



MASSACHUSETTS

Department of Elementary
and Secondary Education

*Release of Spring 2026
MCAS Test Items from the
Grade 5 Science and
Technology/Engineering
Paper-Based Test*

**Spring 2026
Massachusetts Department of
Elementary and Secondary Education**



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and Secondary Education

This document was prepared by the
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Overview of Grade 5 Science and Technology/Engineering Test

The spring 2026 grade 5 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 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.

This document displays released items from the paper-based test. Released items from the computer-based test are available on the MCAS Resource Center website at mcas.onlinehelp.cognia.org/released-items.

Test Sessions and Content Overview

The grade 5 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 5 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 5 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. The correct answers for released selected-response questions are also displayed in the released item table.

Reference Materials

Each student taking the grade 5 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. No other reference tools or materials were allowed.

Grade 5

Science and Technology/Engineering

SESSION 1

This session contains 13 questions.

Directions

Read each question carefully and then answer it as well as you can. You must record all answers in this Test & Answer Booklet.

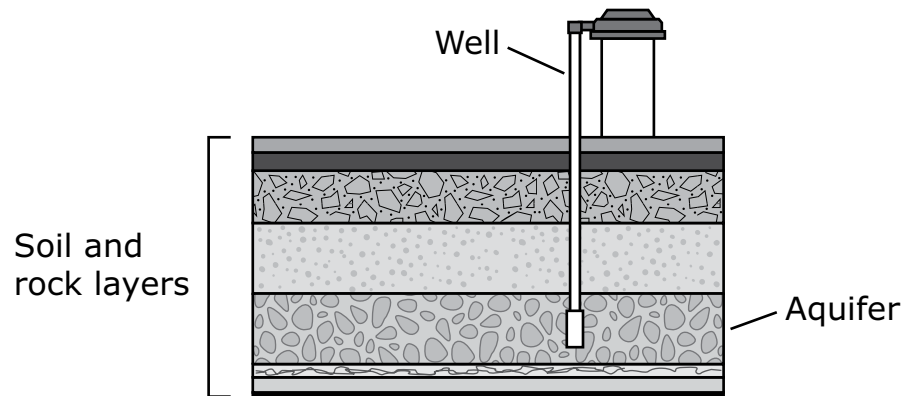
For some questions, you will mark your answers by filling in the circles in your Test & Answer Booklet. Make sure you darken the circles completely. Do not make any marks outside of the circles. If you need to change an answer, be sure to erase your first answer completely.

If a question asks you to show or explain your work, you must do so to receive full credit. Write your response in the space provided. Only responses written within the provided space will be scored.

1 Select the **two** descriptions of motion that provide the best evidence that Earth's gravity exists.

- Ⓐ Leaves drop from a tree.
- Ⓑ Raindrops fall from clouds.
- Ⓒ Smoke rises from a campfire.
- Ⓓ An airplane flies across the sky.

2 An aquifer is an underground layer of rock that holds drinkable water. Engineers are studying an aquifer that provides water to a well. The diagram shows the well, which was drilled deep into the ground to reach the aquifer.



The engineers found that the aquifer now has less water than before.

Which of the following questions would be **most** helpful for the engineers to answer when they investigate why the aquifer has less water than before?

- Ⓐ How have cloudy days affected the area over the last month?
- Ⓑ How much precipitation has fallen in the area over the last year?
- Ⓒ How much condensation has formed on the well over the last month?
- Ⓓ How has the water quality of nearby lakes changed over the last year?

- 3 A student studied the climates of different regions of the world. The student recorded average temperature and average precipitation data for two climate regions, as shown in the table.

Climate Region	Condition	Jan.	Mar.	May	July	Sept.	Nov.
X	Average Temperature (°F)	77	79	85	84	84	81
	Average Precipitation (in.)	4.9	2.0	3.9	8.3	9.8	7.8
Y	Average Temperature (°F)	-40	-20	8	18	6	-29
	Average Precipitation (in.)	0.0	0.0	0.4	1.2	0.8	0.4

Which of the following best describes climate region X?

- (A) arctic tundra
- (B) temperate forest
- (C) temperate grassland
- (D) tropical rainforest

Which of the following best describes climate region Y?

