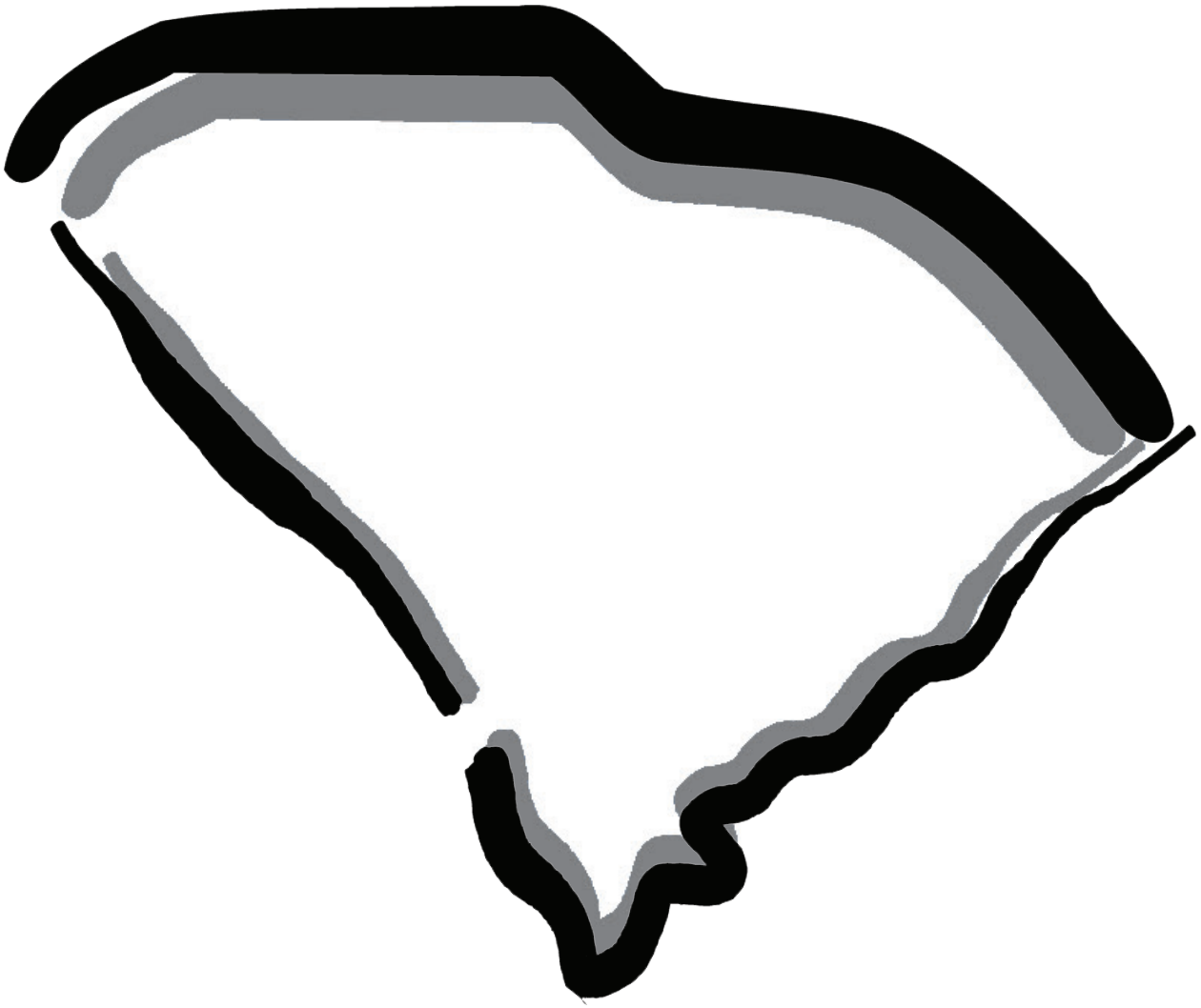
South Carolina

SCPASS

Palmetto Assessment of State Standards



Science Grade 8

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 Academic Standards and Performance Indicators for Science. This document contains a set of twenty South Carolina Palmetto Assessment of State Standards (SCPASS) for 8th Grade Science test items that have been written to align with the South Carolina Academic Standards and Performance Indicators for Science. These items were reviewed for content and bias 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. These items were chosen to reflect the increased rigor of assessing two-dimensional standards that blend disciplinary knowledge with science and engineering practices.
The SCPASS assesses content standards in a variety of ways. This document does not include all item types.

Item Information Format

Indicator Alignment	South Carolina Academic Standards and Performance Indicators for Science
Indicator Description	text from the South Carolina Academic Standards and Performance Indicators for Science
Answer Key	correct answer
Depth of Knowledge	cognitive demand
Estimated Difficulty	estimate based on student responses

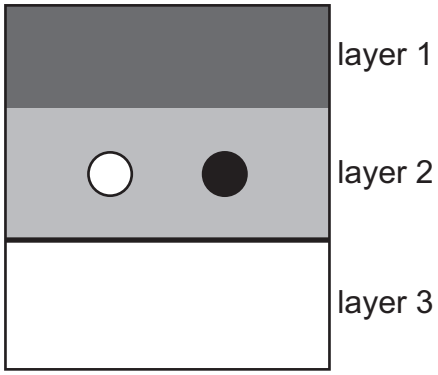
Links

South Carolina Academic Standards and Performance Indicators for Science
https://ed.sc.gov/instruction/standards-learning/science/standards/

Norman Webb's Depth-of-Knowledge for the Four Content Areas
http://www.webbalign.org/Webbs-DOK-Levels-Summary.pdf

1. A student builds a stack of different layers of clay and places two marbles in one of the layers of clay.

Cross Section of Earth Layers



Using this model, which concept can the student **best** communicate about the marbles?

