SCIENCE

DESCRIPTION OF TEST FORMAT AND ORGANIZATION

The Georgia Milestones Science EOG assessment is primarily a criterion-referenced test, designed to provide information about how well a student has mastered the grade-level state-adopted content standards in Science. Each student will receive one of four Achievement Level designations, depending on how well the student has mastered the content standards. The four Achievement Level designations are Beginning Learner, Developing Learner, Proficient Learner, and Distinguished Learner. In addition to criterion-referenced information, the Georgia Milestones measures will also include a limited sample of nationally norm-referenced items to provide a signal of how Georgia students are achieving relative to their peers nationally. The norm-referenced information provided is supplementary to the criterion-referenced Achievement Level designation and will not be utilized in any manner other than to serve as a barometer of national comparison. Only the criterion-referenced scores and Achievement Level designations will be utilized in the accountability metrics associated with the assessment program (such as student growth measures, educator-effectiveness measures, or the CCRPI).

The Grade 5 Science EOG assessment consists of both operational items (contribute to a student's criterion-referenced and/or norm-referenced score) and field test items (newly written items that are being tried out and do not contribute to the student's score). A subset of the norm-referenced operational items have been verified as aligned to the course content standards by Georgia educators and will also contribute to the criterion-referenced score and Achievement Level designation. The other norm-referenced items will contribute only to the national percentile rank, which is provided as supplemental information.

With the inclusion of the norm-referenced items, students may encounter items for which they have not received direct instruction. These items will not contribute to the students' criterion-referenced Achievement Level designation; only items that align to the course content standards will contribute to the criterion-referenced score. Students should be instructed to try their best should they ask about an item that is not aligned to the content they have learned as part of the course.

The table on the following page outlines the number and types of items included on the Grade 5 Science EOG assessment.

Grade 5 Science EOG Assessment Design

Description	Number of Items	Points for CR[1] Score	Points for NRT[2] Feedback
CR Selected-Response Items	43	43	0
NRT Selected-Response Items	20[3]	9[4]	20
CR Technology-Enhanced Items	4	8	0
CR Field Test Items	9	0	0
Total Items/Points[5]	**76**	**60**	**20**

[1]CR—Criterion-Referenced: items aligned to state-adopted content standards
[2]NRT—Norm-Referenced Test: items that will yield a national comparison; may or may not be aligned to state-adopted content standards
[3]Of these items, 9 will contribute to both the CR scores and NRT feedback. The other 11 of these items will contribute to NRT feedback only and will not impact the student's Achievement Level designation, scale score, or grade conversion.
[4]Alignment of national NRT items to course content standards was verified by a committee of Georgia educators. Only approved, aligned NRT items will contribute to a student's CR Achievement Level designation, scale score, and grade conversion score.
[5]Of the 76 total items, 56 items contribute to the CR score, for a total of 60 points; 20 total items contribute to NRT feedback, for a total of 20 points.

The test will be given in two sections. Students may have up to 70 minutes per section to complete Sections 1 and 2. The total estimated testing time for the Grade 5 Science EOG assessment ranges from approximately 90 to 140 minutes. Total testing time describes the amount of time students have to complete the assessment. It does not take into account the time required for the test examiner to complete pre-administration and post-administration activities (such as reading the standardized directions to students). Sections 1 and 2 must be scheduled such that both will be completed in a single day or over the course of two consecutive days (one section each day) and should be completed within the same week following the district's testing protocols for the EOG measures (in keeping with state guidance).

CONTENT MEASURED

The Grade 5 Science assessment will measure the Grade 5 standards that are described at www.georgiastandards.org.

The content of the assessment is organized into three groupings, or domains, of standards for the purposes of providing feedback on student performance. A content domain is a reporting category that *broadly* describes and defines the content of the course, as measured by the EOG assessment. The standards for Grade 5 Science are grouped into three domains: Earth Science, Physical Science, and Life Science. Each domain was created by organizing standards that share similar content characteristics. The content standards describe the level of expertise that Grade 5 Science educators should strive to develop in their students. Educators should refer to the content standards for a full understanding of the knowledge, concepts, and skills subject to be assessed on the EOG assessment.

The approximate proportional number of points associated with each domain is shown in the following table. A range of cognitive levels will be represented on the Grade 5 Science EOG assessment. Educators should always use the content standards when planning instruction.

GRADE 5 SCIENCE: DOMAIN STRUCTURES AND CONTENT WEIGHTS

Reporting Category	Standards Assessed	Approximate Percentage of Test	Approximate Number of Points
Earth Science	S5E1	23%	14
Physical Science	S5P1 S5P2 S5P3	35%	21
Life Science	S5L1 S5L2 S5L3 S5L4	42%	25

ITEM TYPES

Operational items in the Science portion of the Grade 5 EOG assessment consist of selected-response and technology-enhanced items.

A selected-response item, sometimes called a multiple-choice item, is defined as a question, problem, or statement that appears on a test followed by several answer choices, sometimes called options or response choices. The incorrect choices, called distractors, usually reflect common errors. The student's task is to choose, from the alternatives provided, the best answer to the question posed in the stem (the question). The Science selected-response items will have four answer choices.

A technology-enhanced item is an innovative way to measure student skills and knowledge using scaffolding within a multi-step response. For Science multiple-select items, the student is asked to pick two correct responses from five or six possible answer options. In multiple-part items, the student responds to a two-part item that combines two multiple-choice items. For these item types, the student selects the responses from the choices provided and receives two points for selecting all correct answers or partial credit for specific combinations of correct responses.

SCIENCE DEPTH OF KNOWLEDGE EXAMPLE ITEMS

Example items that represent the applicable DOK levels across various Grade 5 Science content domains are provided.

