Computer-Based Released Items
Grade 8 MCAS Science and Technology/Engineering
Spring 2021

The spring 2021 grade 8 Science and Technology/Engineering (STE) test was administered in two primary formats: a computer-based version and a paper-based version. The vast majority of students took the computer-based test. The paper-based test was offered as an accommodation for students with disabilities who are unable to use a computer, as well as for English learners who are new to the country and are unfamiliar with technology.

The Department of Elementary and Secondary Education is releasing items from both versions of the test to provide information about the knowledge and skills that students are expected to demonstrate.

- Released items from the **computer-based test** are available online at mcas.pearsonsupport.com/released-items. The computer-based released items are collected in a mini test called an ePAT (electronic practice assessment tool). Items in the ePAT are displayed in TestNav 8, the testing platform for the computer-based tests.

- Released items from the **paper-based test** are available in PDF format on the Department's website at www.doe.mass.edu/mcas/testitems.html.

This document provides information about each released item from the *computer-based test*, including: reporting category, standard covered, item type, item description, and correct answer (for selected-response items only). Information about unreleased operational items is also presented here, and scoring rubrics are provided for released constructed-response items.

A Note about Testing Mode

Most of the operational items on the grade 8 STE test were the same, regardless of whether a student took the computer-based version or the paper-based version. In places where a technology-enhanced item was used on the computer-based test, an adapted version of the item was created for use on the paper test. These adapted paper items were multiple-choice or multiple-select items that tested the same STE content and assessed the same standard as the technology-enhanced item.

2021 Session Sampling

In 2021, due to the COVID-19 pandemic, the Department reduced testing time for students in grades 3–8 through a session sampling approach, in which each student took only a portion of each MCAS assessment. Instead of taking two sessions in each subject, individual students took one session each.

Grade 8 Science and Technology/Engineering
Spring 2021 Computer-Based Released Operational Items

CBT Item No.	Reporting Category	Standard	Practice Category	Item Type*	Item Description	Correct Answer (SR)**
1	Technology/ Engineering	6.ETS.2.2	A. Investigations and Questioning	SR	Determine properties of a material that should be tested to meet a design criterion for constructing a solution.	A
2	Physical Science	7.PS.3.7	None	SR	Analyze a diagram to determine when an object has the greatest amount of kinetic energy.	*see page 6*
3	Life Science	8.LS.3.3	None	SR	Identify a cellular structure that stores instructions for a trait.	D
4	Earth and Space Science	6.ESS.1.1	C. Evidence, Reasoning, and Modeling	SR	Analyze a model of the Earth-Sun-Moon system to determine that a solar eclipse could be observed from Earth.	B
5	Technology/ Engineering	6.ETS.1.5	B. Mathematics and Data	SR	Determine the scale used to make a drawing of an actual object.	B
6	Physical Science	6.PS.4.2	C. Evidence, Reasoning, and Modeling	SR	Complete a model to show how light interacts with different materials.	*see page 6*
7	Life Science	8.LS.3.1	A. Investigations and Questioning	SR	Describe how a scientist could determine whether a mutation causes changes to a trait in a bacterial cell.	A
8	Life Science	8.LS.1.5	C. Evidence, Reasoning, and Modeling	SR	Distinguish between environmental and hereditary factors influencing the size of an organism.	*see page 6*
9	Earth and Space Science	8.ESS.2.1	C. Evidence, Reasoning, and Modeling	SR	Interpret a plate tectonic model to determine that crust will melt as it is subducted.	A
10	Earth and Space Science	7.ESS.2.2	C. Evidence, Reasoning, and Modeling	SR	Interpret plate tectonic models to determine which model shows an ocean is getting larger and determine why the ocean is getting larger.	*see page 7*
11	Earth and Space Science	8.ESS.2.1	C. Evidence, Reasoning, and Modeling	SR	Explain why the total amount of crust on Earth remains relatively the same.	D
12	Earth and Space Science	6.ESS.2.3	C. Evidence, Reasoning, and Modeling	CR	Identify the type of energy responsible for convection currents and explain why volcanoes and earthquakes occur near plate boundaries.	*see page 7*

13	Life Science	6.LS.1.3	None	CR	Identify body systems that are involved in getting nutrients from food to different parts of the body and describe how the systems work together.	*see page 7*
14	Technology/ Engineering	7.ETS.1.2	B. Mathematics and Data	CR	Use a decision matrix to determine how well different types of objects meet the criteria for building a design solution and explain the reasoning for those determinations.	*see page 8*
15	Life Science	8.LS.3.4	C. Evidence, Reasoning, and Modeling	SR	Use a model of chromosomes in a body cell to determine the number of chromosomes an organism inherits from each parent.	C
16	Physical Science	6.PS.1.7	B. Mathematics and Data	SR	Compare the densities of different samples of a gas by analyzing particulate models of the samples.	*see page 8*
17	Technology/ Engineering	7.ETS.3.1	None	SR	Identify the component of a communication system that converts a message into a digital signal.	B
18	Physical Science	8.PS.1.2	None	SR	Determine in which situation a chemical reaction is occurring.	A
19	Physical Science	8.PS.1.1	C. Evidence, Reasoning, and Modeling	SR	Determine that a pair of chemical models represents two compounds.	B
20	Technology/ Engineering	7.ETS.3.5	None	SR	Classify a part of a given communication system as feedback.	D

* STE item types are selected-response (SR) and constructed-response (CR).

