Computer-Based Released Items
Grade 5 MCAS Science and Technology/Engineering
Spring 2021

The spring 2021 grade 5 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 5 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 5 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	Earth and Space Science	4.ESS.1.1	C. Evidence, Reasoning, and Modeling	SR	Use evidence from a picture to describe the role of erosion in the formation of a landform over time.	A
2	Technology/ Engineering	5.ETS.3.1	B. Mathematics and Data	SR	Evaluate data in a table to explain how an existing technology was improved over time.	*see page 6*
3	Physical Science	5.PS.1.4	C. Evidence, Reasoning, and Modeling	SR	Use evidence from a diagram to support a claim that a mixture formed.	D
4	Technology/ Engineering	5.ETS.3.2	C. Evidence, Reasoning, and Modeling	SR	Analyze a sketch of a design to determine the purpose of one part of the design.	D
5	Physical Science	5.PS.1.3	B. Mathematics and Data	CR	Use data to determine which objects were made from the same substance based on their characteristic properties and explain the reasoning using evidence.	*see page 6*
6	Technology/ Engineering	3.ETS.1.1	B. Mathematics and Data	SR	Analyze information to determine the design criteria an engineer most likely used to redesign a game.	B,D,E
7	Physical Science	5.PS.1.1	C. Evidence, Reasoning, and Modeling	SR	Interpret a particle model of a phase change and determine the phases of the substance and the phase change that took place.	*see page 6*
8	Technology/ Engineering	3.ESS.3.1	C. Evidence, Reasoning, and Modeling	SR	Determine which design solution will best protect a structure from flooding.	B
9	Physical Science	4.PS.4.1	None	SR	Determine the type of energy carried by sound waves and what will happen to water when the sound waves enter the water.	*see page 6*
10	Life Science	5.LS.1.1	None	SR	Describe how plants use energy from sunlight to make their own food.	*see page 7*
11	Life Science	5.LS.2.1	None	SR	Classify organisms from a model as producers, consumers, or decomposers.	*see page 7*
12	Life Science	5.PS.3.1	None	SR	Describe how animals must use food for growth.	A

13	Life Science	5.LS.1.1	A. Investigations and Questioning	CR	Identify a part of a plant where photosynthesis takes place, identify water as what is taken up through roots for photosynthesis, and evaluate a student's investigation of how different amounts of sunlight affect photosynthesis.	*see page 7*
14	Earth and Space Science	4.ESS.2.2	C. Evidence, Reasoning, and Modeling	SR	Analyze a map to explain why there are volcanoes in a region.	B
15	Earth and Space Science	5.ESS.2.1	C. Evidence, Reasoning, and Modeling	CR	Identify, describe, and explain different parts of the water cycle in a student's model.	*see page 8*
16	Physical Science	5.PS.1.2	A. Investigations and Questioning	SR	Identify evidence from an investigation that supports the claim that matter is conserved before and after a phase change.	B
17	Technology/ Engineering	4.PS.4.3	C. Evidence, Reasoning, and Modeling	SR	Analyze a situation to determine how a message was encoded, sent, received, and decoded.	A;C
18	Life Science	5.LS.2.2	C. Evidence, Reasoning, and Modeling	SR	Use evidence to support a claim about compost bin designs.	A
19	Earth and Space Science	3.ESS.2.1	B. Mathematics and Data	SR	Use weather data to explain why there was a greater chance of precipitation on a particular day.	B
20	Earth and Space Science	5.ESS.3.1	None	SR	Identify one way people in a town can reduce human impact on the environment.	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 5 Science and Technology/Engineering
Spring 2021 Computer-Based Unreleased Operational Items

CBT Item No.	Reporting Category	Standard	Practice Category	Item Type*	Item Description
21	Physical Science	3.PS.2.3	None	SR	Determine which pair of magnets has the strongest attraction between them.
22	Earth and Space Science	5.ESS.3.2	C. Evidence, Reasoning, and Modeling	SR	Describe an improvement to increase the effectiveness of a water filter.
23	Physical Science	4.PS.3.4	None	SR	Describe the energy that an object had at a certain position on a ramp.
24	Physical Science	5.PS.2.1	C. Evidence, Reasoning, and Modeling	SR	Identify the direction of the gravitational force that acted on a moving object.
25	Physical Science	4.PS.3.4	C. Evidence, Reasoning, and Modeling	SR	Describe how a change in design would affect the stored energy and speed of an object.
26	Physical Science	4.PS.3.1	C. Evidence, Reasoning, and Modeling	CR	Explain how surface material would affect the force of friction acting on an object, the speed of the object, and the kinetic energy of the object.
27	Technology/ Engineering	4.ETS.1.5	C. Evidence, Reasoning, and Modeling	CR	Describe changes that could be made to the design of a structure to meet specific criteria and describe a possible tradeoff to one of the changes.
28	Physical Science	3.PS.2.1	C. Evidence, Reasoning, and Modeling	SR	Analyze a diagram and determine the effect of unbalanced forces on an object.
29	Earth and Space Science	5.ESS.1.2	C. Evidence, Reasoning, and Modeling	SR	Complete a model to show the cause of day and night and explain why people on Earth experience this change.
30	Life Science	3.LS.4.1	None	SR	Describe how scientists use fossil evidence to make comparisons between a modern-day organism and one that lived long ago.
31	Life Science	3.LS.3.2	C. Evidence, Reasoning, and Modeling	SR	Analyze information to determine a characteristic of a plant that was affected by the environment.
32	Earth and Space Science	3.ESS.2.2	B. Mathematics and Data	SR	Use precipitation and temperature data to describe the climate of a region.
33	Life Science	3.LS.1.1	C. Evidence, Reasoning, and Modeling	SR	Describe a similarity between the life stages of plants and animals.
34	Earth and Space Science	5.ESS.2.2	B. Mathematics and Data	SR	Interpret a circle graph to explain why there is a limited amount of fresh water available for human use.

