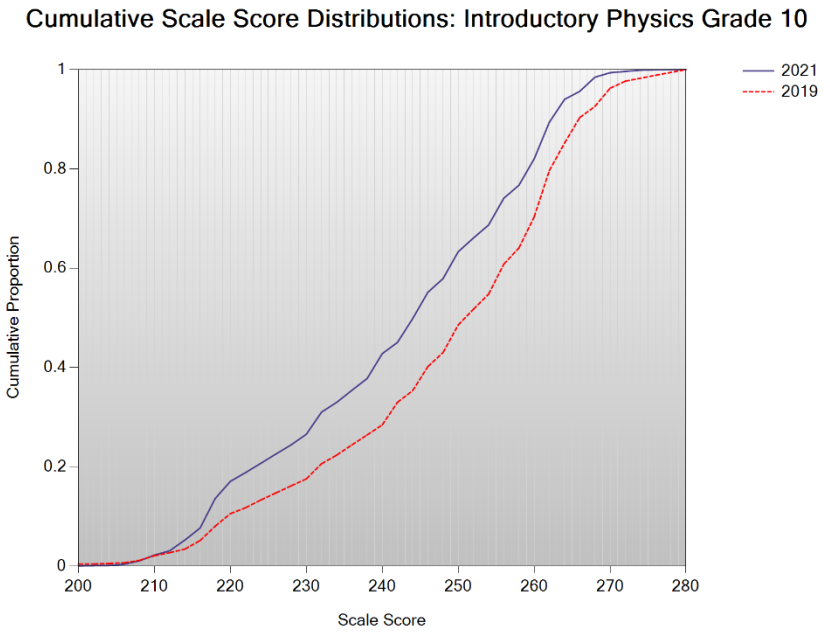


Figure N-3. Cumulative Distribution Graph – High School Introductory Physics

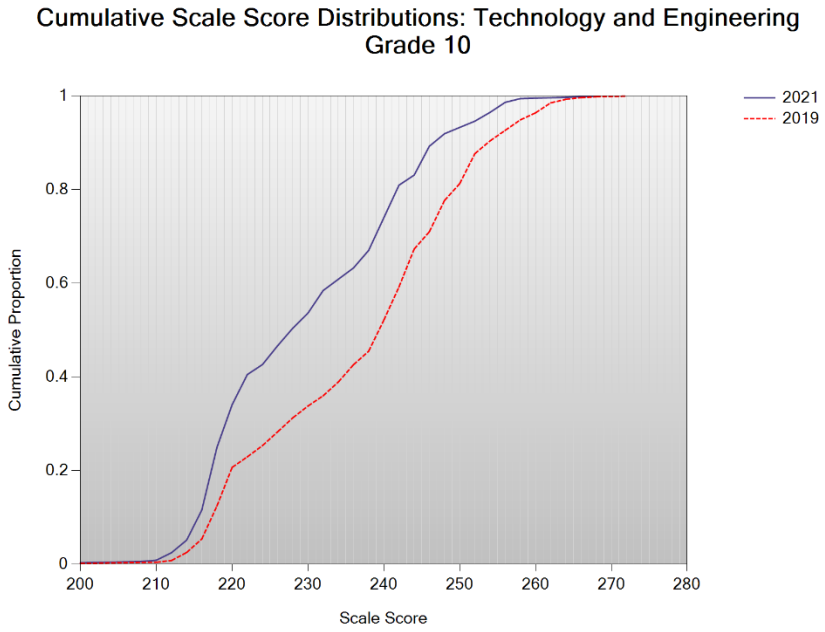


Figure N-4. Cumulative Distribution Graph – High School Technology/Engineering

APPENDIX O
CLASSICAL RELIABILITIES

Table O-1. Subgroup Reliabilities—High School Biology

Subgroup	Number of Students	Raw Score			Alpha	SEM
		Maximum	Mean	Standard Deviation		
All Students	36,383	60	37.39	12.22	0.91	3.59
Economically Disadvantaged	12,633	60	30.62	11.97	0.91	3.65
African American	3,138	60	31.77	11.68	0.90	3.64
Asian	2,430	60	44.88	10.86	0.91	3.27
Hispanic	7,358	60	29.47	11.99	0.91	3.65
Multi-race	1,246	60	38.07	12.65	0.92	3.60
Native American	67	60	36.57	12.46	0.91	3.68
Pacific Islander/Hawaiian	29	60	37.07	14.27	0.93	3.74
White	22,115	60	39.96	10.85	0.90	3.48
Female	18,152	60	38.15	11.88	0.91	3.57
Male	18,183	60	36.61	12.52	0.92	3.59
LEP	1,839	60	19.45	8.93	0.86	3.37
FLEP	1,804	60	32.58	11.26	0.90	3.64
LEPFLEP	3,643	60	25.95	12.09	0.91	3.61
Plan 504	2,697	60	37.05	11.39	0.90	3.57
Special Education	5,904	60	26.83	11.20	0.90	3.58
Title I	11,885	60	32.19	11.99	0.91	3.64

Table O-2. Subgroup Reliabilities—High School Chemistry

Subgroup	Number of Students	Raw Score			Alpha	SEM
		Maximum	Mean	Standard Deviation		
All Students	16	60	29.69	10.76	0.89	3.53
Economically Disadvantaged	7	--	--	--	--	--
African American	2	--	--	--	--	--
Asian	3	--	--	--	--	--
Hispanic	2	--	--	--	--	--
Multi-race	0	--	--	--	--	--
Native American	0	--	--	--	--	--
Pacific Islander/Hawaiian	0	--	--	--	--	--
White	9	--	--	--	--	--
Female	9	--	--	--	--	--
Male	7	--	--	--	--	--
LEP	1	--	--	--	--	--
FLEP	1	--	--	--	--	--
LEPFLEP	2	--	--	--	--	--
Plan 504	1	--	--	--	--	--
Special Education	2	--	--	--	--	--
Title I	2	--	--	--	--	--

Table O-3. Subgroup Reliabilities—High School Introductory Physics

Subgroup	Number of Students	Raw Score			Alpha	SEM
		Maximum	Mean	Standard Deviation		
All Students	11,563	60	36.40	12.71	0.92	3.59
Economically Disadvantaged	3,397	60	27.94	11.65	0.90	3.64
African American	1,103	60	26.21	11.05	0.89	3.61
Asian	920	60	44.10	11.23	0.91	3.29
Hispanic	1,990	60	28.44	11.92	0.91	3.65
Multi-race	479	60	38.67	13.37	0.93	3.53
Native American	17	60	32.76	12.44	0.92	3.54
Pacific Islander/Hawaiian	3	--	--	--	--	--
White	7,051	60	39.09	11.28	0.90	3.49
Female	5,608	60	35.90	12.44	0.92	3.59
Male	5,936	60	36.85	12.95	0.92	3.57
LEP	536	60	19.48	9.54	0.87	3.44
FLEP	677	60	31.19	11.60	0.90	3.62
LEPFLEP	1,213	60	26.01	12.21	0.91	3.63
Plan 504	813	60	36.27	11.26	0.90	3.60
Special Education	2,088	60	25.81	11.16	0.90	3.60
Title I	2,412	60	26.06	11.01	0.89	3.61

Table O-4. Subgroup Reliabilities—High School Technology/Engineering

Subgroup	Number of Students	Raw Score			Alpha	SEM
		Maximum	Mean	Standard Deviation		
All Students	372	60	30.13	10.10	0.88	3.49
Economically Disadvantaged	175	60	27.49	9.77	0.87	3.52
African American	25	60	22.40	11.55	0.90	3.60
Asian	6					
Hispanic	71	60	27.14	8.72	0.84	3.44
Multi-race	10	60	30.50	9.01	0.85	3.50
Native American	0					
Pacific Islander/Hawaiian	0					
White	260	60	31.64	9.83	0.87	3.48
Female	127	60	27.96	8.59	0.83	3.49
Male	245	60	31.25	10.64	0.89	3.49
LEP	23	60	21.09	8.48	0.84	3.42
FLEP	22	60	25.09	10.38	0.88	3.57
LEPFLEP	45	60	23.04	9.57	0.87	3.51
Plan 504	42	60	31.83	10.39	0.89	3.41
Special Education	123	60	25.10	9.66	0.87	3.42
Title I	207	60	29.14	9.64	0.87	3.49

Table O-5. Reliabilities by Reporting Category—High School Biology

Item Reporting Category*	Number of Items	Raw Score			Alpha	SEM
		Maximum	Mean	Standard Deviation		
AP	7	10	5.46	2.24	0.61	1.40
BC	12	15	9.53	3.34	0.69	1.85
EC	10	13	9.09	2.96	0.69	1.65
EV	8	11	6.91	2.35	0.57	1.54
GE	8	11	6.40	3.07	0.74	1.58

** Reporting category definitions are given on the next page.*

Table O-6. Reliabilities by Reporting Category—High School Chemistry

Item Reporting Category*	Number of Items	Raw Score			Alpha	SEM
		Maximum	Mean	Standard Deviation		
AS	12	15	8.56	3.79	0.83	1.55
BR	12	18	9.69	4.39	0.74	2.26
SO	9	12	4.06	1.95	0.42	1.48
TH	12	15	7.38	2.70	0.69	1.51

** Reporting category definitions are given on the next page.*

Table O-7. Reliabilities by Reporting Category—High School Introductory Physics

Item Reporting Category*	Number of Items	Raw Score			Alpha	SEM
		Maximum	Mean	Standard Deviation		
EM	9	12	7.25	2.99	0.70	1.64
HT	6	9	5.49	2.35	0.64	1.41
MF	18	24	14.49	5.22	0.81	2.28
WV	12	15	9.16	3.46	0.75	1.74

** Reporting category definitions are given on the next page.*

Table O-8. Reliabilities by Reporting Category—High School Technology/Engineering

Item Reporting Category*	Number of Items	Raw Score			Alpha	SEM
		Maximum	Mean	Standard Deviation		
CM	9	12	7.02	2.76	0.68	1.56
ED	9	12	7.01	2.23	0.52	1.54
EL	12	18	7.37	3.22	0.63	1.96
FL	15	18	8.73	3.64	0.73	1.88

** Reporting category definitions are given on the next page.*

Reporting Category Definitions

AP	=	Anatomy and Physiology
AS	=	Atomic Structure and Periodicity
BC	=	Biochemistry and Cell Biology
BR	=	Bonding and Reactions
CM	=	Construction and Manufacturing
EC	=	Ecology
ED	=	Engineering Design
EL	=	Electrical and Communications Systems
EM	=	Electromagnetism
EV	=	Evolution and Biodiversity
FL	=	Fluid and Thermal Systems
GE	=	Genetics
HT	=	Heat and Heat Transfer
MF	=	Motion and Forces
SO	=	Solutions, Equilibrium, and Acid-Base Theory
TH	=	Properties of Matter and Thermochemistry
WV	=	Waves and Radiation

APPENDIX P
LEGACY MCAS SAMPLE REPORTS

MASSACHUSETTS DEPARTMENT OF ELEMENTARY AND SECONDARY EDUCATION

Spring 2021 MCAS Tests
Parent/Guardian Report

Name:	**SASID:**
School:	**Grade:** 9
District:	**Date of Birth:**

Dear Parent(s) or Guardian(s):

This *Parent/Guardian Report* provides your child's results on the 2021 Massachusetts Comprehensive Assessment System (MCAS)high school science and technology/engineering test. The report shows your child's **Achievement Level** (*Advanced, Proficient, Needs Improvement,* or *Failing*) for the science and technology/engineering test they took in spring of 2021. The report also provides information regarding how your child's performance compares to school, district, and state performance; how your childperformed in different reporting categories of the test; and how your child did on individual test questions.

If you have questions about your child's performance, I encourage you to meet with your child's teacher(s) to discuss the results andidentify ways that you can partner with your school to support your child's education.

Sincerely,

Jeffrey C. Riley
Commissioner of Elementary and Secondary

What is MCAS and how are test results used?