All example and sample items contained in this guide are the property of the Georgia Department of Education.

Example Item 1

Selected-Response: 1 point

DOK Level: 1

Science Grade 5 Content Domain: Physical Science

Standard: S5P2. Obtain, evaluate, and communicate information to investigate electricity.
b. Design a complete, simple electric circuit, and explain all necessary components.

A student wants to design a complete, simple circuit for a class project. The student has more materials available than are needed for the project.

What does a complete, simple circuit require to work?

A. wire and a switch
B. wire and a light bulb
C. wire, a battery, and a switch
D. wire, a battery, and a light bulb

Correct Answer: D

Explanation of Correct Answer: The correct answer is choice (D) wire, a battery, and a light bulb. The necessary components of a simple electric circuit are a source of power, a path for the current, and something to provide power. Choice (A) is incorrect because a switch is not needed, but a power source is a necessary component. Choice (B) is incorrect because a power source is a necessary component. Choice (C) is incorrect because a switch is not a necessary component.

Example Item 2

Selected-Response: 1 point

DOK Level: 2

Science Grade 5 Content Domain: Earth Science

Standard: S5E1. Obtain, evaluate, and communicate information to identify surface features on the Earth caused by constructive and/or destructive processes.

b. Develop simple interactive models to collect data that illustrate how changes in surface features are/were caused by constructive and/or destructive processes.

Deposition of sediments can change the depth of a lake over time. A student wants to make a model that shows how this process takes place.

Which model would provide data about changes in the depth of a lake caused by deposition?

A. Fill a beaker with water. Slowly allow the water to evaporate from the beaker. Measure the change in the depth of the water.

B. Fill a beaker with water. Slowly drop sand, gravel, and dead plant material into the beaker. Measure the change in the depth of the water.

C. Fill a plastic box with water. Put a hose in the water on one end of the box and turn the water on to a slow flow. Measure the depth of the water when the box is full.

D. Fill a plastic box with sand, gravel, and dead plant material. Put a hose in the middle of the box and turn the water on to a slow flow. Measure the depth of the water when the box is full.

Correct Answer: B

Explanation of Correct Answer: The correct answer is choice (B) Fill a beaker with water. Slowly drop sand, gravel, and dead plant material into the beaker. Measure the change in the depth of the water. Choice (A) is incorrect because there are no sediments being added to the water; the change in water level is due to evaporation. Choice (C) is incorrect because this would demonstrate increased water from runoff, not deposition. Choice (D) is incorrect because this would demonstrate increased rainfall and erosion as the sediments are redistributed by the water flow.

Example Item 3

Selected-Response: 1 point

DOK Level: 2

Science Grade 5 Content Domain: Life Science

Standard: S5L2. Obtain, evaluate, and communicate information showing that some characteristics of organisms are inherited and other characteristics are acquired.

b. Ask questions to compare and contrast inherited and acquired physical traits.

The eastern box turtle lives in Georgia. The list shows some characteristics of the eastern box turtle.

Characteristics of an Eastern Box Turtle

- **can live 50 years or more**
- **will hide in its shell when frightened**
- **has a dark shell with many yellow or orange spots**
- **eats mushrooms, berries, fruits, worms, and insects**

Which question can be asked to find out which characteristic is a learned behavior?

A. Do all eastern box turtles like the same food?
B. Do eastern box turtles in other states live for 50 years?
C. Do eastern box turtles in other states have the same color of spots?
D. Do all eastern box turtles hide in their shells when they are frightened?

Correct Answer: A

Explanation of Correct Answer: The correct answer is choice (A) Do all eastern box turtles like the same food? Choice (B) is incorrect because length of lifespan is not a learned behavior. Choice (C) is incorrect because physical characteristics are not learned behaviors. Choice (D) is incorrect because this is an instinctive behavior.

Example Item 4

Selected-Response: 1 point

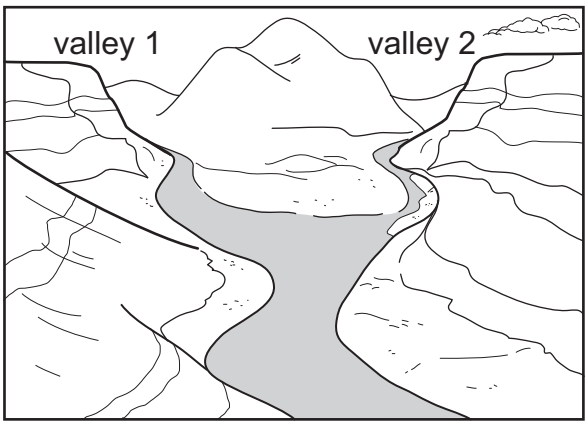
DOK Level: 3

Science Grade 5 Content Domain: Earth Science

Standard: S5E1. Obtain, evaluate, and communicate information to identify surface features on the Earth caused by constructive and/or destructive processes.

a. Construct an argument supported by scientific evidence to identify surface features (examples could include deltas, sand dunes, mountains, volcanoes) as being caused by constructive and/or destructive processes (examples could include deposition, weathering, erosion, and impact of organisms).

The picture shows two steep valleys and two rivers that join together and become one larger river in a wider valley.



A student claims that both valleys have been formed by the same process over a long period of time.

Which argument BEST explains why the student's claim is correct or incorrect?

A. The student's claim is correct; the evidence in the picture shows that both valleys were formed by the constructive force of deposition because flowing water carries large rocks from far away and drops them along a river, making the banks taller.

B. The student's claim is correct; the evidence in the picture shows that both valleys were formed by the destructive forces of weathering and erosion because flowing water breaks down rock and carries the small pieces downstream.

