This lesson will help you practice working with concepts related to Earth's atmosphere. Use it with core lesson 8. 1 The Atmosphere to reinforce and apply your knowledge.

Key Concept

The characteristics of the atmosphere make life on Earth possible. Changes in the types and amounts of gases in the atmosphere cause climate change, which affects organisms.

Core Skills & Practices

- Describe Data Sets Statistically
- * Interpret Graphs

The Composition of the Atmosphere

The atmosphere provides gases that are necessary for life. These gases help regulate the energy from the Sun so that life on Earth can be sustained.

Directions: Answer the questions below.

1. Which characteristic of the atmosphere is **most** critical to support human survival?

A. The atmosphere is divided into five separate layers, each with a role in dispersing energy to Earth's surface.

B. The atmosphere provides a stable environment with oxygen and nitrogen necessary to sustain life on Earth.

C. The atmosphere plays a key role in the evaporation and condensation of water vapor in the water cycle.

D. The atmosphere both absorbs and reflects the Sun's energy in the form of solar radiation.

2. Which of the following would help solve the potential problem known as global warming?

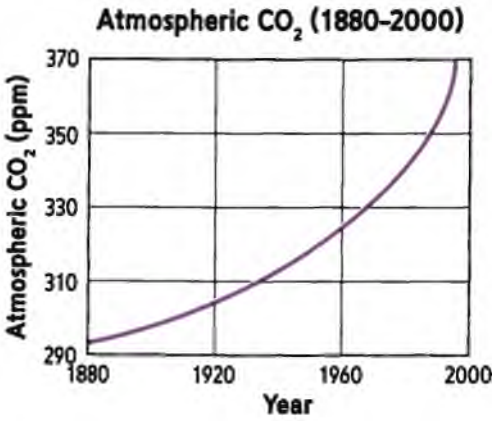
A. return to cooking on wood stoves

B. eliminate the use of alternative energy generators

C. reduce our dependence on all forms of fossil fuels

D. restrict the use of solar panels on homes

Directions: Use the graph below to answer the question.



3. The graph shown here recently appeared in an article that discussed the greenhouse effect (the warming of Earth's atmosphere due to atmospheric gases) on Earth. One of these gases is carbon dioxide (CO2). What information does the author give readers in this graph?

A. Atmospheric $C0_2$ increased steadily between 1880 and 2000.

B. No measurements of atmospheric $C0_2$ were made after 2000.

C. Atmospheric $C0_2$ levels are now less than they were in 2000.

D. All atmospheric $C0_2$ should be considered harmful to human health.

The Layers of the Atmosphere

Earth's atmosphere is organized into five lagers, each with a role to play in sustaining life.

Directions: Use the passage below to answer questions 4-5.

Ozone (0_3) is a gas formed by the addition of a third oxygen atom to an oxygen molecule (O2). The formation of ozone starts when ultraviolet radiation from the Sun strikes a molecule of 0_2 and splits it into two atoms of oxygen (O). Each of these atoms then bonds with other molecules of 0_2 creating ozone (0_3). Ozone, in turn, can absorb additional ultraviolet radiation and split back into 0_2 and 0. The oxygen atom then reacts with 0_2 to form 0_3 again.

This cycle continuously creates ozone in the stratosphere. It also absorbs 97-99 percent of the ultraviolet radiation from the Sun before it reaches Earth's surface. If ozone did not absorb some of this radiation before it reached Earth's surface, many organisms, including humans, could not tolerate exposure to the Sun for very long. Chemicals produced by human activities destroy the ozone molecules in the stratosphere. Efforts to reduce emissions of these chemicals have been under wag since 1989. As a result, the levels of ozone in the stratosphere are slowly recovering.

4. Which of these statements describes the major function of ozone in the stratosphere?

   A. The ozone lager reduces the effects of pollution on Earth's breathable air.

   B. The ozone lager absorbs 97-99 percent of ultraviolet radiation before it reaches Earth.

   C. The ozone lager increases the effects of harmful global warming in Earth's polar regions.

   D. The ozone lager decreases the presence of carbon dioxide by bonding with oxygen in $C0_2$ molecules.

5. What is ultraviolet radiation?

   A. a band of the atmosphere with little oxygen

   B. energy used to cook food in a microwave oven

   C. energy that makes the purple segment of a rainbow

   D. energy from the sun that can be harmful to humans

Directions: Answer the following question.