A. The marbles represent organisms of the same species that died.

B. The marbles represent different fossils that are about the same age.

C. The marbles represent organisms that became extinct at different times.

D. The marbles represent rocks that became fossils at about the same time.

SCPASS Sample Item		
1	**Indicator Alignment**	8.S.1A.2 (8.E.6A.2)
	Indicator Description	Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.
	Answer Key	B
	Depth of Knowledge	2
	Estimated Difficulty	**Medium Difficulty**

2. During an investigation, a student measured the distances that four electric toy cars traveled in 12 seconds.

Electric Toy Car Investigation

Car	Distance (meters)
1	25
2	20
3	30
4	18

Which toy car had an average speed of 2.5 m/s?

A. car 1

B. car 2

C. car 3

D. car 4

SCPASS Sample Item 2		
	Indicator Alignment	8.S.1A.5 (8.P.2A.7)
	Indicator Description	Use mathematical and computational thinking to (1) use and manipulate appropriate metric units, (2) collect and analyze data, (3) express relationships between variables for models and investigations, or (4) use grade-level appropriate statistics to analyze data.
	Answer Key	C
	Depth of Knowledge	2
	Estimated Difficulty	**Medium Difficulty**

3. The drawing shows a bicycle that a student uses to travel every day.

Bicycle

The student wants to be able to increase the speed of the bike while applying the same amount of force. Which statement describes the **best** long-term solution to this problem?

A. Switch to thinner tires to increase friction.

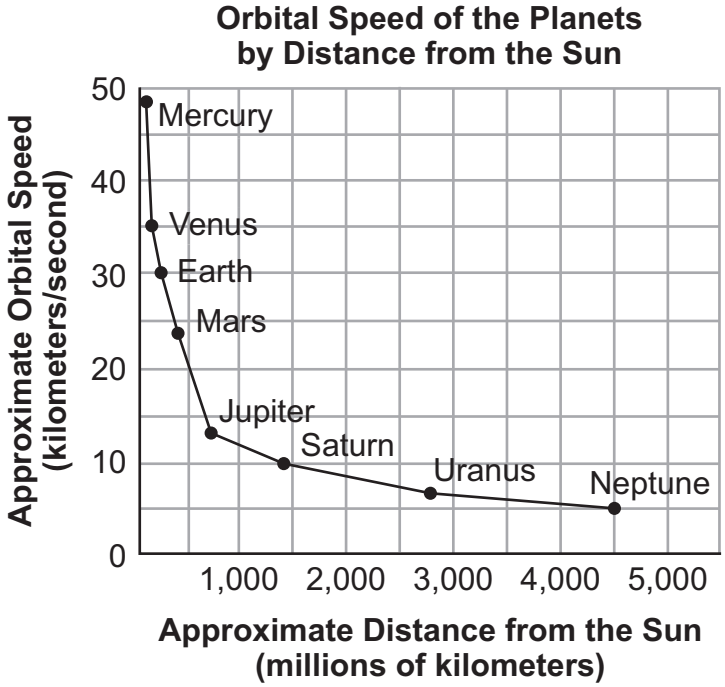
B. Remove unneeded bike parts to reduce mass.

C. Add links to increase the length of the bike chain.

D. Increase the width of the tires to grip the road better.

SCPASS Sample Item		
3	**Indicator Alignment**	8.S.1B.1 (8.P.2A.3)
	Indicator Description	Construct devices or design solutions using scientific knowledge to solve specific problems or needs: (1) ask questions to identify problems or needs, (2) ask questions about the criteria and constraints of the device or solutions, (3) generate and communicate ideas for possible devices or solutions, (4) build and test devices or solutions, (5) determine if the devices or solutions solved the problem and refine the design if needed, and (6) communicate the results.
	Answer Key	B
	Depth of Knowledge	2
	Estimated Difficulty	**Medium Difficulty**

4. The graph shows the orbital speed of the eight planets in the solar system.



Which explanation about the orbital speed of the planets is **best** supported by these data?

A. The orbital speed of large planets is greater than the orbital speed of small planets.

B. The orbital speed of gaseous planets is greater than the orbital speed of rocky planets.

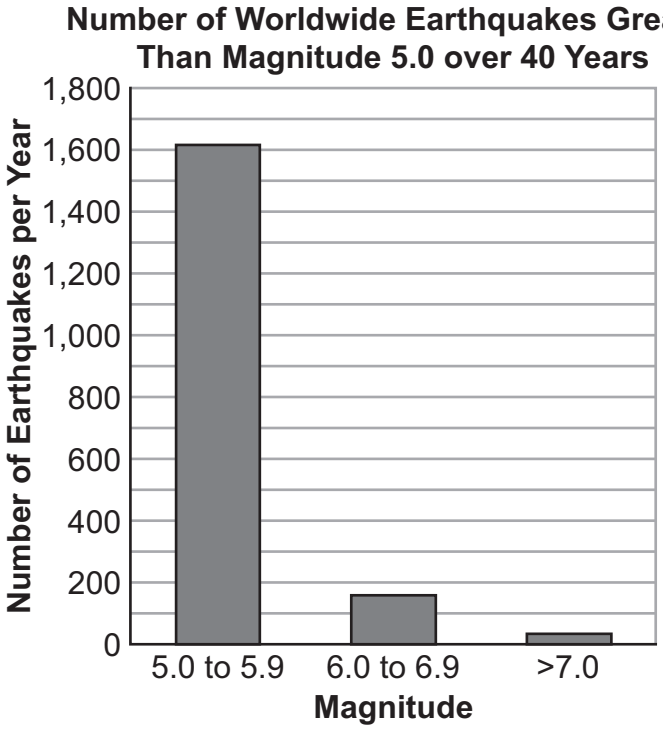
C. The orbital speed of the outer planets is greater than the orbital speed of the inner planets.