C. The student's claim is not correct; the evidence in the picture shows that valley 1 was formed by the destructive forces of weathering and erosion because flowing water breaks down rock and carries the small pieces downstream, but valley 2 was formed by the constructive force of deposition because flowing water carries large rocks from far away and drops them along a river, making the banks taller.

D. The student's claim is not correct; the evidence in the picture shows that valley 1 was formed by the constructive force of deposition because flowing water carries large rocks from far away and drops them along a river, making the banks taller, but valley 2 was formed by the destructive forces of weathering and erosion because flowing water breaks down rock and carries the small pieces downstream.

Correct Answer: B

Explanation of Correct Answer: The correct answer is choice (B) The student's claim is correct; the evidence in the picture shows that both valleys were formed by the destructive forces of weathering and erosion because flowing water breaks down rock and carries the small pieces downstream. Choice (A) is incorrect because water depositing rocks in the river did not form the valleys. Choice (C) is incorrect because the student's claim is correct, and the same evidence of weathering and erosion is found in both valleys. Choice (D) is incorrect because the student's claim is correct, and the same evidence of weathering and erosion is found in both valleys.

Example Item 5

Selected-Response: 1 point

DOK Level: 3

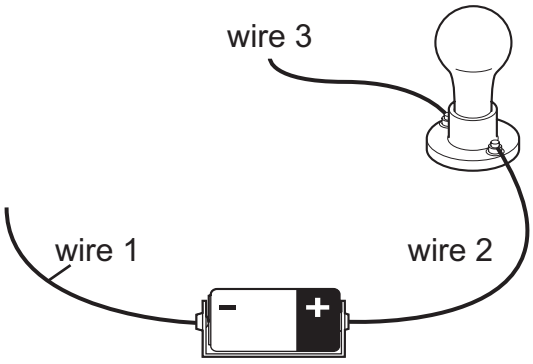
Science Grade 5 Content Domain: Physical Science

Standard: S5P2. Obtain, evaluate, and communicate information to investigate electricity.
c. Plan and carry out investigations on common materials to determine if they are insulators or conductors of electricity.

A student wants to test some materials to find out whether they conduct electricity or insulate electricity. The student uses the following steps to get started.

step 1: Attach wire 1 to the negative end of a battery.
step 2: Attach wire 2 to the positive end of the battery.
step 3: Attach the open end of wire 2 to a light bulb.
step 4: Attach wire 3 to the light bulb.
step 5: ?
step 6: ?

The diagram shows the result of steps 1 through 4.



(Answer the question on the next page.)

The student has a variety of materials to test. Which steps would BEST complete the procedure and which conclusion should the student make?

A. **step 5:** Connect a test material to the open ends of wire 1 and wire 3.
step 6: Make observations, and repeat step 5 with a different test material.
conclusion: If the bulb lights up, the material is a conductor. If the bulb does not light up, the material is an insulator.

B. **step 5:** Connect a test material to the open ends of wire 1 and wire 3.
step 6: Make observations, and repeat step 5 with a different test material.
conclusion: If the bulb lights up, the material is an insulator. If the bulb does not light up, the material is a conductor.

C. **step 5:** Connect the open ends of wire 1 and wire 3 to each other to complete the circuit.
step 6: Touch a test material to the completed circuit, and record observations.
conclusion: If the bulb lights up, the material is an insulator. If the bulb does not light up, the material is a conductor.

D. **step 5:** Connect the open ends of wire 1 and wire 3 to each other to complete the circuit.
step 6: Touch a test material to the completed circuit, and record observations.
conclusion: If the bulb lights up, the material is a conductor. If the bulb does not light up, the material is an insulator.

Correct Answer: A

Explanation of Correct Answer: The correct answer is choice (A)
step 5: Connect a test material to the open ends of wire 1 and wire 3.
step 6: Make observations, and repeat step 5 with a different test material.
conclusion: If the bulb lights up, the material is a conductor. If the bulb does not light up, the material is an insulator.
Choice (B) is incorrect because the student has reversed the definition of insulator and conductor.
Choice (C) is incorrect because the circuit is already complete without the test material; this is not an effective way to test each material. Also, the student has reversed the definition of insulator and conductor. Choice (D) is incorrect because the circuit is already complete without the test material; this is not an effective way to test each material.

SCIENCE ADDITIONAL SAMPLE ITEMS

This section has two parts. The first part is a set of 14 sample items for the Science portion of the EOG assessment. The second part contains a table that shows for each item the standard assessed, the DOK level, the correct answer (key), and a rationale/explanation about the key and distractors. The sample items can be utilized as a mini-test to familiarize students with the item formats found on the assessment.

All example and sample items contained in this guide are the property of the Georgia Department of Education.

Item 1

Selected-Response: 1 point

Two students listed some traits of their favorite football player.

Traits of a Football Player

- **is the youngest of four children**
- **has brown hair and brown eyes**
- **is taller than the other teammates**
- **is good at throwing and catching a football**

Which question would help the student determine which trait on the list is an acquired physical trait of the football player?

A. How tall is the football player?
B. Does the football player have any siblings?
C. Why does the football player have brown eyes and hair?
D. Has the football player always been good at catching a football?

Item 2

Selected-Response: 1 point

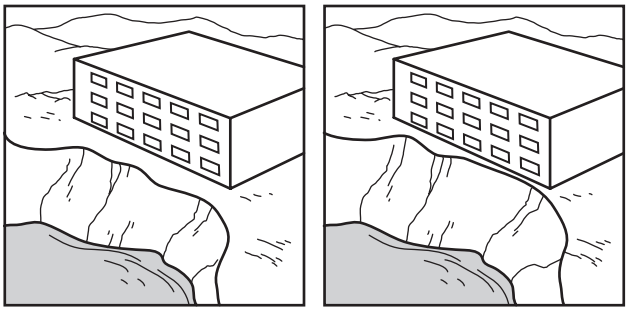
Which investigation would provide evidence of a chemical change?

