MASSACHUSETTS
Department of Elementary
and Secondary Education

Release of Spring 2024 MCAS Test Information

from the

Grade 8 Science and Technology/Engineering Test

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Massachusetts Department of Elementary and Secondary Education

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and Secondary Education

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Overview of Grade 8 Science and Technology/Engineering Test

The spring 2024 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. More information can be found on the MCAS Test Administration Resources page at www.doe.mass.edu/mcas/admin.html.

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.

The Department is not releasing items from the spring 2024 MCAS grades 3–8 tests. Released items from previous years' computer-based test are available on the MCAS Resource Center website at mcas.pearsonsupport.com/released-items.

Test Sessions and Content Overview

The grade 8 STE test was made up of two separate test sessions. Each session included selected-response questions and constructed-response questions. On the paper-based test, the selected-response questions were multiple-choice items and multiple-select items, in which students select the correct answer(s) from among several answer options.

Standards and Reporting Categories

The grade 8 STE test was based on learning standards in the four major content strands in the 2016 *Massachusetts Science and Technology/Engineering Curriculum Framework*. The Framework is available on the Department website at www.doe.mass.edu/frameworks/current.html. The four content strands are listed below.

- Earth and Space Science
- Life Science
- Physical Science
- Technology/Engineering

Science and Technology/Engineering test results are reported under four MCAS reporting categories, which are identical to the four framework content strands listed above.

Most items on the grade 8 STE test are also reported as aligning to one of three MCAS Science and Engineering Practice Categories. The three practice categories are listed below.

- Practice Category A: Investigations and Questioning
- Practice Category B: Mathematics and Data
- Practice Category C: Evidence, Reasoning, and Modeling

More information about the practice categories is available on the Department website at www.doe.mass.edu/mcas/tdd/practice-categories.html.

The tables at the conclusion of this document provide the following information about each operational item: reporting category, standard covered, science and engineering practice category covered (if any), item type, and item description.

Reference Materials

Each student taking the grade 8 STE test was provided with a ruler and a calculator.

During both STE test sessions, the use of authorized bilingual word-to-word dictionaries and glossaries was allowed for students who are currently or were ever reported as English learners.

Grade 8 Science and Technology/Engineering
Spring 2024 Computer-Based Operational Items

CBT Item No.	Reporting Category	Standard	Science and Engineering Practice Category	Item Type*	Item Description
1	*Technology/ Engineering*	6.ETS.2.2	A. Investigations and Questioning	SR	Describe a property of a material that should be selected for the prototype of a design solution.
2	*Earth and Space Science*	7.ESS.3.2	None	SR	Determine the geologic event that could occur during a rainy season in an area impacted by a forest fire.
3	*Physical Science*	7.PS.3.2	C. Evidence, Reasoning, and Modeling	SR	Determine when the potential energy of an object will change the most.
4	*Earth and Space Science*	8.ESS.1.1	C. Evidence, Reasoning, and Modeling	SR	Interpret a diagram showing Earth's orbit around the Sun to identify the part of the diagram that represents a particular season.
5	*Physical Science*	6.PS.1.8	None	SR	Explain why a substance is classified as a mixture.
6	*Life Science*	8.LS.3.1	A. Investigations and Questioning	SR	Describe how a genetic mutation can result in a change to the structure of the cell.
7	*Life Science*	8.LS.3.3	None	SR	Determine that a certain substance is a protein because a gene codes for it.
8	*Life Science*	6.LS.1.1	None	SR	Describe how single-celled organisms and cells from multi-celled organisms carry out similar functions.
9	*Life Science*	8.LS.4.4	C. Evidence, Reasoning, and Modeling	CR	Compare the genetic material of an organism that reproduces asexually with the genetic material of its offspring, and explain how natural selection can lead to an increase of organisms within a population that produce a specific protein.
10	*Earth and Space Science*	7.ESS.3.4	B. Mathematics and Data	CR	Analyze data to explain why a certain crop contributes the most to increasing global temperatures, explain why a certain crop allows for the greatest number of species in the ecosystem, and describe one way to reduce the environmental impact of a certain crop.
11	*Earth and Space Science*	6.ESS.1.4	C. Evidence, Reasoning, and Modeling	SR	Analyze evidence from diagrams showing rock layers and fossils from two locations to put several events in order from earliest to most recent.
12	*Earth and Space Science*	8.ESS.2.5	C. Evidence, Reasoning, and Modeling	SR	Use a diagram showing global wind patterns to describe the temperature and humidity of air in a region, and describe how air becomes warmer and rises as it moves across a region.
13	*Physical Science*	7.PS.3.1	B. Mathematics and Data	SR	Interpret data from a graph to describe the relationship between the speed and kinetic energy of an object.
14	*Technology/ Engineering*	7.ETS.3.1	C. Evidence, Reasoning, and Modeling	CR	Interpret a diagram of a communication system to identify and describe a transmitter and a receiver in the system.
15	*Physical Science*	6.PS.1.6	A. Investigations and Questioning	SR	Identify evidence of an exothermic reaction occurring in an investigation, and identify the equipment used to measure a change in average molecular kinetic energy.
16	*Earth and Space Science*	8.ESS.3.1	None	SR	Identify what led to the formation of fossil fuels in an area.
17	*Physical Science*	8.PS.1.4	None	SR	Explain what happens to water vapor when the temperature of the air changes.