**Answers are provided here for selected-response items only. Pages 6 through 8 of this document provide correct answers for technology-enhanced (TE) items and scoring rubrics for constructed-response items. Sample responses and scoring guidelines for constructed-response items will be posted to the Department's website later this year.

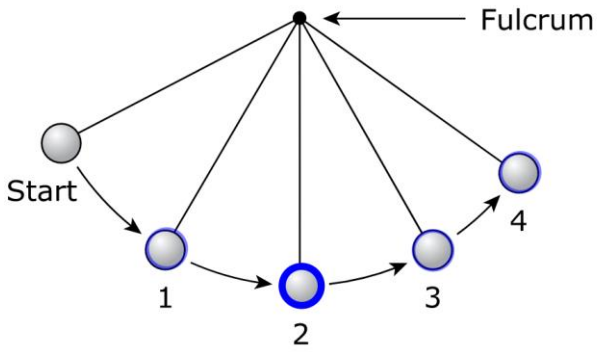
Grade 8 Science and Technology/Engineering
Spring 2021 Computer-Based Unreleased Operational Items

CBT Item No.	Reporting Category	Standard	Practice Category	Item Type*	Item Description
21	Life Science	7.LS.2.5	C. Evidence, Reasoning, and Modeling	SR	Determine which action will most likely help protect populations of a certain organism.
22	Life Science	8.LS.4.4	None	SR	Explain how new species can arise in different environmental conditions.
23	Physical Science	7.PS.3.6	C. Evidence, Reasoning, and Modeling	SR	Complete a model to show how heat flows from warmer areas to colder areas.
24	Physical Science	8.PS.1.4	B. Mathematics and Data	SR	Analyze temperature data from an experiment to predict missing temperatures at a given time.
25	Physical Science	8.PS.1.5	B. Mathematics and Data	SR	Determine the mass of products after a chemical reaction has occurred.
26	Physical Science	7.PS.3.3	A. Investigations and Questioning	CR	Evaluate the effectiveness of a device designed to minimize thermal energy transfer, and describe and explain how design changes will improve the device.
27	Technology/ Engineering	7.ETS.3.4	C. Evidence, Reasoning, and Modeling	CR	Identify live loads, tension forces, and compression forces in a system and describe how those forces act on the system.
28	Earth and Space Science	8.ESS.2.5	C. Evidence, Reasoning, and Modeling	SR	Describe how the amount of moisture in air changes as air moves over an ocean and then over a mountain.
29	Technology/ Engineering	7.ETS.3.3	None	SR	Use a diagram of a vehicle to classify some of its parts into transportation subsystems.
30	Earth and Space Science	8.ESS.1.2	C. Evidence, Reasoning, and Modeling	CR	Analyze a diagram to compare how the strength of the gravitational force between two objects changes when the position or mass of one of the objects changes.
31	Life Science	8.LS.3.2	None	SR	Describe an advantage and a disadvantage of asexual reproduction in bacteria.
32	Earth and Space Science	8.ESS.1.1	None	SR	Explain what causes seasonal differences in hours of daylight.
33	Life Science	7.LS.1.4	C. Evidence, Reasoning, and Modeling	SR	Determine and explain the changes to flowering plant populations when the size of an insect population changes.
34	Earth and Space Science	8.ESS.3.5	B. Mathematics and Data	SR	Use a graph to determine changes in carbon dioxide levels in the atmosphere and identify several activities that have contributed to these changes.

