Computer-Based Released Items
Grade 8 MCAS Science and Technology/Engineering
Spring 2019

The spring 2019 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(s) 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.

Grade 8 Science and Technology/Engineering
Spring 2019 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.2.1	None	SR	Describe why a material is an appropriate choice for part of a bridge.	*see page 6*
2	Physical Sciences	8.PS.1.4	C. Evidence, Reasoning, and Modeling	SR	Describe a change to a particle model that will show the atoms with more thermal energy.	C
3	Physical Sciences	6.PS.4.1	None	SR	Relate the amount of energy in a seismic wave to the wave's amplitude.	C
4	Technology/ Engineering	7.ETS.3.4	C. Evidence, Reasoning, and Modeling	CR	Analyze a model bridge to determine the loads on the system and describe an advantage and a disadvantage of making a design change.	*see page 9*
5	Earth and Space Science	8.ESS.2.1	C. Evidence, Reasoning, and Modeling	CR	Interpret a model of two oceanic plates colliding, identify a geological feature that is formed, and describe the process that causes plates to move.	*see page 9*
6	Life Science	8.LS.3.4	B. Mathematics and Data	SR	Complete a table showing the percentages of genotypes for a cross between two plants that are heterozygous for a particular trait.	*see page 6*
7	Technology/ Engineering	7.ETS.1.2	C. Evidence, Reasoning, and Modeling	SR	Evaluate two design solutions to determine an advantage of one solution over the other.	C
8	Technology/ Engineering	8.ETS.2.5	None	SR	Describe the separation process for creating the desired shape of an object and describe the finishing process for that object.	A;B
9	Physical Sciences	7.PS.3.4	C. Evidence, Reasoning, and Modeling	SR	Analyze particle models of two gas samples and determine that the samples differ in temperature.	C
10	Physical Sciences	6.PS.1.7	B. Mathematics and Data	SR	Order a set of objects from least to most dense given the mass and volume of the objects.	*see page 6*
11	Earth and Space Science	8.ESS.1.1	C. Evidence, Reasoning, and Modeling	SR	Interpret a model of the Sun-Earth system to explain the cause of the cyclical pattern of the seasons.	*see page 6*
12	Physical Sciences	8.PS.2.2	C. Evidence, Reasoning, and Modeling	SR	Analyze force models to determine whether the speeds of objects are changing.	*see page 7*

13	Life Science	7.LS.2.4	None	SR	Describe how a change in the amount of Arctic ice in polar regions is most likely to affect a species that lives in these regions.	B
14	Earth and Space Science	7.ESS.2.4	C. Evidence, Reasoning, and Modeling	SR	Interpret a model to determine how energy from the Sun and Earth's gravity affect the cycling of water.	*see page 7*
15	Physical Sciences	7.PS.3.2	B. Mathematics and Data	SR	Determine which object has the largest potential energy based on the mass and relative position of the objects.	*see page 8*
16	Life Science	8.LS.4.5	None	CR	Describe one advantage and one disadvantage of selecting traits artificially in a species.	*see page 9*
17	Life Science	7.LS.2.2	C. Evidence, Reasoning, and Modeling	SR	Identify a factor that can limit competition between different species living in the same area.	D
18	Life Science	6.LS.1.2	C. Evidence, Reasoning, and Modeling	SR	Use a model to determine the part of a plant cell that produces sugars.	*see page 8*
19	Physical Sciences	7.PS.3.6	None	SR	Identify an example of heat being transferred by conduction.	C
20	Earth and Space Science	8.ESS.2.5	None	SR	Determine why air on Earth circulates between the equator and the poles.	D

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

**Answers are provided here for selected-response items only. Scoring rubrics for constructed-response items are also provided in this document. Sample responses and scoring guidelines for constructed-response items will be posted to the Department's website later this year.

