Computer-Based Released Items
Grade 8 MCAS Science and Technology/Engineering
Spring 2023

The spring grade 8 Science and Technology/Engineering (STE) test was administered in two formats: a computer-based version and a paper-based version. Most students took the computer-based test. The paper-based test was offered as an accommodation for eligible students who were unable to use a computer.

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 item from the *computer-based test*, including the following: reporting category, standard covered, science and engineering practice category covered (if any), item type, and item description. This information is also provided for unreleased operational items. Answers are provided for released selected-response items only. Sample student responses and scoring guides for released 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 2023 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	Determine the location of Earth's solar system when given a diagram of several galaxies.	A
2	Physical Science	7.PS.3.7	B. Mathematics and Data	SR	Analyze graphs to determine the amounts of kinetic and potential energy an object has at two different heights.	B
3	Life Science	8.LS.1.7	C. Evidence, Reasoning, and Modeling	SR	Complete a model that shows food molecules and oxygen combining to release energy during cellular respiration.	*see page 6*
4	Physical Science	8.PS.1.1	C. Evidence, Reasoning, and Modeling	SR	Identify the model that represents a molecule when given the chemical formula.	A
5	Technology/ Engineering	6.ETS.1.1	B. Mathematics and Data	SR	Interpret data from an investigation to identify the criteria used to select a solution.	B,C
6	Technology/ Engineering	7.ETS.1.2	B. Mathematics and Data	SR	Use data to determine which solution meets the given criteria to solve a problem.	C
7	Physical Science	8.PS.2.2	C. Evidence, Reasoning, and Modeling	CR 3 pts.	Analyze steps of an investigation to determine how forces on objects and the masses of objects will affect the speed and kinetic energy of the objects and explain the reasoning.	
8	Technology/ Engineering	6.ETS.2.3	A. Investigations and Questioning	CR 3 pts.	Identify an appropriate tool and fastener and describe how to use them; identify a piece of safety equipment and explain how it can keep a person safe.	
9	Earth and Space Science	6.ESS.2.3	C. Evidence, Reasoning, and Modeling	CR 2 pts.	Identify pieces of evidence supporting the claim that two continents were once one landmass and explain the reasoning.	
10	Life Science	8.LS.3.3	None	SR 2 pts.	Describe the location of chromosomes in cells and describe how genes cause specific proteins to be produced, resulting in the inheritance of different traits.	*see page 6*
11	Physical Science	7.PS.3.6	None	SR	Identify an example of thermal energy being transferred primarily by conduction.	B
12	Physical Science	8.PS.1.5	B. Mathematics and Data	SR	Use a data table to compare masses before and after chemical reactions to determine which reaction took place in a closed system.	D
13	Life Science	6.LS.1.2	None	SR	Describe the function of mitochondria in plant cells.	B

14	Life Science	8.LS.4.4	B. Mathematics and Data	SR	Analyze a graph of a population changing over time to explain the likelihood of surviving and reproducing to pass on a trait.	C
15	Earth and Space Science	8.ESS.2.1	C. Evidence, Reasoning, and Modeling	SR	Use a diagram to describe the cause of plate motion near a mid-ocean ridge.	C
16	Technology/ Engineering	7.ETS.3.2	B. Mathematics and Data	SR	Analyze graphs to determine the benefits and drawbacks of different communication systems.	C
17	Earth and Space Science	8.ESS.2.6	C. Evidence, Reasoning, and Modeling	SR	Use the location of two cities shown on a map to describe how distance from the ocean affects climate.	*see page 6*
18	Life Science	6.LS.4.1	B. Mathematics and Data	SR	Analyze a graph of groups of species over time showing an extinction event to determine what claim can be supported by the graph.	B
19	Earth and Space Science	7.ESS.2.2	None	SR	Identify evidence that the climate of Massachusetts has changed over geologic time.	C
20	Life Science	6.LS.4.2	None	SR	Compare the bone structures of different organisms to describe their evolutionary relationships to a common ancestor.	C

* 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. Page 6 of this document provides 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/.