D. The orbital speed of the inner planets is greater than the orbital speed of the outer planets.

Item Information on following page ☞

SCPASS Sample Item 4		
	Indicator Alignment	8.S.1A.6 (8.E.4B.2)
	Indicator Description	Construct explanations of phenomena using (1) primary or secondary scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams.
	Answer Key	D
	Depth of Knowledge	2
	Estimated Difficulty	**Medium Difficulty**

5. The magnitude of an earthquake can be measured using data from seismographs and the Richter scale. The Richter scale uses numbers 0 to 9; the larger the number, the stronger the earthquake. The graph shows 40 years of earthquake magnitude data for earthquakes of magnitude 5.0 and greater.



Which statement can a student use to explain the information shown in the graph?

A. Lower-magnitude earthquakes are more likely to occur than higher-magnitude earthquakes.

B. Higher-magnitude earthquakes are more likely to occur than lower-magnitude earthquakes.

C. The past 40 years of data show that magnitude 6 earthquakes are common to all regions of the Earth.

D. Over the next 40 years there are likely to be more magnitude 5 earthquakes than earthquakes of any other magnitude.

Item Information on following page ☞

SCPASS Sample Item 5		
	Indicator Alignment	8.S.1A.6 (8.E.5B.2)
	Indicator Description	Construct explanations of phenomena using (1) primary or secondary scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams.
	Answer Key	A
	Depth of Knowledge	2
	Estimated Difficulty	**High Difficulty**

6. A student wants to perform an investigation to demonstrate how varying the amount of force affects the speed of a cart on a level surface. Which investigation plan would **best** demonstrate the relationship between force and speed?

A.

Plan	Apply an increasing amount of force to the cart over time.
Results	The speed of the cart increases over time.

B.

Plan	Push the cart with a constant force over time.
Results	The speed of the cart decreases over time due to friction.

C.

Plan	Apply a decreasing amount of force to the cart over time.
Results	The speed of the cart decreases over time, then increases.

D.

Plan	Provide an initial force on the cart followed by no additional force.
Results	The speed of the cart remains constant due to inertia.

SCPASS Sample Item 6

Indicator Alignment	8.P.2A.1
Indicator Description	Plan and conduct controlled scientific investigations to test how varying the amount of force or mass of an object affects the motion (speed and direction), shape, or orientation of an object.
Answer Key	A
Depth of Knowledge	2
Estimated Difficulty	**Medium Difficulty**

7. A student observed a white light bulb while looking through three different sheets of transparent plastic. The student recorded the observations in the data table.

Investigation Results

Sheet of Plastic	Apparent Color of Light Bulb
1	red
2	yellow
3	green

Which explanation do these data **best** support?

A. Each plastic sheet absorbs one wavelength of light.

B. Each plastic sheet transmits a different wavelength of light.

C. Each plastic sheet refracts the wavelengths of light from the light bulb at different angles.

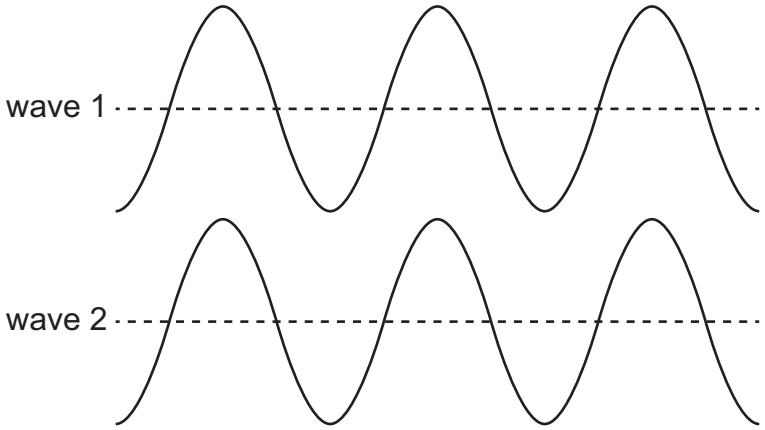
D. Each plastic sheet changes the wavelengths of light from the light bulb in different amounts.

SCPASS Sample Item 7

Indicator Alignment	8.P.3A.3
Indicator Description	Analyze and interpret data to describe the behavior of waves (including refraction, reflection, transmission, and absorption) as they interact with various materials.
Answer Key	B
Depth of Knowledge	2
Estimated Difficulty	**High Difficulty**

8. Two sound waves are in phase with each other.

Two Sound Waves



Which statement describes the **most likely** outcome of an interaction between these two sound waves?