CBT Item No.	Reporting Category	Standard	Science and Engineering Practice Category	Item Type*	Item Description
18	*Life Science*	7.LS.2.1	B. Mathematics and Data	SR	Select a time period on a population graph when the population did not have enough resources available.
19	*Physical Science*	7.PS.2.3	B. Mathematics and Data	SR	Compare the strengths of the electric forces between pairs of charges.
20	*Earth and Space Science*	8.ESS.2.6	C. Evidence, Reasoning, and Modeling	SR	Analyze information from a map and a table to explain the temperature difference between two geographic locations.
21	*Earth and Space Science*	7.ESS.2.4	C. Evidence, Reasoning, and Modeling	SR	Select the water cycle step shown on a diagram that is most directly affected by an increase in the amount of solar radiation.
22	*Physical Science*	8.PS.1.2	A. Investigations and Questioning	SR	Evaluate the steps of an investigation to determine the question students are trying to answer.
23	*Technology/ Engineering*	7.ETS.3.3	None	SR	Determine a subsystem that should be redesigned to achieve a given change in a transportation system.
24	*Physical Science*	7.PS.3.4	B. Mathematics and Data	SR	Analyze a temperature graph of four metal samples to determine differences between the samples.
25	*Technology/ Engineering*	6.ETS.2.3	None	SR	Determine which piece of safety equipment would best protect a worker.
26	*Technology/ Engineering*	8.ETS.2.5	None	SR	Describe an advantage of using one manufacturing method compared to another method.
27	*Technology/ Engineering*	6.ETS.1.5	B. Mathematics and Data	SR	Determine the scale used to create an object.
28	*Technology/ Engineering*	7.ETS.1.2	C. Evidence, Reasoning, and Modeling	CR	Analyze a decision matrix to describe an advantage of using a certain material, explain why a material from the decision matrix should be used to make a certain object, and explain why a property of the material makes it a good choice to use.
29	*Earth and Space Science*	8.ESS.2.1	C. Evidence, Reasoning, and Modeling	SR	Identify the model that represents the type of plate movement that produces a volcanic mountain range.
30	*Physical Science*	8.PS.2.2	B. Mathematics and Data	SR	Use a model to determine the net force on an object.
31	*Life Science*	6.LS.1.3	None	SR	Determine the body system that directly controls when muscles contract.
32	*Physical Science*	7.PS.3.7	C. Evidence, Reasoning, and Modeling	CR	Use information from a video to determine the positions at which an object has the greatest gravitational potential energy, the greatest elastic potential energy, and the greatest kinetic energy, and explain the reasoning.
33	*Life Science*	7.LS.2.3	C. Evidence, Reasoning, and Modeling	CR	Use information from a video to make a food web of an ecosystem, determine which two organisms from the ecosystem have a competitive relationship, and explain the reasoning.
34	*Technology/ Engineering*	7.ETS.3.4	C. Evidence, Reasoning, and Modeling	SR	Use a diagram of a structure to describe a change that would prevent the structure from collapsing.
35	*Life Science*	7.LS.1.4	C. Evidence, Reasoning, and Modeling	SR	Explain how different parts of plants attract animals that pollinate the plant.
36	*Earth and Space Science*	7.ESS.2.2	None	SR	Determine the result of water freezing and thawing on Earth's surface.