6. The ionosphere is found within the thermosphere and is composed of ions and charged particles formed by ultraviolet radiation from the Sun. Why would it be unlikely for such a lager to exist in the troposphere?

   A. The temperatures are too low in the troposphere.

   B. The temperatures are too high in the troposphere.

   C. Too much ultraviolet radiation from the Sun reaches the troposphere.

   D. Most of the ultraviolet radiation from the Sun does not reach the troposphere.

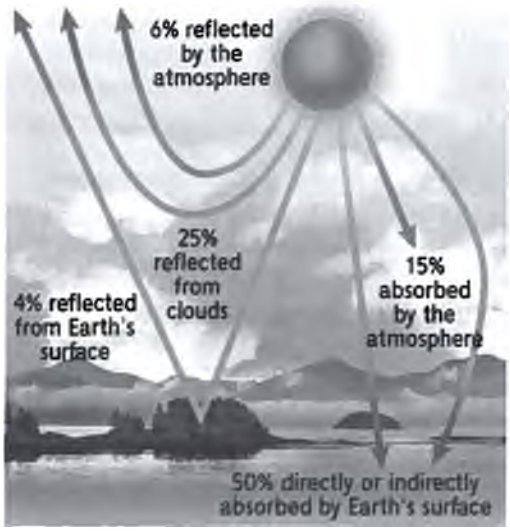
Test-Taking Tip

When trying to determine the correct answer to a multiple-choice question, think about the answer before looking at the answer choices. Then, match the answer you believe to be correct with one of the possible choices.

Energy in Earth's Atmosphere

All life depends on a delicate balance of factors maintained by Earth's atmosphere. Without that balance, life on the planet could not exist.

Directions: Use the diagram to answer questions 7-8.



7. Which of these conclusions can be inferred from the information provided in the illustration?

A. Earth's land masses reflect more of the Sun's energy than Earth's water.

B. Energy reflected from Earth equals 50 percent of the Sun's energy.

C. Earth's land and surface water absorb the Sun's energy.

D. The atmosphere absorbs twice as much of the Sim's energy as it reflects.

8. Earth's atmosphere and surface absorb _____ percent of the Sun's energy.

Climate

Climate refers to long-term weather conditions in a particular area. There are many factors that affect climate changes.

Directions: Answer the questions below.

9. A group of scientists analyzes weather patterns from various regions of Earth. They review data from a period of several hundred years and conclude that the changes in weather experienced at the beginning of the 21st century may be the result of what phenomenon?

A. typhoons in the North Pacific Ocean

B. a prolonged drought season in Africa

C. an era of glacial build-up at both poles

D. a period of significant global warming

10. A catastrophic volcanic eruption sends a massive ash cloud into the atmosphere. The ash cloud spreads around Earth, creating a band from 40°N latitude to 30°S latitude. The cloud takes three years to disperse, and the energy balance of Earth is not maintained. Predict what might happen if such an event were to occur. Explain your reasoning.

Lesson 8. 2 **The Oceans**

This lesson will help you practice working with concepts related to Earth's oceans and how they affect animal and plant life, and climate. Use it with core lesson 8. 2 The Oceans to reinforce and apply your knowledge.

Key Concept

Oceans have a great impact on Earth's climate and organisms. The movement and characteristics of oceans differ with depth and distance from the equator.