A. Spray perfume into the air, and when the air and perfume mix, observe the change in odor that happens as they mix.
B. Put an antacid tablet in water, and when the antacid and water mix, observe the bubbles that form as a new substance is created.
C. Heat water in a pan on a stove, and observe the steam that forms as the state of matter of the water changes.
D. Blow air through a wand filled with soap solution, and observe the bubbles that form as the air becomes trapped.

Item 3

Selected-Response: 1 point

Some people who live in coastal areas along cliffs are using drones to take pictures of their neighborhoods. A drone is a flying vehicle without a pilot on board. The two pictures show changes in the cliff near a building on two days in December.



Which question can be studied by using a drone to observe recent changes in Earth's surface along coastal areas?

A. How fast are the cliffs eroding?
B. How many people live near cliffs?
C. How old are rock layers at the bottom of the cliff?
D. How can people stop the erosion of cliffs near the coast?

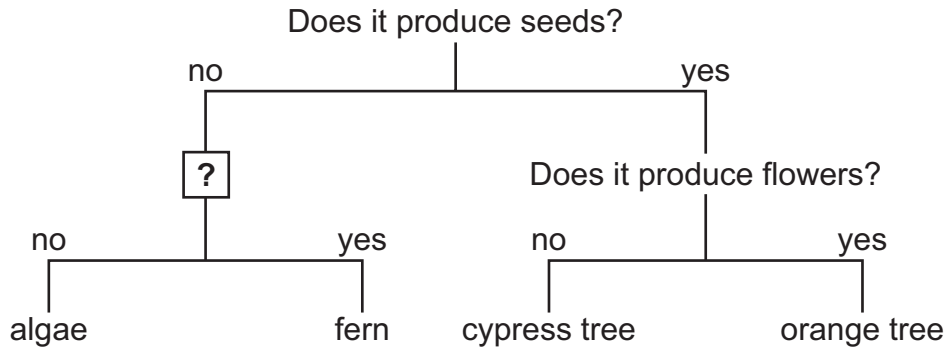
Item 4

Selected-Response: 1 point

A student makes a model to sort plants using the information in the table.

Plant	Characteristics
algae	• **does not produce seeds** • **has no roots, stems, or leaves**
fern	• **does not produce seeds** • **has roots, stems, and leaves**
cypress tree	• **produces seeds from cones** • **has roots, stems, and leaves**
orange tree	• **produces seeds from flowers** • **has roots, stems, and leaves**

The student's model is not complete.



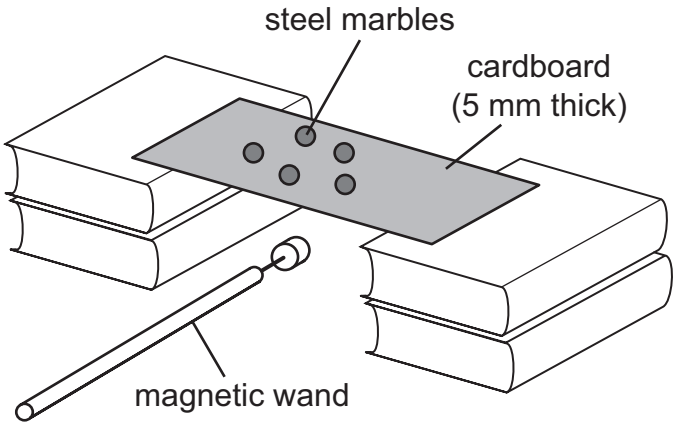
Which question should the student put in the box with a question mark to correctly complete the model?

A. Does it produce cones?
B. Does it grow into a tree?
C. Does it produce flowers?
D. Does it have roots, stems, or leaves?

Item 5

Selected-Response: 1 point

A student creates the setup and procedure shown below to investigate the interaction between a magnetic wand and steel marbles through a piece of cardboard that is 5 millimeters (mm) thick. A magnetic wand is a wooden stick with a small magnet attached to the end.



The student uses the following step to get started.

step 1: Slowly move the magnetic wand to different locations under the cardboard to see whether the marbles move with the wand.

The student has additional materials available to use during the investigation.

- **piece of cardboard (10 mm thick)**
- **piece of iron (5 mm thick)**
- **piece of plastic (5 mm thick)**

Which procedure would BEST demonstrate whether different materials affect the magnetic field of a magnetic wand and which result should the student expect?

A. **step 2:** Replace the 5-mm-thick cardboard with the 10-mm-thick cardboard and repeat step 1.
result: The marbles will follow the magnetic wand on the thin and the thick cardboard because the magnetic field will pass through the cardboard.

B. **step 2:** Replace the 5-mm-thick cardboard with the 10-mm-thick cardboard and repeat step 1.
result: The marbles will follow the magnetic wand on the thinner cardboard because the magnetic field passes through thin materials, but the magnetic field will not pass through the thicker material.

C. **step 2:** Replace the 5-mm-thick cardboard with the 5-mm-thick iron, and repeat step 1.
step 3: Replace the 5-mm-thick iron with the 5-mm-thick plastic, and repeat step 1.
result: The marbles will follow the magnetic wand on all of the materials because the magnetic field passes through nonmagnetic materials.

