DESCRIPTION OF TEST FORMAT AND ORGANIZATION

The Grade 6 Science EOG assessment has a total of 75 selected-response (multiple-choice) items.

The test will be given in two sections.

- You may have up to 70 minutes per section to complete Sections 1 and 2.
- The total estimated testing time for the Grade 6 Science EOG assessment ranges from approximately 90 to 140 minutes.

CONTENT

The Grade 6 Science EOG assessment will measure the Grade 6 Science standards that are described at www.georgiastandards.org. The science items also relate to a Characteristics of Science standard. Because science consists of a way of thinking and investigating and includes a growing body of knowledge about the natural world, you will need to understand the Characteristics of Science standards and the Content standards for Science. The Characteristics of Science and Nature of Science standards can also be found at www.georgiastandards.org.

The content of the assessment covers standards that are reported under these domains:

- Astronomy
- Geology
- Hydrology and Meteorology

ITEM TYPES

The Science portion of the Grade 6 EOG assessment consists of selected-response (multiple-choice) items only.
SCIENCE DEPTH OF KNOWLEDGE EXAMPLE ITEMS

Example items that represent applicable DOK levels of the Science assessment are provided for you on the following pages. The items and explanations of what is expected of you to answer them will help you prepare for the test.

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

Example Item 1

DOK Level 1: This is a DOK level 1 item because the question requires the student to recall information concerning a known relationship between scientific quantities.

Science Grade 6 Content Domain: Astronomy

Standard: S6E1. Students will explore current scientific views of the universe and how those views evolved. a. Relate the Nature of Science to the progression of basic historical scientific models (geocentric, heliocentric) as they describe our Solar System, and the Big Bang as it describes the formation of the universe.

Standard: S6CS5. Students will use the ideas of system, model, change, and scale in exploring scientific and technological matters. b. Identify several different models (such as physical replicas, pictures, and analogies) that could be used to represent the same thing, and evaluate their usefulness, taking into account such things as the model’s purpose and complexity.
Which scientific theory does the model illustrate?

A. Big Bang
B. geocentric
C. heliocentric
D. steady state

Correct Answer: B

Explanation of Correct Answer: The correct answer is choice (B) geocentric. The geocentric model was a popular model in Ancient Greece and other cultures. It described the Sun, planets, and Moon as all revolving around Earth. Choices (A) and (D) are incorrect because the Big Bang theory and steady state theory are both models of how the universe was created. Choice (C) is incorrect. The heliocentric model replaced the geocentric model. It places the Sun as the center of the solar system with all the bodies orbiting around the Sun.
Example Item 2

**DOK Level 2:** This is a DOK level 2 item because the question requires the student to apply learned information to abstract and real-life situations.

**Science Grade 6 Content Domain:** Geology

**Standard:** S6E5. Students will investigate the scientific view of how Earth’s surface is formed. a. Compare and contrast Earth’s crust, mantle, and core including temperature, density, and composition.

**Standard:** S6CS6. Students will communicate scientific ideas and activities clearly. c. Organize scientific information using appropriate tables, charts, and graphs, and identify relationships they reveal.

A teacher provides his students with this table that contains information about Earth’s layers.

<table>
<thead>
<tr>
<th>Layer</th>
<th>Temperature Range (°C)</th>
<th>Average Density (g/cm³)</th>
<th>Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4,400–6,100</td>
<td>11.1</td>
<td>liquid nickel and iron</td>
</tr>
<tr>
<td>2</td>
<td>200–400</td>
<td>3.0</td>
<td>solid rock</td>
</tr>
<tr>
<td>3</td>
<td>5,000–7,000</td>
<td>12.8</td>
<td>solid nickel and iron</td>
</tr>
<tr>
<td>4</td>
<td>500–4,000</td>
<td>4.5</td>
<td>molten rock</td>
</tr>
</tbody>
</table>

Which layer is Earth’s outermost layer, and which is Earth’s innermost layer?

A. Layer 1 is the outermost layer; layer 4 is the innermost layer.

B. Layer 4 is the outermost layer; layer 1 is the innermost layer.

C. Layer 3 is the outermost layer; layer 2 is the innermost layer.

D. Layer 2 is the outermost layer; layer 3 is the innermost layer.

**Correct Answer:** D

**Explanation of Correct Answer:** The correct answer is choice (D) Layer 2 is the outermost layer; layer 3 is the innermost layer. The crust, which is the outermost layer, is made of solid rock with an average density of 3.0 g/cm³ and a temperature range of 200°C to 400°C. The inner core, which is the innermost layer, is made of solid nickel and iron with an average density of 12.8 g/cm³ and a temperature range of 5,000°C to 7,000°C. Choices (A), (B), and (C) are incorrect because they do not identify the layers correctly.
Example Item 3

**DOK Level 3:** This is a DOK level 3 item because the question requires the student to make choices based on a reasoned argument.

**Science Grade 6 Content Domain:** Hydrology and Meteorology

**Standard:** S6E4. Students will understand how the distribution of land and oceans affects climate and weather. b. Relate unequal heating of land and water surfaces to form large global wind systems and weather events such as tornadoes and thunderstorms.

**Standard:** S6CS5. Students will use the ideas of system, model, change, and scale in exploring scientific and technological matters. a. Observe and explain how parts are related to other parts in systems such as weather systems, solar systems, and ocean systems including how the output from one part of a system (in the form of material, energy, or information) can become the input to other parts (for example, El Niño’s effect on weather).

A city near the ocean experiences thunderstorms on a frequent basis. Which of these is the BEST explanation for this?

A. The cold fronts that form only over coastal areas cause thunderstorms.
B. The amount of sunshine received by coastal areas causes thunderstorms.
C. The uneven heating of land and water in coastal areas creates fronts that cause thunderstorms.
D. The interactions of the waves with the landmass change the air pressure to cause thunderstorms.

**Correct Answer:** C

**Explanation of Correct Answer:** The correct answer choice is (C) The uneven heating of land and water in coastal areas creates fronts that cause thunderstorms. There is increased moisture in the air over the city due to the ocean’s presence. Breezes created by the uneven heating of land and water can move the moisture-filled air up, creating a front that produces a thunderstorm. Choice (A) is incorrect. Cold fronts and thunderstorms can be found in all areas of the country, not just in coastal ones. Choice (B) is incorrect. The amount of sunshine alone does not cause thunderstorms to form. Choice (D) is incorrect. Wave action does not cause changes in air pressure or formation of cold fronts.
SCIENCE CONTENT DESCRIPTION AND ADDITIONAL SAMPLE ITEMS

In this section, you will find information about what to study in order to prepare for the Grade 6 Science EOG assessment. This includes main ideas and important vocabulary words. This section also contains practice questions, with an explanation of the correct answers, and activities that you can do with your classmates or family to prepare for the test.

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

CONTENT DESCRIPTION

- Investigate how Earth’s surface is formed
- Recognize the significance of water in Earth processes
- Recognize how the distribution of land and oceans affects climate and weather
- Explore scientific views of the Solar System and the universe
- Explain different phenomena based on understandings of the effects of the relative position of the Earth, Moon, and the Sun
- Describe sources of energy, their uses, and conservation

CHARACTERISTICS OF SCIENCE STANDARDS

- Recognize the importance and value of developing hypotheses that lead to investigations
- Analyze scientific data and use it to support scientific explanations
- Draw conclusions based on analyzed data
- Use appropriate technology to observe phenomena, collect data about the phenomena, and measure physical quantities
- Test a hypothesis, keep records, and use safety procedures and appropriate tools and instruments
- Understand how science knowledge grows and changes
- Create models to explain or represent patterns of change and/or scale
- Communicate scientific ideas orally and in writing
- Organize scientific information in tables, charts, and graphs and identify relationships they reveal
- Question scientific claims and arguments effectively
Unit 1: Rocks and Minerals

In this geology unit, you will study rocks and minerals. You will learn about the rock cycle and the process of formation of sedimentary, igneous, and metamorphic rocks. You will study the physical properties of minerals and how they are formed.