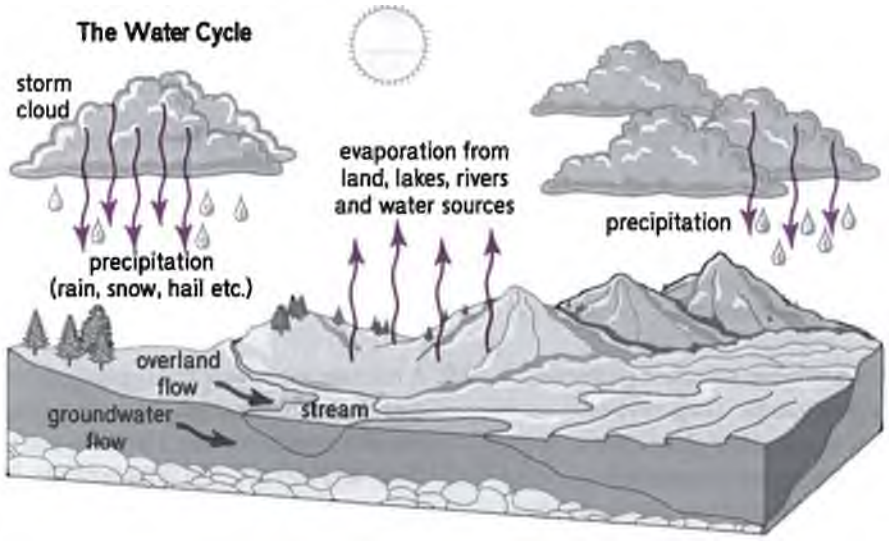
Core Skills & Practice

- Identify and Interpret Independent and Dependent Variables in Scientific Investigations
- Apply Scientific Models

Water on Earth

The sources and properties of oceans, seas, lakes, and rivers affect both the climate and organisms that live on Earth.

Directions: Use the diagram below to answer questions 1-2.



1. According to the diagram, which of the following would be the best definition of the label **precipitation?**

A. moisture that falls to Earth

B. the gases that surround Earth

C. the seeping of water into Earth

D. moisture that evaporates into the sky

2. Based on the diagram, which statement summarizes the primary function of the water cycle?

A. the formation of storm clouds over a stream and land at the same time

B. the evaporation of water from land and streams due to energy

C. the back-and-forth movement of water between Earth's surface and atmosphere

D. the removal of fresh water from land by the actions of both runoff and the growth of vegetation

The World's Oceans

The Pacific Ocean, the Atlantic Ocean, and the Indian Ocean are the three major oceans on Earth. Two smaller oceans, the Arctic Ocean and the Southern Ocean, are located near Earth's poles. All the oceans are interconnected and thus form one global ocean.

Directions: Use the table below to answer questions 3-4.

A scientist tested the salinity of water samples at four locations along 161 km of coast. She sampled from next to a glacier at the water's edge, off a barrier island, in an estuary, and in water 3 km from shore. The table shows the results of the tests.

Sample	February Test	April Test	June Test	August Test
Sample 1	37 ppt	36 ppt	37 ppt	37 ppt
Sample 2	36 ppt	34 ppt	33 ppt	32 ppt
Sample 3	32 ppt	32 ppt	32 ppt	32 ppt
Sample 4	36 ppt	37 ppt	37 ppt	37 ppt

3. What do the data from the experiment show?

A. Samples 2 and 4 show decreasing salinity levels.

B. Samples 1 and 2 have stable salinity levels.

C. Samples 1 and 4 show the lowest solubility rates for the salt dissolving in the water.

D. Samples 2 and 3 indicate a mixture of fresh water with salt water.

4. In this scenario, the salinity of the water is the _____ variable and the location along the coast is the_____ variable.

Directions: Answer the questions below.

5. High tides occur on the side of Earth nearest the Moon and on the side of Earth farthest from the Moon. Low ocean tides occur on each side of Earth between the positions of the high tides. What can you infer causes the high tide that is on the side of Earth closest to the Moon?

A. Earth's gravity

B. the Moon's gravity

C. the rotation of Earth

D. the rotation of the Moon

6. A scientist does an experiment testing ocean water from various depths in the ocean. He wants to find the correlation between the variables of temperature and density. He tests water from the ocean surface (Sample A), then every 100 m, with his last sample (Sample K) taken from 1, 000 m below the surface. What should the scientist find is the difference between Sample A and Sample K?

A. Sample A is denser and has a lower temperature than Sample K.

B. Sample A is denser and has a higher temperature than Sample K.

C. Sample A is less dense and has a lower temperature than Sample K.

D. Sample A is less dense and has a higher temperature than Sample K.

Impact of Oceans

Directions: Use the passage below to answer questions 7-8.

Water transmits much of the light that strikes it. To *transmit* means "to allow to pass through. " This explains why it is easy to see through a thin layer of water. However, it gets harder to see through water that is deeper, because water does not transmit light completely. It always absorbs some light. When sunlight travels down from the ocean surface, more of that light is absorbed as the depth increases. Little or no light reaches the ocean's deepest parts.