- (A) arctic tundra
- (B) temperate forest
- (C) temperate grassland
- (D) tropical rainforest

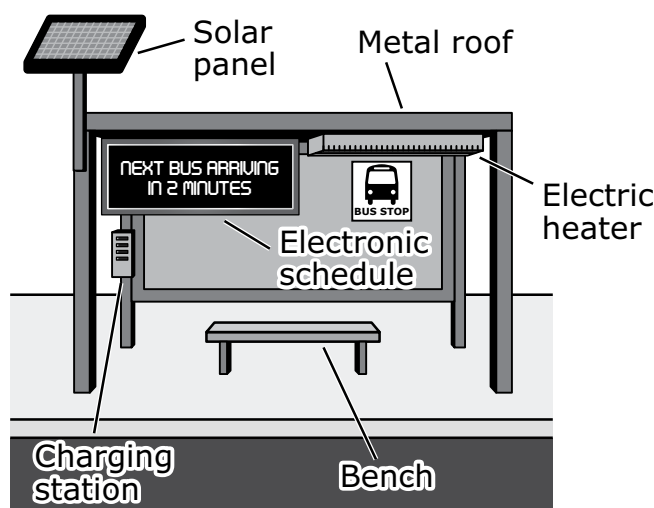
The following section focuses on bus stop design features.

Read the information below and use it to answer the three selected-response questions and one constructed-response question that follow.

The mayor of a city wants to make bus stops more convenient and comfortable so that more people will use the city buses. Currently, each bus stop only has a sign and a bus schedule that estimates when buses will arrive at the bus stop. The mayor plans to add several features to the city’s bus stops, as listed in the table.

Bus Stop Feature	How the Feature Improves Waiting	Cost to Buy and Set Up
electric heater	warms people in the winter	\$19,000
metal bench	people can sit down	\$500
shelter with metal roof and columns	protects people from the weather	\$2,200
solar panel	generates electricity for bus stop	\$5,000
solar-powered charging station	charges cell phones and electronic devices	\$5,000
solar-powered electronic schedule	shows in real time when buses will arrive	\$3,500

The diagram shows a bus stop with the features listed in the table.



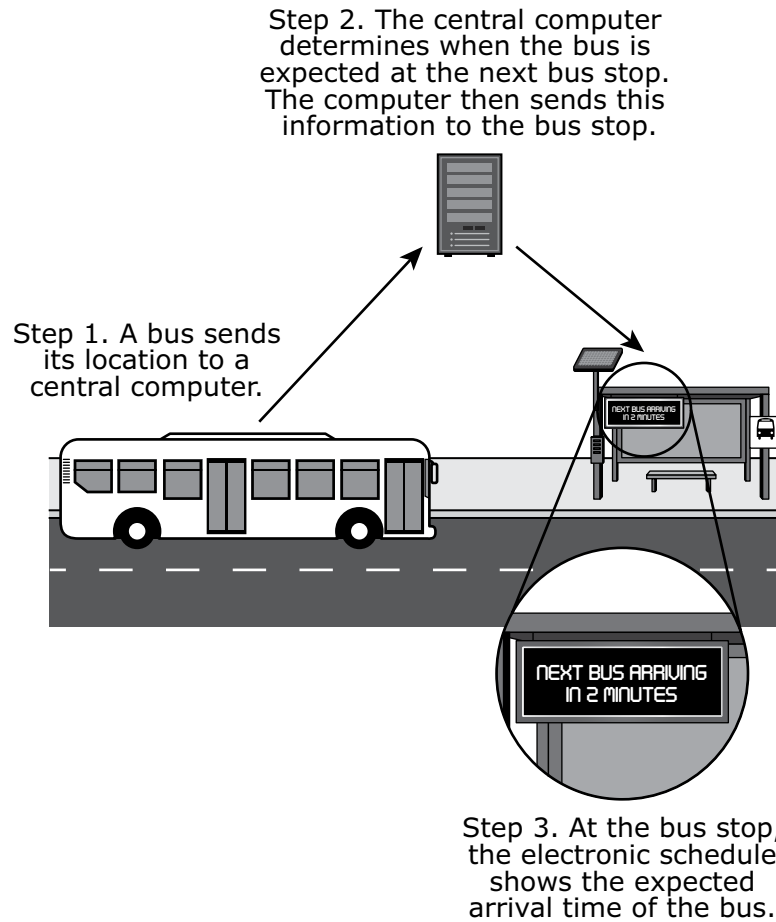
- 4 Some people want shelters that protect them from wind at the bus stops. City engineers decide to add two more walls to the shelter design. In addition to protecting people from wind, the material of the walls must be see-through and resist scratching and cracking. The table shows four materials, A, B, C, and D, and some of their properties.

