Science
Grade 6

Sample Items

Introduction

The South Carolina State Department of Education provides districts and schools with tools to assist in delivering focused instruction aligned with the *South Carolina College- and Career-Ready Science Standards 2021*. This document contains a set of twenty SC READY Science grade 6 test items that have been written to align with the 2021 standards for *Grade 6 Science*. These items were reviewed for content, fairness, and sensitivity prior to being field tested and approved for release to the public.

Purpose

This document is intended to be a resource for educators; it is not designed to be a practice test for students. The sample items are examples of college- and career-ready assessment items. The SC READY test assesses content standards in a variety of ways. This document does not include all item types. To see the full functionality of Technology-Enhanced items see Online Tools Training. https://portal.te.drcedirect.com/SC

Item Information Format

SC READY SCIENCE Grade 6 Sample Item (#)	
Standard Alignment	PE Code (2D or 3D) Science and Engineering Practice (SEP) Disciplinary Core Idea (DCI) Crosscutting Concept (CCC)
Standard Description	text from the *South Carolina College- and Career-Ready Science Standards 2021*
Item Type	Evidence-Based Selected Response (EBSR), Selected Response, Multi-select, Drag and Drop, Drop-down, Match Interaction
Answer Key	correct answer
Depth of Knowledge	cognitive demand
Estimated Difficulty	estimate based on student responses

Links

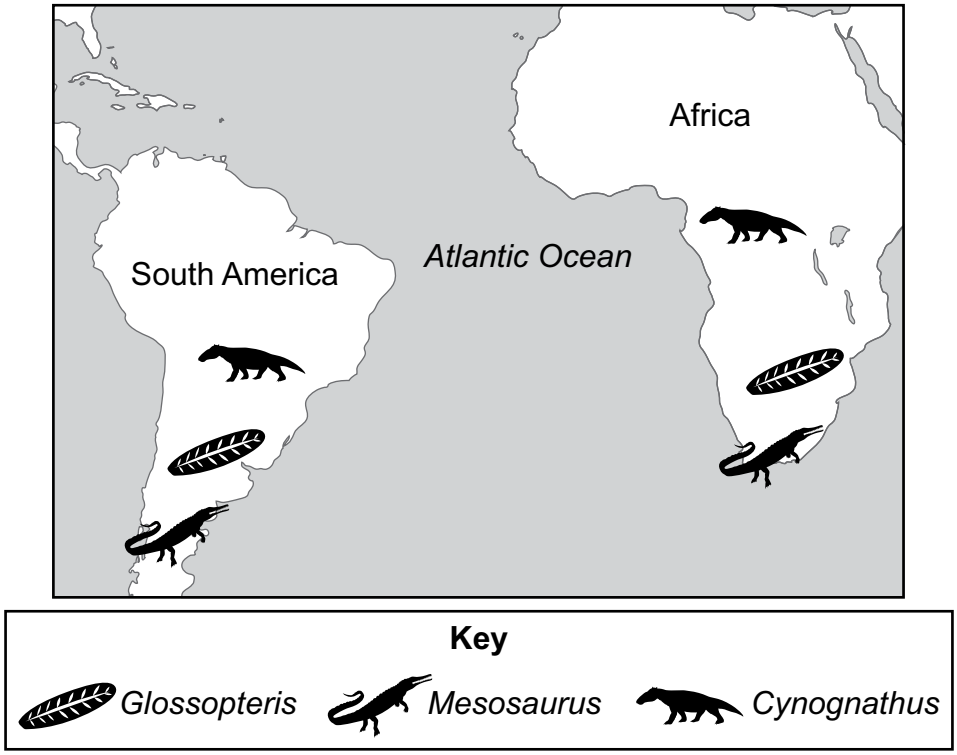
Assessment Quick Links for Teachers
https://ed.sc.gov/tests/assessment-information/quick-links-for-teachers/

South Carolina College- and Career-Ready Science Standards 2021
https://ed.sc.gov/instruction/standards/science/standards/

Norman Webb's Depth-of-Knowledge for the Four Content Areas
https://www.webbalign.org/dok-summary-tables

1. *Glossopteris* was an ancient fern. *Mesosaurus* and *Cynognathus* were ancient reptiles The map shows where fossils of these three organisms have been observed.

Fossils of Land Organisms in South America and Africa



Which statement **best** uses evidence from the map to support the theory of plate tectonics?

A. The fossils indicate that the landmasses were once farther apart and that the organisms traveled long distances between them.

B. The fossils indicate that the landmasses were once joined together and then became separated over a long period of time.

C. The fossils indicate that the organisms swam from one landmass to the other landmass before they became fossilized.

D. The fossils indicate that the organisms developed independently on both landmasses and maintained their similarity as the landmasses moved apart over time.

Item information on following page ☞

Go On ☞

SC READY SCIENCE Grade 6 Sample Item 1	
Standard Alignment	6-ESS2-3 (3D) SEP: Analyzing and Interpreting Data DCI: ESS2.B CCC: Patterns
Standard Description	Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.
Item Type	Selected Response
Answer Key	B
Depth of Knowledge	3
Estimated Difficulty	Medium

Go On ☞

2. A student is making a model to show how kinetic energy and particle movement change as a pot of water is heated from 20°C to 80°C.

Make **one** selection in each row to correctly indicate how kinetic energy and particle movement change as temperature increases.