The distribution of light affects both the temperature of ocean waters and the ocean's living things. Ocean surface temperatures range from -2° C near the poles to 30° C near the equator. Yet, throughout the ocean, temperature decreases with depth. Even in the tropics, the deepest ocean water is always cold. Little light reaches these depths to heat the water.

7. What can you conclude about ocean life, based on the passage?

A. Plants that depend on photosynthesis to survive live in the upper layer of the ocean.

B. Creatures that live near the ocean floor along the coastline live in complete darkness.

C. Fish that live in the deepest oceans depend completely on their sense of smell to find food.

D. The same species that live near the ocean surface at the equator also live near the poles.

8. Explain how life in shallow regions of the ocean would be different than life in the deep ocean?

_____

_____

_____

_____

Test-Taking Tip

When you read a passage during a test, you need to eliminate information that is not necessary for answering questions. One way to do this is to read the passage, taking notes of important information, and then reviewing the questions to see what information is covered and what is not.

9. Many outside influences affect the makeup of the oceans. Categorize the following influences by writing each term in the appropriate box.

overfishing	glacial meltwater	surface evaporation	coral bleaching
water pollution	global warming	ebb tides	

Human Influences	Natural Influences

Earth's Structure, Composition, and Landforms Lesson 8.3

This lesson will help you practice working with concepts related to Earth's structure, composition, and landforms. Use it with core lesson 8. 3 Earth's Structure, Composition, and Landforms to reinforce and apply your knowledge.

Key Concept

Earth is divided into three layers with different compositions. Interactions between Earth's tectonic plates cause most of Earth's volcanoes, earthquakes, and mountains. Minerals, rocks, and soil can be formed or changed during the rock cycle.

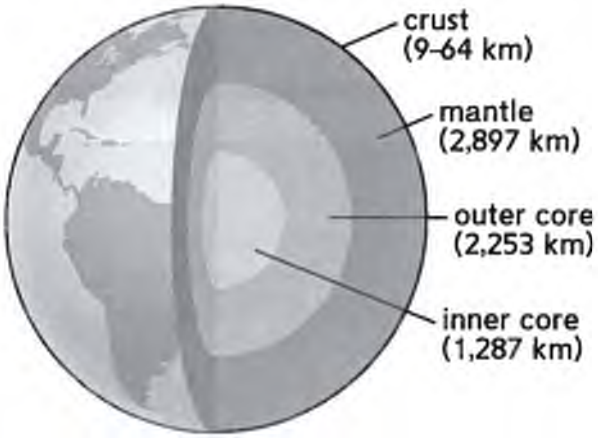
Core Skills & Practices

- Understand and Apply Scientific Models, Theories, and Processes
- Draw Conclusions

Earth's Structure

Earth is divided into three layers. The core lies at the center; the crust is the outer layer. The mantle fills the area between the core and the crust.

Directions: Use the image below to answer questions 1-3.



1. Which of Earth's layers or sub-layers is the thickest?

A. crust

B. mantle

C. inner core

D. outer core

2. According to the image, the crust varies in thickness. Which of the following explains the differences in thickness?

A. Continental crust varies in thickness because of valleys, plains, plateaus, and mountain ranges.

B. The crust under oceans is always 9. 6 km thick in the Pacific Ocean and slightly thicker under the Atlantic Ocean.

C. The difference in thickness is related to the equator, with Earth's crust thicker at the equator and thinner at the poles.

D. Earth is not perfectly round, and the crust is thinnest at the narrowest part of the planet.

3. Which is the most accurate comparison to Earth's structure?

A. Earth is most like an onion with many layers of even thickness.

B. Earth is most like a basketball with a bumpy surface and a hollow center.

C. Earth is most like a golf ball with a hard center, a thick middle, and a thin uneven surface.

D. Earth is most like a walnut with an uneven center and a hard outer shell.

Directions: Use the passage below to answer questions 4-5.

A liquid such as water has different physical properties from a solid such as ice. Earth's layers also have different physical properties. Scientists recognize five layers of Earth based on their physical properties. Two of those layers are discussed here.