CBT Item No.	Reporting Category	Standard	Science and Engineering Practice Category	Item Type*	Item Description
37	*Life Science*	7.LS.2.5	None	SR	Determine an action that would help organisms being negatively affected by a human activity.
38	*Physical Science*	6.PS.4.2	None	SR	Determine whether waves are reflected or absorbed in several examples of wave motion.
39	*Earth and Space Science*	8.ESS.1.2	None	SR	Explain why Earth orbits the Sun.
40	*Technology/ Engineering*	6.ETS.1.6	C. Evidence, Reasoning, and Modeling	SR	Interpret a diagram of a design solution to determine whether different design features are benefits or limitations.
41	*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.

* Science and Technology/Engineering item types are: selected-response (SR) and constructed-response (CR).

Grade 8 Science and Technology/Engineering
Spring 2024 Paper-Based Operational Items

PBT Item No.	Reporting Category	Standard	Science and Engineering Practice Category	Item Type*	Item Description
1	*Technology/ Engineering*	6.ETS.2.2	A. Investigations and Questioning	SR	Describe a property of a material that should be selected for the prototype of a design solution.
2	*Earth and Space Science*	7.ESS.3.2	None	SR	Determine the geologic event that could occur during a rainy season in an area impacted by a forest fire.
3	*Physical Science*	7.PS.3.2	C. Evidence, Reasoning, and Modeling	SR	Determine when the potential energy of an object will change the most.
4	*Earth and Space Science*	8.ESS.1.1	C. Evidence, Reasoning, and Modeling	SR	Interpret a diagram showing Earth's orbit around the Sun to identify the part of the diagram that represents a particular season.
5	*Physical Science*	6.PS.1.8	None	SR	Explain why a substance is classified as a mixture.
6	*Life Science*	8.LS.3.1	A. Investigations and Questioning	SR	Describe how a genetic mutation can result in a change to the structure of the cell.
7	*Life Science*	8.LS.3.3	None	SR	Determine that a certain substance is a protein because a gene codes for it.
8	*Life Science*	6.LS.1.1	None	SR	Describe how single-celled organisms and cells from multi-celled organisms carry out similar functions.
9	*Life Science*	8.LS.4.4	C. Evidence, Reasoning, and Modeling	CR	Compare the genetic material of an organism that reproduces asexually with the genetic material of its offspring, and explain how natural selection can lead to an increase of organisms within a population that produce a specific protein.
10	*Earth and Space Science*	7.ESS.3.4	B. Mathematics and Data	CR	Analyze data to explain why a certain crop contributes the most to increasing global temperatures, explain why a certain crop allows for the greatest number of species in the ecosystem, and describe one way to reduce the environmental impact of a certain crop.
11	*Earth and Space Science*	6.ESS.1.4	C. Evidence, Reasoning, and Modeling	SR	Analyze evidence from diagrams showing rock layers and fossils from two locations to put several events in order from earliest to most recent.
12	*Earth and Space Science*	8.ESS.2.5	C. Evidence, Reasoning, and Modeling	SR	Use a diagram showing global wind patterns to describe the temperature and humidity of air in a region, and describe how air becomes warmer and rises as it moves across a region.
13	*Physical Science*	7.PS.3.1	B. Mathematics and Data	SR	Interpret data from a graph to describe the relationship between the speed and kinetic energy of an object.
14	*Technology/ Engineering*	7.ETS.3.1	C. Evidence, Reasoning, and Modeling	CR	Interpret a diagram of a communication system to identify and describe a transmitter and a receiver in the system.
15	*Physical Science*	6.PS.1.6	A. Investigations and Questioning	SR	Identify evidence of an exothermic reaction occurring in an investigation, and identify the equipment used to measure a change in average molecular kinetic energy.
16	*Earth and Space Science*	8.ESS.3.1	None	SR	Identify what led to the formation of fossil fuels in an area.
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