KEY TERMS

Minerals can be identified by their physical properties, such as crystal structure, streak, one word color, cleavage, luster, and hardness. Minerals form under many conditions. Some molten materials like lava cool and leave iron ore behind. When liquids such as saltwater evaporate, the mineral salt is left behind. When liquids evaporate, such as ground water leaching through a cave, calcium deposits known as stalagmites and stalactites are left behind. Under high temperatures and pressures, minerals can be formed, such as when carbon is turned into diamonds deep in the mantle. (S6E5b)

Rocks are composed of one or more types of minerals. The rock cycle is a slow process through which rocks transform from one type to another. Here is an example of the rock cycle: Magma cools and turns into granite. The granite gets weathered and broken down. Over time it is eroded into the soil. That mixture ends up in a lake and the lake dries up. Over millions of years the pressure of other materials on top of the mixture creates sedimentary rock. This sedimentary rock is composed of the broken-down bits of granite and the sediments that the granite settled into. Limestone is an example of a sedimentary rock. (S6E5b, c)

Igneous rock is formed when magma or lava cools and turns solid. Because most lava contains silica, a naturally occurring mineral in molten form, most igneous rocks have a lot of silica in them. This tends to form crystals. If you look at a piece of granite, you can see the crystals that formed from the silica as the magma cooled. (S6E5c)

Metamorphic rock is formed when existing rock is changed. This change is caused by heat and very high pressure on the rock. Marble is an example of a metamorphic rock. When limestone is subjected to high heat and pressure, it changes into marble. (S6E5c)

Important Tip

Fossils are found in rock and are evidence of the environment changing over time. Fossils are found most often in sedimentary rock and rarely in metamorphic rock. Igneous rock does not contain fossils, because this type of rock forms as a result of the hardening of molten material originating deep within the earth. The size of fossils ranges from microscopic to large dinosaurs. Many fossils discovered on the surface of Earth are found in places that, millions of years ago, were lake beds, forests, and jungles. As Earth changed, these environments changed. Many dead organisms were buried by sediment, a process that creates sedimentary and metamorphic rock. Other beds of fossils can be found in areas where the earth was raised up and what was the bottom of bodies of water became hills and mountains. (S6E5c, e, f, g)
Sample Items 1–3

Item 1

On a trip to a river, a student found a rock. When she observed the rock more closely, she saw small particles, some shell fossils, and large particles.

What conclusion can she make about the rock with this information?

A. The fossils mean this is most likely a sedimentary rock.
B. The particle size means this is most likely an igneous rock.
C. More information is needed because the rock could be either igneous or metamorphic.
D. More information is needed because the rock could be either metamorphic or sedimentary.

Item 2

A group of students observe igneous rocks. Some of the rocks have small, fine grains while other rocks have large, coarse grains.

Which statement would MOST LIKELY explain this difference?

A. Some of the rocks were exposed to weathering.
B. Some rocks cooled faster than other rocks when they formed.
C. The rocks with larger grains were formed from larger sediments.
D. The rocks with larger grains experienced less pressure during formation.
Item 3

A class looks at a sandstone sample from a cliff near a river. The students identify it as a sedimentary rock. Then they discuss what happened to the rock during the rock cycle.

| Student 1: As hot, liquid rock cooled, it created new crystals. The temperature of the liquid rock determined the size of the minerals. |
| Student 2: Preexisting minerals that became unstable in high heat and pressure changed into new minerals to form the sandstone. |
| Student 3: Deep underground, the existing minerals crystalized and grew larger. |
| Student 4: Pieces of sand accumulated over time. The sand was buried under more layers and eventually compressed into a solid rock. |

Which student has the MOST accurate description?

A. Student 1  
B. Student 2  
C. Student 3  
D. Student 4
Unit 2: Weathering and Erosion

In this unit, you will learn about soil formation and erosion. You will study methods of conservation. You will look at the processes of chemical and physical weathering and their effects on rocks. You will study nonrenewable and renewable resources and recycling.

**KEY TERMS**

**Soil formation** happens when rock particles, minerals, organic matter, and water are combined. The amounts of each material can be different in different types of soil. Sandy soil has more rocks and minerals. Soils in swampy areas and rain forests have more broken-down organic matter and less rock particles and minerals. (S6E5f)

Wind, water, and ice all cause erosion. Erosion is the movement of soil and rock from one area to another. Humans can affect the rate of erosion. For example, poor farming practices such as overgrazing cattle or plowing too often make it easier for wind and water to erode soil faster. (S6E5f, i)

Conservation of natural resources is a term that refers to human practices that allow for careful, appropriate management of Earth’s resources by humans. Planting more ground cover and plowing different ways can help control erosion. Many different methods of conservation are used to control erosion. Reshaping land so the ground is not too steep slows down the speed of water on hills. This helps reduce erosion. (S6E5j)

Eroded soil eventually settles into layers known as horizons. Horizons differ based on the sources of their soil. (S6E5h)

After the eroded soil has compacted and cemented into rock over millions of years, scientists study it for evidence of geological events such as volcanoes and floods. (S6E5f)

Rocks are broken down into smaller pieces by a process known as weathering. When rocks are weathered, the particles created are then moved by erosion. (S6E5d, f)

One form of weathering is known as chemical weathering. This happens when chemicals interact with rocks to break them down into smaller pieces. Examples include rocks and minerals that are dissolved in acidic water and the rusting of iron. (S6E5d)

Another form of weathering is known as physical weathering. This happens when rocks and minerals are broken down by physical means, such as ice or heat breaking rocks into smaller pieces. (S6E5d)

Any natural substance used by living things can be considered a natural resource. For example, minerals, such as copper and iron, are natural resources. Most minerals are nonrenewable resources. Nonrenewable resources either can never be replaced or can only be replaced over very long periods of time. Most metals are examples of minerals that cannot be easily replaced. This is why it is important to recycle metals. Other nonrenewable resources include coal, natural gas, oil, and nuclear fuel. (S6E5j, S6E6b)

Renewable resources are resources that can be replaced in the space of a human lifetime. Renewable resources include water, sunlight, wind, and plants. (S6E5j, S6E6b)
Important Tip

Waves can erode shorelines as well as many structures that humans put along coastlines. Erosion would normally carry a certain amount of sediment away from and toward a coastline. Because of human activity, the depth of the water along coastlines can get more shallow as sediment from human activity builds up under the water. The water is still pushed and pulled along the coastlines by oceans and lakes. Because the water has more energy, the water can move more sediment. The water can also create waves that move farther inland. When this happens, the water can erode the soil from the bottom of hills. This can lead to landslides and rockslides. (S6E5i, j)
Sample Items 4–6

Item 4

A group of students visited a farm. The farmland had a gentle slope to it. The farmer had straight rows of cotton planted. As he showed the students the crops, he explained that he was concerned about the amount of soil erosion he was experiencing due to runoff. After returning to school, the class discussed ways to prevent erosion.

Which method would MOST LIKELY prevent the MOST soil erosion due to runoff?

A. use crop rotation
B. plant a wind break
C. reestablish forest cover
D. practice contour farming

Item 5

Students analyze the characteristics of various soil samples. They discover decaying leaves in some of the samples. The students disagree about whether the leaves should be included as part of the sample.

Which statement is the BEST reason for including the leaves?

A. Soil is nonliving, so it should not include plant or animal remains.
B. Soil is made only of rocks that have been broken down over time.
C. Soil has different layers, and only the top layer is organic material.
D. Soil consists of weathered rocks and decomposed organic material.

Item 6

Students are studying fossils found in different layers of a cliff. The teacher explains that the fossils formed over long periods of time. The fossils found in the upper layers of the cliff show desert plants that hold and retain water. The fossils in the lower layers of the cliff show many tropical rainforest plants such as ferns.

Which conclusion MOST LIKELY explains these differences?

A. The climate in the location was drier during later time periods.
B. The climate in the location was colder during later time periods.
C. There was an increasing number of animals bringing new plants into the location during later time periods.
D. There was an increasing number of plant-eating animals in the location during later time periods.
Unit 3: Inside the Earth

In this geology unit, you will study Earth’s lithosphere, mantle, and core. You will also study the processes that are involved in the formation and destruction of Earth’s features such as mountains, volcanoes, continents, and oceans. You will learn about the movements of Earth’s tectonic plates and their effect on major geological events.