Material	Color	Hardness	Strength
A	silver	medium	medium
B	light brown	low	medium
C	no color (clear)	low	high
D	no color (clear)	high	high

Based on the table, which material is the best choice for the walls of the shelters?

- Ⓐ material A
- Ⓑ material B
- Ⓒ material C
- Ⓓ material D

- 5 The electronic schedule will provide information in real time to people waiting for a bus. The diagram describes three steps used to update the electronic schedule at a bus stop.



In step 3, what happens to the information so that people can see the expected arrival time of the bus?

- (A) The electronic schedule sends stored information.
- (B) The electronic schedule encodes stored information.
- (C) The electronic schedule receives and decodes the information.
- (D) The electronic schedule receives and encodes the information.

- 6 The mayor conducted a survey asking the community about the different bus stop features. Part of the results from the survey are shown.

Question	Response	
	Yes	No
Is the plan for the bus stops too expensive?	75%	25%
Do you want a place to sit while waiting for the bus?	50%	50%
Is having a warm bus shelter in the winter important to you?	50%	50%
Do you want to be able to charge your phone while waiting for the bus?	70%	30%

Based on the survey results and the table of bus stop features, which of the following changes to the plan for the bus stops should the mayor make?

- Ⓐ Add more benches.
- Ⓑ Remove the heaters.
- Ⓒ Remove the charging stations.
- Ⓓ Add more electronic schedules.

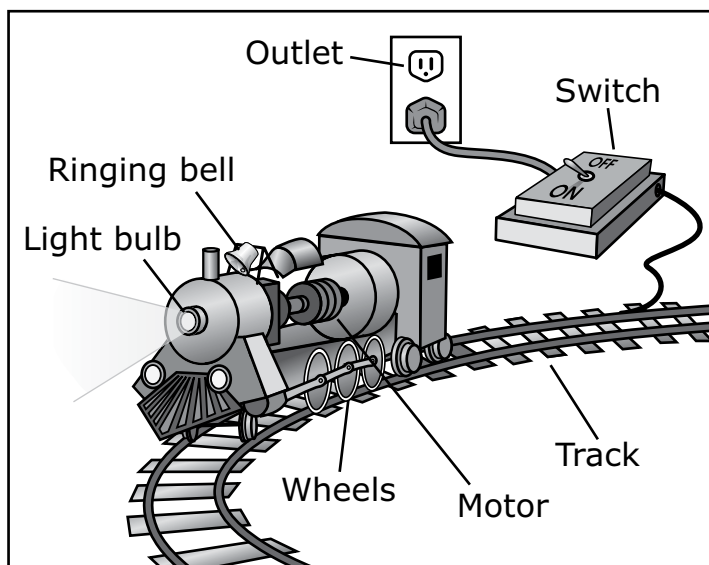
This question has two parts. Write your response on the next page. Be sure to label each part of your response.

- 7** City engineers built a prototype of the new bus stop with the features listed in the table.
 - A. Describe the main purpose of the prototype.
 - B. The bus stop prototype is installed and people begin to use it.

Based on the information, describe **two** criteria that the prototype must meet to be considered successful.

This question has three parts. Write your response on the next page. Be sure to label each part of your response.

- 8 A toy train set is shown in the diagram. The train set plugs into an outlet. While the switch is on, the light bulb gives off light, the bell rings, and the train moves on the track. Energy is converted from one form into another when the train set is on.



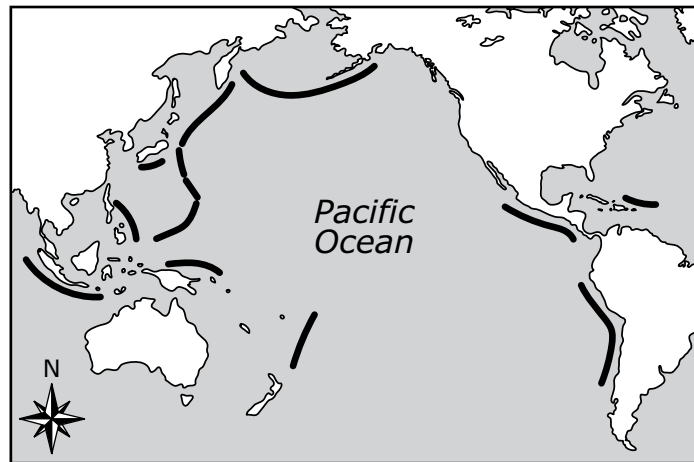
- A. Identify the type of energy that moves from the outlet to the switch.
- B. Describe **one** example of a type of energy being converted into a different type of energy in the train set. In your description, be sure to include
- the part of the train set where energy is being converted, and
 - the **two** types of energy involved.
- C. Describe **another** example of a type of energy being converted into a different type of energy in the train set. In your description, be sure to include
- the part of the train set where energy is being converted, and
 - the **two** types of energy involved.