MCAS is the Commonwealth's standards-based student assessment program. MCAS has the following primary purposes:

- To help families see whether their children are making expected academic progress
- To help educators identify areas of the curriculum where students are learning well and areas where students may needadditional assistance to meet grade-level expectations
- To help the state target resources to schools that need support
- To determine whether students have met the state requirements for the Competency Determination (i.e., whether students areeligible for a high school diploma)
- At the high school level, to determine whether students meet one of the eligibility requirements for the John and AbigailAdams Scholarship and the Stanley Z. Koplik Certificate of Mastery Award

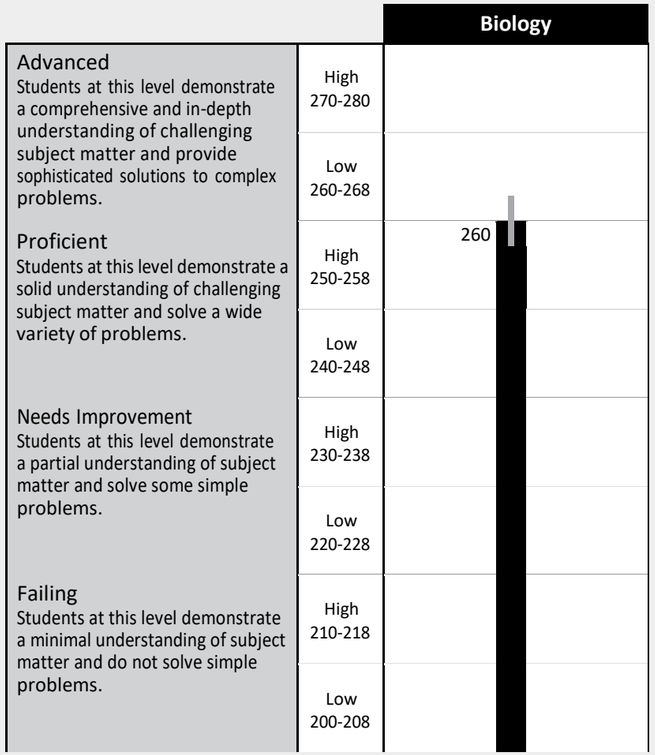
Where can you find more information?

www.doe.mass.edu/mcas/parents

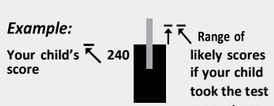
Your child's Spring 2021 achievement level and score

This section shows your child's MCAS score and achievement level on the high schoolScience and Technology/Engineering test your child participated in.

Biology
Achievement Level:
Advanced
Your child has met the MCAS graduation requirementin this subject.
Score:
260



In the figure above, the top of the black bar indicates your child's score on the test. The small gray barshows the range of likely scores your child would receive if they took the test multiple times.



Student Name:

SASID:

September 2021

Your child's scores in the reporting categories measured by the test

This section shows the number and percentage of possible points earned by your child in each reporting category. For comparison, you will also find thepercentage of possible points earned by students who performed at the low end of the *Proficient* level across the state. This information can give

Biology	Reporting Category Code	Points Earned by Your Child	Possible Points	Percent of Possible Points Earned by Your Child	Percent of Possible Points Earned by Students Who Performed at theLow End of the *Proficient* Level
Biochemistry and Cell Biology	BC	13	15	87	55
Genetics	GE	10	11	91	46
Anatomy and Physiology	AP	6	10	60	47
Evolution and Biodiversity	EV	9	11	82	57
Ecology	EC	10	13	77	66

How your child did on individual test questions

This section shows how your child did on each test question. In the bottom row (Your Child's Score), you will find whether your child gave the correct answer on multiple-choice questions and the number of points earned by your child on other types of questions. Reporting Category codesare given in the table above. Information about the test questions is available at www.doe.mass.edu/mcas/testitems.html.

Biology

Question Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Reporting Category	EC	AP	EC	EV	AP	EV	GE	EC	EC	EC	EC	EC	BC	AP	BC	EV	EC	GE	BC	GE	BC	AP	EV	EV	GE	BC	EV	EV	BC	EV	BC	AP	BC	GE	GE	BC	AP	EC	BC	GE	AP	BC	EC	GE	BC
Your Child's Score		-						-				2/4				-							3/4						-				2/4								-				3/4	3/4

Question Type	Score Codes	
Multiple-choice		Correct answer (1 point earned)
	*	More than one answer (0 points earned)
	–	Incorrect answer on an unreleased question (0 points earned)
Open-response	x/4	x points earned out of 4
All types	blank space	No answer (0 points earned)

APPENDIX Q
ANALYSIS AND REPORTING BUSINESS REQUIREMENTS

Massachusetts Comprehensive Assessment System (MCAS)

Spring 2021 MCAS Legacy High School ELA and Mathematics

Overview

Due to the COVID-19 pandemic, the Spring 2020 assessments were cancelled. Also cancelled was the November 2020 Retests in ELA and Mathematics. A Special January 2021 administration was scheduled but also cancelled. Due to these cancellations, there is a need for an assessment to test populations including 11th graders, 12th graders and adults to meet the graduation requirements or for scholarship purposes in ELA and Math. To that end, a special administration will be available to these eligible students. The tests are administered on paper and online. The forms are the forms that would have been administered in Special January 2021 administration.

Contract Code	Administration	Subject(s)	Grade(s)	Test Start	Test End
163551	Legacy HS	ELA, MATH	11, 12 and 12+	5/3/2021	6/11/2021

Inputs from the Department of Elementary and Secondary Education (DESE)

The following lists the files that, if applicable, will be used in reporting the assessment results.

File	Timeframe to receive from DESE
SIMS	February
Test Site Updates	January
Breach List	July
DESE Schtype File	January
Single School Districts File	January

Deliverables

The following deliverables will be produced by Cognia. External deliverables will be produced according to the agreed upon specifications from DESE.

1.

Deliverables	Recipient	Medium for Delivery
Student Results Datafile (aka Megafile) Layout provided by DESE	DESE	Posted on ftp site
Printer Data	SQA	Data file on deliverables
Student Results Labels	Schools	Print only
Individual Student Reports	Schools	Print and web (Available in PAN) Web files will also be posted on the ftp site for DESE to put in school drop boxes
Shipping data for printed reports	iCore Distribution	SQL table

2. 1 printed copy of the Individual Student Report will be shipped to Districts. This is the Student Parent version.
3. The Student School version will be available in PAN and provided to DESE for the school drop boxes.
4. The student school version does not include the letter to parents.

School Identification

1) Each school is identified by a unique eight (8) digit code
   a) The schoolcode field in iCore is the unique identifier for each school. The first 4 digits of the schoolcode field may or may not match the districtcode field, depending on school type.
2) Organization type is stored in iCore and associated with the appropriate institutions in the state.
3) The codes in the DistrictCode field may begin with a letter. This applies to Outplacements.
   a) District Codes stored in iCore will identify updated School Organization Types provided by DESE. p

Form Definition

The tests being administered in the Legacy HS ELA and Math administration are the tests that would have been administered in the Legacy November 2020 retests administration. The Legacy November 2020 retests were cancelled due to the impact of COVID-19.

1) The ELA test being administered is Form K.
2) The Math test being administered is Form D.

AdminID	Test	Form	Session	Form Source
7	2021 MCAS Legacy HS ELA	K	Composition	E
			Session 1	E
			Session 2	E
				C
			Session 3	E
7	2021 MCAS Legacy HS Math	D	All	D

Item Types

Subject	Item Types
ELA	Composition (WR) Comprehension (MC & OR)
Math	MC, OR, SA

Valid Responses and Score Data

1) Multiple Choice items all have valid values
   a) A, B, C, D, blank

b) * multiple response (paper tests only)

2) Open Response / Short Answer Scores shall all be resolved with a final score
   a) Final Score 0-max
   b) Blank response
   c) Not Scorable

Raw Data Value	Description	Point Value
0-max pts	Open Response / Short Answer	0-max*
B	Blank response	0

*the maximum value for an item is found in the pv max column in the test map

3) Writing Composition Scores are scored in two traits: Topic Development and Conventions
   a) Each trait is double scored

Raw Data Value	Description	Reported Value	Point Value	Response Attempted
1-6 (per scorer) **1-4 (per scorer)**	Writing Composition – Topic Development Writing Composition – Conventions	2-12 2-8	2-12 2-8	✓ ✓
A	Insufficient Evidence	IE	0	✓
F	Language Other than English	LO	0	✓
O	Off Topic	OT	0	✓
P	Plot Summary	PS	0	✓
I	Visible but Incomprehensible	VI	0	✓
B	Blank response		0	
N[1]	Not Scorable	NS	0	✓
[1] N is not valid for the Retests				

Student Participation and Exclusions

Item and Test Attempt Rules

1) An MC item is considered attempted if the MC item has values: A, B, C, D, or *(paper tests only).
2) An OR/SA item is considered attempted if the OR/SA has a numerical score.
3) A test is considered attempted if the test has at least one item, MC or OR/SA, attempted according to the above item attempt rules.

Not Tested Reasons

1) The following Not Tested Reasons are not applicable to the MCAS Legacy HS administration:
   a. Absent (ABS)

   b. Medically Documented Absence (MED)
   c. Transfer (TRN)
   d. First-year EL (LEP)
2) If any of these are provided in the PBT or CBT data, they will be ignored and not used to determine participation.

Student Participation Status

Student Participation Status reflects the participation of the student in the assessment.

1) A participation status is assigned to all students in the data
2) If a student has more than 1 completed test for a subject the test may be reported as DUP-duplicate tests
3) If a student submitted a test with no responses the test may be reported as DNT-Did Not Test
4) If the only test submitted by the student is a Voided test, the test may be reported as VAB-Void test
5) If a student falls into more than one category below within a subject, the Participation Status will be determined by applying the following hierarchy:
   i) Did Not Test (No valid responses to any items)
   ii) Invalidated (from Breach List)
   iii) Incomplete (from Breach List)
   iv) Void (from Scannable)
   v) Duplicate Tests
   vi) Tested, Retake
4) The following tables are applied after the student's participation status is determined from the attemptedness and participation rules above.

Participation Status	Participation status code	Participation Status Abbreviation for Reporting	Test Status	Raw Score Megafile	Item Score Megafile	Item Score ISR	Scaled Score	Achievement Level
Tested, Retake	O	N/A	TR					
Duplicate	I	DUP	NTO					
Void	H	VAB	NTO					
Invalidated	N	INV	NTO	Depending on instructions from breach list				
Incomplete	B	INC	NTO	Depending on instructions from breach list				
Did Not Test	J	DNT	NTO					

Breach Participation Requirements

The Breach List is provided by DESE if there are students who have been reported by schools to DESE as testing irregularities or cheating cases. The DESE provides Cognia with specific instructions on the reporting of these students' tests. All breach reporting supersedes all other reporting rules except DNT.

1) A breach can only be applied if the SASID is correct in the Breach list and links to a student record.
2) Internal Breach Codes are assigned by Cognia according to the Breach Amend Code List
3) All Breach List cases are identified in the megafile with the appropriate amend value for the affected subject. E=ELA, the breach was in ELA only; M=Math, the breach was in Math only; EM=ELA & Math, the breach was in both ELA and Math.
   a) The Breach List is provided to Quality Assurance for validation of results

Accommodations

Accommodations are reported based on the test accommodations used for each subject.
Accommodations are reported only when a valid score is being reported.

1. Only special-access accommodations are reported for ELA, Composition and Math:
a) Read Aloud is reported if used as a special-access accommodation
    i) Kurzweil Special-access is reported if the student received Kurzweil Special-access Accommodation (denoted by K in the megafile)
    ii) Text-to-Speech Special-access is reported if the student received the TTS Special access accommodation (denoted by T in the megafile)
b) Scribe is reported
    i) Human Scribe is reported if the student received Human Scribed Special-access Accommodation (denoted by H in the megafile)
    ii) Speech-to-Text is reported if the student received Speech to Text as a Special-access Accommodation (denoted by S in the megafile)

2) If a student used the special access accommodation for the Math test:
a) Calculator is reported if the student received the Math Calculation Device accommodation
b) If the student used a calculator in the non-calculator session, the student is reported with a special-access accommodation in Math

Calculations

The Megafile includes all calculations of raw scores, item scores, scaled scores and achievement levels where applicable for each individual student test. The Individual Student Reports and Student Results Labels contain the Scaled scores and Achievement levels for each student. Additionally, each item level score is reported on the Individual Student Report. The calculations to generate the scores are defined in this section.