A. The interaction will result in no sound.

B. The interaction will result in destructive interference.

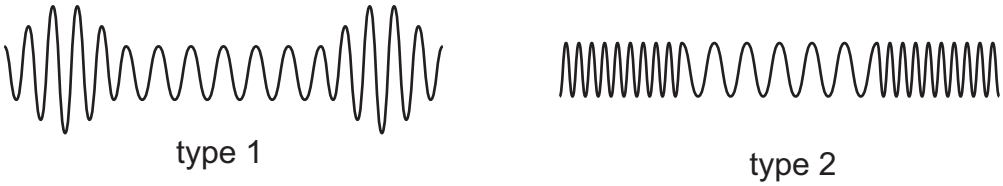
C. The interaction will result in half the amount of sound.

D. The interaction will result in constructive interference.

SCPASS Sample Item		
8	**Indicator Alignment**	8.P.3A.4
	Indicator Description	Analyze and interpret data to describe the behavior of mechanical waves as they intersect.
	Answer Key	D
	Depth of Knowledge	2
	Estimated Difficulty	**Medium Difficulty**

9. At a radio station, sound is converted to an electronic audio signal. In order to transmit this signal to radios farther away, it is combined with an electromagnetic carrier wave by changing (or modulating) the properties of the wave.

Two Types of Transmitted Radio Waves



type 1 type 2

- AM (amplitude modulation) radio signals use changes in wave amplitude to encode information.
- FM (frequency modulation) radio signals use changes in wave frequency to encode information.

One advantage of AM radio is that, since it operates at a lower frequency, it has longer wavelengths than FM radio. Longer wavelengths travel greater distances from the radio station and even through solid objects such as mountains. However, a disadvantage is that AM signals are more easily interfered with than FM signals, so the audio quality is decreased.

Which statement identifies an advantage of one of the two types of transmitted radio waves?

A. Radios in areas with mountains receive type 2 radio waves better than type 1 radio waves.

B. Radios in areas with mountains receive type 1 radio waves better than type 2 radio waves.

C. Radios that receive type 1 radio waves have less interference than radios that receive type 2 radio waves.

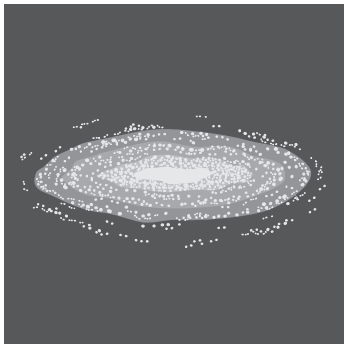
D. Radios that receive type 2 radio waves have more interference than radios that receive type 1 radio waves.

Item Information on following page ☞

SCPASS Sample Item 9		
	Indicator Alignment	8.P.3A.6
	Indicator Description	Obtain and communicate information about how various instruments are used to extend human senses by transmitting and detecting waves (such as radio, television, cell phones, and wireless computer networks) to exemplify how technological advancements and designs meet human needs.
	Answer Key	B
	Depth of Knowledge	3
	Estimated Difficulty	**High Difficulty**

10. Our Sun is located on an arm of the Milky Way galaxy. Which model and statement **best** represent both the Milky Way galaxy and the Sun?

A.

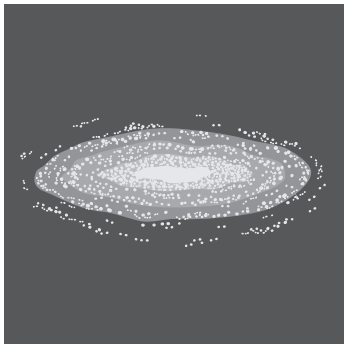


The Milky Way is an elliptical galaxy with the Sun located outside of its center. However, the Sun is at the center of our solar system.

B.

The Milky Way is a spiral galaxy with the Sun at its center. The Sun is also at the center of our solar system.

C.



The Milky Way is an elliptical galaxy with the Sun at its center. The Sun is also at the center of our solar system.

D.

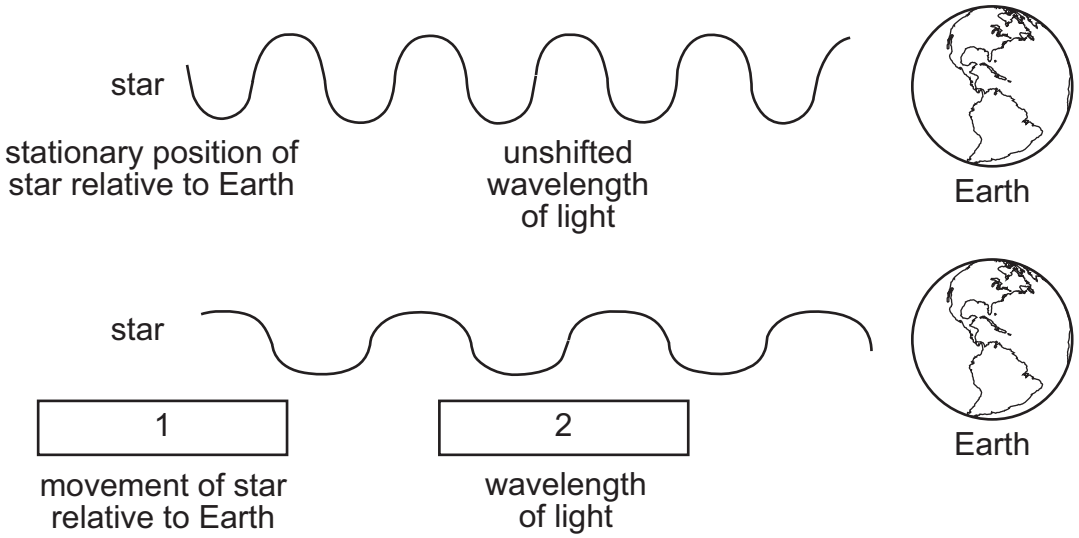
The Milky Way is a spiral galaxy with the Sun located outside of its center. However, the Sun is at the center of our solar system.