- 9 A student pushed a book on two different surfaces, X and Y, with the same force and for the same amount of time. After the student pushed the book on surface X, the book traveled 40 cm. After the student pushed the book on surface Y, the book traveled 50 cm.

Which of the following best explains why the book traveled farther on surface Y?

- Ⓐ The book had more mass on surface X than on surface Y.
- Ⓑ The book experienced more friction on surface X than on surface Y.
- Ⓒ Surface X increased the force of gravity that acted on the book more than surface Y did.
- Ⓓ Surface X converted more kinetic energy of the book to stored energy than surface Y did.

- 10 Ocean trenches are long, narrow areas along the sea floor. Trenches are the deepest parts of the oceans. The shaded lines on the map show the locations of several ocean trenches.



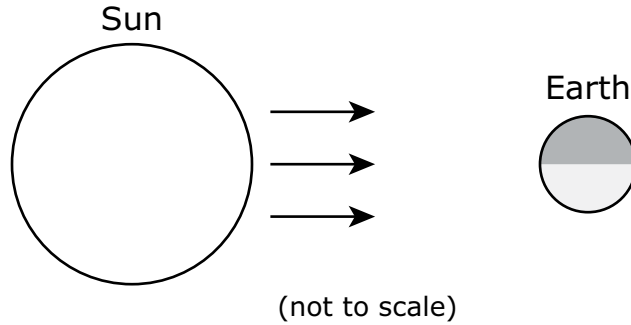
Key	
	Continent
	Ocean
	Ocean trench

Which of the following best describes ocean trenches?

- (A) Ocean trenches are found along plate boundaries.
- (B) Ocean trenches form a ring around all bodies of water.
- (C) Ocean trenches have warmer water than other parts of the ocean.
- (D) Ocean trenches have stronger waves than other parts of the ocean.

This question has two parts. Write your response on the next page. Be sure to label each part of your response.

- 11** A model of the Sun shining on Earth is shown. The shading represents the part of Earth experiencing night. The model contains an error.

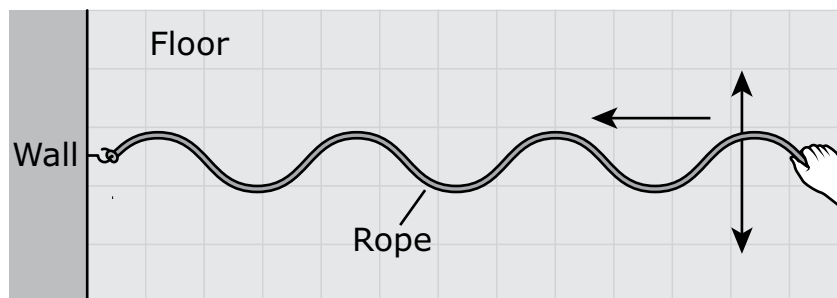


- A. Describe how to fix the error in the model to correctly show day and night on Earth.

- B. Explain what causes day and night to occur in a 24-hour period on Earth.

This question has two parts.

- 12 A student uses a rope to make a wave model. One end of the rope is attached to a wall. The student holds the rope by the other end and moves it from side to side, as shown.



Part A

Which of the following best describes how the wave is created?