KEY TERMS

Earth is made of layers known as the crust, mantle, and core. The crust is the outermost layer—Earth’s surface (including that underneath the oceans). The layer below the crust is the mantle. Below the mantle is Earth’s core, which has two parts: the outer core and the inner core. The temperature and density increase towards the center of Earth. The layers have different compositions: rocky, metallic, solid, liquid, partially solid. (S6E5a)

The top part of the mantle is cooler than the rest, and it is somewhat brittle. This part of the mantle, along with the crust, makes up Earth’s lithosphere. The lithosphere is broken into several pieces of different sizes, called tectonic plates. Tectonic plates move around on the liquid layers below the lithosphere. These plates form sections of the surface of Earth. Some plates move toward or away from each other. (S6E5a, e)

Magma is the molten rock below Earth’s crust. This molten rock is extremely hot. Density and temperature variations cause convection (the process by which matter rises or sinks due to differences in temperature) to occur. This leads to convection currents in which the magma moves in a slow, cycling manner below the lithosphere. Earth’s hot, dense core heats the magma. This hotter magma rises toward the lithosphere. As the magma rises, the cooler, denser magma above it sinks toward Earth’s core. The magma that rises then cools and becomes denser as it gets closer to the lithosphere. This cooler, denser magma then sinks as the hotter, less dense magma below it rises. It is this continuous sinking and rising of magma that forms convection currents. (S6E5a)

The area where two or more plates meet is known as a plate boundary. A fault occurs when Earth’s crust is fractured by the forces that result from the movement of tectonic plates at plate boundaries. Some tectonic plates will push against each other, causing the land to buckle and fold. This process can create hills and mountains. The Himalaya Mountains in Asia formed due to this type of plate interaction. (S6E5e, f)

The process in which one plate slides below the other is known as subduction. This may force the plate on top to rise up. A volcano can result if this occurs between a continental plate and an oceanic plate. When subduction happens between two oceanic plates, a trench can result. When tectonic plates slide past each other instead of colliding, earthquakes can result. This is known as a transform boundary. (S6E5e, f)

On some areas of Earth, tectonic plates are moving away from each other. This allows magma to rise to the surface as the plates move apart. This magma cools to become new lithosphere. This new rock forms mid-ocean ridges where the plates move apart below the ocean. Along the center of a mid-ocean ridge is a rift valley. Rift valleys can also be found where continental plates are moving apart. Because the crust is thinner at these areas, volcanoes and earthquakes often occur near rift valleys. (S6E5e, f)
The theory of **continental drift** explains that the continents are slowly moving on the surface of Earth. Magma underneath tectonic plates is very dense, so the convection currents within the magma are very slow. The slow movement of the magma drags the plates, causing the plates to gradually change position over millions of years. (S6E5e, f)

When tectonic plates move, sudden shifts can occur at their boundaries. **Earthquakes** can result from these movements. The energy released as the plates shift creates seismic waves that move through the Earth. A **volcano** is a break in Earth’s crust that lets magma come out from below the lithosphere and onto Earth’s surface. Volcanoes can be found in the deep ocean and on Earth’s surface. Volcanic eruptions are a constructive process, because the cooling magma creates new lithosphere. (S6E5e, f)

**Important Tip**

ジョン The theory of continental drift was created by many scientists. The first scientist to present a more complete hypothesis, which was later confirmed to be a theory, was Alfred Wegener. As evidence that the continents are drifting, he cited findings from the fossil record. There are fossils of the same fern that can be found in South America, Africa, Antarctica, India, and Australia. There are also many fossils of animals that can be found on many different continents. The only ways those plants and animals could be found as fossils, on each continent is if those continents were all linked at some point. (S6E5e, f)
Sample Items 7–9

Item 7

A student is making a diagram of Earth’s layers.

How should the temperature be labeled on the different layers?

A. The crust would be hotter than the mantle.
B. The outer core would be hotter than the mantle.
C. The crust would be hotter than the inner core.
D. The outer core would be hotter than the inner core.

Item 8

In the early 1900s, a German scientist named Alfred Wegener hypothesized that the continents move on Earth’s surface. However, he never determined the mechanism by which this movement happens, and his hypothesis was not widely accepted. Later in the 20th century, other scientists determined that the ocean floor moves away from a mid-ocean ridge as magma rises through the rift. This magma solidifies to become new lithosphere.

How did this later discovery support Wegener’s hypothesis?

A. It showed that rifts are responsible for continental movement.
B. It showed that if the ocean floor moved, so could other land masses.
C. It showed that the continents were moving away from mid-ocean ridges.
D. It showed that mountain building, volcanoes, and earthquakes occur underneath the ocean.
Item 9

A group of students create different models showing the movement of lithospheric plates. One student creates this model.

What will MOST LIKELY be created if this movement continues?

A. fault  
B. trench  
C. rift valley  
D. river plain
Unit 4: Water in Earth’s Processes

In this unit, you will study the significance of water in many Earth processes. You will examine the water cycle and its relationship to various atmospheric conditions. You will study the composition, location, and subsurface topography of Earth’s oceans. You will learn about the causes of currents, waves, and tides. You will also study the role of the Sun as the ultimate source of wind and water energy, and you will learn how these energy resources are used and conserved.

KEY TERMS

In addition to being vital to life, water plays a significant role in many Earth processes. Almost 80% of Earth is covered by water. Salt water makes up 97% of all the water on Earth. Of the remaining water, 2% is frozen in ice caps and glaciers. The remaining 1% is fresh water. This is the only water humans can drink. (S6E3a)

Earth’s water is a natural resource used by humans. Because fresh water must be used for other human activities like farming, we must practice conservation of fresh water. There is a limited supply of fresh water on Earth. In times of drought, where there is little rain, humans need to make plans to conserve water, such as not watering lawns and filling pools. (S6E3a, S6E5j)

The water cycle is the process that moves water above, below, and around Earth in a cycle. The water cycle has four main stages: evaporation, condensation, precipitation, and collection. The Sun heats up liquid water and causes it to evaporate. The water vapor, which is a gas, then rises up into the atmosphere. When atmospheric conditions are right, the water vapor forms clouds as it cools. The clouds then release the water as precipitation, in the form of rain and snow. As the water runs off, it is collected into the ground and bodies of water. The Sun then heats the liquid water up, causing it to evaporate and the water cycle starts all over again. (S6E3b)

The subsurface topography of the ocean describes the features of the ocean floor. Much like there are hills and valleys on land, Earth below the sea is composed of many different geological features. There are flat valleys where sediment is deposited as it is eroded from rivers. There are mountains on the ocean floor. There are valleys that are not filled in with sediment. There are trenches that are very deep and thousands of kilometers long. There are also active and inactive volcanoes. (S6E5f)

A current is the continuous flow of ocean water. Currents can be described as either surface currents or deep-ocean currents. Many forces act on the flow of these currents. Waves, caused by the wind, act on surface currents. Differences in density, in temperature, and in salinity all have an impact on the flow of deep-ocean currents. (S6E5f)

Tides are caused by the gravitational pull from the Sun and Moon on the ocean water. (S6E5d)
Waves are created when wind moves across the surface of water and pushes the water. The energy from the wind is transferred to the water. Waves can also be created when the energy from the waves created by earthquakes is transmitted to the water in the oceans. (S6E5d)

**Important Tip**

The amount of salt in the ocean, also known as salinity, is largely caused by the runoff from rivers and streams that carry minerals into the oceans. Salt is a mineral and can be found in soil and rocks. The runoff of water has carried and continues to carry salt into the ocean. Salt water is dangerous for humans to drink. Our bodies have a safe level of salts in them. When people drink salt water, their body will try to get rid of the excess salt by making more water leave their body, largely through urine. This is why you should never drink salt water when stranded at sea. You may be thirsty, but by drinking salt water, you will make yourself thirstier. Without enough water, your cells and organs cannot function properly. (S6E3)
Sample Items 10–12

Item 10

A student reads an adventure novel. In the novel, a deep-diving research submarine has a problem while in the deepest part of the ocean.

Which part of the ocean will the student find listed as the deepest in her science textbook?

A. The ocean basin is the deepest point.
B. The oceanic trench is the deepest point.
C. The continental rise is the deepest point.
D. The continental shelf is the deepest point.

Item 11

Passengers on a ship observe that waves are moving in the opposite direction of the wind near the ship. Later, the wind becomes stronger and moves in the same direction as the waves. The captain tells the passengers that the ship is passing through a major current in the ocean.