The rigid, relatively cool outer layer of Earth is called the lithosphere. The lithosphere is made up of the crust and the solid portion of the upper mantle. The lithosphere is brittle, meaning that it can crack and break. When it does crack, large amounts of force are released. These forces can cause earthquakes. Cracks in the lithosphere can also allow hot material from deeper inside Earth to rise to the surface. Because the lithosphere is the outer layer of Earth, it is the layer that we know the most about

The hot layer underneath the lithosphere is the asthenosphere. The asthenosphere is the part of the upper mantle that can slowly flow. Even though it can flow, the asthenosphere is actually a solid.

4. Students are asked to make models of the lithosphere. Which of these models accurately depicts the lithosphere?

A. a grainy, lumpy sphere made of multi-colored clay

B. a slick, rounded ball made of rubber

C. a flat, smooth surface made of molded plastic

D. an uneven, cracked surface made of plaster

5. Which of these definitions of **mantle** shows the correct use in this context?

A. a solid framework

B. a layer of Earth between the crust and the core

C. a liquid or solid coating spread evenly over a substance

D. anything that covers or hides completely

Earth's Composition

When Earth formed, the heaviest elements sank toward the center, and the lighter elements remained close to the surface. Iron and nickel are the main elements in the core, while the mantle is mostly iron and magnesium. The surface crust mostly consists of silica and oxygen.

Directions: Answer the question below.

6. A scientist has several rock samples, some of which may be hematite. She already has a piece of hematite that she has studied at another time. How might she go about determining which of the new samples are hematite and which are not?

Test-Taking Tip

When answering a short answer question, always write in complete sentences. It is often useful to reword the question into the format of an opening sentence. Then add specific information and keep to the topic. Check that all parts of your answer are directly relevant to the question you are answering.

7. Which of the following items are examples of weathering or deposition. Sort the examples into the correct categories. Write each example in the appropriate box.

soil laid down at the mouth of a river	ice cracking the surface of a rock
underground water dissolving limestone	rubble left after a glacier recedes
a natural bridge carved by wind	rocks and soil at the base of a landslide

Examples of Deposition	Examples of Weathering

The Theory of Plate Tectonics

Millions of years ago, Earth had only one continent, called Pangaea. That huge continent broke up and spread apart, creating continents separated by large oceans.

Directions: Use the map below to answer questions 8-10.

8. According to the map, the Mid-Atlantic Ridge runs between the_____ plate and the_____plate.

9. Which statement is supported by the information in the map?

A. The North American Plate and Eurasian Plate are moving towards each other.

B. The North American Plate is moving over and covering the Mid-Atlantic Ridge.

C. The spread of the Mid-Atlantic Ridge will divide Iceland into three separate islands.

D. The nation of Iceland straddles two major tectonic plates and the Mid-Atlantic Ridge.

10. Which event is an example of something that would occur at a convergent plate boundary?

A. the continuous build-up of lava rock that forms the string of Hawaiian Islands

B. the ongoing movement of North and South America away from Europe and Africa

C. the spreading sea floor and widening of the Atlantic Ocean by the Mid-Atlantic Ridge

D. the collision of the Indian Plate and the Eurasian Plate forming the Himalaya Mountains

Lesson 8. 4 **Earth's Resources**

This lesson will help you practice working with concepts related to Earth's natural resources. Use it with core lesson 8. 4 Earth's Resources to reinforce and apply your knowledge.

Key Concept

Earth supplies a wide variety of natural resources. All organisms on Earth, including humans, use resources provided by the environment. The use of resources has both advantages and disadvantages.

Core Skills & Practices

- Express Scientific Information or Findings Verbally
- Interpret Graphics

Natural Resources

Natural resources are substances, organisms, or forms of energy that occur in nature and that are used by living things.

Directions: Answer the following questions.

1. Sort the following resources into the correct category. Write the term in the appropriate box.

coal	flowers	diamonds	gold	oxygen
oil	river water	silver	sunlight	wind

Renewable Natural Resources	Nonrenewable Natural Resources

2. A government agency organizes a research project on reducing pollution in the air and water supply. Which of these agencies would most likely conduct this type of research, given the purpose of the research?