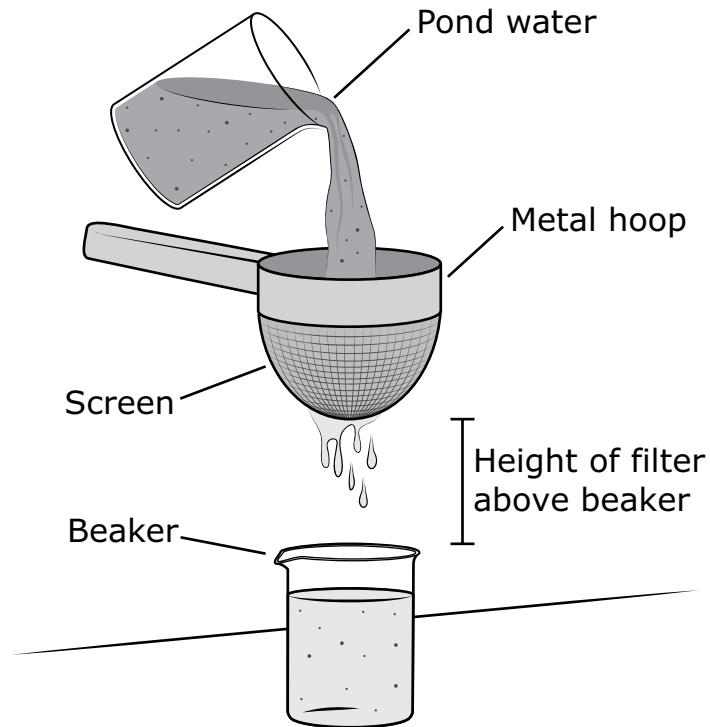
- Ⓐ The wave is created when energy is transferred from the rope to the student.
- Ⓑ The wave is created when energy is transferred from the student to the rope.
- Ⓒ The wave is created when matter is transferred from the rope to the student.
- Ⓓ The wave is created when matter is transferred from the student to the rope.

Part B

In which way is the wave model most like a sound wave?

- Ⓐ The rope has a regular pattern of motion.
- Ⓑ The rope has the most motion near the wall.
- Ⓒ The rope is transferring heat in all directions.
- Ⓓ The rope is transferring matter in all directions.

- 13 Students in a science class built a prototype of a water filter. The prototype was made using a screen and a metal hoop. The students tested the prototype by filtering pond water into a beaker, as shown.



After being filtered, the water in the beaker still had particulates in it. Which of the following changes would most likely improve the water filter?

- Ⓐ Decrease the size of the metal hoop.
- Ⓑ Add a layer of paper towels over the screen.
- Ⓒ Increase the height of the filter above the beaker.
- Ⓓ Decrease the volume of water poured through the screen.

Grade 5

Science and Technology/Engineering

SESSION 2

This session contains 7 questions.

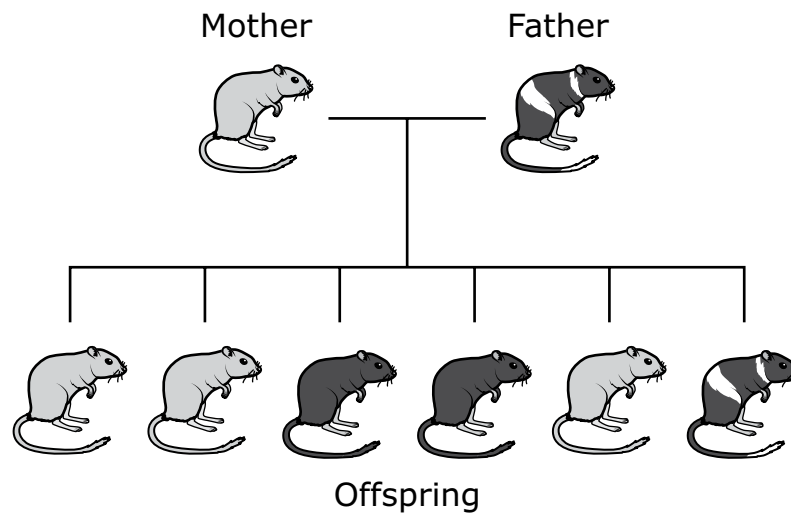
Directions

Read each question carefully and then answer it as well as you can. You must record all answers in this Test & Answer Booklet.

For some questions, you will mark your answers by filling in the circles in your Test & Answer Booklet. Make sure you darken the circles completely. Do not make any marks outside of the circles. If you need to change an answer, be sure to erase your first answer completely.

If a question asks you to show or explain your work, you must do so to receive full credit. Write your response in the space provided. Only responses written within the provided space will be scored.

- 14 The diagram shows two parent gerbils and their offspring.