1) Total Raw Score is reported for the following participation statuses only:
a) Tested, Retake
b) Duplicate
c) Void
d) Or as otherwise stated in the breach list from DESE
2) To calculate the Composition score, the scores given by each scorer are added together for each trait. The trait scores are added to create the Composition score. The score range for the Composition score is 4-20.
3) The Total Raw Score for a student record is the sum off all scored items for each subject. For ELA, the composition score is added to the sum of all scored MC and OR items.
4) The sum of the MC points and the sum of OR and Writing scores are reported separately in the megafile for students with a reported achievement level.

Item Score

1) Item Scores are reported for the following Participation Statuses Or as otherwise stated in the breach list from DESE:
a) Tested, Retake
b) Duplicate

Scaled Score and Achievement Level

1) The tests are pre-equated

2) Scaled Scores are assigned via a lookup table provided by Psychometrics.
3) Scaled Scores are assigned based on the calculated total raw score for the test.
4) The ELA and Math Scaled Score ranges from 200 to 280 and are used to determine Achievement Levels
5) Achievement Levels are defined using the Scaled Score ranges:
   ELA and Math
   a) Advanced:
      Scale score range: 260-280
   b) Proficient:
      Scaled Score range: 240-258
   c) Needs Improvement:
      Scaled Score range: 220-238
   d) Failing:
      Scaled Score range: 200-218
6) A passing score is a scaled score greater than or equal to 220.

CD Flag

CD is set based on the student's performance. Its value may be based on previous administrations or based on the current administration. CD is determined for each subject independently.

1) The valid CD values for ELA are: 1=the student has met the graduation requirement in ELA, but the student still needs to complete an Educational Proficiency Plan, 2=the student has met the graduation requirement in ELA, 0=the student has not met the graduation requirement in ELA
2) The valid CD values for Math are: 1=the student has met the graduation requirement for Math, but needs to complete an Educational Proficiency Plan, 2=the student has met the graduation requirement in Math, 0=the student has not met the graduation requirement in Math.
3) SIMS variables ELA_CD and MTH_CD are the starting point for determining the value of CD which will be reported for the current administration.
4) The specific wording on a student's report is based on the earned achievement level or not tested reason and their CD value. See table below in the Student Report section for scenarios
5) If a student has a not tested reason for a subject, their note will be based on the CD value from SIMS, ELA_CD or MTH_CD as appropriate.
6) If the student has a Tested, Retake or Tested status, the CD value reported is based on both previous performance and current performance on the retest taken.
7) CD values assigned per the table below if SIMS CD=0:
8) If the SIMS CD=1 for the subject and student is assigned an achievement level in the current administration, and:
   (1) The student's achievement level=1 (Failing) then the reported CD value is 1
   (2) The student's achievement level=2 (Needs Improvement) then the reported CD value is 1
   (3) The student's achievement level=3 or 4 (Proficient or Advanced) then the reported CD value is 2.

Subject	Failing	Needs Improvement	Proficient or Advanced
ELA	0	1	2
Math	0	1	2

Released Items

There are no released items in the MCAS Legacy HS administration

Specific Reporting Rules

Linking IDs that do not begin with '10' are blanked out for reporting. A blank will be reported as the student ID (SASID) in all reporting deliverables. Linking IDs are used to link a student's ELA and Math tests. Dummy linking IDs are created by DESE when a valid SASID does not exist for a student.

Student Results Label(s)

Student Results Label packages are printed and shipped to the Districts to distribute to individual schools. Each package to a District contains individual School packages and printed simplex.

1) Student Results labels are grouped by District and School with the first page of each school or district is a Slip Sheet
   a) The following is reported on the Slip Sheet
      i) District Name (truncated to 30 chars)
      ii) School Name (truncated to 30 chars)
      iii) School Code (formatted as 4-digit districtcode-8-digit schoolcode)
      iv) Grade/Content=**Legacy HS ELA/Math**
      v) Report Type=**Label Report**
2) Each Student Results Label contain both subjects per student
   a) The Student Results Label contain the following student information:
      i) Student Full Name formatted as **Firstname MI. Lastname**
      ii) State Assigned Student ID (SASID)
      iii) Grade= **Legacy HS ELA/Math**
      iv) School Name (truncated to 30 chars)
      v) 8-digit School Code
      vi) District Name (truncated to 30 chars)
      vii) Date of Birth formatted as mm/dd/yyyy
      viii) Test Date=Spring 2021
      ix) Subject earned Scaled Score
      x) Subject earned Achievement Level
3) If a First Name and Last Name are both blank, the name will appear as "**BLANK NAME"**
   a) If First Name is blank, the first name will be "**BLANK"** followed by the student's Last Name. Example, BLANK S. Smith
   b) If Last Name is blank, the last name will be the Student's First Name followed by **BLANK.** Example, John S. BLANK
4) Student Results Labels are created for all students with a Scaled Score and Achievement level for at least one subject
   a) If a student only has a Scaled Score and Achievement level in one subject, they will have '---' reported for both their Scaled Score and Achievement Level for the other subject.
5) Each Student Results Label page will have up to ten (10) student result labels to a sheet
   a) Each sheet shall be 8 ½ x 11 standard
   b) Grouped by School, ordered alphabetically by Student Last Name, Student First Name
6) Each package shall not contain more than 500 pages (up to 499 Student Labels, 10 each page)

Student Report(s)

Report Packages are printed and shipped to the districts to distribute to individual schools. Each package to a District contains individual School packages and printed duplex.

1) One copy of the Individual Student Report is printed, for the Parent/Guardian or Adult tester.
2) Each Individual Student Report combines the results for both subjects for each student
3) Individual Student Reports are grouped by District, School and Student Name, with a Slip Sheet for each package
4) On the front page of the report the name is formatted as LASTNAME, FIRSTNAME MI.
   a) If both the FirstName and LastName are missing, the name is reported as "**BLANK NAME"**
   b) If only the FirstName is missing, then the name is reported as LASTNAME, BLANK MI. Example, SMITH, BLANK K.
   c) If only the LastName is missing, then the name is reported as BLANK, FIRSTNAME MI. Example, BLANK, JOHN K.
5) On the back of the report on the bottom of the page, the name is formatted as FIRSTNAME MI. LASTNAME
   a) If a First Name and Last Name are both blank, the name shall appear "**BLANK NAME"**
   b) If First Name is blank, the first name will be "**BLANK"** followed by the student's Last Name. Example, BLANK S. SMITH
   c) If Last Name is blank, the name will be the Student's First Name followed by "**BLANK".** Example, JOHN S. BLANK
6) On the Scaled Score display on the front page of the report, the student's first name appears formatted as Firstname
7) Grouped by School, the packages contain a slip sheet displays the following as the first page of the district or school package:
   i) District Name (truncated to 30 chars)
   ii) School Name (truncated to 30 chars)
   iii) School Code (formatted as 4-digit district code-8-digit school code)
   iv) Grade/Content= **Legacy HS ELA/Math**
   v) Report Type=**Student Report-Parent Copy**
8) The Student Parent version of the report is accompanied by a Letter to the Parent/Guardian or Adult Examinee.
   a) The Letter is one page with a blank back page (printed duplex).
9) Each Individual Student Report has the following student information, when available:
   i) Student Full Name (formatted as LASTNAME, FIRSTNAME MI.)
   ii) State Assigned Student ID (SASID)
   iii) Birth Date (mm/dd/yyyy)
   iv) School Name (truncated to 30 chars)
   v) District Name (truncated to 30 chars)
10) Individual Student Reports contain the Scaled Score, Achievement Level and whether a student has met or still has not met the graduation requirements for each subject reported. Additionally, the item scores for each subject is reported, including the Topic Development and Conventions trait scores. Topic Development (CT) is reported out of 12 points and Conventions (CC) is reported out of 8 points.
    a) Each correct multiple-choice response is displayed as a check mark
    b) For the writing prompt, short-answer questions, and open-response questions, the number of points earned by the student's response is shown
11) Student Reports are created for all students where a Scaled Score and Achievement level is reported for at least one subject. The ParentLetter flag in tblStudemo is set to 1 if the student record meets this requirement. Otherwise, it is set to 0.

12) At the bottom of the back page, students who have a Scaled Score and Achievement Level to report in only one subject have '---' for both the Scaled Score and Achievement Level where there is no Scaled Score or Achievement Level to report
13) If Scaled Score and Achievement Level is not reported, the appropriate Not Tested text is displayed on the front page of the report.
14) If a student utilized a special-access accommodation as described above, the appropriate text is displayed on the students' Student Report. The text is documented in daNSATextLookup.xlsx
15) Note text for student's based on their achievement level and CD values are as follows:

Achievement Level	Subject	Parent/Guardian Report text
Failing	ELA	IF SIMS ELA_CD=0, This student has performed at the *Failing* level and has not met the MCAS graduation requirement in English Language Arts, but they may be eligible for the modified CD. See above for details about MCAS graduation requirements.
		IF SIMS ELA_CD=1, This student performed at the *Failing* level, but has already met the MCAS testing requirement in English Language Arts for graduation and requires an Educational Proficiency Plan.
		If SIMS ELA_CD=2, This student performed at the *Failing* level, but has already met the MCAS testing requirement in English Language Arts for graduation.
	Math	If SIMS MTH_CD=0 This student has performed at the *Failing* level and has not met the MCAS graduation requirement for Mathematics, but they may be eligible for the modified CD. See above for details about MCAS graduation requirements.
		IF SIMS MTH_CD=1, This student performed at the Failing level, but has already met the MCAS testing requirement in Mathematics for graduation and requires an Educational Proficiency Plan.
		If SIMS MTH_CD=2, This student performed at the Failing level, but has already met the MCAS testing requirement in Mathematics for graduation.
Needs Improvement	Math	If SIMS_CD=0 or 1 This student has performed at the *Needs Improvement* level and has met the MCAS testing requirement in Mathematics for graduation but requires an Educational Proficiency Plan.
	ELA	If SIMS_CD=0 or 1 This student has performed at the *Needs Improvement* level and has met the MCAS testing requirement in English Language Arts for graduation but requires an Educational Proficiency Plan.
	Math	If SIMS_CD=2 This student has performed at the *Needs Improvement* level and has already met the MCAS graduation requirement for Mathematics.
	ELA	If SIMS_CD=2 This student has performed at the Needs Improvement level and has already met the MCAS graduation requirement for English Language Arts.
Proficient	Math	This student has performed at the *Proficient* level and has met the MCAS graduation requirement for Mathematics.
	ELA	This student has performed at the *Proficient* level and has met the MCAS graduation requirement for English Language Arts.
Advanced	ELA	This student has performed at the *Advanced* level and has met the MCAS graduation requirement for English Language Arts.
	Math	This student has performed at the *Advanced* level and has met the MCAS graduation requirement for Mathematics.
Incomplete (INC)	ELA	This student's work was not complete, and no scaled score is reported. This student has not met the MCAS graduation requirement for English Language Arts, but they may be eligible for the modified CD.

Achievement Level	Subject	Parent/Guardian Report text
	Math	This student's work was not complete and no scaled score is reported. This student has not met the MCAS graduation requirement for Mathematics , but they may be eligible for the modified CD.
Invalidated (INV)	ELA	This student's English Language Arts test was invalidated.
		If SIMS ELA_CD = 0 or blank, This student has not met the MCAS graduation requirement in this subject, but they may be eligible for the modified CD.
		If SIMS ELA_CD = 1, This student has already met the MCAS testing requirement in this subject for graduation, but requires an Educational Proficiency Plan.
		If SIMS ELA_CD = 2, This student has already met the MCAS graduation requirement in this subject.
	Math	This student's Mathematics test was invalidated.
		If SIMS MTH_CD = 0 or blank, This student has not met the MCAS graduation requirement in this subject , but they may be eligible for the modified CD.
		If SIMS MTH_CD = 1, This student has already met the MCAS testing requirement in this subject for graduation, but requires an Educational Proficiency Plan.
		If SIMS MTH_CD = 2, This student has already met the MCAS graduation requirement in this subject.
Did Not Test (DNT)	Math	If SIMS MTH_CD = 0 or blank, This student has not met the MCAS graduation requirement in this subject , but they may be eligible for the modified CD.
		If SIMS MTH_CD = 1, This student has already met the MCAS testing requirement in this subject for graduation, but requires an Educational Proficiency Plan.
		If SIMS MTH_CD = 2, This student has already met the MCAS graduation requirement in this subject.
	ELA	If SIMS ELA_CD = 0 or blank, This student has not met the MCAS graduation requirement in this subject , but they may be eligible for the modified CD.
		If SIMS ELA_CD = 1, This student has already met the MCAS testing requirement in this subject for graduation, but requires an Educational Proficiency Plan.
		If SIMS ELA_CD = 2, This student has already met the MCAS graduation requirement in this subject.
Duplicate AnswerBooklets (DUP)	ELA	This student's English Language Arts test was invalidated.
		If SIMS ELA_CD = 0 or blank, This student has not met the MCAS graduation requirement in this subject, but they may be eligible for the modified CD.
		If SIMS ELA_CD = 1, This student has already met the MCAS testing requirement in this subject for graduation, but requires an Educational Proficiency Plan.
		If SIMS ELA_CD = 2, This student has already met the MCAS graduation requirement in this subject.
	Math	This student's Mathematics test was invalidated.
		If SIMS MTH_CD = 0 or blank, This student has not met the MCAS graduation requirement in this subject, but they may be eligible for the modified CD.
		If SIMS MTH_CD = 1, This student has already met the MCAS testing requirement in this subject for graduation, but requires an Educational Proficiency Plan.