What should the passengers conclude about how the ocean was changed by the wind?

A. The waves will get bigger because wind causes waves.
B. The current will increase because wind causes the current.
C. The current will decrease because wind works against the current.
D. The waves will get smaller because wind works against the waves.
Item 12

A class created the following diagram of the water cycle to show how the parts of the water cycle work together as a whole.

The students want to add information about the type of precipitation that falls. Which would be MOST useful in predicting the type of precipitation that will fall?

A. whether the precipitation occurs over land or ocean
B. the air pressure measurement in the precipitation area
C. the number of droplets in the clouds in the precipitation area
D. how the temperature changes between the surface and the clouds
Unit 5: Climate and Weather

In this unit, you will study climate, weather, and weather patterns. You will learn about global winds, air masses, weather fronts, and pressure systems. You will examine tornadoes and hurricanes.

KEY TERMS

When people talk about weather, they are talking about the conditions in the atmosphere at a specific time. Conditions that describe the weather include the temperature, humidity, and amount of wind. For example, the temperature in Georgia on January 5 was 41°F. This is an example of the weather of Georgia. (S6E4)

When people talk about climate, they are talking about the average of the conditions in the atmosphere in an area over a long period of time. To compare the two, think about the temperature. In January, Georgia averages a temperature of about 39°F. This is an example of the climate of Georgia. (S6E2c)

As Earth orbits around the Sun, Earth rotates on its axis. Earth’s axis tilts toward or away from the Sun. Light from the Sun heats up Earth. When the Northern Hemisphere of Earth is tilted toward the Sun, it receives more direct light from the Sun. At the same time, the Southern Hemisphere receives less direct light from the Sun. Because of this effect, when the Northern Hemisphere is having summer, the Southern Hemisphere is having winter. (S6E2c, S6E4a, S6E6a)

The formation of weather patterns is caused by the uneven heating patterns that Earth experiences as it rotates on its tilted axis in its orbit around the Sun. This causes a transfer of energy as light from the Sun heats up air. The heated air rises from the equator and moves to cooler regions to the north and south. This effect creates the six convection currents, also known as global winds, which cover Earth. (S6E4b, S6E6a)

The global winds move from the center of Earth to the north and south due in part to the rotation of Earth. The Coriolis force causes the winds to shift clockwise and counterclockwise, depending on the hemisphere. An object on the surface of Earth will rotate faster at the equator than at other latitudes. This difference in speeds causes the air masses moving away from the equator to not follow a straight line. Because of this, wind that is moving from the equator up to the North Pole will bend counterclockwise as it moves north, and wind that is moving from the equator to the South Pole will bend clockwise as it moves south. (S6E4b)

Convection is the process by which air or other matter rises or sinks due to differences in temperature and density. Uneven heating of air produces convection currents that push air masses around different regions of Earth. An air mass is a large body of air in which temperature and moisture levels are similar throughout. Air masses cover large areas of Earth. Each air mass has different characteristics. Air masses that form over the polar regions are drier and colder. Air masses that form over tropical areas are moister and warmer. (S6E4b)

Areas where two different air masses meet are called weather fronts. On a weather map, warm fronts are usually shown as red arcs. These warm fronts replace cold fronts. Cold fronts are usually shown as blue arcs. These cold fronts replace warm fronts. (S6E4b)
Meteorologists often talk about **high- and low-pressure** systems when they talk about weather. In a low-pressure system, the air is pushed toward the center of the system. Because the air has nowhere to go but up, the air rises. This causes water to condense and clouds to form. In a high-pressure system, air moves away from the center and the air is pushed down. This causes clouds to break up and makes for sunnier weather. (S6E4b, c)

**Tornadoes** largely form over flatter areas of earth. When a cold air mass rises at the same time and in the same area as a warm air mass, the two air masses start spinning horizontally. As air masses move up, the spinning air mass is tilted so it is vertical. The spinning air mass touches one end down to Earth and it is a tornado. Most tornadoes in the United States occur east of the Rocky Mountains. Most tornadoes only last a short time. **Hurricanes** only form over oceans that are warmer than 80°F (26.7°C). They are much larger than tornadoes and can last for more than a week. Like a tornado, hurricanes are formed when rotating air masses start to move. Light winds push the rotating air masses. As a hurricane moves over the ocean, it picks up moisture from the ocean. At the same time, the hurricane picks up more energy from the movement of the air masses and the hurricane grows in size. (S6E4b)

Evaporation has an effect on the salinity of a body of water. When water evaporates, it leaves behind the salts that it contains. This causes an increase in the salinity of the body of water. (S6E4c)

**Important Tip**

When trying to make sense of how weather is created, always remember that the Sun is the source of energy for the whole system. Light energy warms the soil and water on Earth unevenly, and this creates warmer and cooler regions. This causes the movement of air and water throughout regions of Earth. Changes in moisture level and air temperature can affect weather patterns, sometimes producing extreme events such as hurricanes. (S6E4c)
Sample Items 13–15

Item 13

Scientists study four areas to analyze the possibility of a future hurricane. They measure the Sea Surface Temperature (SST) in degrees Celsius (°C) at the same position in each area once a week for three weeks.

<table>
<thead>
<tr>
<th></th>
<th>SST 1</th>
<th>SST 2</th>
<th>SST 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area A</td>
<td>26°C</td>
<td>28°C</td>
<td>29°C</td>
</tr>
<tr>
<td>Area B</td>
<td>30°C</td>
<td>29°C</td>
<td>27°C</td>
</tr>
<tr>
<td>Area C</td>
<td>20°C</td>
<td>21°C</td>
<td>20°C</td>
</tr>
<tr>
<td>Area D</td>
<td>8°C</td>
<td>6°C</td>
<td>7°C</td>
</tr>
</tbody>
</table>

Based on the information in the table, which area is MOST LIKELY to develop a hurricane in Week 2 or Week 3?

A. Area A
B. Area B
C. Area C
D. Area D

Item 14

A student is using a scientific website to do research on the unequal heating of land and water surfaces. She discovers that during the day, the land near the Georgia coast gets warmer faster than the nearby water.

Which of these is the MOST LIKELY result of this uneven heating?

A. doldrums
B. land breeze
C. sea breeze
D. trade winds
**Item 15**

Some students have created the following drawing of a tornado. Their teacher has asked them to expand on their drawing by including the type of weather conditions that would need to be present in order for tornadoes to occur.

What type of conditions should the students describe for a tornado to form as shown in the diagram?

A. They should show that it is a sunny but cool day.
B. They should show a winter storm that includes a lot of snow.
C. They should show a strong thunderstorm with a lot of wind present.
D. They should show that the temperature is above twenty-five degrees Celsius.
Unit 6: Universe and Solar System

In this unit, you will explore the universe and learn about how scientists think it came into being. You will learn about galaxies, constellations, and our own Solar System. You will compare the geocentric and heliocentric models and learn how scientists moved from one to the other as they improved their understanding of our Solar System. You will also learn about the role that the force of gravity plays in shaping the universe as we see it.