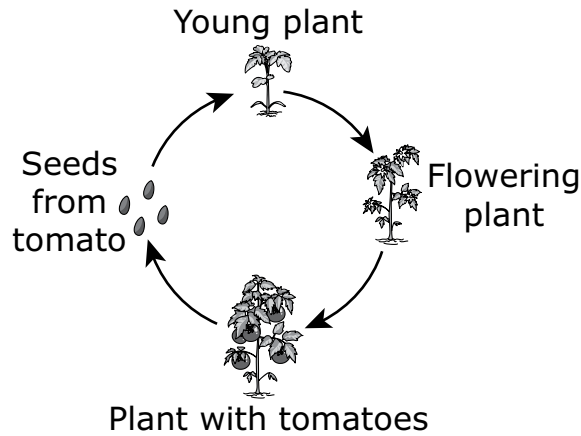


Which of the following scientific questions does the diagram help to answer?

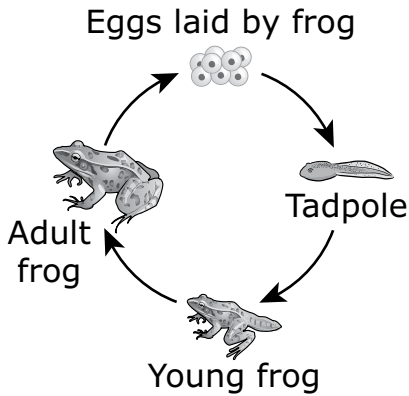
- Ⓐ Can the size of gerbil offspring change over time?
- Ⓑ How can gerbil parents produce more than two gerbil offspring?
- Ⓒ Which fur color can help the gerbil offspring camouflage with their environment?
- Ⓓ What fur color traits can be passed from the gerbil parents to the gerbil offspring?

- 15 The diagrams show the life cycle of a tomato plant and the life cycle of a frog.

Life Cycle of a Tomato Plant



Life Cycle of a Frog



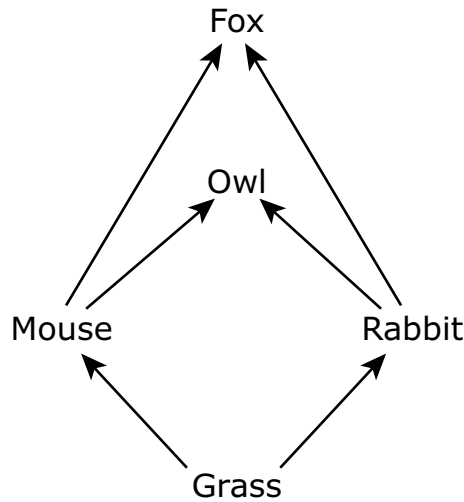
Which of the following best compares these life cycles?

- Ⓐ The flowering plant and the tadpole are at the same life stage.
- Ⓑ The plant with tomatoes and the young frog can both reproduce.
- Ⓒ The tomato plant and the frog both live for a similar amount of time.
- Ⓓ The tomato seeds and the frog eggs are structures that develop into new organisms.

- 16** Scientists found whale fossils in a desert in South America. Which of the following explains why whale fossils were found in a desert that is located many miles from the ocean?
- Ⓐ A large storm carried the whale fossils to the area.
 - Ⓑ Some whale species adapted to living out of the water.
 - Ⓒ All whale species lived on land at the time these whales died.
 - Ⓓ The area where the whale fossils were located was once an ocean.
- 17** Which of the following best explains why the Sun appears brighter than other stars when viewed from Earth?
- Ⓐ The Sun is older than other stars.
 - Ⓑ The Sun is closer to Earth than other stars.
 - Ⓒ The Sun has a larger mass than other stars.
 - Ⓓ The Sun has a higher temperature than other stars.

This question has two parts.

18 Part of a food web for an ecosystem is shown.



Part A

Which of the following describes one way energy flows through the food web?

- Ⓐ Energy originally from the Sun is first used by the fox, then passed to the rabbit, and then to the grass.
- Ⓑ Energy originally from the fox is first used by the grass, then passed to the mouse, and then to the owl.
- Ⓒ Energy originally from the Sun is first used by the grass, then passed to the mouse, and then to the fox.
- Ⓓ Energy originally from the owl is first used by the rabbit, then passed to the grass, and then to the mouse.

Part B

Which of the following best describes how consumers in this ecosystem use energy?

- Ⓐ to grow and reproduce
- Ⓑ to grow and produce more water
- Ⓒ to produce more food and reproduce
- Ⓓ to produce more food and more water

- 19 Many birds migrate long distances to warm climates for the winter months and return to their spring and summer habitats to reproduce. In recent years, warm spring weather has started earlier than in past years. Scientists have observed that birds are now returning to their spring and summer habitats earlier.