Achievement Level	Subject	Parent/Guardian Report text
		If SIMS MTH_CD = 2, This student has already met the MCAS graduation requirement in this subject.
Void Answer Booklet (VAB)	ELA	If SIMS ELA_CD = 0 or blank, This student has not met the MCAS graduation requirement in this subject, but they may be eligible for the modified CD.
		If SIMS ELA_CD = 1, This student has already met the MCAS testing requirement in this subject for graduation but requires an Educational Proficiency Plan.
		If SIMS ELA_CD = 2, This student has already met the MCAS graduation requirement in this subject.
	Math	If SIMS MTH_CD = 0 or blank, This student has not met the MCAS graduation requirement in this subject, but they may be eligible for the modified CD.
		If SIMS MTH_CD = 1, This student has already met the MCAS testing requirement in this subject for graduation but requires an Educational Proficiency Plan.
		If SIMS MTH_CD = 2, This student has already met the MCAS graduation requirement in this subject.

16) The following text will be printed on the student report when appropriate based on participation status:

Partstatus	Not Tested Reason	Subject	Student Report Text
J	Did Not Test	ELA	[Firstname] did not test.
N	Invalidated	ELA	Test was invalidated.
B	Incomplete	ELA	Test was incomplete.
H	Void Answer Booklet	ELA	Test was voided.
I	Duplicate Answer Booklet	ELA	Test was invalidated.
J	Did Not Test	Math	[Firstname] did not test.
N	Invalidated	Math	Test was invalidated.
B	Incomplete	Math	Test was incomplete.
H	Void Answer Booklet	Math	Test was voided.
I	Duplicate Answer Booklet	Math	Test was invalidated.

I. Web Reports

In addition to being printed and shipped, Student reports will be available in Pearson Access Next (PAN) and will be posted to the ftp site for DESE to distribute to school dropboxes. The formatting rules for the web reports is the same as the printed reports.

A. PDF Structure

There will be 2 types of PDFs created.

- A school level pdf. Contains all student report pdfs for that school.
- A district level pdf. Contains all student report pdfs for that district.

B. Naming convention of the pdfs

- School Web: MALegacyELA_Math_20_21Student Parent_<sprp_sch>.pdf
- District Web: MALegacyELA_Math_20_21Student Parent_<sprp_dis>.pdf

C. Sort Order

- The school pdfs will be sorted by grade, Lastname, Firstname
- The district pdfs will be sorted by sprp_sch, grade, Lastname, Firstname

D. ProductID **4**=school level pdfs and ProductID5=District level pdfs

E. Web reports are only of the student parent version of the student report.

F. For Cognia use:

- Recalculate group order using the above sort order rules.
- In the rptstudent_web table recorddescriptor1 is populated with sprp_sch for the school pdfs and sprp_dis for the district pdfs
- Replevel=dis for the district pdfs
- School PDFs:
  Pathname will be \\measuredprogress.org\deliverables\Massachusetts 20-21 Legacy HS ELA and Math\Release1\web\StudentReport\School

- District PDFs:
  Pathname will be \\measuredprogress.org\deliverables\Massachusetts 20-21 Legacy HS ELA and Math\Release1\web\StudentReport\District

Datafile Reporting

The Megafile is a data file containing all demographic and test results for each subject for each student. The student's ELA and Math records are linked and reported as one row in the file. The Megafile contains item scores, raw scores, scaled scores and achievement level and accommodations used. The datafile is a comma separated variable format with a .dat extension.

1) The demographic fields are either sourced from SIMS if there is a valid SASID or from the test data (online or paper)
2) The file is named MCAS2021_LegacyHS.dat. It is posted on the ftp site for DESE.
3) The writing trait scores for Topic Development and Conventions are formatted as a 2-digit char. If the score is less than 10, concatenate with a preceding 0. Example, 08.

4) MCASRowID
   The mcasrowid is a 15-digit alpha-numeric field created in the following manner:
   a) 2 digits = year (21)
   b) 1 digit = test (1 = combined subjects)
   c) 2 characters = time ("LE" for Legacy HS ELA and Math Administration)
   d) 10 digits = bookletnumber (derived by DP)
5) Student Reporting Organization

   a) Official District (sprp_dis)

   i) If the student's testing discode+schcode is on the Exceptions List (System+School) then the official district is the sprp_dis from the Exceptions List.
   ii) If the student's testing orgtype is 6, 13 or 22 then the official district is set to the discode concatenated with four zeroes.
   iii) Otherwise, the official district is the sending district from SIMS (senddiscode) if it exists, concatenated with four zeroes at the end. If senddiscode is blank the official district is set to '99999999'.

b) Official School (sprp_sch)
   i) If the student's testing school (discode+schcode) is on the Exceptions List (System+School) then the official school is the sprp_sch from the Exceptions List.
   ii) If a student is from a collaborative school (testing OrgType = 3 or 4) then the official school is = 05XX0000 where XX is the 3rd and 4th digit of the testing district code.

iii) If the student's testing orgtype is 25,31, or 50 then the official school is the official school code from SIMS (simsDiscode + SimsSchcode). If the simsDiscode and simsSchcode are blank the official school is set to the testing school code (discode+schcode). If the official school from SIMS turns out to be orgtype 22, then use the Exceptions list for official school.
iv) Otherwise, the official school is the testing school (discode+schcode).

c) Setting of Orgtype
i) Orgtype is based on the official school code
ii) Using the official school code link to the MCAS org data file (DA use: icore) and pull the org type (DA use: Reportcode2).
iii) In the event that an orgtype is not assigned, default orgtype to 'X'. This is expected due to some SPRP schools not being in the Org data file

Organization Types

Valid Organization types (Orgtypes) found in iCore

Orgtype Code	Description	
2	Special Education School	
3	Collaborative	
4	Collaborative Program	
6	Public School	
10	MA State Agency	
11	Private School	
13	Charter School	
22	Charter School Program	
25	Public ALT Ed Program	
29	Out-of-State School	
30	Adult Diploma Site	
31	MCAS Test Site	
34	SEIS Program	
37	Adult Basic Education	
50	Public School Program	
95	Special Education Program	

Using the orgtype the following table describes the rules for assigning sprp_dis and sprp_sch:

Testing School OrgType in DA	Testing School OrgType description	sprp_dis rule (no change)	sprp_sch rule (no change)
6	public school	first 4 digits + 0000	self
13	charter school	first 4 digits + 0000	self
22	charter school program	first 4 digits + 0000	test site exceptions
25	Public alternative education program	SIMS or 99999999 if no match in SIMS	test site exceptions, SIMS, or testing school if no match in SIMS
31	MCAS test site	SIMS or 99999999 if no match in SIMS	test site exceptions, SIMS, or testing school if no match in SIMS
37	Adult Basic Education - Community Services	SIMS or 99999999 if no match in SIMS	self

Testing School OrgType in DA	Testing School OrgType description	sprp_dis rule (no change)	sprp_sch rule (no change)
30	Adult Diploma Site	SIMS or 99999999 if no match in SIMS	self
4	collaborative program	SIMS or 99999999 if no match in SIMS	05xx0000
anything not above (2, 10, 11, 29, 34 in current shipping list, but may contain new types in the future)	any other types of non-public entities: 2=Approved Private Special Ed. School; 10=MA State Agency Unit; 11=Private (Non-Public/Non-Special Ed.) School; 29=School located outside of MA; 34=SEIS Program	SIMS or 99999999 if no match in SIMS	self
50	Public School Program	SIMS or 99999999 if no match in SIMS	test site exceptions, SIMS, or testing school if no match in SIMS
95	Special Education Program	SIMS or 99999999 if no match in SIMS	self
3	Collaborative	For registration/testing purpose only	
9	MA State Agency	For registration/testing purpose only	
5	Public School District		
12	Charter District		

A. Shipping Product Code Summary

Reporting Products

1) daStageReportShipment is populated based on the table below:

Contract Code: [163551] Description MCAS Legacy HS Admin ID 7	Report Type	Report For	Grade(s)	Report Subtype	Content Code	Qty
Student Report Parent Copy	07	1	00	02	00	1
Student Label	07	1	00	03	00	1

Analysis and Reporting Decision Rules (2020-2021)
Massachusetts Comprehensive Assessment System (MCAS) February Biology

This document details rules for analysis and reporting. The final student level data used for analysis and reporting is described in the "Data Processing Specifications." This document is considered a draft until the Massachusetts Department of Elementary and Secondary Education (DESE) signs off. If there are rules that need to be added or modified after said sign-off, ESE sign-off will be obtained for each such rule.

Table of Contents

Year to Year Change Highlights:

1. All students will be reported on the “Retester” template for the Student Report. This template does not include the achievement level summary display.
2. Eligibility for the February Biology test has changed to include only 9th graders and 12+ students.
3. “Orphan Schools” will be reported with generic district names in all deliverables.
4. February Biology reports will ship by themselves back to districts. In previous years they were shipped with the March Retest reports.
5. The process to find students at the border of Proficient for the reporting category comparison has been updated.
6. First time testers in grade 9 are reported as Testers (T) if they meet attemptedness. Students not at grade 9 with no prior results who meet attemptedness are reported as Tested, Retake (TR)
7. Students who are Previously Passed, will have their 2021 results reported if they pass the test. If they do not pass their results will be suppressed and reported with Performance Level “Previously Passed”.

Decision Rules

I. Contract Overview

A. Test Administration(s)

This section lists all administrations covered by these decision rules.

Admin ID		Eligible student Grade(s)	Testing medium	Items Included in Raw Score	Total Possible Raw Score	Reporting Categories (Test Map)
2	Biology	09, 12+	Paper only	Common	60	Legacy Reporting Category

B. Contract Code is 163550.

C. Deliverables List

Client and internal deliverables for the standard assessment are listed. Specifications for each deliverable are detailed in the Deliverable Specifications section provided.

Deliverable	Type	Delivery	Notes	Naming Convention
Student Labels	.pdf	FTP for Print Vendor	Printed	MCASBiologyXXXXLabelSchool_[i].pdf
Student Report – School Copy	.pdf	FTP for Pearson, DESE and Print Vendor	1. One printed copy per student 2. Available in PAN 3. Released electronically to DESE	MCASBiologyXXXXStudentSchool_[i].pdf
Student Report – Parent Copy	.pdf	FTP for Print Vendor	One printed copy per student	MCASBiologyXXXXStudentParent_[i].pdf
State Level File (Mega File Layout)	.dat	FTP for State	Consists of results for all participating students in the state	MCAS[yyyy]_FebBio.dat

Where XXXX=academic year,

yyyy=calendar year,

i=filenumber

II. Internal Data Sources

The following section provides details on how data are managed internally within Cognia. This information is provided for informational purposes only.