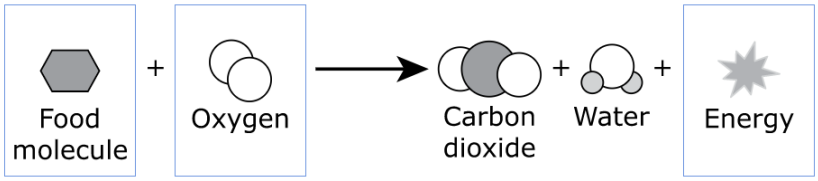
Grade 8 Science and Technology/Engineering
Spring 2023 Computer-Based Unreleased Operational Items

CBT Item No.	Reporting Category	Standard	Science and Engineering Practice Category	Item Type*	Item Description
21	Earth and Space Science	8.ESS.3.1	C. Evidence, Reasoning, and Modeling	SR	Explain why two locations can have different amounts of fossil fuel resources.
22	Life Science	8.LS.3.4	C. Evidence, Reasoning, and Modeling	SR	Analyze Punnett squares to identify which one can be used to determine the probability of a trait for a given cross.
23	Life Science	8.LS.4.5	None	SR	Identify selective breeding as a method people use to develop different types of plants.
24	Technology/ Engineering	6.ETS.2.2	A. Investigations and Questioning	SR 2 pts.	Describe the properties of materials needed for a design solution.
25	Life Science	7.LS.2.3	None	SR	Describe some of the reactants and products of photosynthesis.
26	Life Science	6.LS.1.3	C. Evidence, Reasoning, and Modeling	SR	Describe how organs shown in a diagram work together as a body system.
27	Technology/ Engineering	7.ETS.3.5	A. Investigations and Questioning	SR	Use the concept of systems engineering to describe how data can be used to modify a part of a transportation system.
28	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.
29	Technology/ Engineering	6.ETS.1.5	B. Mathematics and Data	SR	Use a ruler to measure the dimensions of a scale drawing and calculate the dimensions of the actual object.
30	Technology/ Engineering	7.ETS.3.1	None	SR	Identify the encoder and receiver in a communication system.
31	Earth and Space Science	6.ESS.1.1	C. Evidence, Reasoning, and Modeling	SR	Explain why the appearance of the Moon changes over time.
32	Physical Science	6.PS.2.4	None	SR	Identify that very massive objects have noticeable gravitational forces between them and those forces are attractive.
33	Earth and Space Science	8.ESS.1.1	C. Evidence, Reasoning, and Modeling	SR	Explain the reason for a pattern of increasing daylight hours in a given area.
34	Earth and Space Science	8.ESS.1.2	C. Evidence, Reasoning, and Modeling	CR 3 pts.	Analyze a data table to complete a model showing the positions of the Moon, the Sun, and Earth on a certain date; analyze data to determine a tide height and use evidence to support the answer.
35	Earth and Space Science	7.ESS.2.4	C. Evidence, Reasoning, and Modeling	SR	Use a model to describe the role of gravity in the water cycle.

36	Life Science	8.LS.3.2	C. Evidence, Reasoning, and Modeling	CR 3 pts.	Describe differences between sexual and asexual reproduction and explain how sexual reproduction benefits a population.
37	Physical Science	7.PS.3.3	B. Mathematics and Data	CR 2 pts.	Use data to determine a design that minimizes thermal energy transfer, describe how the speed of air molecules inside the design changes, and explain the reasoning.
38	Technology/ Engineering	8.ETS.2.5	C. Evidence, Reasoning, and Modeling	SR	Describe assembling, quality control, and safety processes used in the manufacturing of an object.
39	Physical Science	6.PS.4.1	C. Evidence, Reasoning, and Modeling	SR 2 pts.	Analyze wave models to determine relative wavelengths, amplitudes, and energies of the waves.
40	Technology/ Engineering	6.ETS.1.1	A. Investigations and Questioning	SR	Determine the design problem given a design solution.
41	Physical Science	8.PS.1.2	None	SR	Compare results of investigations to determine which result describes the separation of a compound rather than the separation of a mixture.

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

Correct Answers for CBT Item #3: Technology-Enhanced Item



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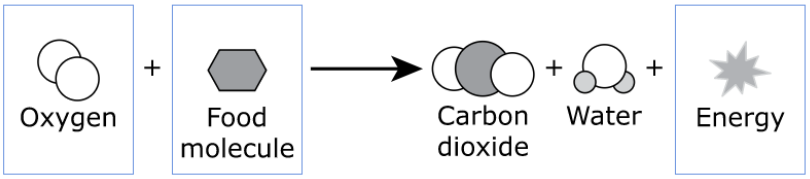

Correct Answer for CBT Item #10: Technology-Enhanced Item

Part A:

This chromosome is located in the nucleus of all body cells.

Part B:

Each child has a different eye color because each inherited genes that cause different proteins to be produced.

Correct Answer for CBT Item #17: Technology-Enhanced Item

Los Angeles is expected to have cooler summers than Oklahoma City due to the difference in distance from the ocean.