Which of the following factors **most likely** contributes to this change in the birds' migration?

- Ⓐ the availability of the birds' food in the spring
- Ⓑ the distance that birds can travel in a single day
- Ⓒ the time that scientists spend observing bird species
- Ⓓ the amount of precipitation in the birds' winter habitat

- 20 A student is using a bean plant to investigate how the amount of light changes the rate at which a plant makes sugar. The student will cover a plant structure on the bean plant with black paper and tape.

Covering which plant structure will most **slow** the rate at which the plant makes sugar?

- Ⓐ flowers
- Ⓑ leaves
- Ⓒ seeds
- Ⓓ stems

Grade 5 Science and Technology/Engineering Spring 2026 Released Operational Items

PBT Item No.	Page No.	Reporting Category	Standard	Science and Engineering Practice Category	Item Type*	Item Description	Correct Answer**
1	4	<i>Physical Science</i>	5.PS.2.1	None	SR	Determine which scenarios provide evidence that Earth exerts a gravitational force on objects.	A,B
2	4	<i>Earth and Space Science</i>	5.ESS.2.1	A. Investigations and Questioning	SR	Determine which question would be most helpful when investigating a change in the amount of groundwater.	B
3	5	<i>Earth and Space Science</i>	3.ESS.2.2	B. Mathematics and Data	SR	Interpret climate data to classify different climate regions.	D;A
4	7	<i>Technology/Engineering</i>	3.ETS.1.2	B. Mathematics and Data	SR	Using information about material properties, determine which material best meets the given criteria.	D
5	8	<i>Technology/Engineering</i>	4.PS.4.3	C. Evidence, Reasoning, and Modeling	SR	Evaluate a model to determine that information is received and decoded at one step in a process.	C
6	9	<i>Technology/Engineering</i>	3.ETS.1.1	B. Mathematics and Data	SR	Analyze survey results to better define a design problem.	B
7	10–11	<i>Technology/Engineering</i>	4.ETS.1.5	A. Investigations and Questioning	CR	Describe the main purpose of a prototype and use information about a design problem to describe two criteria the prototype must meet.	
8	12–13	<i>Physical Science</i>	4.PS.3.2	C. Evidence, Reasoning, and Modeling	CR	Use information from a model to identify a type of energy in a system and describe two types of energy conversions in the system.	
9	14	<i>Physical Science</i>	3.PS.2.1	None	SR	Explain how friction affects the distance that an object moves.	B
10	15	<i>Earth and Space Science</i>	4.ESS.2.2	C. Evidence, Reasoning, and Modeling	SR	Describe the pattern of ocean trench locations shown on a map.	A
11	16–17	<i>Earth and Space Science</i>	5.ESS.1.2	C. Evidence, Reasoning, and Modeling	CR	Describe how to fix the error in a model showing day and night on Earth and explain the cause of day and night.	
12	18	<i>Physical Science</i>	4.PS.4.1	C. Evidence, Reasoning, and Modeling	SR	Describe the transfer of energy and regular pattern of motion that occurs as a wave travels.	B;A
13	19	<i>Earth and Space Science</i>	5.ESS.3.2	A. Investigations and Questioning	SR	Describe a change to improve a water filter design.	B
14	21	<i>Life Science</i>	3.LS.3.1	A. Investigations and Questioning	SR	Determine which scientific question can be answered by interpreting a model showing certain traits of parents and their offspring.	D
15	22	<i>Life Science</i>	3.LS.1.1	C. Evidence, Reasoning, and Modeling	SR	Compare life cycle models of a plant and an animal to describe a common characteristic.	D

PBT Item No.	Page No.	Reporting Category	Standard	Science and Engineering Practice Category	Item Type*	Item Description	Correct Answer**
16	23	<i>Life Science</i>	3.LS.4.1	C. Evidence, Reasoning, and Modeling	SR	Explain why a fossil of a marine organism may be found in a desert.	D
17	23	<i>Earth and Space Science</i>	5.ESS.1.1	None	SR	Explain why the Sun appears brighter than other stars.	B
18	24	<i>Life Science</i>	5.PS.3.1	C. Evidence, Reasoning, and Modeling	SR	Describe one way energy moves through a food web and describe how consumers use this energy.	C;A
19	25	<i>Life Science</i>	3.LS.4.4	None	SR	Describe an environmental condition that leads to a change in an animal's behavior.	A
20	25	<i>Life Science</i>	5.LS.1.1	A. Investigations and Questioning	SR	Determine the next step in an investigation about the plant structures in which photosynthesis takes place.	B