KEY TERMS

The Big Bang theory states that the universe started as a result of one giant explosion. According to this theory, the universe started from a single point in time and space. All the matter and energy in the universe was released in this explosion. The universe is constantly expanding away from the single point that is the center of the universe. (S6E1a)

The universe is made up of matter and energy. Most of the matter in the universe is concentrated in large structures called galaxies. Galaxies are composed of stars, gas, dust, dark matter, and solar systems. Our Solar System is contained in a galaxy known as the Milky Way. (S6E1b)

Until the mid-1600s, people believed in the geocentric model: that Earth (geo) was the center (centric) of the universe. It was believed that the Sun and planets revolved around Earth. People believed this model was correct for a number of reasons. One reason often cited was that the place where one stands does not appear to move while the Sun, Moon, and planets appear to move around Earth. (S6E1a)

The heliocentric model replaced the geocentric model. The heliocentric model states that the Sun (helio) is the center (centric) of the universe and that Earth and other planets revolve around the Sun. Scientists used mathematical models to support the heliocentric model. Scientists such as Galileo Galilei used telescopes to confirm the hypotheses predicted by the mathematical models. (S6E1a)

Isaac Newton’s mathematical models described the motion of the planets. He showed that the gravitational force between the Sun, planets, and other objects in space affected the motion of the planets. Newton’s work also explained how gravitational attraction between bodies in space affected the movements of those bodies. (S6E1e)

Our Solar System is made up of the Sun and all the objects that orbit the Sun. The largest objects that orbit the Sun are the planets. Inner planets are all composed of rock, have few to no moons, and do not have ring systems. The inner planets of the Solar System are Mercury, Venus, Earth, and Mars. (S6E1c)

The outer planets refer to the gas giants—planets farther from the Sun that are mostly made up of gases and liquids. The outer planets all have ring systems that orbit around each planet. The outer planets of the Solar System are Jupiter, Saturn, Uranus, and Neptune. (S6E1c)

The Solar System also includes dwarf planets. Dwarf planets are round and orbit the Sun. But unlike other planets, dwarf planets cannot clear other objects out of their orbital paths. Dwarf planets are small—some are smaller even than our Moon. Pluto is the best-known dwarf planet.
Between the inner and outer planets is the **asteroid belt**. When the Solar System was formed, bits of solid matter smaller than planets ended up in a zone between the inner and outer planets. This zone is an area where the pull of gravity between the Sun and Jupiter, the closest outer planet to the asteroid belt, is equal. The matter in this zone cannot join together to form planets. (S6E1f)

**Asteroid** is a term used to describe solid material, often made of rock, found in the asteroid belt. The smallest asteroids are the size of small dust. The largest asteroid is about the size of Georgia. (S6E1f)

**Comets** are bodies made of ice and dust that orbit the Sun. Many comets are created beyond the orbit of Jupiter and even outside our Solar System. Most comets have tails, which are created when the ice melts and trails behind the comet as it orbits the Sun. (S6E1f)

A **meteor** is a piece of comet or asteroid that enters Earth’s atmosphere. As it falls toward the earth at great speed, the atmosphere creates friction with the meteor. This creates a streak of light and heat. Before a meteor enters Earth’s atmosphere, it is known as a **meteoroid**. The remains of a meteor that hits Earth is known as a **meteorite**. (S6E1f)

A **revolution** is the movement of a body in an orbit around another body. Planets in our Solar System revolve around the Sun. A **rotation** is the movement of a body around a central axis. A spinning top rotates around its axis. (S6E1)

**Important Tip**

Remembering the relative position of each planet in the Solar System can be difficult. People often remember the phrase “My Very Eager Mother Just Served Us Nachos.” Each word represents the name of a planet, in order from the Sun and moving outward. “My” represents Mercury, “Very” represents Venus, “Eager” represents Earth, “Mother” represents Mars, “Just” represents Jupiter, “Served” represents Saturn, “Us” represents Uranus, and “Nachos” represents Neptune. (S6E1c)
Sample Items 16–18

Item 16

A student creating a science fiction story writes about an asteroid as a small body of rock and metal that has a large dust tail when it orbits the Sun. Another student refers to a science textbook to determine if this is an accurate description.

Which part of the story’s description of asteroids would the science textbook disagree with?

A. The asteroid orbits the Sun.
B. The asteroid is a small body.
C. The asteroid has a large dust tail.
D. The asteroid is made of rock and metal.

Item 17

The Sun is the largest object in the Solar System, and the planets and other objects in the Solar System all revolve around it.

What would happen to the orbits of the planets if the amount of gravity produced by the Sun were reduced to almost zero?

A. The planets would continue to orbit as usual.
B. The planets would start crashing into each other.
C. The planets would eventually float off into space.
D. The planets would stay in a fixed position in space.
**Item 18**

Students created a chart to compare and contrast the planets.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mars</td>
<td>Jupiter</td>
</tr>
<tr>
<td>Venus</td>
<td>Saturn</td>
</tr>
<tr>
<td>Earth</td>
<td>Uranus</td>
</tr>
<tr>
<td>Mercury</td>
<td>Neptune</td>
</tr>
</tbody>
</table>

Which of these BEST describes how the planets are grouped?

A. Column A planets can support life, while Column B planets cannot.
B. Column A planets are rocky, while Column B planets are mostly gas.
C. Column A planets are farther from the Sun, while Column B planets are closer to the Sun.
D. Column A planets have thick atmospheres, while Column B planets have thin atmospheres.
Unit 7: Earth, Moon, and Sun

In this unit, you will study the effects of the relative position of the Earth, Moon, and Sun on phenomena that we observe and experience here on Earth. You will learn about the phases of the Moon, what causes an eclipse, and the relationship between the tilt of the Earth’s axis and the seasons.

**KEY TERMS**

The Moon appears to change shape because of its relative position in respect to Earth and the Sun as it orbits Earth. The phases of the Moon are created by how much of the Moon is lit up and visible from Earth. During the new moon phase, the Moon is between Earth and the Sun. This means that sunlight is lighting the side of the Moon facing away from Earth. From our position on Earth, the Moon is not lit. Fourteen days later, the Moon has rotated around Earth. Earth is now between the Sun and the Moon, and light from the Sun lights the side of the Moon facing Earth. This is known as a full moon. Each day within each fourteen-day cycle, a little more or a little less of the Moon is lit up. (S6E2a)

As Earth orbits around the Sun, Earth rotates on its axis. The tilt of Earth’s axis is toward or away from the Sun. Light from the Sun heats up Earth. When the Northern Hemisphere of Earth is tilted toward the Sun, it receives more direct light from the Sun. At the same time, the Southern Hemisphere receives less direct light from the Sun. Because of this effect, when the Northern Hemisphere is having summer, the Southern Hemisphere is having winter. (S6E2b)

The gravity of the Moon pulls on Earth. As the Moon rotates around Earth, the gravity from the Moon pulls on the water on the oceans. This causes water in oceans, and other bodies of water like lakes, to rise and fall. People refer to the rising and falling of bodies of water as a result of this effect as tides. (S6E1d)

A **lunar eclipse** happens when the Moon passes directly behind Earth and into the shadow of Earth created by the Sun. Lunar eclipses can last for a couple hours and are safe to look at. (S6E2b)

A **solar eclipse** happens when the Moon passes between Earth and the Sun. Solar eclipses only last a few minutes. A solar eclipse will cause the temperature of Earth to get colder as the eclipse passes through an area. Solar eclipses are not safe to look at unless you are wearing the proper protective gear or equipment. (S6E2b)

**Important Tip**

During the phases of the Moon, the Moon is said to be waxing or waning. This refers to the increase or decrease of the amount of area of the Moon being lit by sunlight. The term “wax” comes from “to grow.” A waxing moon is a Moon whose lit portion is increasing each day until the Moon is fully lit. The term “wane” comes from “to be less than.” A waning moon is a Moon whose lit portion is decreasing each day until the Moon is completely unlit. (S6E2a)
Sample Items 19–21

Item 19

A class is creating a series of posters to share what they have learned about Earth and the Solar System.

According to the “X” on the diagram, what season is currently being experienced by the Northern Hemisphere, and how much light is it receiving?

A. It is fall and there is a lot of light.
B. It is summer and there is little light.
C. It is spring and there is a lot of light.
D. It is winter and there is very little light.
**Item 20**

The diagram shows the phases of the Moon as they are seen from the surface of Earth.

Based upon this diagram, which numbers represent the first and third quarter phases of the Moon?

A. Numbers 1 and 5  
B. Numbers 3 and 5  
C. Numbers 3 and 7  
D. Numbers 5 and 7
Item 21

Four students used the diagram to study the relationships in the Earth-Moon-Sun system.

Each student drew a conclusion based on the diagram.

Student 1: The Moon is passing through Earth’s shadow.
Student 2: The Moon is blocking the light from the Sun.
Student 3: The Moon will be in an eclipse.
Student 4: The Sun will not be visible from Earth.

Which students are correct?

A. Student 1 and Student 2  
B. Student 2 and Student 3  
C. Student 1 and Student 3  
D. Student 2 and Student 4
Unit 8: Human Impact

In this unit, you will examine nonrenewable and renewable resources and energy sources on Earth. You will learn about fossil fuels and biomass. You will compare solar, wind, and thermal energy. You will evaluate conservation strategies.