A. National Park Service

B. Food and Drug Administration

C. Environmental Protection Agency

D. Agency for Healthcare Research and Quality

3. Based on what you have learned about natural resources, predict which factor is most likely to influence how the United States uses natural resources 100 years from today.

A. Available stores of uranium

B. Resource use by other countries

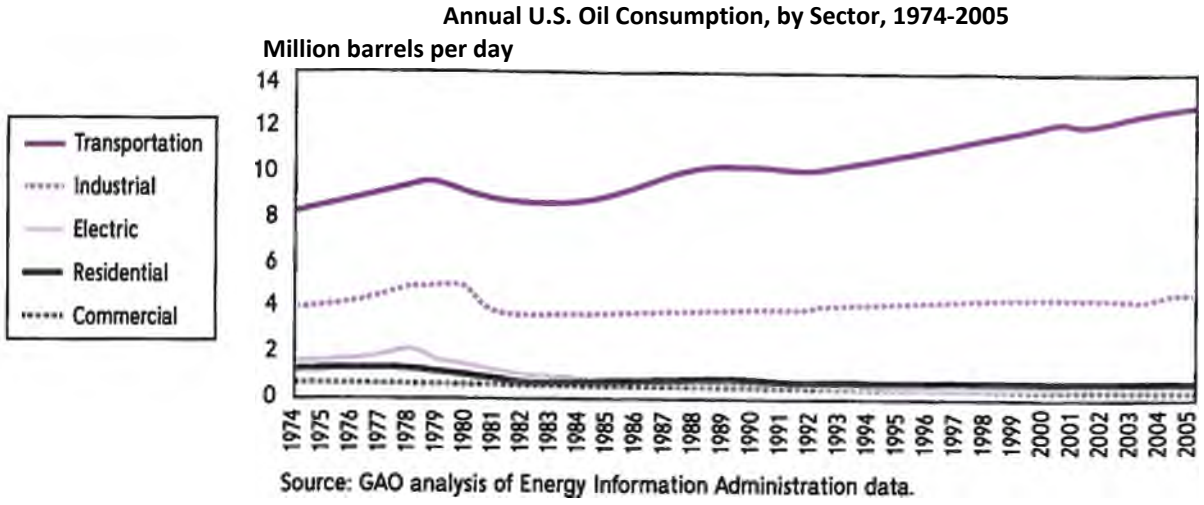
C. Profits made by power companies

D. The remaining supply of fossil fuels

Nonrenewable Energy Resources

Fossil fuels, including oil, gas, coal, and nuclear energy, are nonrenewable energy sources.

Directions: Use the graph to answer question 4.



4. Based on the data above, which is a reasonable conclusion about oil use in electricity production between 1985 and 2005?

A. Electric-power usage per person increased, but the overall expenses of purchasing oil decreased each year.

B. Electric-power usage did not increase during this 20-year period, because the US population did not increase during that time.

C. Electric-power production using oil remained consistent, implying that increased power production came from other resources.

D. Methods for producing electric power became more efficient, so the use of oil to produce electricity decreased dramatically.

Directions: Answer the following questions.

5. Which statement best compares the hazards of using nuclear energy to energy produced by a coal-burning power plant?

A. Both produce waste that threatens the health of living things.

B. Both use nuclear fission as a process to create electrical energy.

C. Both use a steam-driven turbine to turn an electric generator.

D. Both create carbon dioxide and release the gas into the atmosphere.

6. How does burning fossil fuels affect Earth's atmosphere and change its climate?

Test-Taking Tip

A short-answer test question may have two or more related topics. When answering a short-answer question that has more than one part, separate the parts of the question. As you write your answer, mentally check off each part to ensure that you provide a complete answer.

Renewable Energy Resources

Nature provides a number of resources that provide energy and promote sustainability. The Sun, wind, moving water, and heat sources beneath Earth's surface are all renewable energy sources.

Directions: Use the information to answer question 7.

> In the United States, interest in the use of field crops for energy has increased in recent years. Com and grains can also be made into a liquid fuel called ethanol. Ethanol is added to gasoline to reduce the harmful chemicals produced by running engines.