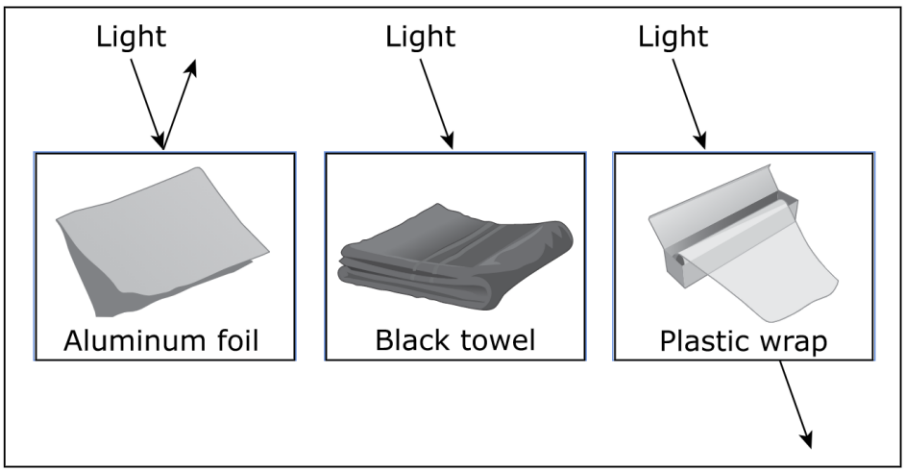
35	Life Science	7.LS.2.3	C. Evidence, Reasoning, and Modeling	SR	Interpret a food web to determine one way energy flows through an ecosystem.
36	Technology/ Engineering	8.ETS.2.5	None	SR	Determine that the manufacturing process of conditioning occurs in a given scenario.
37	Life Science	7.LS.2.2	C. Evidence, Reasoning, and Modeling	SR	Analyze information to determine that the type of ecological relationship between two organisms is mutually beneficial.
38	Technology/ Engineering	6.ETS.2.3	B. Mathematics and Data	SR	Use a ruler to determine the appropriate location to cut a wooden rod.
39	Physical Science	6.PS.4.1	C. Evidence, Reasoning, and Modeling	SR	Use a model to identify the characteristic of a wave that is related to the amount of energy carried in that wave.
40	Physical Science	7.PS.2.3	C. Evidence, Reasoning, and Modeling	SR	Complete a model to show how pairs of spheres behave, depending on each sphere's electric charge.
41	Life Science	6.LS.4.1	C. Evidence, Reasoning, and Modeling	SR	Use fossil evidence to determine how the environment of a location changed over time.

* STE item types are selected-response (SR) and constructed-response (CR).

Correct Answer for CBT Item #2: Technology-Enhanced Item



Correct Answer for CBT Item #6: Technology-Enhanced Item



Correct Answer for CBT Item #8: Technology-Enhanced Item

Factors That Affect Trout Size	Environmental	Hereditary
Pond X is three times the size of pond Y.	◉	○
The trout in pond X have different genes than the trout in pond Y.	○	◉
There is more food available for trout in pond X than in pond Y.	◉	○
Pond X has a different species of predator that preys on trout than pond Y.	◉	○

Correct Answer for CBT Item #10: Technology-Enhanced Item

Select from the drop-down menus to correctly complete the sentence.

An ocean is getting larger, based on the evidence from example [3] , because of

[sea-floor spreading]

Scoring Rubric for CBT Item #12: Constructed Response

Scoring Guide	
Score	**Description**
3	The response demonstrates a thorough understanding of analyzing and interpreting maps that show Earth's plates have moved great distances, collided, and spread apart. The response correctly identifies the type of energy in the convection currents that cause the changes to Earth shown in the examples. The response clearly explains why volcanoes often form near each other. The response also clearly explains why earthquakes are evidence that Earth's plates are moving.
2	The response demonstrates a partial understanding of analyzing and interpreting maps that show Earth's plates have moved great distances, collided, and spread apart.
1	The response demonstrates a minimal understanding of analyzing and interpreting maps that show Earth's plates have moved great distances, collided, and spread apart.
0	The response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.

Scoring Rubric for CBT Item #13: Constructed Response

Scoring Guide	
Score	**Description**
3	The response demonstrates a thorough understanding of the general functions of major systems of the human body and describes ways that these systems interact with each other. The response correctly identifies and clearly describes two body systems that work together to deliver nutrients to different parts of the runner's body.
2	The response demonstrates a partial understanding of the general functions of major systems of the human body and describes ways that these systems interact with each other.
1	The response demonstrates a minimal understanding of the general functions of major systems of the human body and describes ways that these systems interact with each other.
0	The response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.

Scoring Rubric for CBT Item #14: Constructed Response

Scoring Guide	
Score	**Description**
2	The response demonstrates a thorough understanding of evaluating competing solutions to a given design problem using a decision matrix. The response correctly identifies two criteria that the students used to make their choice. The response also correctly identifies the type of building block that is better than the number cubes and clearly explains the reasoning.
1	The response demonstrates a partial understanding of evaluating competing solutions to a given design problem using a decision matrix.
0	The response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.

Correct Answer for CBT Item #16: Technology-Enhanced Item

Part A

Select from the drop-down menu to correctly complete the sentence.

The density of container 2 is [one-half] the density of container 1.

Part B

Select from the drop-down menu to correctly complete the sentence.

The density of container 2 is now [the same as] the density of container 1.