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

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

Grade 5 Science and Technology/Engineering Spring 2026 Unreleased Operational Items

PBT Item No.	Reporting Category	Standard	Science and Engineering Practice Category	Item Type*	Item Description
21	<i>Physical Science</i>	4.PS.4.2	C. Evidence, Reasoning, and Modeling	SR	Use a model to describe how light travels so that an object can be seen by the eye.
22	<i>Earth and Space Science</i>	4.ESS.2.1	C. Evidence, Reasoning, and Modeling	SR	Describe how tree root wedging affects a rock.
23	<i>Life Science</i>	5.LS.2.1	C. Evidence, Reasoning, and Modeling	SR	Complete a model to classify organisms as producers, consumers, and decomposers.
24	<i>Life Science</i>	3.LS.1.1	C. Evidence, Reasoning, and Modeling	SR	Determine which stage in a plant's life cycle is most similar to a hatching egg in a bird's life cycle.
25	<i>Life Science</i>	4.LS.1.1	C. Evidence, Reasoning, and Modeling	SR	Determine which two characteristics of a bird's beak are most important for helping it to eat food.
26	<i>Life Science</i>	5.PS.3.1	C. Evidence, Reasoning, and Modeling	CR	Complete a model to show how energy moves through an ecosystem, explain one reason why a plant needs energy, and describe what would most likely happen to the size of an animal population in the ecosystem when an area of plants is removed.
27	<i>Life Science</i>	5.LS.2.2	None	SR	Describe the effect of adding more bacteria to a composter.
28	<i>Technology/Engineering</i>	3.ETS.1.4	None	SR	Determine the representation of a design solution that would best help choose the design.
29	<i>Earth and Space Science</i>	5.ESS.2.2	B. Mathematics and Data	SR	Interpret a circle graph to make conclusions about the relative amounts of salt water and fresh water in different water sources.
30	<i>Technology/Engineering</i>	3.ETS.1.1	A. Investigations and Questioning	SR	Define a design problem that a student was most likely trying to solve by changing the design of a toy car.
31	<i>Physical Science</i>	4.PS.3.4	C. Evidence, Reasoning, and Modeling	SR	Use data from an investigation to explain what happens when additional batteries are added to a circuit.
32	<i>Technology/Engineering</i>	3.ESS.3.1	B. Mathematics and Data	SR	Using information from a table, explain why one type of material is a better choice to reduce the damage caused by weather.
33	<i>Technology/Engineering</i>	4.PS.4.3	C. Evidence, Reasoning, and Modeling	SR	Identify the step in the transfer of information that is modeled in diagrams.
34	<i>Technology/Engineering</i>	3.ETS.1.4	C. Evidence, Reasoning, and Modeling	SR	Compare different representations of a design to determine the benefits and drawbacks of using the representations in certain situations.
35	<i>Physical Science</i>	4.PS.3.1	B. Mathematics and Data	SR	Use information in a table to order a car's kinetic energy during a trip from least to greatest.
36	<i>Physical Science</i>	3.PS.2.4	C. Evidence, Reasoning, and Modeling	CR	Identify which diagrams show how magnets could be placed to keep a box closed and explain the reasoning.
37	<i>Physical Science</i>	5.PS.1.4	C. Evidence, Reasoning, and Modeling	SR	Identify evidence of a chemical reaction in an investigation.
38	<i>Earth and Space Science</i>	5.ESS.3.1	None	CR	Describe several different ways a school community could help the environment.
39	<i>Earth and Space Science</i>	4.ESS.1.1	None	SR	Determine that weathering and erosion played a role in the formation of a landscape.

PBT Item No.	Reporting Category	Standard	Science and Engineering Practice Category	Item Type*	Item Description
40	<i>Physical Science</i>	5.PS.1.1	C. Evidence, Reasoning, and Modeling	SR	Describe how wax in a candle changed states of matter from when it was lit to after it was blown out.
41	<i>Earth and Space Science</i>	4.ESS.3.1	None	SR	Identify evidence to support a claim that river water is a renewable source of energy.

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