7. What does the author want the audience to know about the value of ethanol?

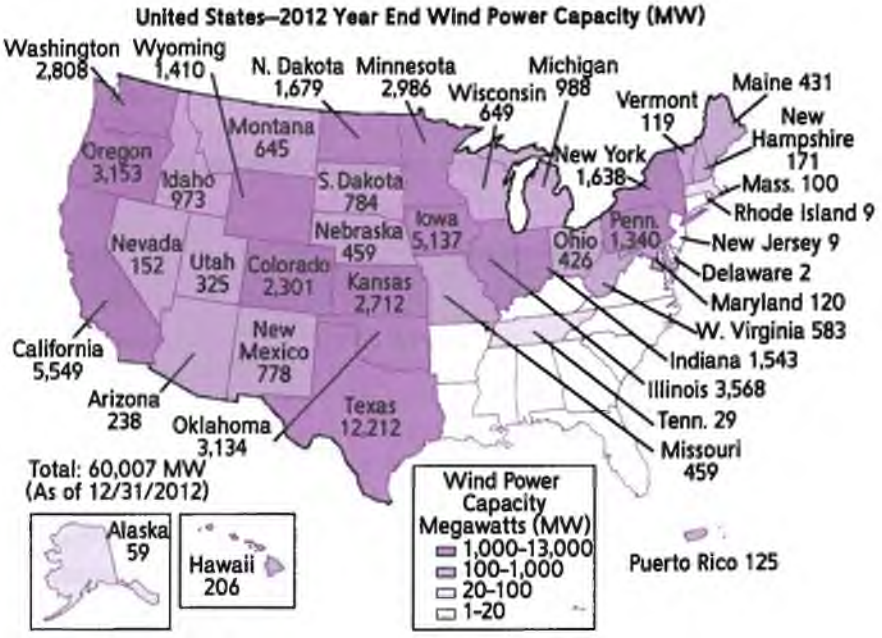
A. Ethanol's main value is that it can be made from com and hay.

B. Ethanol uses crop waste materials to produce a gasoline additive.

C. Ethanol bums cleaner in an engine and is less polluting than gasoline.

D. Ethanol can be produced and marketed as fuel in developing countries.

Directions: Use the map to answer questions 8-9.



8. Which statement is supported by the data in the map?

A. States on the West Coast of the US have greater wind resources than other states.

B. No eastern US states produce more than 250 megawatts of wind-power energy.

C. States with no wind-power generators generate sufficient hydroelectric energy.

D. Texas and California have invested heavily in using wind-power technology.

9. Which conclusion can be drawn from the map?

A. States in the Midwest generate more wind-power energy than eastern states.

B. Utah, Rhode Island, and Michigan will increase their use wind-power technology.

C. All western states have embraced the technology needed to generate wind-power energy.

D. New York and Pennsylvania have more wind available for power generation than Nebraska.

This lesson will help you practice working with concepts related to the interactions between Earth's systems. Use it with core lesson 8. 5 Interactions Between Earth's Systems to reinforce and apply your knowledge.

Key Concept

Earth's systems interact, resulting in a variety of effects, some of which are disastrous.

Core Skills & Practices

- Use Sampling Techniques to Answer Scientific Questions.
- Follow a Multistep Procedure

Weather

Weather, the condition of the atmosphere at a particular place and time, is a daily concern worldwide.

Directions: Use the passage below to answer the question below.

The study of weather is the study of the changes that take place in Earth's atmosphere, the layer of gases that surrounds the planet. A local weather report usually includes the following four features:

- **Temperature** is a measure of the warmth of the air.
- **Humidity** is a measure of the water vapor in the air. Humidity readings are usually given as percentages. A humidity reading of 90 percent means that the air contains 90 percent of the water vapor it can possibly hold at that particular temperature.
- **Wind** refers to air movement Both the speed and direction of the wind are usually cited. Wind direction refers to the direction from which the wind is blowing.
- **Air pressure (barometric pressure)** refers to the weight of the atmosphere. Air pressure depends on atmospheric temperature, humidity, and air movement. A high-pressure reading usually indicates clear, pleasant weather. A low-pressure reading indicates wet or stormy weather.