SCPASS Sample Item 10

Indicator Alignment	8.E.4A.1
Indicator Description	Obtain and communicate information to model the position of the Sun in the universe, the shapes and composition of galaxies, and the measurement unit needed to identify star and galaxy locations.
Answer Key	D
Depth of Knowledge	2
Estimated Difficulty	**Medium Difficulty**

11. A student is using a model to demonstrate redshift as part of a scientific argument about the nature of the universe.

Light from Two Distant Stars as Observed from Earth



This model supports the claim that the universe is [3] .

Which list correctly completes the model to represent how information from stars can be used to understand the nature of the universe?

A. 1. away
   2. redshifted
   3. expanding

B. 1. toward
   2. unshifted
   3. expanding

C. 1. toward
   2. redshifted
   3. contracting

D. 1. away
   2. unshifted
   3. contracting

Item Information on following page ☞

SCPASS Sample Item 11		
	Indicator Alignment	8.E.4A.2
	Indicator Description	Construct and analyze scientific arguments to support claims that the universe began with a period of extreme and rapid expansion using evidence from the composition of stars and gases and the motion of galaxies in the universe.
	Answer Key	A
	Depth of Knowledge	2
	Estimated Difficulty	**High Difficulty**

12. In 1929 American astronomer Edwin Hubble published observations that the wavelength of light emitted from distant galaxies was long and that it shifted toward the red end of the electromagnetic spectrum. Which conclusion about these galaxies can **best** be made from these observations?

A. The galaxies are old since their wavelengths of light are compressed.

B. The galaxies are newly formed since their wavelengths of light are stretched.

C. The galaxies are moving toward Earth because their wavelengths of light are compressed.

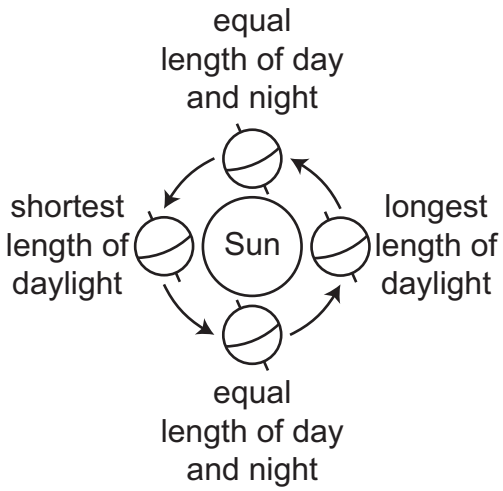
D. The galaxies are moving away from Earth because their wavelengths of light are stretched.

SCPASS Sample Item 12

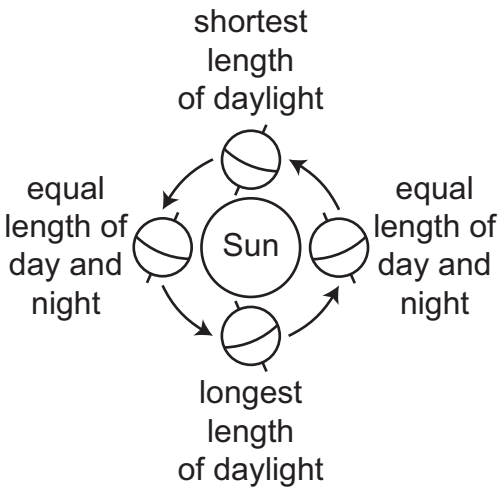
Indicator Alignment	8.E.4A.2
Indicator Description	Construct and analyze scientific arguments to support claims that the universe began with a period of extreme and rapid expansion using evidence from the composition of stars and gases and the motion of galaxies in the universe.
Answer Key	D
Depth of Knowledge	2
Estimated Difficulty	**Medium Difficulty**

13. A student is modeling Earth's seasons in the Northern Hemisphere. Which model **best** represents Earth's orbit and is correctly labeled with phrases describing the length of daylight associated with each orbital position?

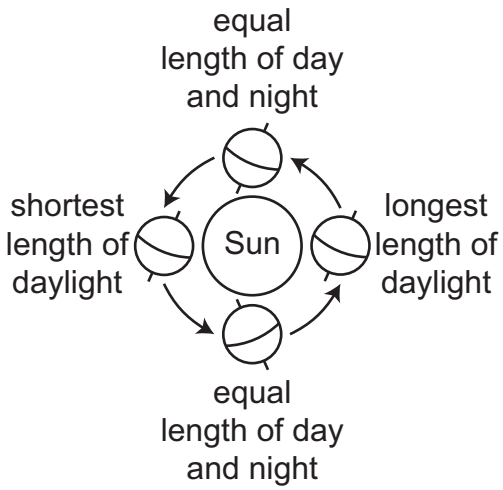
A.



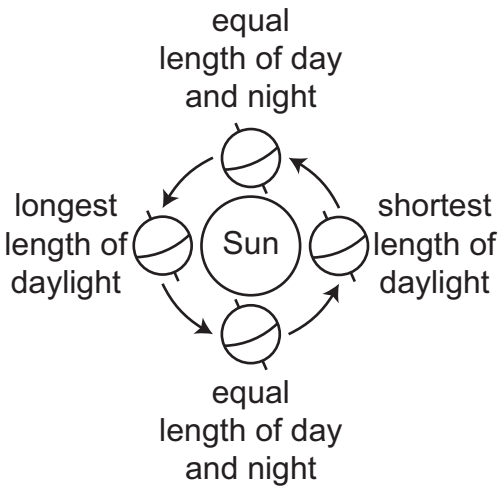
B.



