Computer-Based Released Items
Grade 8 MCAS Science and Technology/Engineering
Spring 2022

The spring 2022 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/release.html.

This document provides information about each released and unreleased item from the *computer-based test*, including reporting category, standard covered, practice category covered (if any), item type, and item description. Answers are provided for released selected-response items only. Sample student responses and scoring guides for constructed-response items will be posted at www.doe.mass.edu/mcas/student/.

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 2022 Computer-Based Released Operational Items

CBT Item No.	Reporting Category	Standard	Science and Engineering Practice Category	Item Type*	Item Description	Correct Answer (SR)**
1	Earth and Space Science	6.ESS.1.5	C. Evidence, Reasoning, and Modeling	SR	Use a model to order a planet, a solar system, a galaxy, and the universe from smallest to largest.	*see page 6*
2	Earth and Space Science	7.ESS.3.2	C. Evidence, Reasoning, and Modeling	SR	Interpret a map to determine where an earthquake is most likely to occur.	B
3	Physical Science	7.PS.2.3	C. Evidence, Reasoning, and Modeling	SR	Compare the strengths of the electric forces between charged particles at different distances to determine which two particles have the greatest attractive electric force.	C
4	Earth and Space Science	8.ESS.1.2	B. Mathematics and Data	SR	Analyze mass and distance data of planets to determine the planet that has the greatest gravitational force acting on it.	A
5	Physical Science	7.PS.3.1	B. Mathematics and Data	CR 2 pt.	Compare the kinetic energy of two students when given their speed and mass and explain the reasoning; identify the graph that shows the relationship between speed and kinetic energy and explain the reasoning.	
6	Earth and Space Science	8.ESS.3.5	C. Evidence, Reasoning, and Modeling	SR 2 pt.	Interpret a model to show how thermal energy that causes global warming moves through Earth's systems. Identify activities that will reduce greenhouse gas production.	Part A: *see page 6* Part B: A,B,E
7	Technology/ Engineering	7.ETS.3.5	None	SR	Determine whether parts of a system are inputs, processes, or outputs.	*see page 6*
8	Technology/ Engineering	7.ETS.3.3	C. Evidence, Reasoning, and Modeling	SR	Determine whether parts of a vehicle are structural, propulsion, or control subsystems.	*see page 7*
9	Technology/ Engineering	6.ETS.2.3	A. Investigations and Questioning	SR	Select the appropriate safety equipment and tools needed to construct a prototype.	B,C,E
10	Earth and Space Science	8.ESS.2.5	B. Mathematics and Data	SR	Analyze data to determine the causes of a change in weather.	B,D
11	Physical Science	7.PS.3.4	C. Evidence, Reasoning, and Modeling	SR	Explain how mass affects the amount of heat energy that one object can transfer to another.	D
12	Life Science	7.LS.2.2	C. Evidence, Reasoning, and Modeling	SR	Analyze a food web to describe how the ecological relationships among organisms influence populations in an ecosystem.	D

13	Life Science	7.LS.2.3	C. Evidence, Reasoning, and Modeling	SR	Use a food web to determine which organisms in an ecosystem transfer energy from sunlight into food molecules.	D
14	Life Science	7.LS.2.4	A. Investigations and Questioning	SR	Determine what data should be collected to study how overfishing one population affects another population.	A,D
15	Life Science	7.LS.2.1	C. Evidence, Reasoning, and Modeling	CR 3 pt.	Analyze a food web to describe and explain the ecological relationship between two organisms and explain how changes to the populations of organisms affect the population sizes of other organisms.	
16	Earth and Space Science	7.ESS.2.4	C. Evidence, Reasoning, and Modeling	SR	Analyze a water cycle model to determine what would cause an increase in evaporation.	D
17	Physical Science	6.PS.1.6	A. Investigations and Questioning	CR 3 pt.	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.	
18	Technology/ Engineering	7.ETS.3.1	C. Evidence, Reasoning, and Modeling	SR 2 pt.	Interpret a model of a communication system to determine its source and storage.	C;D
19	Technology/ Engineering	7.ETS.1.7	None	SR	Describe the function of a prototype.	A
20	Life Science	8.LS.1.7	None	SR	Describe how digested food molecules are used by a person's body.	B,D

* STE item types are selected-response (SR) and constructed-response (CR). All selected-response items are worth 1 point unless otherwise noted.

**Answers are provided here for selected-response items only. Pages 6 and 7 of this document provide correct answers for technology-enhanced (TE) items. Sample student responses and scoring guides for constructed-response items will be posted at www.doe.mass.edu/mcas/student/.