A. Test Information and Item Banking

i. Test Design

Tested Grade	Subject	Form(s)	Items included in Raw Score	Legacy Item Types
10	bio	01 = common + Matrix items	Common	MC, OR

ii. Test Map to dalref Translations (Cognia)

i. Legacy Reporting Category is used to populate Cat2 in dairef

iii. ***Item Reporting Categories****(daReportingCategoriesLookup, daSciRepCatCodes, tblIref)*
   i. *Reporting Categories (2 character abbreviated code and corresponding text) are stored in daReportingCategoriesLookup (see Appendix A). Not all categories are tested at each grade and may vary by year. The sort order listed is a generic order the categories will appear in when they exist.*
   ii. *For sciences, the reporting category is derived for each item from daIref.Cat2. The translation to the reporting category code is listed in Appendix A and stored in daSciRepCatCodes.*

iv. ***Released Items****:*
   i. *No items are released.*

B. Scoring

i. *Multiple Choice Scores – Scanning*

Valid multiple-choice responses are A, B, C, D, blank, and * = multiple responses. All responses except “blank” are considered a response attempt.

ii. *Open Response Scores – Scoring*

Raw Data Value	Reported Value	Description	Point Value	Response Attempted
0-max pts	Final score	Open Response	0-max	ü
N	0	Not Scorable	0	ü
B		Blank response	0	

C. Data Processing (DP)

i. *Amend Flag*

i. The Amend flag is set by DP based on test booklet reconciliation, the DESE Breach List, and discrepancy resolution data on an individual student basis. The default Amend flag value for all students is ‘0’.

ii. See the Amend Code Definition Lookup (Cognia Document) for valid Amend Flag values and their impact on reporting.

ii. *Test Booklet Reconciliation*

i. If a student submits an answer booklet with no work and does not identify a reason for not participating in the test, the answer document is suppressed, and the student is not reported.

ii. If a student has multiple answer booklets for the same subject from the same school with the same sessions attempted the student is considered a possible security breach until resolved:

   a. Only one record for the student is included for reporting for the subject, as determined in the Data Processing Specifications.

   b. The Amend flag for the subject is set to ‘1’ for the reported record.

   c. The DESE may resolve the students and provide new instructions for reporting during subsequent reporting.

iii. If a student's only answer booklet for a subject is Void the data are reported as stated in the Student Participation Summary and Reporting Guidelines tables.

iii. ***SciTry***

i. Scitry is set to 1, as the only test administered is biology

III. External Data Sources

A. Breach List

i. Students who are considered a security breach are provided by the DESE in the Breach List. These students are identified as Security Breach: Cheating and instructions for processing and reporting the tests on an individual case basis are provided.

ii. Data Analysis adds necessary Amend flag values (> '1') and instructions to the Amend Code Definition Lookup for each distinct scenario on the Breach List.

iii. Data Processing applies any necessary changes to the raw student record based on the DESE instructions and applies the corresponding Amend Flag value from the lookup to the student for Data Analysis processing.

B. SIMS

i. Student demographic data is provided by the DESE for reporting use. Please see the Data Processing Specifications for internal validations and requirements of the data.

ii. ***Banked Prior Achievement Level***

i. *High_sPerf* in SIMS contains the prior high achievement level to be considered during participation status assignment.

ii. SciNTL='1' indicates a student has previously participated in Science as a first-year LEP student. These students are considered to have prior results in Science during the participation status assignment hierarchy. Corresponding fields for Math and ELA do not exist currently in SIMS.

iii. All other fields with historical score or performance information, including the CD fields, are ignored during the participation status determination for students.

iv. Data are stored in DPRaw for DA in *sci*PerfLevelHigh.

iii. ***Additional Historical Results***

i. SciTry_Prev contains the HS STE Science subject previously taken by a student when applicable.

ii. The highest earned scaled score is provided for students in High School, as available, in SIMS as high_*s*ScaledS. Data are stored in DPRaw for DA as *sci*ScaledScore.

iii. Data Processing translates all historical achievement levels that are no longer reported (e.g., Mastery) into currently reported achievement levels (this applies to all incoming historical achievement levels). See *Appendix B*

C. Student Growth Data – *Not provided for Biology reporting.*

D. Grade Span Lookup – *Not provided for Biology reporting.*

E. Discrepancy Site – *Does not apply to Biology reporting.*

F. Alternate Assessment Override – *Does not apply to Biology reporting.*

IV. Data Reconciliation Audits

The following cleanup will be performed on student level data prior to analysis once demographic data and reconciled test information are compiled to ensure consistency. Calculations are performed in the order listed below, and audited values are used in each subsequent check and for all analysis, reporting, and deliverables as applicable:

A. *Summarize (Blank in SIMS, this will be set by Cognia)*

Cognia will set the Summarize variable so we can produce results consistent with the Operational reporting in the summer. Summarize will be set to '0' or '1' using the following rules:

i. If High_sPerf is blank and sciNTL = '0' then Summarize is set to '1'.

ii. Otherwise, if High_sPerf is not blank or sciNTL = '1' then do the following:

i. If High_sPerf in ('A', 'P', 'NI') and StuGrade not in ('11','12','SP', ' ') then set Summarize = '1'. Note: These students are considered previously passed.

ii. Otherwise set Summarize = '0'

B. *LEPFirst*

i. The LEPFirst is provided by the ESE via an additional file.
ii. if LEPFirst = '1' then update YrsInMass = '1'.

C. *LEP*

i. If LEPFirst = '1' then update existing LEP to '1'.

D. *LEPFLEP*

i. If LEPFirst = '1' or LEP = '1' then update existing LEPFLEP to '1'.

E. *Official School and Official District Code*

i. **Terminology:**
  i. Discode = Cognia Testing Discode from DPRaw (See DP Specifications)
  ii. SchCode = Cognia Testing SchCode from DPRaw (See DP Specifications)
  iii. SendDiscode = Sending District from SIMS
  iv. SimsDisCode = Official Discode from SIMS
  v. SimsSchCode = Official SchCode from SIMS
  vi. Testing Orgtype = Testing school (discode+schcode) Org type
  vii. OrgType = SPRP school org type
  viii. Exceptions List is provided to Cognia by the ESE.
  ix. *(DA Use)*: The exceptions list is stored in daTestSitelookup

ii. Official District (sprp_dis)
   i. If the student's testing discode+schcode is on the Exceptions List (System+School) then the official district is the sprp_dis from the Exceptions List.
   ii. If the student's testing orgtype is 6, 13 or 22 then the official district is set to the discode concatenated with four zeroes.
   iii. Otherwise, the official district is the sending district from SIMS (senddiscode) if it exists, concatenated with four zeroes at the end. If senddiscode is blank the official district is set to '99999999'.

iii. Official School (sprp_sch)
   i. If the student's testing school (discode+schcode) is on the Exceptions List (System+School) then the official school is the sprp_sch from the Exceptions List.
   ii. If a student is from a collaborative school (testing OrgType = 3 or 4) then the official school is = 05XX0000 where XX is the 3rd and 4th digit of the testing district code.
   iii. If the student's testing orgtype is 25 or 31 then the official school is the official school code from SIMS (simsDiscode + SimsSchcode). If the simsDiscode and simsSchcode are blank the official school is set to the testing school code (discode+schcode). If the official school from SIMS turns out to be orgtype 22, then use the Exceptions list for official school.
   iv. Otherwise the official school is the testing school (discode+schcode).

V. Using the orgtype the following table describes the rules for assigning sprp_dis and sprp_sch:

Testing School OrgType in DA	Testing School OrgType description	sprp_dis rule (no change)	sprp_sch rule (no change)
6	public school	first 4 digits + 0000	self
13	charter school	first 4 digits + 0000	self
22	charter school program	first 4 digits + 0000	test site exceptions
25	Public alternative education program	SIMS or 99999999 if no match in SIMS	test site exceptions, SIMS, or testing school if no match in SIMS
31	MCAS test site	SIMS or 99999999 if no match in SIMS	test site exceptions, SIMS, or testing school if no match in SIMS
37	Adult Basic Education - Community Services	SIMS or 99999999 if no match in SIMS	self
30	Adult Diploma Site	SIMS or 99999999 if no match in SIMS	self
4	collaborative program	SIMS or 99999999 if no match in SIMS	05xx0000
anything not above (2, 10, 11, 29, 34 in current shipping list, but may contain new types in the future)	any other types of non-public entities: 2=Approved Private Special Ed. School; 10=MA State Agency Unit; 11=Private (Non-Public/Non-Special Ed.) School; 29=School located outside of MA; 34=SEIS Program	SIMS or 99999999 if no match in SIMS	self

Testing School OrgType in DA	Testing School OrgType description	sprp_dis rule (no change)	sprp_sch rule (no change)
50	Public School Program	SIMS or 99999999 if no match in SIMS	test site exceptions, SIMS, or testing school if no match in SIMS
95	Special Education Program	SIMS or 99999999 if no match in SIMS	self
3	Collaborative	For registration/testing purpose only	
9	MA State Agency	For registration/testing purpose only	
5	Public School District		
12	Charter District		

i. Setting of Orgtype
   i. Orgtype is based on the official school code
   ii. Using the official school code link to the MCAS org data file (DA use: icore) and pull the org type (DA use: Reportcode2).
   iii. In the event that an orgtype is not assigned, default orgtype to 'X'. This is expected due to some SPRP schools not being in the Org data file.

ii. The table below displays possible values for a school's Orgype:

Orgtype Code	Description
2	Special Education School
3	Collaborative
4	Collaborative Program
6	Public School
10	MA State Agency
11	Private School
13	Charter School
22	Charter School Program
25	Public ALT Ed Program
29	Out-of-State School
30	Adult Diploma Site
31	MCAS Test Site
34	SEIS Program
37	Adult Basic Education
50	Public School Program
95	Special Education Program

B. ***YrsInSch and YrsInDis*** *– Not provided in October SIMS for Biology reporting.* Set both of these variables to blank in the MegaFile deliverable.

C. ***OctEnrol*** *(enrolled in same location since October)*

i. If sprp_sch or testing school (discode+schcode) = the official SIMS school code from October SIMS (simsDiscode + simsSchcode) then OctEnrol = Oct_off from SIMS. Otherwise set OctEnrol= '0'.

D. ***ConEnrol*** *(continuously enrolled for 2 years) – Not provided in October SIMS for Biology Reporting.*

E. ***Historical Scores and Growth for Reporting*** *(Yr1, Yr2, Yr3) – Not provided in October SIMS for Biology reporting.*

F. ***SciTry_Prev*** *(previous science subject tested) – Not used as part of the Biology reporting.*

G. YrsInMass and YrsInMass_Num

i. YrsInMass and YrsInMass_Num are now reported for all students. These are no longer blanked out for non-LEP students.

V. Student Participation and Reporting Status

A. Basic Definitions

The following criteria are defined for use during the participation status assignment hierarchy. Students may meet the criteria for multiple definitions, but during the hierarchy are assigned a single final participation status.

i. ***Standard Test Attemptedness***

i. A student is considered to have **met attemptedness** if they have a response attempt for at least one common item in <u>each</u> test session.

ii. A student is considered to have **partially attempted** if they have a response attempt to at least one common item, but they do not have a common item attempted in every session (has at least 1 session with no common items attempted).

iii. All other students are considered to have **not attempted**.

ii. ***Not Tested Indicators***

The following Not Tested reasons may be bubbled on the student's answer booklet.

i. Absent (ignored)

ii. Medically Excused Absent (MED)

iii. ***Transfer***

i. If either the Added or Removed bubble from the SRB is set to '1' then the student is considered to have transferred during the test administration.

iv. ***Tested Alternate Assessment****- Does not apply to Biology reporting.*

v. ***Void***

i. Students whose only answer booklet has been voided (*VoidSci* = '1') are considered Void and reported as stated in the Student Participation Summary and Reporting Guidelines tables.

vi. ***Prior Results***

i. No Prior Results
Students with a blank High_*s*Perf and sciNTL ≠ '1' from SIMS are considered to not have prior results.

ii. Previously Passed

Students with a High_*s*Perf from SIMS in ('A', 'P', 'NI'') are considered to have previously passed the subject, regardless of sciNTL value.

iii. Previously Failed

Students with a High_*s*Perf from SIMS in ('F', 'PRG', 'EMG', 'AWR', and 'INP') are considered to have previously failed the subject.

iv. Previously First Year LEP

a. Students with SciNTL = '1' from SIMS are considered to have previously participated in science as a First Year LEP student.
- If High_sPerf is <u>not</u> a Previously Passed status and SciNTL = '1', the student is considered Previously Failed.