C.



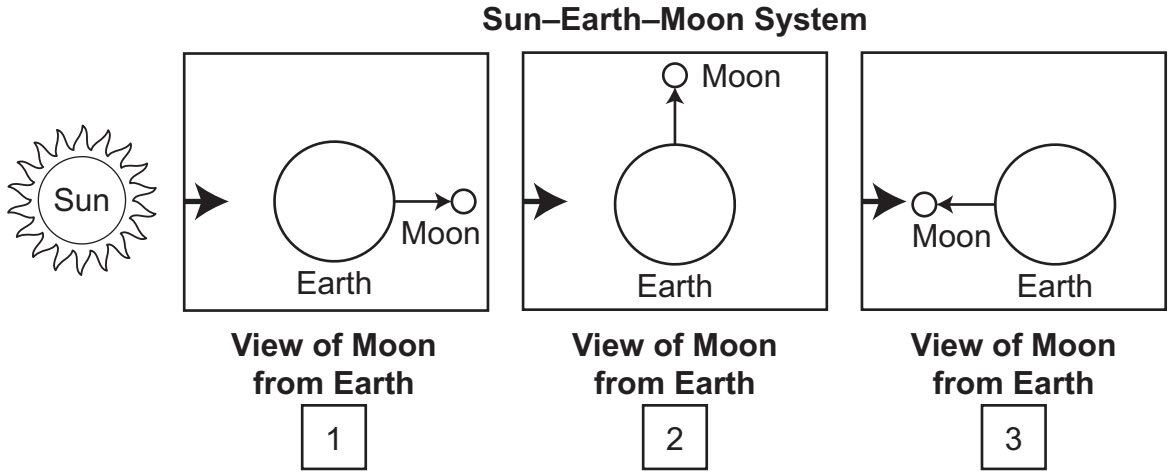
D.



SCPASS Sample Item 13

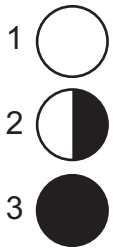
Indicator Alignment	8.E.4B.3
Indicator Description	Develop and use models to explain how seasons, caused by the tilt of Earth's axis as it orbits the Sun, affects the length of the day and the amount of heating on Earth's surface.
Answer Key	A
Depth of Knowledge	2
Estimated Difficulty	**High Difficulty**

14. The diagram represents the Sun-Earth-Moon system. As Earth spins on its axis, the view of the Moon from Earth changes.

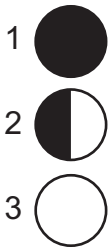


Which moon phases are matched to a correct location on the model?

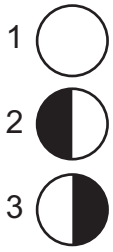
A.



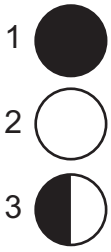
B.



C.



D.

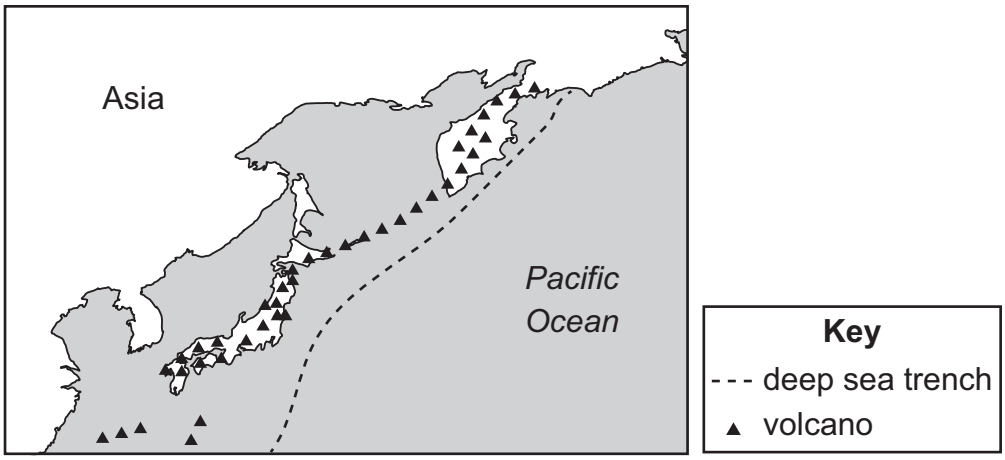


SCPASS Sample Item 14

Indicator Alignment	8.E.4B.4
Indicator Description	Develop and use models to explain how motions within the Sun-Earth-Moon system cause Earth phenomena (including day and year, moon phases, solar and lunar eclipses, and tides).
Answer Key	A
Depth of Knowledge	2
Estimated Difficulty	**Medium Difficulty**

15. The map shows the locations of volcanoes in an area.

Some Volcanoes of the Asia-Pacific Region



Which geologic feature is **most likely** responsible for the formation of these volcanoes?