	Increases	Decreases
kinetic energy	☐	☐
particle movement	☐	☐

Key:

	Increases	Decreases
kinetic energy	☑	☐
particle movement	☑	☐

SC READY SCIENCE Grade 6 Sample Item 2	
Standard Alignment	6-PS1-4 (3D) SEP: Developing and Using Models DCI: PS1.A CCC: Cause and Effect
Standard Description	Develop and use a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
Item Type	Match Interaction
Answer Key	See key
Depth of Knowledge	2
Estimated Difficulty	High

Go On ☞

3. This question has two parts.

Students are learning about a certain type of fossil called an index fossil. Index fossils are easily recognizable and abundant fossils unique to a particular geologic time period. They can be used to estimate the age of the rock layer in which they appear. The table shows five index fossils by their appearance in the geologic time scale.

Index Fossils by Geologic Time Scale

Cenozoic	 *Pecten*
Mesozoic	
	 *Perisphinctes*  *Nerinea*
Paleozoic	
	 *Mucrospirifer*
	 *Paradoxides*

Part A

Which statement is **best** supported by the information in the table?

A. *Mucrospirifer* fossils are the youngest index fossils.
B. *Pecten* index fossils are older than *Paradoxides* index fossils.
C. *Perisphinctes* and *Nerinea* index fossils are about the same age.

Part B

Which evidence **best** supports the answer to Part A?

A. Both index fossils were formed in the Mesozoic era.
B. The Cenozoic era happened before the Paleozoic era.
C. The youngest index fossils were formed in the Paleozoic era.

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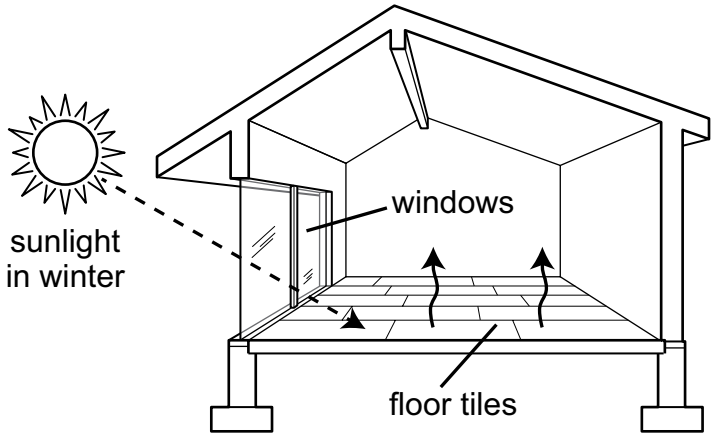
SC READY SCIENCE Grade 6 Sample Item 3	
Standard Alignment	6-ESS1-4 (3D) SEP: Constructing Explanations and Designing Solutions DCI: ESS1.C CCC: Scale, Proportion, and Quantity
Standard Description	Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.
Item Type	Evidence-Based Selected Response (EBSR)
Answer Key	C/A
Depth of Knowledge	2
Estimated Difficulty	Medium

Go On ☞

4. The diagram shows a house design that allows the house to remain warm in winter.

Passive Solar House Design



Select the **two** statements that describe how materials in the house interact with the environment in winter.

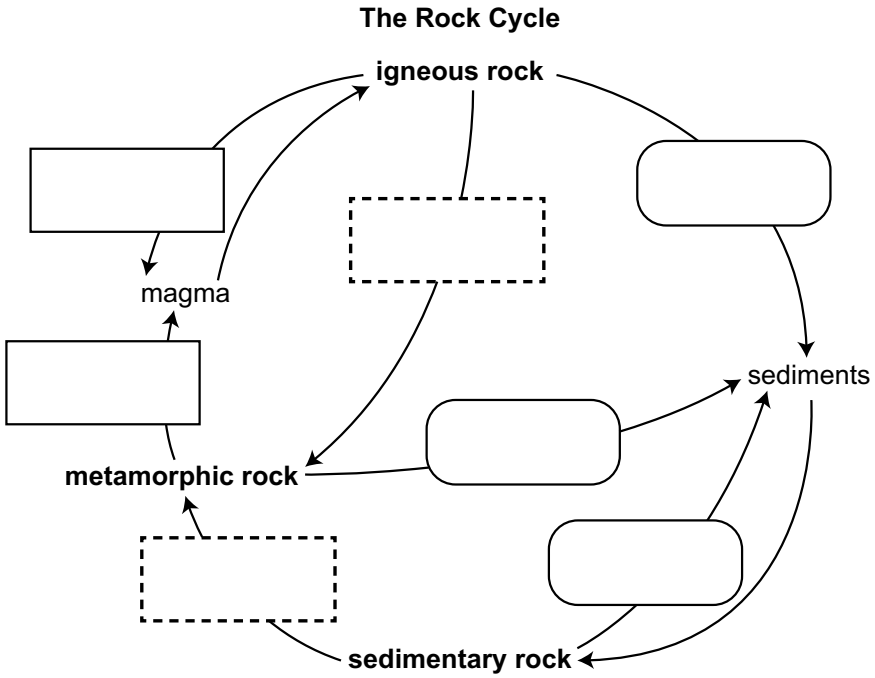
A. The windows reflect solar energy.
B. The floor tiles reflect solar energy.
C. The windows transmit solar energy.
D. The windows absorb solar energy and release heat.
E. The floor tiles absorb solar energy and release heat.