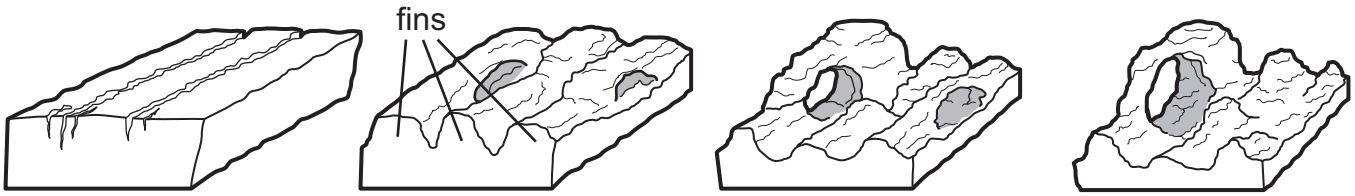
D. **step 2:** Replace the 5-mm-thick cardboard with the 5-mm-thick iron, and repeat step 1.
step 3: Replace the 5-mm-thick iron with the 5-mm-thick plastic, and repeat step 1.
result: The marbles will follow the magnetic wand on the cardboard and plastic because the magnetic field passes through nonmagnetic materials, but the magnetic field will not pass through the magnetic material.

Item 6

Selected-Response: 1 point

A student wants to model how arches form in the desert. The student finds a diagram on a website.

Arch Formation



1. The top layers of sandstone rock crack from earth movements.

2. Cracks in rock layers grow wider and deeper due to erosion, and eventually form fins.

3. Rain and freezing cause exposed rock to crumble and fall leaving an opening in the fin.

4. Holes grow larger as more rock is weathered and eroded from the fin.

The student designs a procedure to model the formation of an arch.

Procedure

step 1:	Mix sand, clay, and water in a shoebox and let it harden into a block.
step 2:	Drop the block on the ground to form cracks in the surface.
step 3:	Use a watering can to sprinkle 15 liters of water over the block every day until fins form from the cracks.
step 4:	?
step 5:	?

Which actions should be used in steps 4 and 5 to BEST model the formation of a desert arch?

A. **step 4:** Use a hammer to hit the block from the side until a hole is formed.
step 5: Repeat step 4 every day until an arch is formed.

B. **step 4:** Continue to sprinkle 15 liters of water over the block every day until a hole is formed.
step 5: Repeat step 4 every day until an arch is formed.

C. **step 4:** Sprinkle water over the block and place it in the freezer overnight. In the morning, place the block in sunlight to thaw and dry.
step 5: Repeat step 4 every day until a hole forms and grows larger, forming an arch.

D. **step 4:** Place the block in an oven on low heat overnight. In the morning, place the block on a table and use a fan to blow air over the block during the day.
step 5: Repeat step 4 every day until a hole forms and grows larger, forming an arch.

Item 7

Selected-Response: 1 point

A student observed a label found on raw chicken meat sold at the grocery store.

> **Warning:**
>
> Cook thoroughly to kill bacteria.

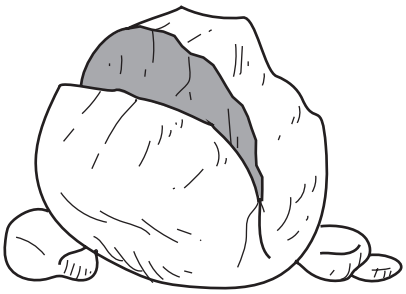
Which argument should the student use to support a claim that some bacteria are harmful to humans?

A. Some bacteria can harm humans because bacteria reproduce faster when they are cooked at high temperatures.
B. Some bacteria can harm humans because bacteria become toxic when cooked at high temperatures.
C. Some bacteria can harm humans because bacteria make food taste bad when it is not cooked properly.
D. Some bacteria can harm humans because bacteria can cause food poisoning when contaminated food is not cooked properly.

Item 8

Selected-Response: 1 point

A student observes a large rock at the base of a volcano in a river valley that gets a lot of snow in the winter and floods in the spring. The student claims that the large crack in the rock was caused by a destructive process called weathering.



Which argument BEST describes the student's claim?

A. The student's claim is correct because water fills small cracks in rocks, freezes, and expands, making the cracks larger over time.
B. The student's claim is correct because the rock was carried from the top of the volcano to its base by a glacier, creating many cracks over time.
C. The student's claim is not correct because the rock was picked up by moving water and rolled against other rocks, smoothing its surface and causing cracks in a short period of time.
D. The student's claim is not correct because large cracks in rocks are caused when lava from a volcano covers the rock so its temperature rises and falls in a short period of time, causing it to break.

Item 9

Selected-Response: 1 point

A student fills a tray with water and places the tray in the freezer. Three hours later, the student removes the tray from the freezer and makes observations.

Student Observations

- **The water is solid.**
- **The water does not flow.**
- **The water keeps its shape in any container.**
- **The color of the water has changed to white.**

The student claims that changing the temperature of water causes a physical change that turns water into ice.

Which argument BEST supports the student's claim?

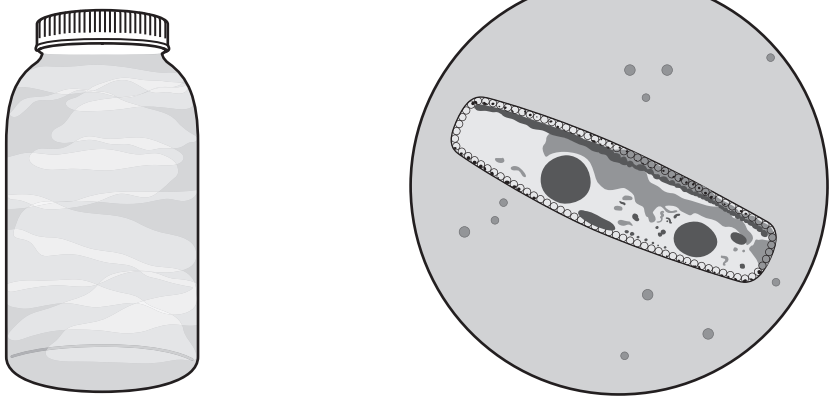
A. Ice forms because heat is added, causing the particles to move faster. This makes the ice flow.
B. Ice forms because heat is removed, causing the particles to move slower. This makes the ice change its shape.
C. Ice forms because heat is removed, causing the particles to move slower. This changes the water from a liquid to a solid.
D. Ice forms because heat is added, causing the particles to move faster. This changes the color of the water from clear to white.