A. a convergent boundary where oceanic crust is being subducted

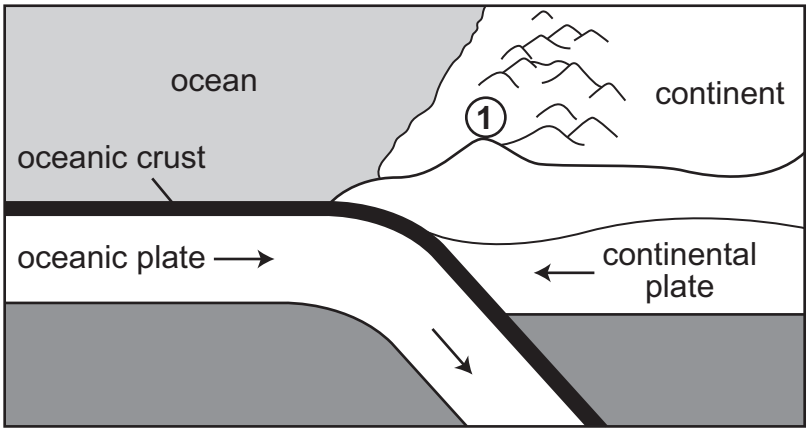
B. a divergent boundary where new crust is forming a mid-ocean ridge

C. a region where hot convection currents are rising through the mantle

D. a hot spot where crust is thin enough to allow mantle material to rise to the surface

SCPASS Sample Item 15		
	Indicator Alignment	8.E.5B.1
	Indicator Description	Analyze and interpret data to describe patterns in the location of volcanoes and earthquakes related to tectonic plate boundaries, interactions, and hot spots.
	Answer Key	A
	Depth of Knowledge	2
	Estimated Difficulty	**High Difficulty**

16. A student is studying a diagram that shows the interaction of two lithospheric plates at a plate boundary.



Which statement correctly identifies the **most likely** surface feature at point 1 and explains its formation?

A. Point 1 represents a mountain because the plates are pulling apart, causing new land to rise upward.

B. Point 1 represents a mid-ocean ridge because the colliding plates are causing magma to rise and uplift the crust.

C. Point 1 represents a volcano because the colliding plates are turning solid rock into magma that is rising to the surface.

D. Point 1 represents an island hot spot because the plates are pulling apart, allowing magma to reach the surface and form new land.

SCPASS Sample Item 16

Indicator Alignment	8.E.5B.2
Indicator Description	Construct explanations of how forces inside Earth result in earthquakes and volcanoes.
Answer Key	C
Depth of Knowledge	2
Estimated Difficulty	**High Difficulty**

17. A time period referred to as the Cambrian Explosion occurred between 530 million and 570 million years ago. Many of the complex organisms on Earth today are thought to have evolved from much simpler organisms that lived during this time period. However, physical evidence that can be used to support this claim is rare and difficult to find.

Which statement **best** explains this phenomenon?

A. The organisms that lived during the Cambrian Explosion were relatively small animals.

B. Relatively few fossils exist because they were consumed by larger organisms later in geologic time.

C. The organisms that lived during the Cambrian Explosion were composed mainly of liquids and gases.

D. Relatively few organisms were fossilized because of the complex sequence of events required to form fossils.

SCPASS Sample Item 17

Indicator Alignment	8.E.6A.5
Indicator Description	Construct explanations for why most individual organisms, as well as some entire taxonomic groups of organisms, that lived in the past were never fossilized.
Answer Key	D
Depth of Knowledge	2
Estimated Difficulty	**High Difficulty**

18. A student reads about a sexually reproducing population that has high genetic variability. Which statement **best** explains how this characteristic affects survival of the population if it is exposed to a new disease?

A. This characteristic reduces chances for survival because a variation for disease resistance is more likely to exist among the population.

B. This characteristic increases chances for survival because a variation for disease resistance is less likely to exist among the population.

C. This characteristic reduces chances for survival because a variation for disease resistance is less likely to exist among the population.

D. This characteristic increases chances for survival because a variation for disease resistance is more likely to exist among the population.

SCPASS Sample Item 18

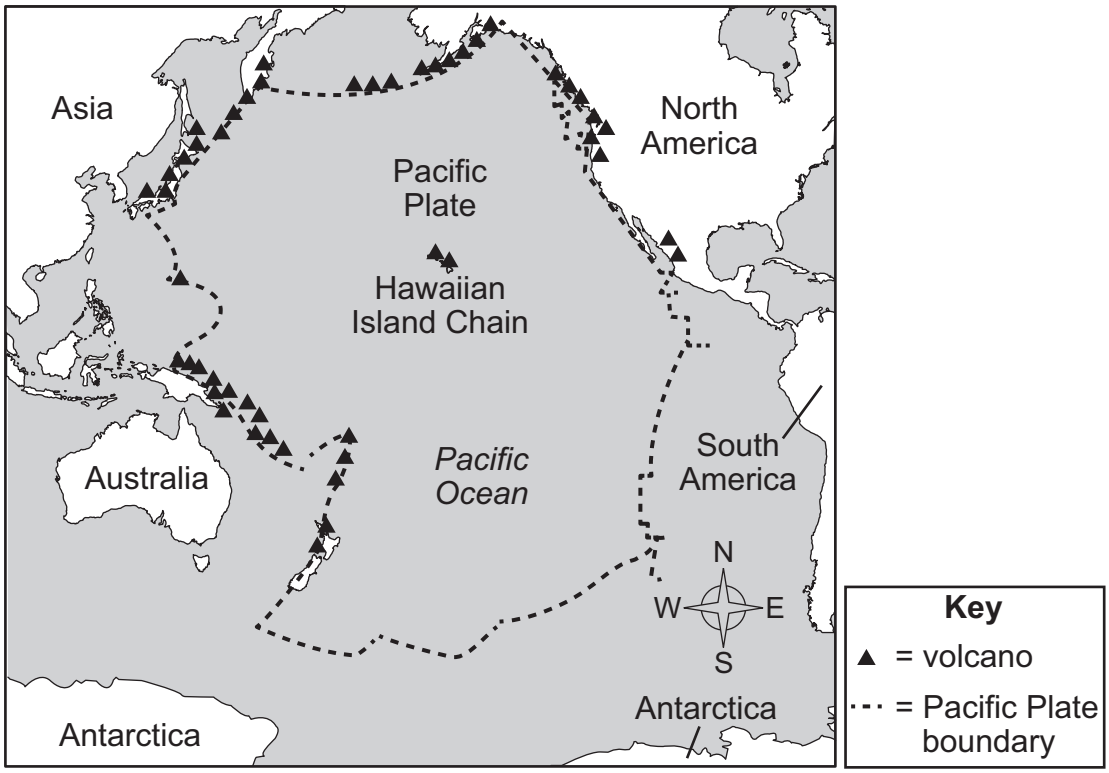
Indicator Alignment	8.E.6B.1
Indicator Description	Construct explanations for how biological adaptations and genetic variations of traits in a population enhance the probability of survival in a particular environment.
Answer Key	D
Depth of Knowledge	2
Estimated Difficulty	**High Difficulty**