B. Participation Status Assignment Hierarchy

i. **Breach List** *(Amend Flag > '1' assign participation status per standard hierarchy, all rules are then trumped by specific breach instructions)*

ii. **Void**

i. (Partstatus = 'H')

iii. **Multiple Answer Booklets** *(Amend='1')*

i. (PartStatus='I').

iv. **<u>Summarize = '1':</u>**

i. <u>Without</u> prior results:

a. If the student *meets attemptedness* **and Stugrade='09'** then: **Tested** (PartStatus = 'Z').

b. If the student meets attemptedness and Stugrade not equal to '09' then: **Tested Not Accountable (Retest)** (PartStatus = 'Q').

c. If the student *partially attempted* or *did not attempt*:
- If the student is a Transfer student then**: Not Tested Transfer** (PartStatus='D').
- Otherwise if MED then: **Not Tested Medically Excused** (PartStatus='G').
- Otherwise: **Did Not Test** (PartStatus='S').

ii. <u>Previously Failed:</u>

a. If the student *meets attemptedness* then: **Tested Accountable Retest** (PartStatus='Y').

b. If the student *partially attempted* or *did not attempt* then: **Not Tested Accountable Retest** (PartStatus='L').

iii. <u>Previously Passed:</u>

a. If the student did *not attempt, partially attempted* or *meets attemptedness* then: **Previously Passed** (PartStatus = 'K').

v. **<u>Summarize = '0'</u>** (regardless of any prior test results):

i. If the student *meets attemptedness* then: **Tested Not Accountable (Retest)** (PartStatus = 'R').

ii. Otherwise, if the student *partially attempted* then: **Partially Tested Not Accountable (Retest)** (PartStatus = 'B').

iii. Otherwise, if the student *did not attempt* then: **Not Tested Not Accountable (Retest)** *(*PartStatus = 'J').

C. Participation Status Summary

Summarize	Prior Results	Description**	Part Status	Test Stat*
n/a	*n/a*	Breach	*Breach Instructions are applied at the student level regardless of participation status and are identified by Amend > '1'*	
		Void *(Preliminary Only)*	H	NTO
		Multiple Answer Documents *(Security Breach)*	I	NTO
		Invalidated *(Only assigned via Breach List)*	N	NTO
1	*n/a*	Tested	Z	T*
		Tested Not Accountable (Retest)	Q	TR*
		Not Tested (/Partially Tested) - Transfer	D	NTO
		Not Tested (/Partially Tested) – Medically Excused Absent	G	NTM
		Not Tested (/Partially Tested) – Absent**	E	NTA
		Not Tested (/Partially Tested) – Did not test	S	NTO
	Prev. Failed	Tested Accountable Retest**	Y	TR*
	Prev. Failed	Previously Failed (Not Tested /Partially Tested Accountable Retest)**	L	NTO*
	Prev. Passed	Previously Passed	K	NTO*
0	*Any*	Tested Not Accountable (Retest)	R	TR*
		Partially Tested Not Accountable (Retest)	B	NTO*
		Not Tested Not Accountable (Retest)	J	NTO*

* Student results achieved while First-year LEP, or students currently First-year LEP (see rptLEPFirst calculation) are reported with TestStat = "NTL" in place of listed TestStat (all subjects). See Calculations by Participation Status Summary Table for more details.

** These statuses are not achievable during the biology test. All students with prior test scores are included in the summarize = '0' statuses, and students who return a blank answer document are suppressed and not reported.

VI. Calculations

A. Rounding Rules

Calculation	Rounded (to the nearest)
Student Counts	Whole Number
Percents	Whole Number

B. Psychometric Input

i. ***Item Analysis Interactions Specific for MCAS***

i. Below are MCAS-specific conditions programmed within the standard Item Analysis System (DAMS). Any changes to the handling of these cases need to be vetted against this system to ensure accurate scoring and item calculations.

ii. ***Item Analysis Student Inclusion/Exclusion (ExSci)***

i. Only first-time test takers that are not first-year LEP (Partstatus = 'Z' and rptLEPsci='0') are included for item analysis

ii. All other students are excluded (ExSci = '1').

iii. If an included student does not attempt at least one of the first 10 items (common or matrix/field-test) they are excluded (ExSci = '1').

C. Scaling, Equating, and Item Statistics

i. **Item statistics will not be calculated as the matrix items included in the legacy tests have previously been administered.**

ii. ***Scaling***

- **Psychometrics will apply a pre-equated solution for scaling**

i. Scaling is done using a lookup table provided by psychometrics and the student's overall raw score.

ii. The scaled score lookup achievable scaled scores are always even numbers and are between 200 and 280 every year.

D. Reporting Category Comparison

i. Students are compared to students at the border of Proficient for each reporting category

ii. The goal is to use at least 50 students at the border of Proficient for the comparison

iii. Only students with partstatus='Z' are included

iv. In order to reach at least 50 students around the 240 (Proficient) cut, we will start with scaled scores in the following order with 240, 242, 238, 244, 236

E. Achievement Level Coding

i. The MCAS Standard Assessment has four possible achievement levels, assigned to students using the raw to scale score lookup provided by psychometrics.

ii. Needs Improvement (PerfLevel = '2') or higher is considered "Passing".

MCAS Achievement Level	MCAS Description
1	Failing (F)
2	Needs Improvement (NI)
3	Proficient (P)
4	Advanced (A)

F. Student Level Calculations

i. Calculations by Participation Status Summary

						Current Year Reporting Results *('---' indicates data are blank)*					Aggregation Results		
Summarize	**Prior Results**	**Description [2]**	**Part Stat**	**rptLEPsci [1]**	**Test Stat**	**Raw Scores**	**Item Scores**	**rScaled Score** *(Cognia Reports)*	**Achievement Level** *(rPerfLevel, mfPerfLev)*	**mfScaledScore**	**Achievement Level** *(Perf2/mfPerf2)*	**CPI / Numin**	**Assess**
		Breach	*Breach Instructions are applied at the student level regardless of participation status and are identified by Amend > '1'*										
n/a		Void	**H**	*any*	NTO	earned	earned	---	VAB	---	---	---	---
		Multiple Answer Documents	**I**	*any*	NTO	earned	earned	---	DUP	---	---	---	---
		Invalidated	**N**	*any*	NTO	---	---	---	INV	---	---	---	---
1		Tested	**Z**	0	T	earned	earned	earned	earned	earned	earned	---	---
				1	NTL			*Pass:* earned *Else:* ---	*Pass:* earned *Else:* LEP	*Pass:* earned *Else:* ---	---	---	---
		Not Tested - Transfer	**D**	*any*	NTO	earned		*Pass:* earned *Else:* ---	*Pass:* earned *Else*: TRN	*Pass:* earned *Else:* ---	---	---	---
		Not Tested – Medically Excused Absent	**G**	*any*	NTM				*Pass:* earned *Else*: MED		---	---	---
		Not Tested – Absent [2]	**E**	*any*	NTA				*Pass:* earned *Else*: ABS		---	---	---
		Not Tested – Did not Test	**S**	any	NTO				Pass: earned Else: INC				
		Tested Not Accountable (Retest)	**Q**	0	TR	earned	earned	earned	earned	earned	earned	---	---
				1	NTL			*Pass:* earned *Else:* ---	*Pass:* earned *Else:* LEP	*Pass:* earned *Else:* ---	---		
	F	Tested Accountable Retest [2]	**Y**	0	TR	earned	earned	Earned	earned	highest	highest	---	---
				1	NTL			*Pass:* earned *Else:* ---	*Pass:* earned *Else*: LEP	*Pass:* highest *Else:* ---	---	---	---
	F	Previously Failed [2]	**L**	0	NTO	*Pass:* earned *Else:* ---	*Pass:* earned *Else:* ---	*Pass:* earned *Else:* ---	*Pass:* earned *Else:* PRF	highest	highest	---	---
				1	NTL				*Pass:* earned *Else:* LEP	*Pass:* highest *Else:* ---	---	---	---
	P	Previously Passed	**K**	0	NTO			*Pass:* earned		---	---	---	---

						Current Year Reporting Results *('---' indicates data are blank)*					Aggregation Results		
Summarize	**Prior Results**	**Description** [2]	**Part Stat**	**rptLEPsci** [1]	**Test Stat**	**Raw Scores**	**Item Scores**	**rScaled Score** *(Cognia Reports)*	**Achievement Level** *(rPerfLevel, mfPerfLev)*	**mfScaledScore**	**Achievement Level** *(Perf2/mfPerf2)*	**CPI / Numin**	**Assess**
				1	NTL	*Pass:* earned *Else:* ---	*Pass:* earned *Else:* ---	*Else:* ---	*Pass:* earned *Else:* PAS *Pass:* earned *Else:* LEP	---	---	---	---
0		Tested Not Accountable (Retest)	**R**	0	TR	earned	earned	earned	earned	earned	---	---	---
				1	NTL			*Pass:* earned *Else:* ---	*Pass:* earned *Else:* LEP	*Pass:* earned *Else:* ---			
		Partially Tested Not Accountable (Retest)	**B**	*Any*	NTO	earned	earned	*Pass:* earned *Else:* ---	*Pass:* earned *Else:* INC	*Pass:* earned *Else:* ---	---	---	---
		Not Tested Not Accountable (Retest)	**J**	*Any*	NTO	---	---	---	DNT	---	---	---	---

[1] rptLEP is LEPFirst for all grades/subjects/participation statuses that do not have prior results. It is set to the audited version of LEPFirst. See calculations section for details.
[2] These statuses are not achievable during the biology test.

ii. ***StudentID*** *(tblStudemo)*
   i. StudentID = rptStudentID from DPRaw (verified SASID).

iii. ***Accommodations and Accommodation Footnotes*** *(tblStudemo)*
   i. Standard Accommodations:
      a. Accom_s = '1' if the student receives any accommodations in Science, otherwise set it to blank.

iv. ***Attempt Status (****tblStudemo)*
   i. AttemptSci indicates if a student fully meets attemptedness, or did not attempt the subject, based on the definition of attemptedness in *section VI.A.i*
   ii. Calculated for all participation statuses, values:
      a. 'F' = Fully Meets Attemptedness
      b. 'P' = Partial Attempt
      c. 'N' = No Attempt

v. ***ParentLetter*** *(tblStudemo)*
   i. The Parent Letter flag is set to '0' to indicate that a student should not receive a Parent/Guardian Report or Student Results Label in the following cases:
      a. Void (PartStatus='H')
      b. Duplicate (PartStatus='I')

   ii. Class Pack Identifiers (Cognia) for printing the School and Parent version of the Parent/Guardian Report as we as the Student Results Labels are produced for all students with ParentLetter = '1'.

vi. ***Reporting First Year LEP Status (rptLEPsci)*** *(tblStudemo)*

i. RptLEP is determined for each subject based on current year partstatus, test attemptedness, First Year LEP status, and Prior First Year LEP Status (where applicable) in order to determine if a student's results should be considered achieved while under First-Year LEP status or as currently First-year LEP. This takes into consideration the prior status of the student when prior results are eligible for accountability (currently only allowed in Science).

ii. For all participation statuses that are considered Not Accountable rptLEP*sci* = LEPFirst.

iii. Otherwise, if the student is considered Accountable then:

a. If the student has prior results:

- If the student meets attemptedness this year (Attempt= 'F') then: rptLEP*sci* = LEPFirst.
- If the student partially attempts or does not attempt this year (Attempt*sci* = 'P' or 'N') then:
  - rptLEP*sci* = '1' if either LEPFirst = '1' or *sci*NTL = '1'.
  - Otherwise rptLEP*sci* = '0'.

b. If the student does not have prior results then rptLEP*sci* = LEPFirst.

vii. ***Alt***

i. *s*Alt is set to blank for all students as the Alt is not available during the Biology reporting.

viii. ***TestStat*** *(TeststatusSci in tblStudemo)*

i. *s*TestStat is assigned based on the student's participation status, rptLEP, and possible breach codes for the subject. It is not dependent on scores. See the Participation Status Summary table on page 16.

ix. ***SpecialEd*** *(tblStudemo)*

i. SpecialEd is taken from Sped_off in SIMS. If it is blank it is defaulted to '0'.

x. ***Sims CD*** *(tblStudemo)*

i. The latest CD value from SIMS for Science is stored for each student as-is, without any additional formatting as *sci*_CD.