KEY TERMS

**Nonrenewable resources** are resources that can only be replaced over very long periods of time. Oil and coal are examples of nonrenewable resources. Millions of years ago the remains of marine plants, animals, and microorganisms became compressed and slowly turned into oil and coal. (S6E6b)

**Renewable resources** are resources that can be replaced in the space of a human lifetime. Renewable resources include sunlight, wind power, and plants. (S6E6b)

The Sun is the major source for all energy sources on Earth. Light from the Sun provides the energy for the wind systems that move air around Earth. Light from the Sun also provides the energy for the systems that move water around Earth. In addition, energy from the Sun is used by plants to power processes that produce the substances necessary for growth. (S6E6a)

Millions of years ago, plants began converting energy from the Sun into their own energy. Other organisms ate some of those plants. When those plants and animals became buried under rock, they eventually became oil and coal. Thus, the energy from oil and coal started as energy from the Sun. Fuels that come from ancient plants and animals are known as **fossil fuels**. Fossil fuels contain a lot of carbon. Because fossil fuels contain a lot of carbon, along with hydrogen and oxygen, they burn easily. The three major fossil fuels are oil, coal, and natural gas. Because of the millions of years it takes for fossil fuels to form, they are considered nonrenewable. (S6E6a)

Fuel that is produced from **biomass** is a renewable resource. Biomass refers to biological energy sources such as plant materials, manure, sawdust, paper waste, and other organic materials. For example, corn can be converted into ethanol, a type of alcohol that can be used as fuel. Biodiesel is made from old frying oil and is used in vehicles that burn diesel, a fuel that is usually made from fossil fuels. (S6E5j, S6E6b)

**Solar** energy is energy that Earth receives from the Sun. Scientists are working to develop ways to capture more of this energy. Buildings in colder areas can be designed to trap more solar energy. In areas that are warmer, buildings can be designed to reduce the amount of solar energy that heats the buildings. Because the building in a colder area would retain more heat from the Sun, less energy from electrical and gas sources would be needed to keep it warm. The building in the warmer area would retain less heat from the Sun, and so less energy would be needed to cool it. Such conservation strategies, which help to preserve and protect resources, reduce the amount of energy needed to keep the buildings at comfortable temperatures. (S6E6a, b)
Hydroelectric energy is another source of renewable energy. Dams are built on large rivers to slow the flow of water and create lakes, and water is allowed to flow out at the bottom of the dam. The energy of the moving water turns turbines that are connected to generators which convert this into electrical energy. The advantage of hydroelectric power generation is that it uses a renewable resource to produce electricity. A disadvantage is that lakes were created in places where people lived, so they had to be moved to other locations. Another disadvantage is that sometimes fish would use places further up the river as places to reproduce and they either died out or the dams had to have special structures built to allow the fish to go upstream past the dam. (S6E6a, b)

Wind energy is another source of renewable energy. For hundreds of years, humans have used windmills to capture energy from the wind to power grain mills. As humans rely more on electrical energy, they have started to generate electricity from wind energy using wind turbines (mechanical windmills). Wind farms are areas where many wind turbines are set up to generate electricity. They are often built on coastland, where there is an abundance of wind, and on farmland. The advantage of wind turbines is that they use a renewable resource to produce electricity. But there are also disadvantages. Birds and bats can die after flying into a turbine’s blades. Wind turbines are also loud, contributing to noise pollution where they are located. (S6E6a, b)

Geothermal energy is a source of renewable energy that is extracted from the ground. In areas of the world where the heat from Earth is closer to the surface, machinery is built that helps pull up heat from below the surface of Earth. The heat is brought up to a turbine where the heat helps spin a turbine. The turbine spins a generator and electricity is generated. (S6E6b)

Important Tip

When thinking of ways people use conservation strategies and develop new energy sources, it is always good to remember that there are always advantages and disadvantages to everything. Fossil fuels have the advantage of having a high-energy capacity. The disadvantage is that fossil fuels are nonrenewable, and they produce a lot of pollution that affects environments. Solar energy has the advantage of being renewable and in great supply, but the disadvantage is that the Sun doesn’t always shine. Fuel from biomasses has the advantage of being renewable and a great way to recycle materials. The disadvantage is that fuels that come from biomasses tend to have a lower-energy capacity. (S6E5j, S6E6a,b)
Sample Items 22–24

Item 22

Students made a list of energy resources available in their state.

<table>
<thead>
<tr>
<th>Energy Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
</tr>
<tr>
<td>Wind</td>
</tr>
<tr>
<td>Oil</td>
</tr>
<tr>
<td>Solar</td>
</tr>
<tr>
<td>Biomass</td>
</tr>
<tr>
<td>Natural gas</td>
</tr>
<tr>
<td>Hydroelectric</td>
</tr>
</tbody>
</table>

They want to sort the resources into those that are easily replaced and those that are not. Which question will BEST help them sort the resources?

A. Are they unlimited?
B. Are they renewable?
C. Are they pollution-free?
D. Are they naturally occurring?
Item 23

Scientists are interested in the influence of the Sun on Earth. They study the temperatures of the air and ground in the larger geographic area surrounding a wind farm (an area with many windmills used to generate electricity). Earlier in the year, there was a 20 degree difference between the temperatures on the ground and the temperatures in the air. However, their recent measurements show only a 10 degree difference.

What might this MOST LIKELY mean for the local winds that power the farm?

A. The local winds will stop moving because the Sun is no longer fueling the wind.
B. The local winds will be stronger because the temperature difference has dropped.
C. The local winds will increase in intensity because there is unequal heating of the land and air.
D. The local winds will decrease in intensity because the Sun is heating the ground and the air more uniformly.
Item 24

A new electricity company claims that the electricity it provides is generated completely through the use of renewable resources. However, a visit to the company’s plant reveals that it uses coal-powered generators to power the machines that extract geothermal energy from the ground.

Which of these is the BEST reason why an environmental group might dispute the electricity company’s claims?

A. Geothermal energy is nonrenewable. Therefore, the company cannot claim it uses only renewable resources to generate electricity.

B. Coal is a nonrenewable resource. Therefore, the company cannot claim it uses only renewable resources to generate electricity.

C. Electricity can only be generated using nonrenewable resources. Therefore, the company cannot claim it uses only renewable resources.

D. Electricity can only be generated using renewable resources. Therefore, the company cannot be producing electricity if it uses coal-powered generators.
### SCIENCE ADDITIONAL SAMPLE ITEM KEYS