Item information on following page ☞

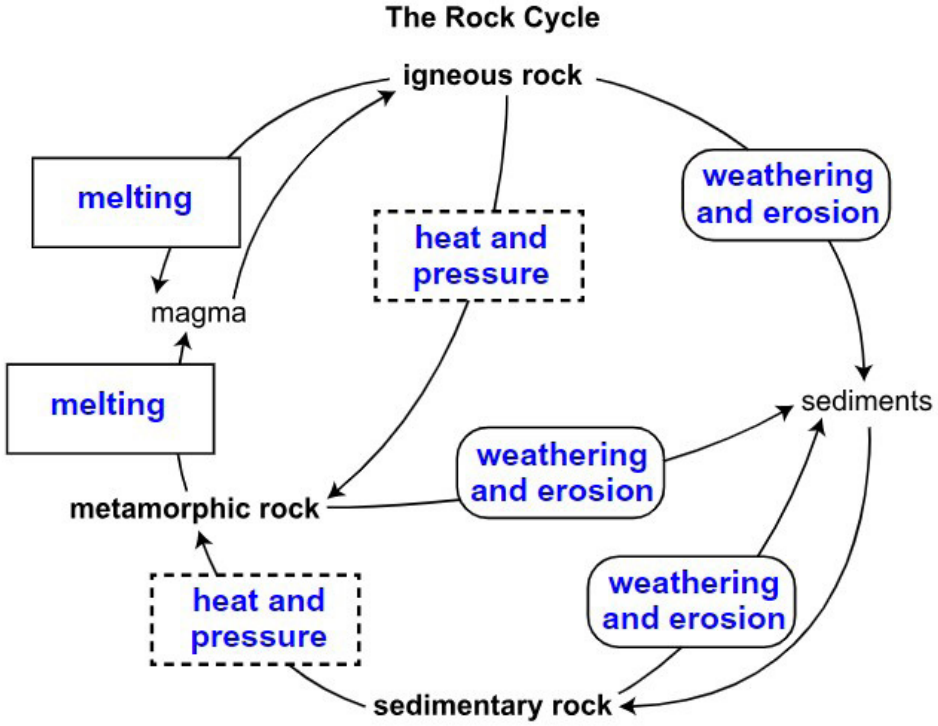
SC READY SCIENCE Grade 6 Sample Item 4	
Standard Alignment	6-PS4-2 (3D) SEP: Developing and Using Models DCI: PS4.B CCC: Structure and Function
Standard Description	Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
Item Type	Multi-select
Answer Key	C, E
Depth of Knowledge	2
Estimated Difficulty	High

Go On ☞

5. A student is making a model to represent processes in the rock cycle. Drag the processes into the correct positions in the model. Processes will be used more than once. **Boxes with the same shape or outline will have the same process.**



Key:



Item information on following page ☞

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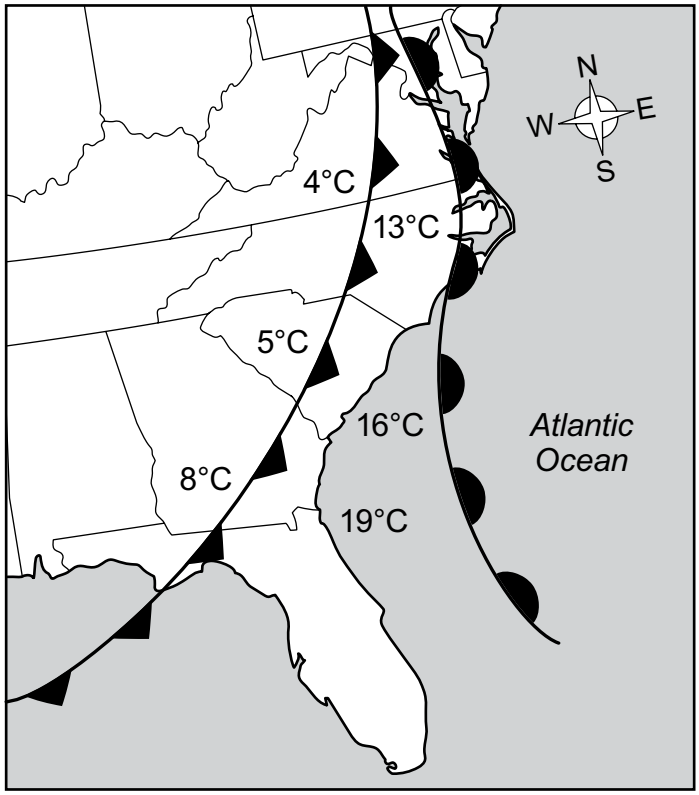
SC READY SCIENCE Grade 6 Sample Item 5	
Standard Alignment	6-ESS2-1 (3D) SEP: Developing and Using Models DCI: ESS2.A CCC: Energy and Matter
Standard Description	Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.
Item Type	Drag and Drop
Answer Key	See key
Depth of Knowledge	2
Estimated Difficulty	High

Go On ☞

6. A student looks at the weather map below.

Weather Map of Southeastern United States



Use this information and the drop-down menus to describe the weather on the South Carolina coast over the next 24 hours.

The temperature will **most likely** become [ ] , and there will also be an increased chance of [ ] .

Key:

The temperature will **most likely** become [colder] , and there will also be an increased chance of [cloudy skies with rain] .

Item information on following page ☞

SC READY SCIENCE Grade 6 Sample Item 6	
Standard Alignment	6-ESS2-5 (3D) SEP: Analyzing and Interpreting Data DCI: ESS2.D CCC: Cause and Effect
Standard Description	Analyze and interpret data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions.
Item Type	Drop-down
Answer Key	colder; cloudy skies with rain
Depth of Knowledge	2
Estimated Difficulty	Medium

Go On ☞

7. An eagle is flying near a chicken coop. A hen produces a sound that acts as an alarm to her chicks. The chicks run toward the hen and hide under her feathers.