Volcanoes

Volcanoes are geologic features that can be both dangerous and intriguing. Scientists regularly collect seismic data to measure characteristics of gases being released by volcanoes. They also research processes occurring along plate boundaries to better understand volcanoes and their eruption patterns. These boundaries include areas where plates are coming together, moving apart, or sliding past one another. The edges of various sections of the Pacific Plate contain all three types of plate boundaries.

Volcanoes form at plate boundaries and also at hot spots, which are areas on Earth's surface directly above a mantle plume, or a section of magma. One example of a volcanic hot spot is the Hawaiian Island Chain, located in the middle of the Pacific Plate, as shown in the first map below.

Pacific Plate Volcanoes

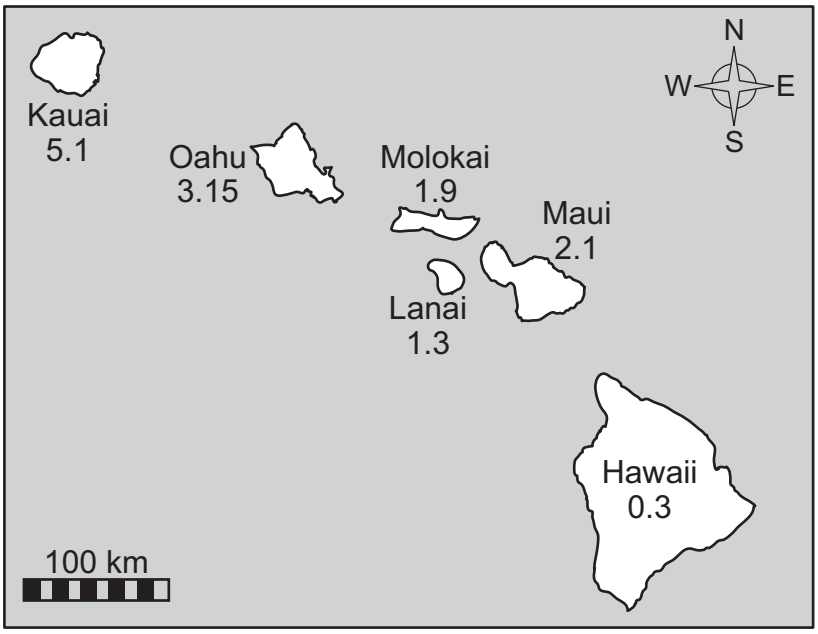


The second map shows part of the Hawaiian Island Chain and the estimated age of each island.

Continued ☞

Sample

Formation of Islands in the Hawaiian Island Chain
(millions of years ago)



By studying the ages of the Hawaiian Islands, scientists are able to confirm Pacific Plate movement across the hot spot over time.

19. A student studied the maps in the passage to better understand the pattern of hot spot activity related to the formation of the Hawaiian Island Chain. The student estimated that the Pacific Plate moved 90 kilometers over a time period of one million years.

Using the student's estimate, what is the average speed of the Pacific Plate over time in centimeters per year?

A. 0.9 centimeters per year

B. 9.0 centimeters per year

C. 90.0 centimeters per year

D. 900.0 centimeters per year

SCPASS Sample Item 19

Indicator Alignment	8.S.1A.5 (8.E.5B.1)
Indicator Description	Use mathematical and computational thinking to (1) use and manipulate appropriate metric units, (2) collect and analyze data, (3) express relationships between variables for models and investigations, or (4) use grade-level appropriate statistics to analyze data.
Answer Key	B
Depth of Knowledge	2
Estimated Difficulty	**High Difficulty**

20. Which statement **best** explains the conditions that cause volcanoes to form along the northern and southwestern edges of the Pacific Plate?

A. The movement of material in the mantle causes the formation of new rock in these areas.

B. The mantle has convection currents that cause the crust of two plates to collide in these areas.

C. The downward movement of cooling magma causes earthquakes to release energy in these areas.

D. The collection of magma below the plate boundary causes a subduction zone to form in these areas.

SCPASS Sample Item		
20	**Indicator Alignment**	8.E.5B.2
	Indicator Description	Construct explanations of how forces inside Earth result in earthquakes and volcanoes.
	Answer Key	B
	Depth of Knowledge	2
	Estimated Difficulty	**Medium Difficulty**