xi. ***rptSciTry*** *(tblStudemo,updated during tblScoredItem)*

i. SciTry is provided by Data Processing. For students that Previously Failed the SciTry will reflect the current-year science subject submitted and any submitted items will be scored.

ii. rptSciTry is then set to SciTry for tblStudemo and item analysis.

iii. During tblScoredItem processing if it is determined that a student's prior science results should be reported (instead of the current test), rptSciTry will be updated to reflect the prior science subject and any item responses from the current test will be blanked.

xii. ***tblIref*** *(ItemOrder, RepCatCode, Released)*
   - ***i.*** The released item order is the order in which items appear in the Released Item Document, stored in tblIref.ItemOrder.
     - ***a.*** Includes common, non-flawed items only.
     - ***b.*** Items are ordered in order of test position.
     - ***c.*** Item responses in tblScoredItem are stored according to ItemOrder, not position.
   - ***ii.*** Released = '0' (all items are unreleased)
   - ***iii.*** RepCatCode is the 2-character reporting category code for each item:
     - ***a.*** Assigned by daIref.Cat2 for Science using daSciRepCatCodes.

xiii. ***tblPointsPossible*** *(Reporting Category Points Possible, RepOrder)*
   - ***i.*** Common, non-flawed items (from tblIref) are summarized by reporting category and at the total test level in tblPointsPossible by grade, subject, and reporder.
     - ***a.*** Points = the total points possible in each reporting category by grade and subject and reporting category.
     - ***b.*** RepOrder = the reporting category order.
       - The unique list of existing reporting categories in a grade and subject are ordered by the generic sort order from daReportCategoryLookup and re-numbered from 1-max number of reporting categories.
       - The total test is set as RepOrder = 0.
     - ***c.*** RepCatCode is the 2-character reporting category code, and RepCatText is the associated text. For RepOrder = '0' RepCatCode = '00', and RepCatText = 'Total'.

xiv. ***Raw Scores*** *(tblScoredItem)*
   - i. Overall Raw Score
     - ***a.*** The student's overall raw score is the sum of scores for all common items.
     - ***b.*** If a student has a partstatus that does not receive reported raw scores or if the student did not attempt any items (Attempt*Sci*='N') then the raw score is set to blank after all subsequent calculations are complete.

xv. ***Points Earned*** *(tblScoredItem)*
   - i. MCpts = number of common multiple-choice points earned in the test for the given subject.
   - ii. ORpts = number of common open response, short answer, and short response points earned in the test for the given subject.
   - iii. If a student does not receive reported raw scores these calculations are set to blank.

xvi. ***Reporting Category Points Earned*** *(tblScoredItem)*
   - i. The total points earned, and the percent of possible points earned by the student are calculated by reporting category and stored in nRepCat*x* and pRepCat*x* where *x* is the RepOrder from tblPointsPossible.
   - ii. Calculations include all common items.
   - iii. If a student does not receive reported raw scores the number of points earned, and the percent of possible points earned are set to blank.

xvii. ***Item Responses*** *(tblScoredItem)*

i. If a student has a participation status that does not receive reported item scores, or does not receive item scores because of attempt status, pass requirements or rptLEP conditions, all item responses will be blanked out (NULL) after raw score calculations are complete.

ii. Otherwise, re-formatted and re-ordered (by released item order) responses to all common items are reported and stored in tblScoredItem to support the student report and megafile deliverables :

a. Released OR items: the item score or not scorable code is reported. Responses of 'B' (blank) are set to NULL.

b. Released MC items: the plus-data from daPlusData is stored, where a "+" indicates a correct response and an alpha character (A, B, C, D, *) indicates an incorrect response choice.

xviii. ***Current-Year Reporting Results*** *(tblScoredItem)*

i. Information stored in ScaledScore, Perflevel, rScaledScore, and rPerflevel are based on current year test results only. See the **Calculations by Participation Status Summary** table for details.

ii. ScaledScore

a. Current-year scaled score results that are eligible to earn a current year scaled score. Conditions based on pass/fail, rptLEP or breach codes are not applied. This is an internal Cognia field that is not directly reported.

b. Blank for students not eligible to receive a scaled score based solely on participation status.

iii. PerfLevel

a. Earned current-year achievement level based on scaledscore (1-4). Conditions based on pass/fail, rptLEP, or breach codes are not applied.

b. If the student does not receive an achievement level based solely on partstatus PerfLevel is blank.

c. Valid Values: numeric achievement levels (1-4) or blank. Internal Cognia field that is not directly reported.

iv. rScaledScore *(Cognia reporting – labels and student report)*

a. rScaledScore is the current year earned scaled score for Cognia reporting purposes.

b. rScaledScore = ScaledScore, with suppression based on pass/fail status, rptEP, or breach codes applied from the participation status summary table.

v. **rPerfLevel** *(Cognia reporting – labels and student report, mfPerfLev)*

a. rPerfLevel is the current year achievement level or partstatus code for Cognia reporting purposes.

b. rPerfLevel = Perflevel, modified based on pass/fail status, rptLEP, or breach codes for reporting as follows:

- If perflevel = '1' and rptLEP*sci* = '1' and the student has a partstatus that receives the text "LEP" in place of a non-passing achievement level then rPerfLevel = 'F'.
- Otherwise, if perflevel is blank then rPerflevel = partstatus.

c. If a student has a breach code then rPerfLevel is assigned per the breach instructions to override any other standard rules. Valid values: numeric achievement levels (1-4) and partstatus codes.

vi. mfPerfLev *(megafile: sPerfLev)*

a. Formatted rPerfLevel (current year reporting results) to contain either the student's achievement level abbreviated text, or 3-character participation status code for all students (e.g. 'P' or 'TRN').

xix. ***Aggregation Results*** *(tblScoredItem)*

i. *Aggregation and Accountability Results combine prior and current results, where applicable*. *See the* ***Error! Reference source not found.*** *table for details.*

ii. mfScaledScore *(megafile: sscaleds)*

a. For Accountable students mfScaledScore is populated with the current year scaled score.
For Not-Accountable students mfScaledScore is populated with current year results as applicable.

b. mfScaledScore is populated as follows for Accountable students:

- mfScaledScore = rScaledScore for First Time Testers and First Time Testers that did not meet attemptedness (ABS, MED, TRN).
- mfScaledScore = Highest between rScaledScore and the prior highest ScaledScore (*sci*ScaledScore from DPRaw) for Accountable Retest Students.
- mfScaledScore = Prior highest scaled score for Previously Passed students (sciScaledScore] from DPraw).
  - Note: if *sci*ScaledScore is blank for the above scenario, the student passed via appeals and an accurate scaled score may not be available. mfScaledScore is left blank.
- Otherwise mfScaledScore is blank.

c. If rptLEP = '1' and the student's mfScaledScore (as determined above) is considered Failing, then mfScaledScore is set to blank.

d. mfScaledScore = rScaledScore for Not-Accountable students.

iii. Perf2 *(Cognia aggregate calculations)*

a. Populated with the achievement level for Cognia aggregate calculations and to support the megafile Perf2 using current year results.

b. Perf2 is blank for all students with rptLEP*sci* = '1'.

c. Otherwise Perf2 is populated as follows for Accountable or Grade 09 students:

- Perf2 = rPerfLevel for First Time Testers (1-4, '6' is translated to '1').
- Perf2 is blank for First Time Testers that did not meet attemptedness (ABS, MED, TRN).

d. Otherwise perf2 is blank. Perf2 is blank for all Not-Accountable students.

iv. mfPerf2 *(megafile: sPerf2*)

a. Perf2 formatted to contain the student's achievement level abbreviated text (using Standard Assessment text only, e.g. 'P' or 'A'). Blank if Perf2 is blank.

xx. ***Competency: Updating Sci_CD*** *(mfCD in tblScoredItem)*

i. These variables represent whether or not a student has met the testing graduation requirement for the subject, combining prior CD information from SIMS with the current test results.

ii. The updated mfCD fields begin with the prior CD value from SIMS (studemo SIMS_*sci*CD) for all students, regardless of participation status on this year's test. The prior value may be blank for students that have not previously tested in a subject.

iii. The mfCD fields are then updated using current year scaled score results (rscaledscore) if and only if the CD value increases, otherwise the prior value is retained:

iv. For Science:

a. If scaled score ≥ 220 then CD = '1'.

b. Otherwise CD is '0'.

xxi. ***Graduation Requirement Footnote (CDFootnote)*** *(tblScoredItem)*

i. The graduation requirement footnote is for High School students and indicates if a student has met, previously met, or still needs to meet the testing requirements for graduation.

ii. Using the previous CD value from SIMS (tblstudemo.SIMS_*sci*CD) and the updated CD value incorporating current test results (tblScoredItem.mfCD):

a. If SIMS_*[sub]*CD is '1' or '2' then CDFootnote = '4' *(Already Met)*.

b. Otherwise:

- If mfCD = '0' then CDFootnote = '1' *(Not Met).*
- If mfCD = '1' then CDFootnote = '3' *(Met).*

iii. For Student Report text see *Appendix C.*

xxii. ***Composite Performance Index (CPI) Points*** *– Not calculated for Biology reporting.*

xxiii. ***NumIn –*** *Not calculated for Biology reporting.*

xxiv. ***Assess –*** *Not calculated for Biology reporting.*

xxv. ***Student Growth Percentile (GP)*** *(tblScoredItem) – Not calculated for Biology reporting.*

xxvi. ***Complexity*** *(tblScoredItem)* ***–*** *Not calculated for Biology reporting.*

G. Aggregate Calculations

i. ***Aggregation Summary***

These rules are applied to all aggregate calculations. Any additional rules specific to a particular calculation will be listed under the rules for the calculation.

i. Single School District List is provided by ESE to Cognia.

ii. *(DA Use)*: The Single School District List is stored in daSingleSchDisLookup.

iii. Only first-time testers (Summarize = '1') are included in aggregate calculations.

iv. Students are aggregated to their official school (sprp_sch) and official district (sprp_dis), unless their sprp_dis is a one-school district, in which case they

are aggregated to the school associated with their sprp_dis and inclusion rules are dictated by the district (school and district calculations must match).

v. Exclusions based on OctEnrol are not applied to one-school district school or district level calculations.

ii. ***Number and Percent of Students by Achievement Level*** *(tblSummary)-In 2021 this data will not be reported*

i. All student grades are aggregated together at the school, district, and state level.

ii. Calculations are performed using tblScoredItem.Perf2. All students with a non-blank Perf2 are eligible to be included in the calculations.

iii. The following exclusions are applied to the pool of eligible students:

a. Students with OctEnrol ≠'1' are excluded at the school level, unless they are in a one-school district.

iv. N = the total number of students included in the calculation of the number of students at each achievement level (n1-n4) and is the denominator for the calculation of the percent of students at each achievement level (p1-p4).

v. ***Minimum N-Requirement:*** if N < 10 for a school or district results are calculated but suppressed from reports.

vi. Only schools with orgtype=6 or 13 will have achievement level summary data on the report if N>=10.

iii. ***P34*** *(tblSummary) In 2021 this data will not be reported*

i. This is the sum of the percent of students in the Proficient Achievement Level (p3) and the students in the Advanced Achievement Level (p4) in each school, district, or state as calculated above in *Number and Percent of Students by Achievement Level*.

ii. ***Minimum N-Requirement:*** if N < 10 for a school or district results are calculated but suppressed from reports.

iv. ***Median Student Growth Percentile*** *(tblSummary) – Not calculated for Biology reporting.*

v. ***State Reporting Category Performance Comparison*** *(tblRepCatSummary)*

i. The average number of points earned (nPoints) and the percent of total possible points earned (pPoints) by students at the "*low end of the Proficient level*" is calculated for each reporting category at the state level, stacked by subject and reporder.

ii.