Item 10

Selected-Response: 1 point

A student collects a sample of pond water in a jar to observe the microscopic algae that live in the water. The student then places a drop of the pond water on a microscope slide and observes it under a microscope. The drawings show what the student observed in the jar and on the slide.

Pond Water Observations



in jar

- cloudy water
- no visible algae in water

on slide

- sediments floating in water
- algae swimming in water

Which claim is supported by evidence in the drawings?

A. The student observed microscopic algae only on the slide because algae grow larger when placed on a microscope slide.

B. The student observed microscopic algae only on the slide because all of the algae cells were removed from the pond water on the microscope slide.

C. The student observed microscopic algae only on the slide because algae cells are too small to be seen without magnification by a microscope.

D. The student observed microscopic algae only on the slide because the water in the jar was too cloudy to see the algae.

Item 11

Multi-Select Technology-Enhanced: 2 points

Students are investigating chemical changes that occur in different materials.

Which TWO investigations would provide evidence of a chemical change?

A. Placing a liquid in a freezer until the liquid becomes a solid would provide evidence of a chemical change because the state of matter changes.

B. Using a saw to cut a solid into two different pieces would provide evidence of a chemical change because the pieces cannot be put back together.

C. Using a hot plate to heat a solid until it changes color and releases an odor would provide evidence of a chemical change because the particles cannot be changed back.

D. Placing two different liquids together in a beaker and observing that a solid forms when they mix would provide evidence of a chemical change because a new material is formed.

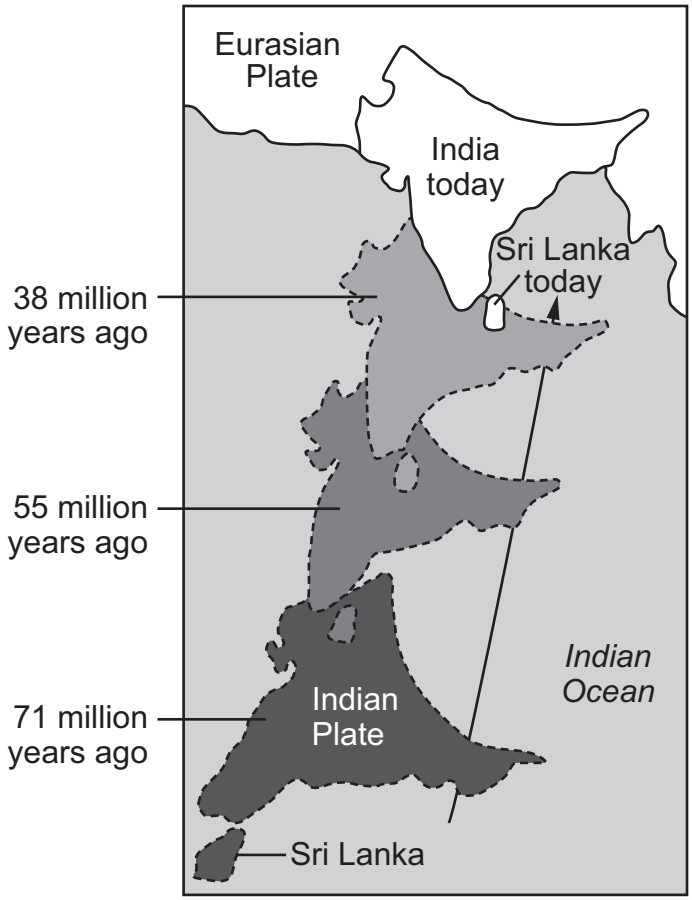
E. Placing a mixture containing a solid and a liquid on a windowsill and letting the liquid evaporate would provide evidence of a chemical change because the evaporated material is lost.

F. Using a magnet to remove a magnetic solid from a mixture that also contains nonmagnetic solids would provide evidence of a chemical change because the mixture cannot be mixed together again.

Item 12

Multi-Part Technology-Enhanced: 2 points

A student is studying the formation of the Himalayas. The student finds a picture and learns that the mountain range formed when the Indian Plate collided with the Eurasian Plate. The student uses the picture to design a model that will show classmates how the Himalayas formed.



(Answer the question on the next page.)

Part A

Based on the picture, which steps would produce the BEST model of how the Himalayas formed over time?

A. **step 1:** Label one cardboard box as the Eurasian Plate.
step 2: Label another cardboard box as the Indian Plate.
step 3: Slowly push both plates toward each other.
step 4: Observe and record how the sizes of both plates change when the edges push against each other.

B. **step 1:** Label one cardboard box as the Eurasian Plate.
step 2: Label another cardboard box as the Indian Plate.
step 3: Slowly push the Indian Plate toward the Eurasian Plate.
step 4: Observe and record how the size of the Indian Plate changes when it touches the edge of the Eurasian Plate.