Which flowchart shows the correct cause-and-effect relationship for the behavior of the chicks?

A.

stimulus	→ stimulus type	→ receptor	→ response	→ memory
eagle flying nearby	visible	ears	Chicks run and hide.	Chicks learn flying birds are dangerous.

B.

stimulus	→ stimulus type	→ receptor	→ response	→ memory
hen making a sound	visible	eyes	Hen makes a sound.	Chicks learn flying birds are dangerous.

C.

stimulus	→ stimulus type	→ receptor	→ response	→ memory
eagle flying nearby	mechanical	eyes	Hen makes a sound.	Chicks learn hen sounds mean danger.

D.

stimulus	→ stimulus type	→ receptor	→ response	→ memory
hen making a sound	mechanical	ears	Chicks run and hide.	Chicks learn hen sounds mean danger.

Item information on following page ☞

SC READY SCIENCE Grade 6 Sample Item 7	
Standard Alignment	6-LS1-8 (3D) SEP: Obtaining, Evaluating, and Communicating Information DCI: LS1.D CCC: Cause and Effect
Standard Description	Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.
Item Type	Selected Response
Answer Key	D
Depth of Knowledge	2
Estimated Difficulty	High

Go On ☞

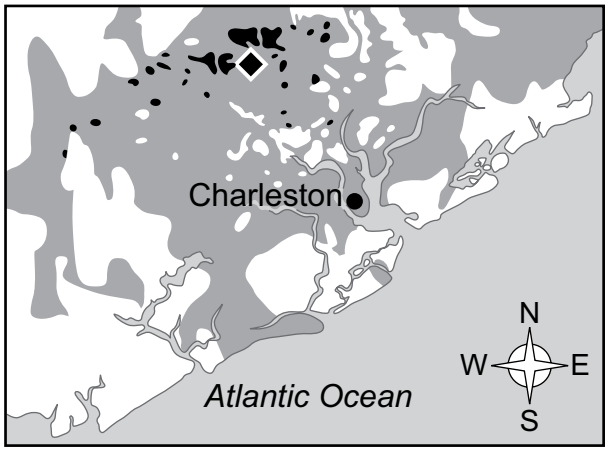
Use the passage to answer questions 8–10.

Fossils of South Carolina

Many fossils have been found in the coastal plain of South Carolina as shown on the map.

This map and diagram give more information about these fossils and where they were found.

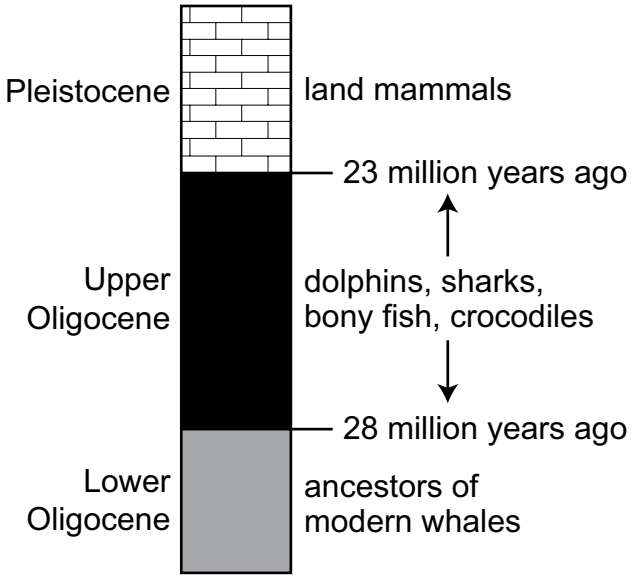
Locations of Fossils



Key

■ Upper Oligocene ■ Lower Oligocene

◆ location where fossils were found



8. Students are developing a model of how energy and the force of gravity drive the water cycle. They want the model to show how the water cycle can create conditions where fossils could form.

Drag the phrases into the chart to correctly identify whether each part of the water cycle absorbs energy, releases energy, or is driven by the force of gravity. The phrases may be used once, more than once, or not at all.

Water evaporates from the ocean.	
Water vapor condenses to form clouds.	
Water precipitates from the clouds.	
Surface runoff moves water and sediment into the ocean.	

Key:

Water evaporates from the ocean.	**absorbs energy from the Sun**
Water vapor condenses to form clouds.	**releases energy into the atmosphere**
Water precipitates from the clouds.	**is driven by the force of gravity**
Surface runoff moves water and sediment into the ocean.	**is driven by the force of gravity**

Item information on following page ☞

SC READY SCIENCE Grade 6 Sample Item 8	
Standard Alignment	6-ESS2-4 (3D) SEP: Developing and Using Models DCI: ESS2.C CCC: Energy and Matter
Standard Description	Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.
Item Type	Drag and Drop
Answer Key	See key
Depth of Knowledge	2
Estimated Difficulty	High

Go On ☞

9. The thickness of the rock layer from the *Upper Oligocene* varies from *5 meters* to *less than 1 meter*. Scientists believe that this difference is the result of erosion that occurred after the *Upper Oligocene*.

A student claims that this change took thousands of years to occur. Which statement **best** supports or refutes the student's claim?