Data Deliverables Specifications

I. Data file

A. Generic Details

i. Data file is posted by grade to the FTP site for the state and contain data for all processed students.

ii. Students with Amend>1 are reported as Amend='1' in the data file.

iii. The datachanged value is incremented with each rerun. The current data is compared to the previous version and datachanged is assigned to records that have changed. Datachanged is initially set to 0.

iv. DataChanged

- DataChanged indicates if a student's record has changed since a prior release of the file. It is defaulted to '0' for all students, and then incrementally updated for each data revision to the latest revision number in which a change occurred. Prior values are maintained through each revision.
- Reruns will have changes flagged incrementally.
- The file *DataChangedVariables.xlsx* indicates which fields are included in determining datachanged.

v. Commas are suppressed from school and district names, and student names.

vi. ELLfirstyear in the data file is populated with the audited version of the LEPfirst variable, provided by the ESE

vii. MCASRowID: The MCASRowID is a 15 digit alpha-numeric field created in the following manner:

- 2 digits = administration year (ie: 21 for the 2021 test)
- 1 digit = test (4 = Feb. Biology)
- 2 characters="bi" for Biology
- 10 digits = bookletnumber (derived by DP from the student's SASID or submitted answer document)

viii. All deliverables follow the most recent layout: MCAS 2020-2021 File Layout.xlsx.

ix. ELLfirstyear = tblStudemo.LEPFirst. If LEPFirst = '0' then set to blank.

x. *s*TestStat = tblStudemo. *s*TestStat

xi. *s*ScaledS = tblScoredItem.mfscaledscore. This is the current year official scaled score results for students included in aggregations.

xii. *s*Perflev = tblScoredItem.mfPerfLev. This is the formatted current year achievement level or code.

xiii. *s*Perf2 = tblscoredItem.mfPerf2. This is the formatted current year achievement level results for aggregations.

xiv. *s*_CD = tblScoredItem.mfCD. This is updated with current-year results.

xv. Item scores and raw scores are printed as they are stored in tblScoredItem in their respective fields without any additional formatting.

xvi. The following fields are set to blank:

- sCPI
- sNumin

- sAssess

xvii. Schtype is provided by DESE and stored in daESESchtypelookup data file.

Report Deliverables Specifications

I. Shipping Product Code Summary

A. School (ReportFor='1')

Grade	Report Name	ReportType	Subject	ContentCode	ReportSubType	Quantity
10	Student Label	07	Biology	19	03	1
10	Parent/Guardian Report (School Copy)	07	Biology	19	01	1
10	Parent/Guardian Report (Parent Copy)	07	Biology	19	02	1

B. Reports are shrink-wrapped at the Printer. Each packet contains:

i) Parent/Guardian Report for the school
ii) Parent/Guardian Report for the parent
iii) Student results labels for the school

II. Student Labels

A. Definitions

The following terms will be used to describe certain formats/behavior:

ii. Data listed as being taken "from SIMS" are taken from tblStudemo, after any necessary audits are complete. If the student does not link to SIMS the data are blank.

B. Templates

iii. There is only one template – one subject.

C. Label Displays

iv. Student Name –

- Presented as: *FName MI. LName* (with a period after the middle initial when the middle initial is not blank). Examples: John T. Smith or Jenny Jones
- Names are propercased
- This section requires special formatting when one or more of the names are missing:
  a. If Lname is blank and Fname is blank, then section = "BLANK NAME"
  b. If Lname is blank and Fname is not blank, then section = "Fname BLANK "
  c. If Lname is not blank and Fname is blank then section = "BLANK Lname"

v. Grade: Student's grade from SIMS (stugrade)

vi. Date of Birth: DOB from SIMS, formatted mm/dd/yyyy. Stored in tblStudemo.DOB.

vii. SASID – Student ID from SIMS, no special formatting applied.

viii. School Name, School Code, and District Name – School and District names and School Code from iCore based on testing school (discode,schcode). School and district names are title cased.

ix. School ID# is the 8 digit school code

x. Sorting

- Labels should be sorted by grade, lname, fname.
- Blank names are sorted to the top within school and student grade.

xi. Test Date: "FEBRUARY 20YY" where 20*YY* = test year, e.g. 2015.

xii. Subject Title – 'Biology':

xiii. Scaled Score – student earned scaled score stored as rScaledScore in tblScoredItem. If a student did not earn a scaled score for a tested subject (rScaledScore is NULL) the display is formatted as "---".

xiv. Achievement level – contains either the achievement level text or the not-tested statement stored in tblPerfLevelLookup (see *Appendix C* - Description). This is set using the student's rPerfLevel from tblScoredItem. This is always populated if the subject existed at the tested grade.

III. Student Report (Parent/Guardian)

A. The following sections discuss the formatting of the various displays presented on the student report. All calculations and aggregation rules can be found in earlier sections of this document. **Definitions**
The following terms will be used to describe certain formats/behavior:

xv. The Summarize value is used to identify which report template to use when reporting the student. The students who are not included in the achievement level aggregations have the Achievement Level Comparison table suppressed from the report.

xvi. Data listed as being taken "from SIMS" are taken from tblStudemo, after any necessary audits are complete. If the student does not link to SIMS the data are blank.

xvii. The following students do not receive Parent/Guardian Reports:

- The student's booklet is voided.
- The student is classified as a Duplicate.

xviii. School/District/State summary includes only students who are taking a High school STE test for the first time. For single-school districts, school results will be the same as district results.

xix. The Parent/Guardian Report text corresponding to the student's earned performance level is listed in Appendix C.

xx. Sorting: Parent/Guardian reports are sorted by grade, lname, fname.

xxi. Percentages in the sub-content table are formatted with a % sign after the number.

B. Cover Page

xxii. Title – "MCAS February 20*YY* Biology Test" where 20*YY* = test year, e.g. 2015.

xxiii. Student Name – Uppercased and presented as: *LName, FName MI.* (with a period after the middle initial when the middle initial is not blank). Examples: SMITH, JOHN T. or JONES, JENNY

This section requires special formatting when one or more of the names is missing:

- If Lname is blank and Fname is blank, then section = “BLANK NAME”
- If Lname is blank and Fname is not blank, then section = “BLANK, Fname”
- If Lname is not blank and Fname is blank then section = “Lname, BLANK”

xxiv. SASID – Student ID from SIMS, no special formatting applied.

xxv. School Name and District Name – School and District names from iCore based on testing school. No special formatting applied.

xxvi. Grade: student’s grade from SIMS (stugrade)

xxvii. DOB – DOB from SIMS, formatted mm/dd/yyyy.

C. Reporting Category Display

xxviii. Subject – ‘Biology’

xxix. Reporting category text and two-character codes – refer to daReportingCategoriesLookup for the approved text and codes (see *Appendix I.A)*.

xxx. Points earned by your child – nRepCat*X* variables from tblScoredItem, no special formatting where *X*= the Reporting category RepOrder in tblPointsPossible.

xxxi. Percent of points earned by your child – pRepCat*X* variables from tblScoredItem. If the pRepCat variable is not blank, then place % symbol immediately after the number. Example: 15%.

xxxii. Percent of points earned by minimally proficient kids – pPoints variable from tblRepCatSummary. Place % symbol immediately after the number. Example: 15%.

- This data is always displayed when the grid is displayed, regardless of whether or not the individual student has earned reporting category points.

xxxiii. If the items for a student are blanked out, the reporting category data is blank as well.

D. Released Item Display

xxxiv. *Subject Title* – ‘Biology’

xxxv. *Order of rows within each grid*

The following definitions are used to both describe what appears and also what is printed in Section7b.

- 1 = “Question Number” – this is the released item order number.
- 2 = “Reporting Category” – this is the two-character reporting category code.
- 3 = “Your Child’s Score” – this is the response provided by the student.

xxxvi. *Order of items*

- The items are ordered from left to right in released item order
- Item responses in tblScoredItem are already ordered by released item order.

xxxvii. *Formatting of Student Responses*

- Formatting of the items for the Student Report is mostly completed in tblScoredItem, with the following additions:
  a. If the student correctly responded a ‘+’ is stored in tblScoredItem for all MC items. This is translated to a ‘P’ in the reporting data so that a check mark is displayed on the student report.

b. Incorrect MC are already formatted to display a '-'
c. Open response items are formatted as earned score/pointspossible. Example: 2/4. The earned score is stored in tblScoreditem.

xxxviii. Item responses are blanked out in tblScoredItem for students that should not receive reported item responses in the display.

E. Student Achievement Level and Scaled Score Statements (inside, section2)

xxxix. Achievement level – contains either the achievement level text or the not-tested statement stored in tblPerfLevelLookup (see *Appendix C*- Description). This is set using the rPerfLevel variable from tblScoredItem.

xl. Score – contains the reported scaled score, the rScaledScore variable from tblScoredItem.

xli. Graduation requirement footnotes – contains the text from tblCDFootnoteLookup (see *Appendix B*) associated with the CDFootnote variable in tblScoredItem.

F. Scaled Score / Achievement Level Bar Graph Display

xlii. Current year scaled scores

- Use rScaledScore from tblScoredItem
- Contains standard error bar (lowScaledScore and highScaledScore from tblScoredItem)

G. Achievement Level Comparison Table -*Not included on Retester template*

xliii. Your child column – a check mark is placed in the row associated with the earned achievement level based on the data stored in the rPerfLevel column in tblScoredItem.

- Students who did not earn an achievement level on this year's test do not receive a checkmark.

xliv. School/District columns – the school and district achievement level percentages from tblSummary based on the student's official school and district (sprp_sch and sprp_dis respectively).

xlv. State column – the state achievement level percentages from tblSummary.

xlvi. Percentages are formatted with a % directly after the number. Example: 15%

xlvii. Display is not shown on reports for students identified as Summarize = '0'.

xlviii. If the display is shown, the school, district, and state data are displayed regardless of whether or not the student earned an achievement level.

IV. Web Reports

In addition to being printed and shipped, Student reports will be available in Pearson Access Next (PAN) and will be posted to the ftp site for DESE to distribute to school dropboxes.

A. PDF Structure
There will be 2 types of PDFs created.

- A school level pdf. Contains all student report pdfs for that school.
- A district level pdf. Contains all student report pdfs for that district.

B. Naming convention of the pdfs
   - The school pdfs will be named MCASBiology2021StudentParent_<sprp_sch>.pdf
   - The district pdfs will be named MCASBiology2021StudentParent_<sprp_dis>.pdf

C. Sort Order
   - The school pdfs will be sorted by grade, Lastname, Firstname
   - The district pdfs will be sorted by sprp_sch, grade, Lastname, Firstname

D. ProductID 4=school level pdfs and ProductID5=District level pdfs

E. Web reports are only of the student parent version of the student report.

F. For Cognia use:
   - Recalculate group order using the above sort order rules.
   - In the rptstudent_web table recorddescriptor1 is populated with sprp_sch for the school pdfs and sprp_dis for the district pdfs
   - Replevel=dis for the district pdfs
   - School PDFs:
     Pathname will be \\measuredprogress.org\deliverables\Massachusetts 20-21 February Biology\Release1\web\StudentReport\School

   - District PDFs:
     Pathname will be \\measuredprogress.org\deliverables\Massachusetts 20-21 February Biology\Release1\web\StudentReport\District

Appendix

A. daReportingCategoriesLookup

This table lists the possible item reporting categories by subject. The actual reporting categories that exist may vary by grade and year. The provided sort order is the generic hierarchy of appearance when a reporting category exists for a grade:

Subject	Generic Sort Order	daIref. Cat2	Item Display Code: (RepCatCode)	Student Report Text: (RepCatText)
bio	1	1	BC	Biochemistry and Cell Biology
	2	2	GE	Genetics
	3	3	AP	Anatomy and Physiology
	4	4	EV	Evolution and Biodiversity
	5	5	EC	Ecology

B. Graduation Requirement Performance Level Text (Student Report)

tblScoredItem. CDFootnote	Text
1	Your child has not met the graduation requirement in Science and Technology/Engineering.
3	Your child has met the graduation requirement in Science and Technology/Engineering.
4	Your child has already met the graduation requirement in Science and Technology/Engineering.

C. rPerfLevel Lookup for MegaFile codes *(PerfLev, Perf2)*

For reformatting tblScoredItem rPerfLevel to mfPerfLevel and Perf2 to mfPerf2.

Achievement Level or Part Flag	Mega File Code	Description
1	F	Failing
2	NI	Needs Improvement
3	P	Proficient
4	A	Advanced
D	TRN	Transferred
E	ABS	Absent
F	LEP	First-year LEP
G	MED	Absent—Medically Documented
H	VAB	Void
I	DUP	Invalidated
J	DNT	Did Not Test
K	PAS	Previously Passed
P	PPR	Previously Passed & Retested
L	PRF	Previously Failed
N	INV	Invalidated
S	DNT	Did Not Test

Addenda

(Post-Approval Edits)

Date	Description	Location