C. **step 1:** Use light-colored clay to make the shape of the Eurasian Plate.
step 2: Use dark-colored clay to make the shape of the Indian Plate.
step 3: Slowly push the dark-colored plate toward the light-colored plate.
step 4: Observe and record how the shapes of both plates change when the edges push against each other.

D. **step 1:** Use light-colored clay to make the shape of the Eurasian Plate.
step 2: Use dark-colored clay to make the shape of the Indian Plate.
step 3: Slowly push the light-colored plate toward the dark-colored plate.
step 4: Observe and record how the shape of the Eurasian Plate changes when it touches the edge of the Indian Plate.

Part B

Which data could the student collect using the BEST model from part A?

A. the changing distance between the two plates

B. the time it takes for the two plates to collide

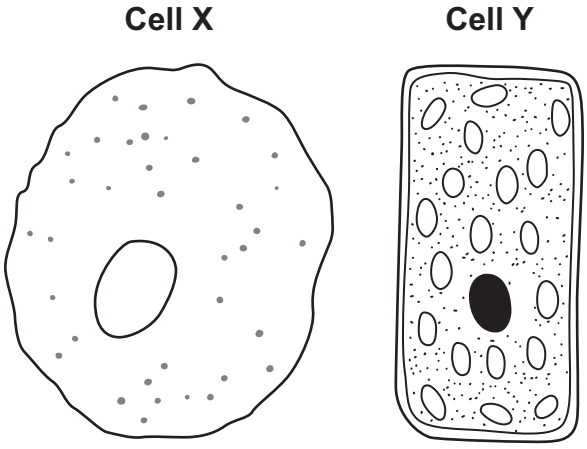
C. the mass of the materials used to make the two plates

D. the changing height of the edge where the two plates collide

Item 13

Multi-Part Technology-Enhanced: 2 points

The pictures show the structure of two cells.



Part A

Which sentence explains why the shape and structure of the two cells are different?

A. Cell X is shaped like a circle because it is an animal cell, which means it does not have a cell wall, and cell Y is shaped like a rectangle because it is a plant cell, which means it has a cell wall.

B. Cell X is shaped like a circle because it is a plant cell, which means it does not have a cell wall, and cell Y is shaped like a rectangle because it is an animal cell, which means it has a cell wall.

C. Cell X is shaped like a circle because it is an animal cell, which means it has a cell membrane, and cell Y is shaped like a rectangle because it is a plant cell, which means it does not have a cell membrane.

D. Cell X is shaped like a circle because it is a plant cell, which means it has a cell membrane, and cell Y is shaped like a rectangle because it is an animal cell, which means it does not have a cell membrane.

Part B

Which sentence describes how the differences between a plant cell and an animal cell can be determined by looking at the parts inside the cell?

A. Plant cells have a nucleus, but animal cells do not.

B. Plant cells have chloroplasts, but animal cells do not.

C. Plant cells do not have a nucleus, but animal cells do.

D. Plant cells do not have chloroplasts, but animal cells do.

Item 14

Multi-Select Technology-Enhanced: 2 points

A student is comparing two types of magnets. The student asks five questions, and then finds the answers to the questions by experimenting with the magnets. The results are shown in the table.

Student Results

Question	Magnet 1	Magnet 2
Can it be turned on and off?	yes	no
Does it require an energy source?	yes	no
Can its strength be changed?	yes	no
Does it attract iron and steel objects?	yes	yes
Can it lift 50 paper clips?	no	yes

Based on the evidence, which TWO arguments correctly match a magnet to its best use?

A. Magnet 1 should be used to pick up many small magnetic objects at once because the temporary magnet can pick up as many objects as the permanent magnet can.

B. Magnet 1 should be used to pick up magnetic objects in one location and dropping them off in another location because temporary magnets can be turned on and off.

C. Magnet 1 can be used in all the ways magnet 2 is used because temporary magnets can be made stronger or weaker and permanent magnets cannot.

D. Magnet 2 should be used to pick up magnetic objects in places where there is no power supply because permanent magnets do not run out of energy.

E. Magnet 2 should be used to pick up large magnetic objects because permanent magnets are stronger than temporary magnets.

F. Magnet 2 can be used in all the ways magnet 1 is used because permanent and temporary magnets can both pick up the same magnetic objects.

SCIENCE ADDITIONAL SAMPLE ITEM KEYS

Item	Standard/ Element	DOK Level	Correct Answer	Explanation
1	S5L2b	2	D	The correct answer is choice (D) Has the football player always been good at catching a football? Choice (A) is incorrect because body height is an inherited trait. Choice (B) is incorrect because having siblings is not a physical trait of an individual. Choice (C) is incorrect because this is an inherited trait from parents, not an acquired trait.
2	S5P1c	2	B	The correct answer is choice (B) Put an antacid tablet in water, and when the antacid and water mix, observe the bubbles that form as a new substance is created. Choice (A) is incorrect because no chemical reaction takes place, and state of matter is a physical change. Choice (C) is incorrect because no chemical reaction takes place. Choice (D) is incorrect because no chemical reaction takes place.
3	S5E1c	2	A	The correct answer is choice (A) How fast are the cliffs eroding? Choice (B) is incorrect because drones cannot see into the houses to count people. Choice (C) is incorrect because knowing the age of the rocks does not address the recent change in Earth's surface. Choice (D) is incorrect because drones can be used to document erosion but not to prevent it.
4	S5L1b	2	D	The correct answer is choice (D) Does it have roots, stems, or leaves? Choice (A) is incorrect because neither algae nor ferns produce seeds. Choice (B) is incorrect because neither algae nor ferns grow into trees. Choice (C) is incorrect because neither algae nor ferns produce flowers.
5	S5P3b	2	D	The correct answer is choice (D) **step 2:** Replace the 5-mm-thick cardboard with the 5-mm-thick iron, and repeat step 1. **step 3:** Replace the 5-mm-thick iron with the 5-mm-thick plastic, and repeat step 1. **result:** The marbles will follow the magnetic wand on the cardboard and plastic because the magnetic field passes through nonmagnetic materials, but the magnetic field will not pass through the magnetic material. Choice (A) is incorrect because it would test thickness of a single material, not different materials. Choice (B) is incorrect because it would test thickness of one material, and the magnetic field would pass through a piece of 10-mm-thick cardboard. Choice (C) is incorrect because the magnetic field would not pass through iron, which is a magnetic material.