CBT Item No.	Reporting Category	Standard	Practice Category	Item Type*	Item Description
21	Earth and Space Science	6.ESS.1.5	C. Evidence, Reasoning, and Modeling	SR	Determine the size of the Sun relative to the planets in our solar system.
22	Technology/ Engineering	6.ETS.2.3	A. Investigations and Questioning	SR	Select the appropriate safety equipment and tools needed to construct a prototype.
23	Physical Sciences	7.PS.2.3	B. Mathematics and Data	SR	Compare the strengths of the electric forces between pairs of charges.
24	Life Science	6.LS.1.3	None	SR	Determine the body system that directly controls when muscles contract.
25	Technology/ Engineering	7.ETS.3.3	C. Evidence, Reasoning, and Modeling	SR	Determine whether parts of a vehicle are structural, propulsion, or control subsystems.
26	Physical Sciences	6.PS.1.8	A. Investigations and Questioning	SR	Determine the next step in a procedure for separating a mixture, and identify evidence that shows a substance is a mixture.
27	Earth and Space Science	8.ESS.1.2	C. Evidence, Reasoning, and Modeling	CR	Complete a model to show the force that keeps a planet in orbit around a star, and identify that force.
28	Technology/ Engineering	7.ETS.3.5	None	SR	Classify part of a transportation system according to the universal systems model.
29	Earth and Space Science	6.ESS.1.4	C. Evidence, Reasoning, and Modeling	SR	Analyze a diagram to determine the youngest rock layer that was present when a fault formed.
30	Earth and Space Science	8.ESS.3.5	B. Mathematics and Data	SR	Analyze a graph to determine a result of changes in atmospheric carbon dioxide levels over time.
31	Life Science	8.LS.1.5	C. Evidence, Reasoning, and Modeling	SR	Determine that genetic differences in individuals of the same species result in different traits.
32	Life Science	7.LS.2.2	C. Evidence, Reasoning, and Modeling	SR	Determine the relationship between a plant and an insect and describe that relationship.
33	Life Science	7.LS.1.4	C. Evidence, Reasoning, and Modeling	SR	Describe how attracting insects can increase the probability of a plant reproducing.
34	Life Science	8.LS.3.2	None	SR	Select an advantage of a plant reproducing sexually and an advantage of a plant reproducing asexually.

35	Life Science	6.LS.4.1	B. Mathematics and Data	CR	Analyze fossil record data to describe fossils found in different time periods, and describe evidence that could show a relationship between certain plants and insects.
36	Earth and Space Science	7.ESS.2.2	C. Evidence, Reasoning, and Modeling	SR	Determine that an area in New England was once covered by glaciers based on a description of the area.
37	Physical Sciences	6.PS.1.6	A. Investigations and Questioning	CR	Analyze the results of an investigation to determine whether a reaction was endothermic or exothermic, and show how the results should be organized in a lab notebook.
38	Earth and Space Science	6.ESS.1.1	None	SR	Determine the cause of the Moon's phases, and identify what occurs during one cycle of the Moon's phases.
39	Technology/ Engineering	6.ETS.2.1	C. Evidence, Reasoning, and Modeling	SR	Identify an important property of a material for a given design task.
40	Technology/ Engineering	6.ETS.1.5	B. Mathematics and Data	SR	Use an appropriate ruler to determine the scale of a drawing.
41	Technology/ Engineering	7.ETS.3.1	None	SR	Determine why part of a communication system is considered a decoder.

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

Correct Answer for CBT Item #1: Technology-Enhanced Item

Concrete is [high in strength ▼] , so this part of the bridge

can [support a large amount of weight ▼] .

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

Genotype	Percentage
HH	[25] %
Hh	[50] %
hh	[25] %

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

Least dense ⟶ Most dense

[wood]   [rubber]   [glass]
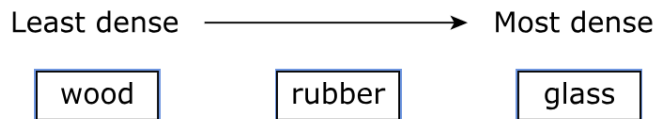
Correct Answer for CBT Item #11: Technology-Enhanced Item

The seasons change in Massachusetts as Earth travels around the Sun because of
Earth's [tilted axis ▼] , which causes

[uneven heating of Earth's surface by the Sun ▼] .