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard/Element</th>
<th>Characteristics of Science</th>
<th>DOK Level</th>
<th>Correct Answer</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>S6E5c</td>
<td>S6Cs9a</td>
<td>2</td>
<td>A</td>
<td>The correct answer is choice (A) The fossils mean this is most likely a sedimentary rock. Igneous rocks are rocks formed from melted rock, so there would be no fossils. Choice (B) is incorrect as igneous rocks do not contain fossils or sediments. Choices (C) and (D) are incorrect as metamorphic rocks normally do not contain fossils or sediment, and they do not have different sizes of particles.</td>
</tr>
<tr>
<td>2</td>
<td>S6E5b</td>
<td>S6CS3d</td>
<td>2</td>
<td>B</td>
<td>The correct answer is choice (B) Some rocks cooled faster than other rocks when they formed. Igneous rocks are formed when molten rock solidifies. The size of the crystals in the rock depends on how quickly the molten lava cools. When the rock cools slowly, it creates larger crystals. Choice (A) is incorrect because weathering would not influence the grain size. The grain size was determined when the rock was formed. Choice (C) is incorrect because igneous rocks are not formed from sediment. Choice (D) is incorrect because the size of the crystal grains is related only to the time it takes to form, not the pressure.</td>
</tr>
<tr>
<td>3</td>
<td>S6E5c</td>
<td>S6CS3d</td>
<td>2</td>
<td>D</td>
<td>The correct answer is choice (D) Student 4. Sedimentary rocks are often formed when pieces of transported rocks are deposited in an area. They build up in layers and then are compacted under pressure until they are cemented together to form a new rock. Choices (A) and (C) are incorrect. They describe the formation of an igneous rock. Choice (B) is incorrect. It describes the creation of a metamorphic rock.</td>
</tr>
<tr>
<td>Item</td>
<td>Standard/Element</td>
<td>Characteristics of Science</td>
<td>DOK Level</td>
<td>Correct Answer</td>
<td>Explanation</td>
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<tr>
<td>4</td>
<td>S6E5i</td>
<td>S6CS3d</td>
<td>2</td>
<td>D</td>
<td>The correct answer is choice (D) practice contour farming. In traditional farming, crops are planted in straight rows. In contour farming, the land is ploughed following the elevation, or contour lines. This helps to prevent runoff of water during heavy rains. Water runoff is a factor in soil erosion. Choice (A) is incorrect. Crop rotation is important for the health of the soil, but it will not prevent as much runoff. Choice (B) is incorrect. Planting a wind break will help prevent soil erosion from the wind, but it will not prevent as much water runoff. Choice (C) is incorrect. Reestablishing forest cover can prevent wind erosion, but it will not help as much with water runoff.</td>
</tr>
<tr>
<td>5</td>
<td>S6E5h</td>
<td>S6CS9a</td>
<td>2</td>
<td>D</td>
<td>The correct answer is choice (D) Soil consists of weathered rocks and decomposed organic material. Soil is composed of rock that has been weathered into particles and decomposed organic material such as leaves. Different types of soil have different mixtures of rock and organic material. Choice (A) is incorrect. While soil is nonliving, it contains the decomposed remains of plants and animals that were once living. Choice (B) is incorrect because soil can also contain organic materials. Choice (C) is incorrect. Soil consists of different layers, but organic material may be found in all layers.</td>
</tr>
<tr>
<td>6</td>
<td>S6E5g</td>
<td>S6CS3d</td>
<td>2</td>
<td>A</td>
<td>The correct answer is choice (A) The climate in the location was drier during later time periods. The fossil record can show evidence of the changing surface and climate of Earth. These fossils appear to indicate that the climate changed from one that supported tropical plants to a drier climate. Choice (B) is incorrect because the climate was drier, shown by the desert plant fossils. Choices (C) and (D) are incorrect because the fossil record in the area does not give evidence about animals.</td>
</tr>
<tr>
<td>Item</td>
<td>Standard/Element</td>
<td>Characteristics of Science</td>
<td>DOK Level</td>
<td>Correct Answer</td>
<td>Explanation</td>
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<tr>
<td>7</td>
<td>S6E5a</td>
<td>S6CS5a</td>
<td>2</td>
<td>B</td>
<td>The correct answer is choice (B) The outer core would be hotter than the mantle. The temperature of each Earth layer increases toward the center. Choice (A) and (C) are incorrect because the crust has the lowest temperature. Choice (D) is incorrect because the inner core has the highest temperature.</td>
</tr>
<tr>
<td>8</td>
<td>S6E5f</td>
<td>S6CS8c</td>
<td>2</td>
<td>B</td>
<td>The correct answer is choice (B) It showed that if the ocean floor moved, so could other land masses. The evidence revealed that large land masses can move, giving support to Wegener's idea. Choice (A) is incorrect because Wegener's hypothesis did not involve rifting. Choice (C) is incorrect because Wegener's hypothesis did not concern mid-ocean ridges. Choice (D) is incorrect because the discovery did not have anything to do with these geological features or events.</td>
</tr>
<tr>
<td>9</td>
<td>S6E5e</td>
<td>S6CS5b</td>
<td>2</td>
<td>C</td>
<td>The correct answer is choice (C) rift valley. The diagram shows a divergent boundary where two plates are separating. At the boundary, magma from the mantle is pushed up, creating new crust. The movement of plates as they spread apart could create a rift valley. Choice (A) is incorrect, as faults form when two plates slide next to each other. Choice (B) is incorrect because a trench is a deeper area that forms when one plate slides under another. Choice (D) is incorrect because a river plain is a large flat area.</td>
</tr>
<tr>
<td>10</td>
<td>S6E3c</td>
<td>S6CS3d</td>
<td>2</td>
<td>B</td>
<td>The correct answer is choice (B) The oceanic trench is the deepest point. When one tectonic plate slips below another, it creates a large trench similar to a valley on land. Choice (A) is incorrect. The ocean basin is above a trench. Choice (C) is incorrect. The continental rise moves upward toward the surface. Choice (D) is incorrect. The continental shelf is the shallowest part of the ocean floor.</td>
</tr>
<tr>
<td>Item</td>
<td>Standard/Element</td>
<td>Characteristics of Science</td>
<td>DOK Level</td>
<td>Correct Answer</td>
<td>Explanation</td>
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<td>11</td>
<td>S6E3d</td>
<td>S6CS3d</td>
<td>2</td>
<td>A</td>
<td>The correct answer choice is (A) The waves will get bigger because the wind causes waves. Wind blowing over the water pushes water at the surface, and waves begin to form. Choices (B) and (C) are incorrect because wind does not cause ocean currents; they are caused by temperature and salinity differences between areas and depths in the ocean. Choice (D) is incorrect because wind moving in the same direction as waves works to build them, not reduce them.</td>
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<tr>
<td>12</td>
<td>S6E3b</td>
<td>S6CS5a</td>
<td>2</td>
<td>D</td>
<td>The correct answer is choice (D) how the temperature changes between the surface and the clouds. This is the temperature of the atmosphere at different heights. The combination of the temperature and the amount of relative humidity in certain zones are the two most important factors in determining the type of precipitation that falls. Choice (A) is incorrect. While certain geographic areas are more prone to certain types of weather, this is a result of the temperature in the atmosphere rather than the geographic location. Choice (B) is incorrect. Low-pressure systems are generally associated with rain, but they do not determine the type of precipitation that falls. Choice (C) is incorrect. The number of droplets will determine if precipitation falls, but it does not influence the type of precipitation that falls.</td>
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<td>Correct Answer</td>
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<td>13</td>
<td>S6E4c</td>
<td>S6CS6c</td>
<td>3</td>
<td>A</td>
<td>The correct answer is choice (A) Area A. A hurricane needs energy to form, and the data show the temperature of the sea trending upward. Under the proper conditions, this causes the water to evaporate. This cools the surface ocean temperature and releases heat energy into the air, which is then stored as latent heat. Choices (B) and (C) are incorrect, as the water temperature remains consistent. Choice (D) is incorrect, as the water temperatures are too cool to form a hurricane.</td>
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<tr>
<td>14</td>
<td>S6E4a</td>
<td>C6CS5a</td>
<td>2</td>
<td>C</td>
<td>The correct answer is choice (C) sea breeze. Land and sea breezes are formed from the uneven heating of land and sea. On warm, sunny days, the temperature of the land is often higher than the temperature of the water. Pressure differences raise the warm air from the land, causing air to sink over the ocean. This cycle of moving air causes the sea breeze. Choices (A) and (D) are incorrect because doldrums and trade winds do not occur near the shore. Choice (B) is incorrect because land breezes occur when the water is warmer than the land.</td>
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<td>15</td>
<td>S6E4b</td>
<td>S6CS5a</td>
<td>2</td>
<td>C</td>
<td>The correct answer is choice (C) They should show a strong thunderstorm with a lot of wind present. The fronts that bring strong thunderstorms create the movement of air needed for tornadoes to form. Choice (A) is incorrect because on sunny days, there is little movement of air, and it is fairly uniform in terms of temperature. Choice (B) is incorrect because in order for it to snow, the lower atmosphere needs to be cooler than the upper atmosphere, which is the opposite of what is needed for tornadoes to form. Choice (D) is incorrect because even though the air temperature may be very warm, there is no guarantee of a difference in air temperature between the upper and lower atmospheres or that the cold front needed to create the thunderstorm will be present.</td>
</tr>
<tr>
<td>16</td>
<td>S6E1f</td>
<td>S6CS7a</td>
<td>2</td>
<td>C</td>
<td>The correct answer is choice (C) The asteroid has a large dust tail. Asteroids do not have tails or comas. A comet is a body that orbits the Sun, displaying a coma when it is close enough to the Sun. Choices (A), (B), and (D) are properties of asteroids.</td>
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<td>17</td>
<td>S6E1e</td>
<td>S6CS5a</td>
<td>3</td>
<td>C</td>
<td>The correct answer is choice (C) The planets would eventually float off into space. Without the Sun’s gravity, there would be nothing to hold the planets in their orbits, so they would travel off into space. Choice (A) is incorrect because in order to remain in orbit around the Sun, there would need to be gravity. Choice (B) is incorrect because each planet is currently moving at a different rate, so the likelihood of crashing into another is fairly small. Choice (D) is incorrect because Newton’s Law says, an object in motion will stay in motion, so the planets will not just stand still.</td>
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<tr>
<td>18</td>
<td>S6E1c</td>
<td>S6CS6c</td>
<td>2</td>
<td>B</td>
<td>The correct answer is choice (B) Column A planets are rocky, while Column B planets are mostly gas. “Rocky” and “Gaseous” describe the groupings. Mars, Venus, Earth, and Mercury are inner planets with rocky surfaces. The outer planets are all gaseous. Choice (A) is incorrect. No life has been detected on Mars, Venus, or Mercury. Choice (C) is incorrect, as the planets in Column A are closest to the Sun. Choice (D) is incorrect as there are planets with thick and thin atmospheres in both columns.</td>
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<tr>
<td>19</td>
<td>S6E2c</td>
<td>S6CS3d</td>
<td>3</td>
<td>D</td>
<td>The correct answer is choice (D) It is winter and there is very little light. The position of Earth puts it closer to the Sun, but the Northern Hemisphere is tilted away from it, thereby receiving less light. Choice (A) is incorrect because in the fall, the amount of light received is decreasing, and the position of Earth on the diagram is incorrect. Choice (B) is incorrect because in the summer, the Northern Hemisphere receives a lot of light from the Sun. Choice (C) is incorrect because while the amount of light in spring is increasing, the position of Earth is incorrect.</td>
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<tr>
<td>20</td>
<td>S6E2a</td>
<td>S6CS3d</td>
<td>1</td>
<td>C</td>
<td>The correct answer is choice (C) Numbers 3 and 7. As the Moon moves through its cycle, the first and third quarters appear when the Sun, Earth, and Moon form 90-degree angles with each other. Choice (A) is incorrect because based on their positioning, Number 1 is the new moon, and Number 5 is the full moon. Choice (B) is incorrect because while Number 3 is the first quarter, Number 5 is receiving too much light to be the quarter moon, so it is the full moon phase. Choice (D) is incorrect because Number 5 is getting a lot of light, so it must be the full moon, while Number 7 is a third quarter moon.</td>
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<tr>
<td>21</td>
<td>S6E2b</td>
<td>S6CS5a</td>
<td>3</td>
<td>C</td>
<td>The correct answer is choice (C) Student 1 and Student 3. The diagram illustrates a lunar eclipse. During a lunar eclipse, the Moon passes into Earth’s shadow, impairing the visibility of part or all of the Moon from Earth. Choices (A), (B), and (D) are incorrect. This diagram describes a lunar, not a solar, eclipse. A solar eclipse occurs when the Moon is blocking light from the Sun, so it is not visible from Earth.</td>
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<td>22</td>
<td>S6E6b</td>
<td>S6CS6c</td>
<td>2</td>
<td>B</td>
<td>The correct answer is choice (B) Are they renewable? Renewable energy resources are resources that are easily replaced. These resources include hydroelectric, solar, biomass, and wind. Choice (A) is incorrect. Biomass is limited. However, it can be replenished at a sustainable level. Choice (C) is incorrect. Both renewable and nonrenewable resources have the potential to cause pollution. Choice (D) is incorrect because both renewable and nonrenewable resources can be natural resources.</td>
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<tr>
<td>23</td>
<td>S6E6a</td>
<td>S6CS4b</td>
<td>3</td>
<td>D</td>
<td>The correct answer is choice (D) The local winds will decrease in intensity because the Sun is heating the ground and the air more uniformly. Choice (A) is incorrect. As long as a discrepancy exists, the local winds will be produced. Choice (B) is incorrect. It will decrease the wind intensity. Choice (C) is incorrect. Since the temperature difference has decreased, the local winds will also decrease in intensity.</td>
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<tr>
<td>24</td>
<td>S6E6b</td>
<td>S6CS7a</td>
<td>2</td>
<td>B</td>
<td>The correct answer is choice (B) Coal is a nonrenewable resource. Therefore, the company cannot claim it uses only renewable resources to generate electricity. The company is not relying on only renewable resources. Choice (A) is incorrect because geothermal energy is renewable. Coal is the resource that is nonrenewable. Choices (C) and (D) are incorrect because electricity can be generated using both renewable and nonrenewable resources.</td>
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</tbody>
</table>
**ACTIVITY**