A. The student is most likely correct because mudslides can occur over long periods of time.

B. The student is most likely incorrect because earthquakes can cause rapid changes in Earth features.

C. The student is most likely incorrect because volcanic activity is common near the edges of tectonic plates.

D. The student is most likely correct because it takes a long time for wind and water to wear away surface Earth materials.

SC READY SCIENCE Grade 6 Sample Item 9	
Standard Alignment	6-ESS2-2 (3D) SEP: Constructing Explanations and Designing Solutions DCI: ESS2.A CCC: Scale, Proportion, and Quantity
Standard Description	Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
Item Type	Selected Response
Answer Key	D
Depth of Knowledge	2
Estimated Difficulty	High

Go On ☞

10. Which investigation would **best** confirm that fossils found in South Carolina are the remains of living organisms?

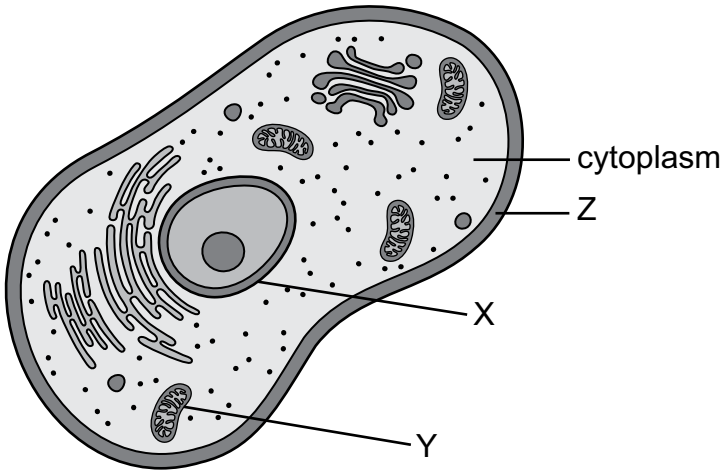
A. using iron filings to test the materials for magnetic properties
B. using microscopes to search for evidence of cellular structures
C. using circuits to determine whether the materials conduct electricity
D. using digital scales and beakers of water to find the mass and volume of the fossils

SC READY SCIENCE 6 Sample Item 10	
Standard Alignment	6-LS1-1 (3D) SEP: Planning and Carrying Out Investigations DCI: LS1.A CCC: Scale, Proportion, and Quantity
Standard Description	Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.
Item Type	Selected Response
Answer Key	B
Depth of Knowledge	2
Estimated Difficulty	Medium

STOP.

11. Use the model to answer the question.

Animal Cell



Which statement **best** describes the function of one of the cell parts in the model?

A. Cell part Z controls the cell and holds the DNA.
B. Cell part X limits what enters and leaves the cell.
C. Cell part Y produces most of the energy for the cell.
D. Cell part X stores water and nutrients the cell needs.

SC READY SCIENCE Grade 6 Sample Item 11	
Standard Alignment	6-LS1-2 (3D) SEP: Developing and Using Models DCI: LS1.A CCC: Structure and Function
Standard Description	Develop and use a model to describe the function of a cell as a whole and ways the parts of cells contribute to the function.
Item Type	Selected Response
Answer Key	C
Depth of Knowledge	1
Estimated Difficulty	Medium

Go On ☞

12. Students are evaluating two different containers to determine which is most efficient at minimizing the loss of thermal energy. One liter of water at 50°C is poured into each container. The containers are sealed.

Which method would **best** measure which container was the most efficient at minimizing the loss of thermal energy?

A. Place both containers under a heat lamp.

B. Change the amount of water in one of the containers.

C. Measure the temperature of the water in each container after one hour.

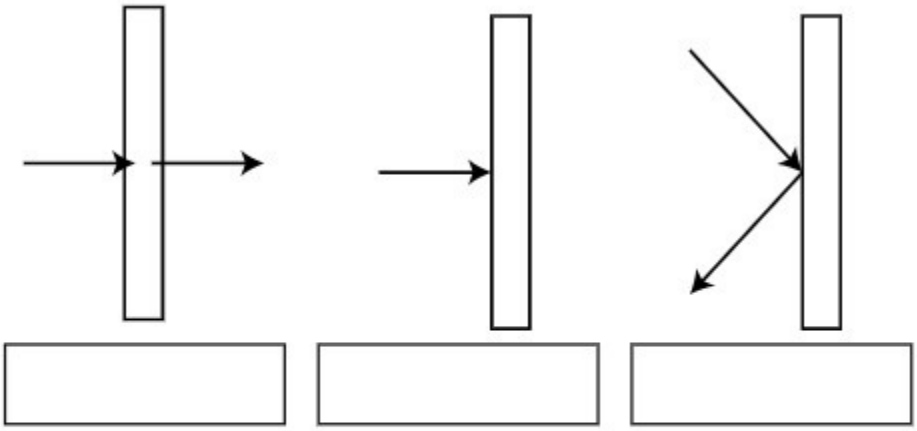
D. Place one container in a box filled with ice and leave the second container on the table.

SC READY SCIENCE Grade 6 Sample Item 12	
Standard Alignment	6-PS3-3 (3D) SEP: Constructing Explanations and Designing Solutions DCI: PS3.A CCC: Energy and Matter
Standard Description	Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.
Item Type	Selected Response
Answer Key	C
Depth of Knowledge	2
Estimated Difficulty	Medium

Go On ☞

13. Light can behave in different ways when it interacts with different materials.

Identify what is occurring in each of the ray diagrams by dragging the correct term into the box.