Correct Answer for CBT Item #12: Technology-Enhanced Item

Speed Changing	Speed Not Changing

Correct Answer for CBT Item #14: Technology-Enhanced Item

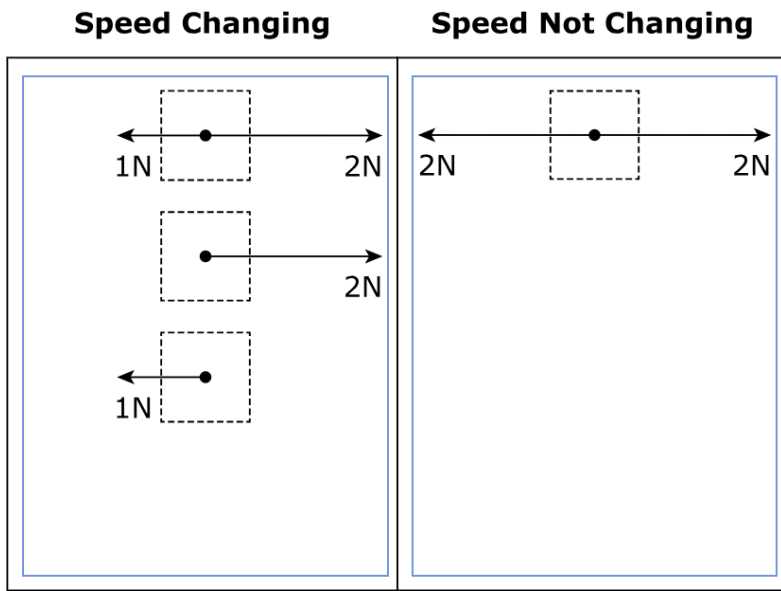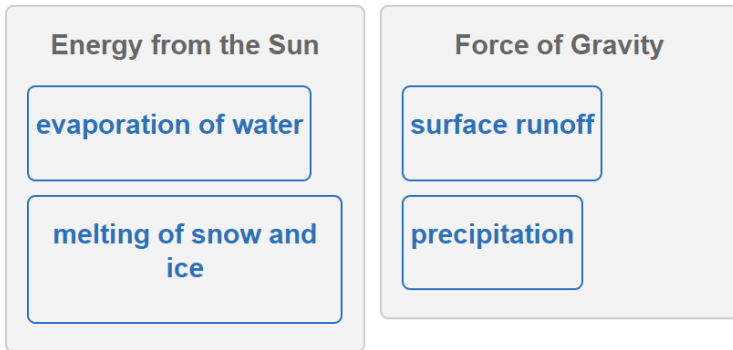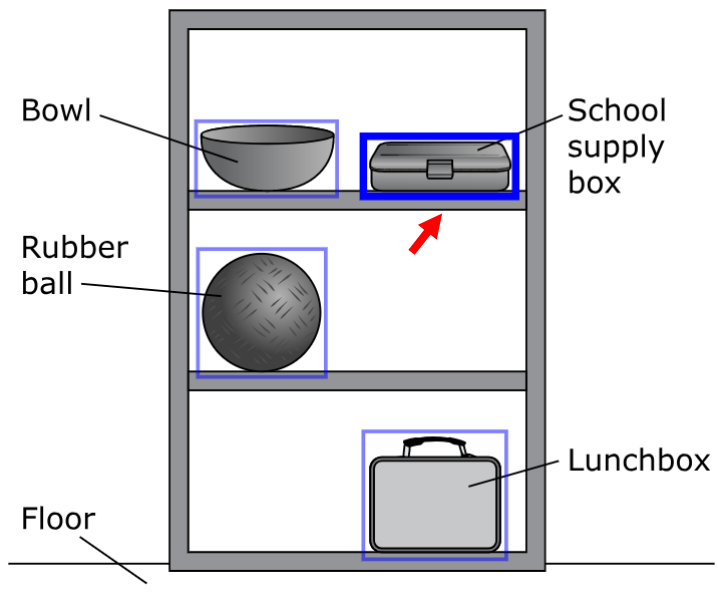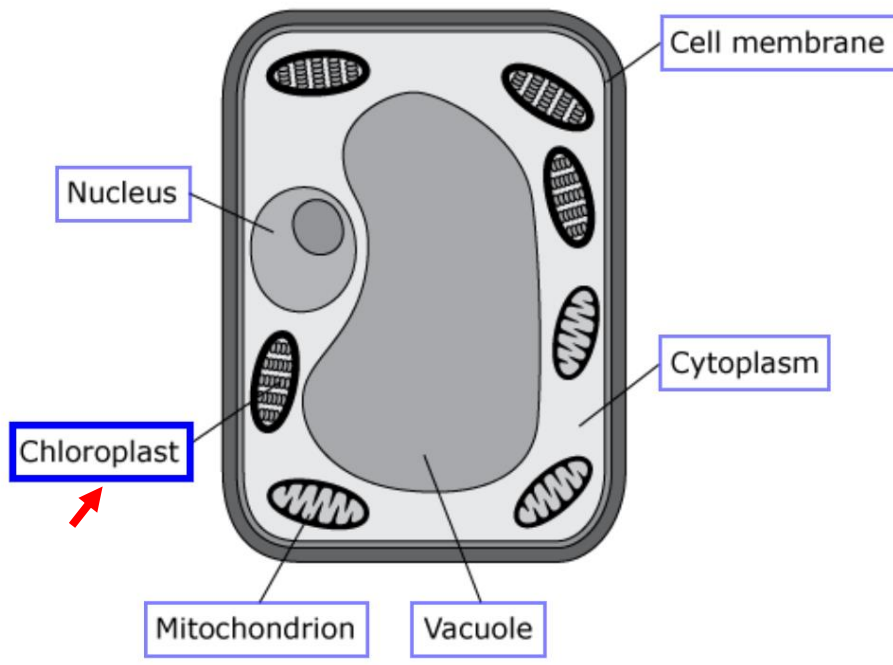| Energy from the Sun	Force of Gravity
evaporation of water	surface runoff
melting of snow and ice	precipitation