The following activity develops skills in Unit 7: Earth, Moon, and Sun.

**Standards:** S6E2a, S6E2b

**Earth, Moon, and Sun**

**Part One:**

Before beginning, gather the following materials:

- small ball, such as a tennis ball
- desk light or flashlight
- swivel chair

To understand moon phases, work with friends or family.

- Ask one individual to sit in the swivel chair, explaining that this represents our view from Earth.
- Ask another individual to hold a ball at different positions around the chair, explaining that this person represents the Moon.
- With the lights off or dimmed, have a third individual stand in a fixed position on the outside of the circle with the light to represent the Sun.
- Everyone should exchange positions and have an opportunity to see the views from Earth.
- Record your observations.

**Part Two:**

For the second half of the activity, gather the following materials:

- foam ball on a stick
- desk light or flashlight

To understand solar and lunar eclipses, work with a friend or a family member.

- The foam ball on a stick represents the Moon, and the flashlight represents the Sun.
- Your heads will represent Earth. Have one individual stand, holding the stick with the foam ball in front of his or her face.
- The individual holding the flashlight should stand behind the individual shining the light toward the ball. The light should be positioned so the head is blocking the light.
- Draw what you observe.
- Experiment with different placements of Earth, the Sun, and the Moon, predicting what you will observe as the objects change position.
Discuss the following questions after completion of the entire activity:

- How did the phases of the Moon change?
- How was your model alike and different from the way the phases of the Moon are made?
- How did the alignment of the models of the Earth, the Moon, and the Sun affect what was observed in the second half of the activity?
- How was your model alike and different from the way the solar and lunar eclipses are made?
ACTIVITY

The following activity develops skills in Unit 2: Weathering and Erosion.

Standards: S6E5b, S6E5d, S6E5f, S6E5h, S6E5j

Erosion and Soil Composition

Part One:

Before beginning, gather the following materials:

- dry sand
- aluminum pan
- materials to use for testing methods to resist erosion, such as sticks, small branches of leaves, blocks, mesh, and rocks or pebbles

Work to complete a model.

- Partly fill the pan with sand so that it is up to the pan’s rim at one end and almost down to the bottom at the other end.
- Gently blow across from the low-sand end toward the high-sand end. Observe what happens, and predict what happens when wind blows across the sand. This represents strong winds blowing ashore over a beach.
- Where did the sand move? Did it move evenly? What happens when you blow harder?

Some beach communities encourage residents to donate used holiday trees to serve as wind breaks to help prevent sand erosion.

- Place small branches of leaves on the edge of your pans and repeat the experiment.
- How did the trees change what happened to the sand?
- Research different soil conservation practices such as no-till farming, terrace farming, contour farming, and planting windbreaks and forest cover.
- Create a poster to share how each technique works.

Answer the following questions after completion of the entire activity:

- What effect does the wind play on sand formations?
- What methods were used to reduce erosion in your model? Were they effective?
- What methods could humans use to reduce soil erosion?

Part Two:

For the second half of the activity, gather the following materials:

- clear container with lid (6–20 fl oz size)
- soil sample
- clock
- water
- tablespoon
Fill the container two-thirds full with water and add two heaping tablespoons of soil.

- Seal the container and shake it for a minute.
- Afterward, place the container on a flat surface so the soil components can settle out.
- After 5 minutes, observe and record what you see in the soil sample.

Note: As the soil settles in the container, heavier materials will settle toward the bottom and lighter materials will settle toward the top. Look for small bits of rock at the bottom, then sand, clay, loam, and other lighter materials at the top.

If different soil types such as topsoil and potting soil are available, you may wish to test different samples and determine where in Georgia the samples came from based on the composition of the soil.

- For example, sandier soils from coastal areas, Georgia red clay from many areas of the state, rockier soils from the mountain regions, etc.

Answer the following questions after completion of the activity:

- What components of soil were visible in your soil sample?
- Based on the composition of your soil sample, what properties do you think the soil has?
- Compare different soil samples. How are the samples alike and different?