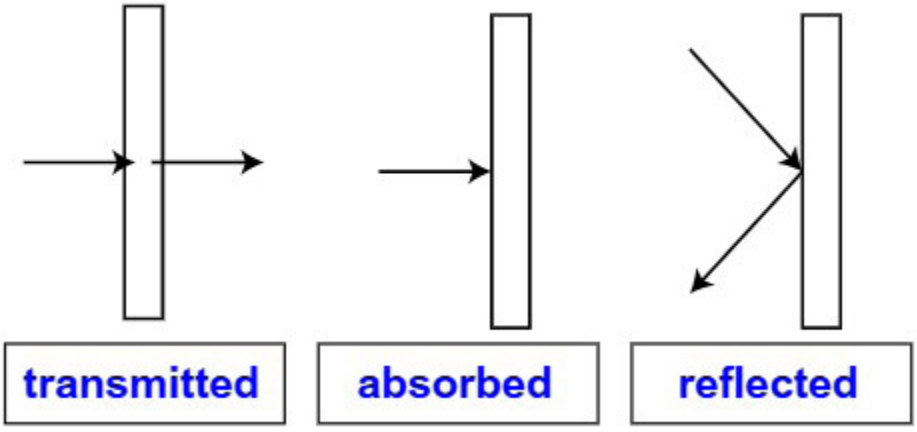


absorbed

reflected

transmitted

Key:



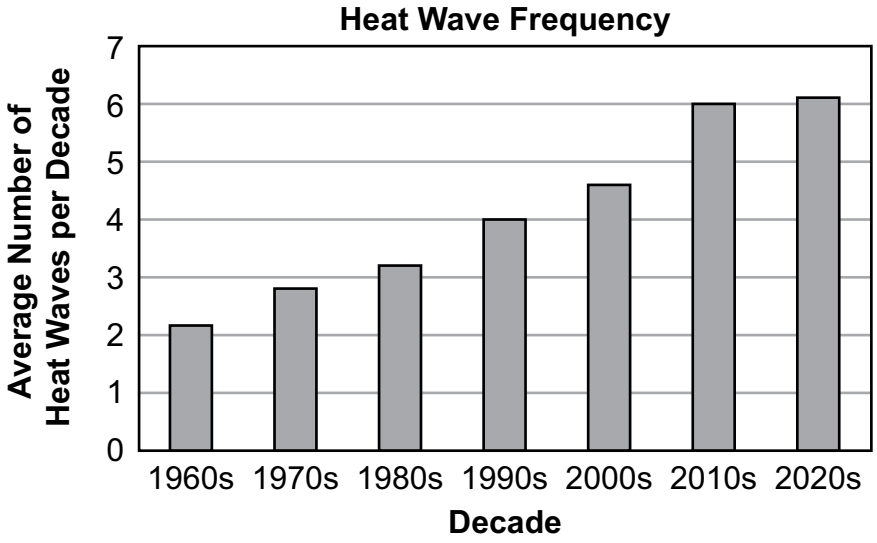
Item information on following page ☞

Go On ☞

SC READY SCIENCE Grade 6 Sample Item 13	
Standard Alignment	6-PS4-2 (3D) SEP: Developing and Using Models DCI: PS4.B CCC: Structure and Function
Standard Description	Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
Item Type	Drag and Drop
Answer Key	transmitted; absorbed; reflected
Depth of Knowledge	1
Estimated Difficulty	Medium

Go On ☞

14. The bar graph shows heat wave data in the United States per decade since the 1960s.



Which statement is **best** supported by the graph?

A. The frequency of heat waves has likely reached a maximum and will begin to decrease and people can expect fewer blizzards.

B. The duration of heat waves has likely reached a maximum and will begin to decrease and people can expect an increase in flooding.

C. The duration of heat waves is greater in the 2020s than in the 1960s and will likely continue to increase and people can expect a decrease in high winds.

D. The frequency of heat waves is greater in the 2020s than in the 1960s and will likely continue to increase and people can expect more droughts.

SC READY SCIENCE Grade 6 Sample Item 14	
Standard Alignment	6-ESS3-2 (3D) SEP: Analyzing and Interpreting Data DCI: ESS3.B CCC: Patterns
Standard Description	Analyze and interpret data on natural hazards to identify patterns, which help forecast future catastrophic events and inform the development of technologies to mitigate their effects.
Item Type	Selected Response
Answer Key	D
Depth of Knowledge	2
Estimated Difficulty	Medium

Go On ☞

15. Use the drop-down menus to describe how some of the body systems in the human body interact.

The muscular system interacts with the [ ] system to [ ]

[ ] options: skeletal / digestive / circulatory

[ ] options: break down food. / expel waste material. / bring air into the body.

The [ ] system pumps nutrients through the bloodstream to cells in the body.

[ ] options: skeletal / digestive / circulatory

Key:

The muscular system interacts with the [digestive] system to [break down food.]

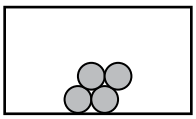
The [circulatory] system pumps nutrients through the bloodstream to cells in the body.

SC READY SCIENCE Grade 6 Sample Item 15	
Standard Alignment	6-LS1-3 (2D) DCI: LS1.A CCC: Systems and System Models
Standard Description	Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
Item Type	Drop-down
Answer Key	digestive, break down food; circulatory
Depth of Knowledge	2
Estimated Difficulty	Medium

Go On ☞

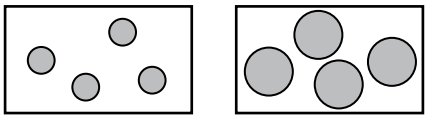
16. A model of a solid is shown below.