Grade 8 Science and Technology/Engineering
Spring 2022 Computer-Based Unreleased Operational Items

CBT Item No.	Reporting Category	Standard	Science and Engineering Practice Category	Item Type*	Item Description
21	Technology/ Engineering	7.ETS.1.2	B. Mathematics and Data	SR	Interpret a decision matrix to determine the best design solutions.
22	Physical Science	6.PS.4.2	C. Evidence, Reasoning, and Modeling	SR	Determine which model shows how light is transmitted through a material.
23	Life Science	8.LS.3.4	C. Evidence, Reasoning, and Modeling	SR	Complete a model to show the pairs of alleles that code for a trait in an offspring and its parents.
24	Technology/ Engineering	6.ETS.1.1	A. Investigations and Questioning	SR	Determine a constraint of a design solution for a manufacturer.
25	Technology/ Engineering	6.ETS.1.5	B. Mathematics and Data	SR	Calculate the length of a scaled drawing and select the correct scaled drawing by measuring its length.
26	Technology/ Engineering	6.ETS.2.1	None	SR	Determine which property of a metal blade allows it to cut other materials.
27	Technology/ Engineering	8.ETS.2.5	C. Evidence, Reasoning, and Modeling	CR 3 pt.	Identity which manufacturing processes are used to make a product and explain an advantage of using computer-controlled machines for some manufacturing steps.
28	Earth and Space Science	6.ESS.1.4	C. Evidence, Reasoning, and Modeling	CR 3 pt.	Identify and explain the relative ages of rock layers, explain how fossils of a species can be found in a different environment from where the species lived, and explain why fossils of a species may be found in only one rock layer.
29	Earth and Space Science	8.ESS.1.1	C. Evidence, Reasoning, and Modeling	SR 2 pt.	Complete a model to show the Sun-Earth system and describe the daylight hours in the Southern Hemisphere for a certain month.
30	Physical Science	8.PS.1.1	C. Evidence, Reasoning, and Modeling	SR	Compare the properties of two molecules by interpreting models of the molecules.
31	Physical Science	8.PS.2.2	C. Evidence, Reasoning, and Modeling	SR	Use information about the motion and speed of an object to determine if the forces on the object are balanced or unbalanced.
32	Life Science	8.LS.1.5	C. Evidence, Reasoning, and Modeling	SR	Analyze data to determine that an environmental factor influenced the growth of organisms.
33	Earth and Space Science	8.ESS.2.1	C. Evidence, Reasoning, and Modeling	SR	Use a model to draw a conclusion about oceanic crust near a mid-ocean ridge.
34	Physical Science	6.PS.4.1	C. Evidence, Reasoning, and Modeling	SR	Compare wave models and determine which two have the same amplitude.

35	Life Science	8.LS.3.2	C. Evidence, Reasoning, and Modeling	SR	Explain why sexual reproduction helped a species survive an environmental change.
36	Life Science	8.LS.4.4	C. Evidence, Reasoning, and Modeling	CR 2 pt.	Identify whether an inherited trait will increase in a population over time and explain the reasoning.
37	Physical Science	7.PS.3.3	None	SR	Explain how an insulated cooler can keep its contents cold.
38	Life Science	6.LS.4.1	C. Evidence, Reasoning, and Modeling	SR	Analyze fossil record data to determine how the fossil record changed and explain why the change occurred.
39	Physical Science	6.PS.1.7	B. Mathematics and Data	SR	Use a data table with mass, volume, and physical state to determine which material has the greatest density.
40	Earth and Space Science	6.ESS.1.1	C. Evidence, Reasoning, and Modeling	SR	Describe how Earth would appear from the Moon when Earth is experiencing a lunar eclipse.
41	Life Science	8.LS.3.3	C. Evidence, Reasoning, and Modeling	SR	Explain why different types of cells in an organ can have different functions.

* STE item types are selected-response (SR) and constructed-response (CR). All selected-response items are worth 1 point unless otherwise noted.

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

Massachusetts

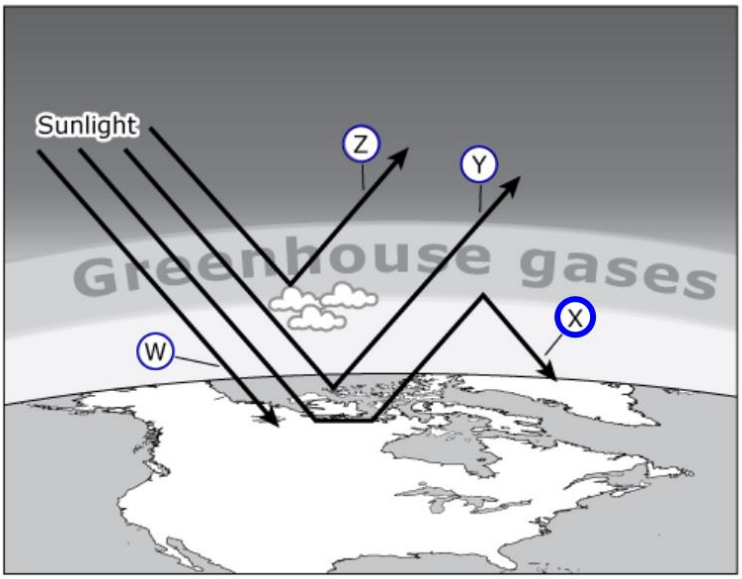
United States

North America

Northern Hemisphere

Earth
solar system
Milky Way galaxy
universe

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



Correct Answer for CBT Item #7: Technology-Enhanced Item

Part of System	Input	Process	Output
hammering a nail	○	◉	○
roof with new shingles	○	○	◉
tools	◉	○	○

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