35	Life Science	3.LS.4.4	None	SR	Describe how an environmental change is likely to affect an organism's survival.
36	Technology/ Engineering	3.ETS.1.2	C. Evidence, Reasoning, and Modeling	SR	Compare design solutions to determine why one design cooks food faster.
37	Life Science	4.LS.1.1	None	SR	Describe how plant roots support the survival of plants during winter.
38	Technology/ Engineering	3.ETS.1.4	None	CR	Compare different representations of a design solution and describe an advantage of each representation.
39	Earth and Space Science	4.ESS.2.1	C. Evidence, Reasoning, and Modeling	SR	Describe how the loss of trees affects the soil in an area.
40	Earth and Space Science	4.ESS.3.1	None	SR	Determine whether energy resources are renewable or nonrenewable.
41	Life Science	3.LS.4.2	None	SR	Describe how some individuals within a population have an advantage in survival and reproduction because of variations of a characteristic.

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

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

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

Over time, tennis rackets have become [lighter] in weight because of a change in the racket [frame material].

Scoring Rubric for CBT Item #5: Constructed Response

Scoring Guide	
Score	**Description**
2	The response demonstrates a thorough understanding of characteristic properties of substances. The response correctly identifies two objects made of the same substance and clearly explains the reasoning using data from the table to support the answer.
1	The response demonstrates a partial understanding of characteristic properties of substances.
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 #7: Technology-Enhanced Item

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

Before the phase change, the substance is a [solid]. After the phase change, the substance is a [liquid]. As the phase change took place, the substance [melted].

Correct Answer for CBT Item #9: Technology-Enhanced Item

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

When a tuning fork is hit, it creates sound waves that carry [kinetic] energy.

If a tuning fork is hit and then placed in water, the sound waves from the tuning fork will [move the water].

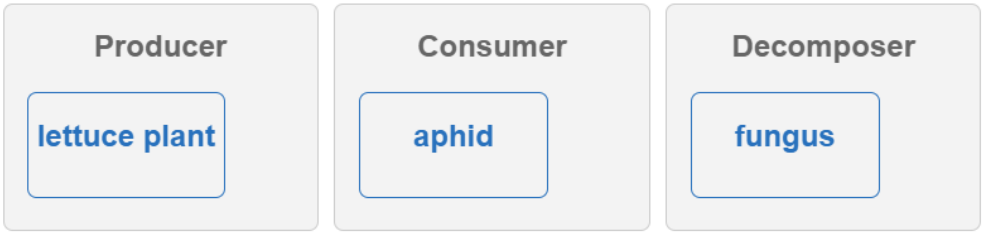
Correct Answer for CBT Item #10: Technology-Enhanced Item

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

Pea plants use energy from [sunlight] to [make their own food].

Correct Answer for CBT Item #11: Technology-Enhanced Item

Drag and drop **each** organism into the correct box.



Scoring Rubric for CBT Item #13: Constructed Response

Scoring Guide	
Score	**Description**
3	The response demonstrates a thorough understanding of the process by which plants use air, water, and energy from sunlight to produce sugars and plant materials needed for growth. The response correctly identifies the part of the pea and lettuce plants where most photosynthesis takes place and what both plants must take up through their roots to perform photosynthesis. The response also clearly explains why the student compared the data from boxes W and Y instead of the data from boxes W and Z to determine the effect of sunlight.
2	The response demonstrates a partial understanding of the process by which plants use air, water, and energy from sunlight to produce sugars and plant materials needed for growth.
1	The response demonstrates a minimal understanding of the process by which plants use air, water, and energy from sunlight to produce sugars and plant materials needed for growth.
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 #15: Constructed Response

Scoring Guide	
Score	**Description**
3	The response demonstrates a thorough understanding of using a model to describe the cycling of water. The response correctly identifies what the lamp represents in the model. The response clearly describes the part of the water cycle that is caused by the lamp shining on the water and clearly describes what happens to the water. The response correctly identifies the part of the water cycle that was represented by the droplets of water forming on the bottom of the lid under the ice pack and also clearly explains the reasoning.
2	The response demonstrates a partial understanding of using a model to describe the cycling of water.
1	The response demonstrates a minimal understanding of using a model to describe the cycling of water.
0	The response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.