Model of a Solid



A student wants to show how the model will change if the solid becomes a gas.

Two Models of a Gas



model W model X

Which model **best** shows what will happen if the solid becomes a gas?

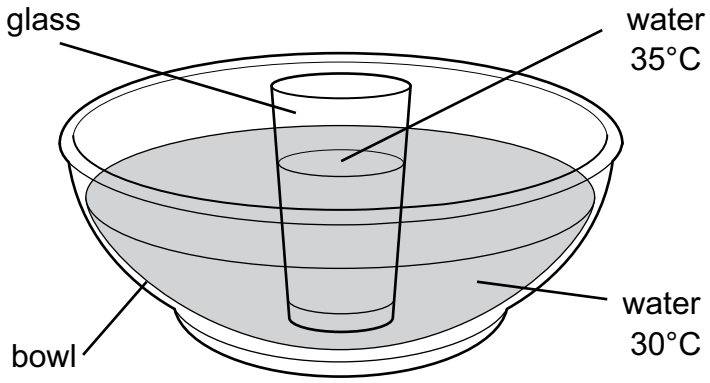
A. model W because the molecules of a gas take up less space
B. model W because the molecules of a gas are more spread apart
C. model X because the molecules of a gas are larger than the molecules of a solid
D. model X because the molecules of a gas must become a liquid before becoming a gas

SC READY SCIENCE Grade 6 Sample Item 16	
Standard Alignment	6-PS1-4 (3D) SEP: Developing and Using Models DCI: PS1.A CCC: Cause and Effect
Standard Description	Develop and use a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
Item Type	Selected Response
Answer Key	B
Depth of Knowledge	2
Estimated Difficulty	Medium

Go On ☞

17. A student planned an investigation to determine how thermal energy would transfer from one liquid to another. A glass of water was placed in a bowl of water. The model shows the setup for the investigation.

Thermal Energy Transfer Investigation



Use the drop-down menus to **best** complete the statement describing how thermal energy would transfer and how the average kinetic energy of particles would change in one of the containers.

Thermal energy will flow from the water in the [ ] (glass, bowl) to the [ ] (cooler, warmer) water until the two temperatures are [ ] (higher, lower, equal).

Item information on following page ☞

Key:

Thermal energy will flow from the water in the [glass] to the [cooler] water until the two temperatures are [equal].

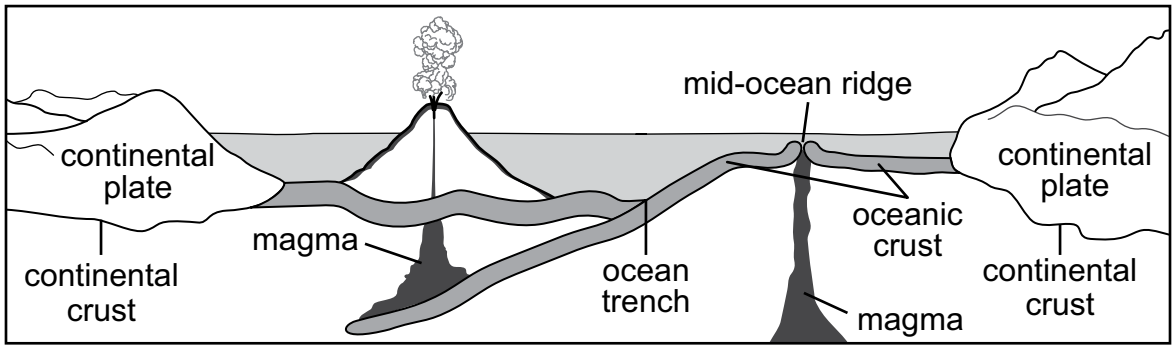
SC READY SCIENCE Grade 6 Sample Item 17	
Standard Alignment	6-PS3-4 (2D) SEP: Planning and Carrying Out Investigations DCI: PS3.B
Standard Description	Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.
Item Type	Drop-down
Answer Key	glass; cooler; equal
Depth of Knowledge	3
Estimated Difficulty	Medium

Read the information below. Then answer the questions.

Underwater Exploration

During and after World War II, sound wave technology called sonar was developed and used to map the ocean floor. Underwater landforms were discovered using this technology. Observations of underwater earthquake and volcanic activity on the ocean floor and along the edges of continents provided more evidence of the existence of plate tectonics.