Item	Standard/ Element	DOK Level	Correct Answer	Explanation
6	S5E1b	3	C	The correct answer is choice (C) **step 4:** Sprinkle water over the block and place it in the freezer overnight. In the morning, place the block in sunlight to thaw and dry. **step 5:** Repeat step 4 every day until a hole forms and grows larger, forming an arch. Choice (A) is incorrect because a hammer strike does not model frost wedging and rainwater erosion. Choice (B) is incorrect because rainwater erosion alone is not likely to form a hole or an arch. Choice (D) is incorrect because any one of these—wind without sand blasting, rainwater erosion, or frost wedging—alone is not enough to form the hole or an arch.
7	S5L4b	2	D	The correct answer is choice (D) Some bacteria can harm humans because bacteria can cause food poisoning when contaminated food is not cooked properly. Choice (A) is incorrect because bacteria die when they are cooked. Choice (B) is incorrect because cooking bacteria kills them. Choice (C) is incorrect because bad taste is not harmful.
8	S5E1a	2	A	The correct answer is choice (A) The student's claim is correct because water fills small cracks in rocks, freezes, and expands, making the cracks larger over time. Choice (B) is incorrect because movement of rock to another location is erosion not weathering. Choice (C) is incorrect because erosion in a river tends to smooth the surface of rocks not crack them as shown. Choice (D) is incorrect because the heating and cooling of rocks by lava is not an example of weathering.
9	S5P1b	2	C	The correct answer is choice (C) Ice forms because heat is removed, causing the particles to move slower. This changes the water from a liquid to a solid. Choices (A) and (D) are incorrect because the particles will move slower. Choice (B) is incorrect because ice keeps its shape.
10	S5L3a	2	C	The correct answer is choice (C) The student observed microscopic algae only on the slide because algae cells are too small to be seen without magnification by a microscope. Choice (A) is incorrect because the algae do not change size. Choice (B) is incorrect because the algae and water are both on the slide. Choice (D) is incorrect because even if the water were clear, the algae would be too small to see in the jar.

Item	Standard/ Element	DOK Level	Correct Answer	Explanation
11	S5P1c	3	C, D	The correct answers are choice (C) Using a hot plate to heat a solid until it changes color and releases an odor would provide evidence of a chemical change because the particles cannot be changed back, and choice (D) Placing two different liquids together in a beaker and observing that a solid forms when they mix would provide evidence of a chemical change because a new material is formed. Choices (A) and (E) are incorrect because a change in the state of matter is a physical change. Choices (B) and (F) are incorrect because no chemical reaction takes place.
12	S5E1b	3	C, D	**Part A:** The correct answer is choice (C) **step 1:** Use light-colored clay to make the shape of the Eurasian Plate. **step 2:** Use dark-colored clay to make the shape of the Indian Plate. **step 3:** Slowly push the dark-colored plate toward the light-colored plate. **step 4:** Observe and record how the shapes of both plates change when the edges push against each other. Choices (A) and (B) are incorrect because cardboard boxes are not going to change size when they are pushed together. Choice (D) is incorrect because the Indian Plate should move toward the Eurasian Plate. **Part B:** The correct answer is choice (D) the changing height of the edge where the two plates collide. Choice (A) is incorrect because measuring the distance between the two plates does not help the student understand how the Himalayas formed. Choice (B) is incorrect because the time it took to form the Himalayas is not being demonstrated by this model. Choice (C) is incorrect because the mass of the materials does not help the student to understand how the Himalayas formed.
13	S5L3c	3	A, B	**Part A:** The correct answer is choice (A) Cell X is shaped like a circle because it is an animal cell, which means it does not have a cell wall, and cell Y is shaped like a rectangle because it is a plant cell, which means it has a cell wall. Choice (B) is incorrect because cell X is an animal cell without a cell wall and cell Y is a plant cell with a cell wall. Choices (C) and (D) are incorrect because both cells have a cell membrane. **Part B:** The correct answer is choice (B) Plant cells have chloroplasts, but animal cells do not. Choices (A) and (C) are incorrect because both cells have a nucleus. Choice (D) is incorrect because plant cells have chloroplasts and animal cells do not have chloroplasts.

Item	Standard/ Element	DOK Level	Correct Answer	Explanation
14	S5P3a	3	B, D	The correct answers are choice (B) Magnet 1 should be used to pick up magnetic objects in one location and drop them off in another location because temporary magnets can be turned on and off, and choice (D) Magnet 2 should be used to pick up magnetic objects in places where there is no power supply because permanent magnets do not run out of energy. Choice (A) is incorrect because magnet 1 is the temporary magnet and the permanent magnet can pick up more small magnetic objects. Choice (C) is incorrect because magnet 1 cannot pick up 50 paper clips like magnet 2 can, so magnet 1 cannot be used in all the same ways. Choice (E) is incorrect because permanent magnets are not always stronger than temporary magnets. Choice (F) is incorrect because magnet 2 cannot be turned on and off or made stronger like magnet 1 can, so magnet 2 cannot be used in all the same ways.