Correct Answer for CBT Item #15: Technology-Enhanced Item

Correct Answer for CBT Item #18: Technology-Enhanced Item

Scoring Rubric for CBT Item #4: Constructed Response

	Scoring Guide	
Score	**Description**	
3	The response demonstrates a thorough understanding of the components and loads on a bridge. The response correctly identifies what the coins represent and correctly identifies all the materials that are a part of the total load of the bridge. The response also clearly describes one advantage and one disadvantage of adding more materials.	
2	The response demonstrates a partial understanding of different loads on a bridge.	
1	The response demonstrates a minimal understanding of different loads on a bridge.	
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 #5: Constructed Response

	Scoring Guide	
Score	**Description**	
3	The response demonstrates a thorough understanding of energy from Earth's interior and how convection currents cycle Earth's crust. The response correctly identifies one geological feature that will form as plate X is pushed under plate W. The response clearly describes what happens to the solid material of plate X when it is pushed beneath plate W and clearly explains why this happens. The response also clearly describes the process that causes the plates to move toward each other and correctly identifies where this process is occurs.	
2	The response demonstrates a partial understanding of energy from Earth's interior and how convection currents cycle Earth's crust.	
1	The response demonstrates a minimal understanding of energy from Earth's interior and how convection currents cycle Earth's crust.	
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 #16: Constructed Response

	Scoring Guide	
Score	**Description**	
2	The response demonstrates a thorough understanding of the ways in which humans have changed the inheritance of desired traits in organisms by artificial selection. The response clearly describes one advantage and one disadvantage of selecting traits artificially in horses.	
1	The response demonstrates a partial understanding of the ways in which humans have changed the inheritance of desired traits in organisms by artificial selection.	
0	The response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.	