Seafloor Model

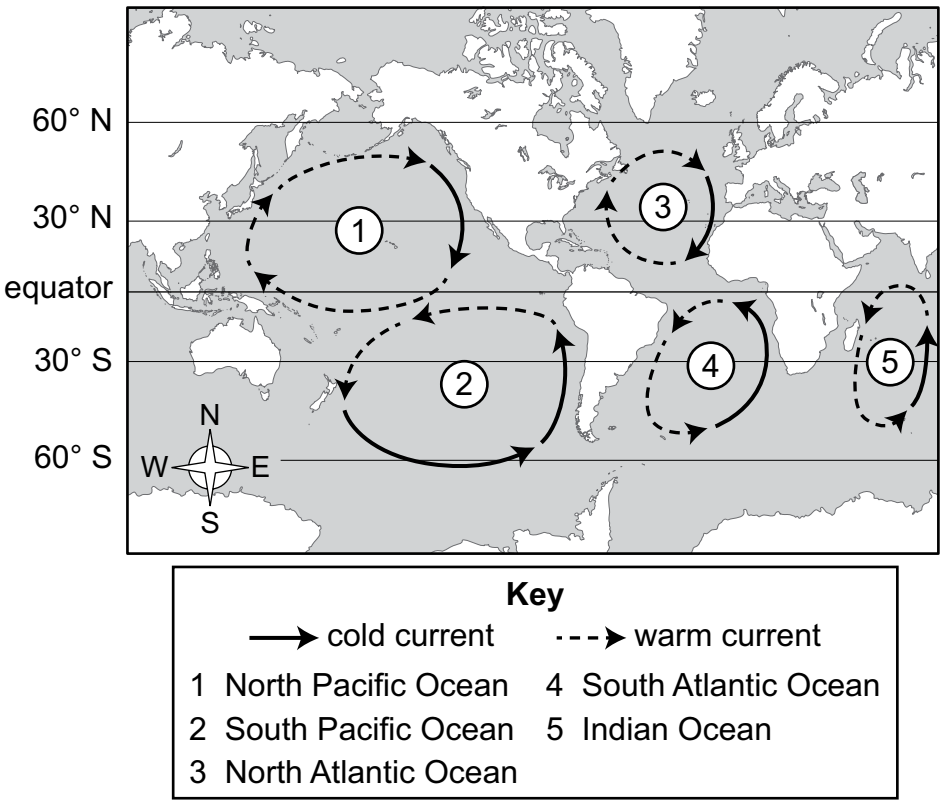


One example of a mid-ocean ridge is the Mid-Atlantic Ridge, which was one of the most famous ocean discoveries.

Earth

18. The map shows some of the major warm and cold currents in the world's oceans.

Ocean Current Movement



What causes ocean currents to have different temperatures?

A. Earth's rotation causes the ocean to absorb heat during the day and release heat at night, causing water to change temperature.

B. Sunlight is more direct near the equator and less direct near the poles, causing water to absorb different amounts of energy.

C. Earth's core releases more heat near the equator and less heat near the poles, causing water to absorb different amounts of energy.

D. Glaciers near the poles absorb heat from the ocean while continents release heat into the ocean, causing water to become different temperatures.

Item information on following page ☞

SC READY SCIENCE Grade 6 Sample Item 18	
Standard Alignment	6-ESS2-6 (3D) SEP: Developing and Using Models DCI: ESS2.C CCC: Systems and System Models
Standard Description	Develop and use models to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.
Item Type	Selected Response
Answer Key	B
Depth of Knowledge	2
Estimated Difficulty	High

Go On ☞

19. This question has two parts.

As small marine animals die, their remains sink to the bottom of the ocean. The buildup of marine sediments on the deep ocean floor occurs at a rate of approximately 1 centimeter every 1,000 years. Sediment thickness at the Mid-Atlantic Ridge ranges from 10 to 20 meters thick, and sediment is over 400 meters thick farther away from the ridge. Scientists can use this information to infer the ages of ocean floor rocks.

Students make three different claims regarding this evidence.

- Student One states, “The buildup of thicker sediments must be on the younger rocks because it has not been removed by waves.”
- Student Two states, “The thicker sediments must be on the older rocks because sediments had more time to build up.”
- Student Three states, “The sediments along the mid-ocean ridge are thicker because volcanic activity has destroyed them.”

Part A: Based on the information above, which student’s claim is **best** supported by the evidence?

A. Student One
B. Student Two
C. Student Three

Part B: Which evidence **best** supports the correct answer in Part A?

A. The sediments farther from the mid-ocean ridge are thicker due to the weathering and erosion of rocks on the continents.
B. Since sediments are deposited very slowly on the ocean floor, the rocks under the deeper sediment layers must be older.
C. Volcanic activity is common along the mid-ocean ridge, so the sediments that build up on the rocks near the mid-ocean ridge are destroyed.

Item information on following page ☞

SC READY SCIENCE Grade 6 Sample Item 19	
Standard Alignment	6-ESS2-3 (3D) SEP: Analyzing and Interpreting Data DCI: ESS2.B CCC: Patterns
Standard Description	Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.
Item Type	Evidence-Based Selected Response (EBSR)
Answer Key	B / B
Depth of Knowledge	3
Estimated Difficulty	High

Go On ☞

20. The maps below show how continental drift broke up the supercontinent over time to form today's continents.

Continental Drift of Plates

200 million years ago | 135 million years ago | 65 million years ago | today

The Mid-Atlantic Ridge is located at a [▾] plate boundary, which causes the
- convergent
- divergent

Atlantic Ocean to grow larger between continents from [▾]
- new ocean crust that pushes
- subduction zones that push

continents slowly away from each other in a process called [▾].
- seafloor spreading
- folding

Key:

The Mid-Atlantic Ridge is located at a [divergent ▾] plate boundary, which causes the Atlantic Ocean to grow larger between continents from [new ocean crust that pushes ▾] continents slowly away from each other in a process called [seafloor spreading ▾].

Item information on following page ☞

SC READY SCIENCE Grade 6 Sample Item 20	
Standard Alignment	6-ESS2-2 (2D) SEP: Constructing Explanations and Designing Solutions DCI: ESS2.A
Standard Description	Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
Item Type	Drop-down
Answer Key	divergent; new ocean crust that pushes; seafloor spreading
Depth of Knowledge	2
Estimated Difficulty	Low

STOP.