1. By analyzing weather data, meteorologists can predict weather patterns that affect people several days later. Select the type of weather data that corresponds to each weather occurrence from the choices provided. Write the type of weather data in the appropriate space in the table.

high barometric pressure	high humidity
temperature	heavy winds

Type of Weather Data	Weather Occurrence
	Tropical rain storms
	A heat wave
	Clear, pleasant weather
	Broken tree branches and falling limbs

Earth's Changing Surface

Changes occur on Earth's surface all the time. Slow changes may result from weathering or erosion. Rapid, more violent changes can result from events such as earthquakes or volcanic eruptions.

Directions: Answer the questions below.

2. A class goes to visit a beach. On the dunes at the back of the beach, the sand lies in a rippled pattern. High tides have never reached this far up on the beach. What is the main process that created the rippled pattern on the beach?

A. wind erosion

B. gravity erosion

C. physical weathering

D. chemical weathering

3. Agriculture frequently contributes to soil erosion. Farmers want to prevent soil erosion but using positive conservation practices. Which of these agricultural activities *decreases* soil erosion?

A. plowing up land and leaving the acreage unplanted

B. using farm land for building houses, businesses, and roads

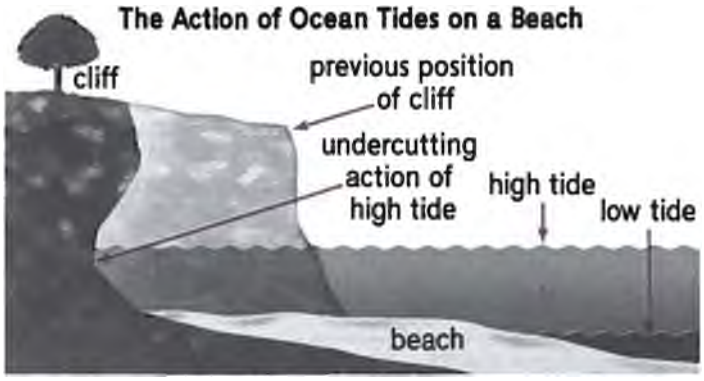
C. planting a row of cottonwood trees and low-cover shrubs at the edge of fields

D. introducing a herd of cattle that eats all the native vegetation

Test-Taking Tip

When answering a multiple-choice question that includes a scenario, look for typographic clues to help find the right answer. Italicized, underlined, and boldfaced words give you a hint about which answer is correct.

Directions: Use the diagram below to answer questions 4-5.



4. A scientist studies the profile of a beach that has extremely high tides. The scientist notes how the cliff face changes over several seasons. What two processes does the scientist discover are acting on the beach and cliff?

A. wind erosion and gravity erosion

B. wind erosion and physical weathering

C. water erosion and physical weathering

D. water erosion and chemical weathering

5. What is one result of the action of the high tide waves on the cliff?

A. a decrease in the amount of beach

B. an increase in the amount of beach

C. a decrease in the height of the cliff

D. an increase in the height of the tide

Extreme Weather Systems

Hurricanes, tornados, and powerful thunderstorms are hazards caused bp extreme weather patterns.

Directions: Use the chart below to answer questions 6-7.

Category	Wind Speed (mph)	Damage at Landfall	Storm Surge (feet)
1	74-95	Minimal	4-5
2	96-110	Moderate	6-8
3	111-130	Extensive	9-12
4	131-155	Extreme	13-18
5	Over 155	Catastrophic	19+

6. A hurricane strikes the coast of the Bahamas and moves westward toward the United States. When it strikes the Bahamas, the hurricane is a Category 2. Forecasters predict that it will become a Category 4 by the time it reaches the United States. Explain the difference between the storm that strikes the Bahamas and the one that strikes the United States.

_____

_____

_____

_____

7. A storm begins off the coast of Africa. The storm quickly becomes a Category 3 hurricane. After the hurricane strikes land, it loses energy. The wind speed of the hurricane is reduced to 85 miles per hour. What type of hurricane is it at this point?

A. Category 1

B. Category 2

C. Category 3

D. Category 4

Directions: Answer the questions below.

8. What is the relationship between a tornado and a thunderstorm?

A. Rapidly rotating air masses collide and form a tornado, and if the tornado is large enough, it generates a thunderstorm.

B. When a thunderstorm lifts rotating air near the ground from a horizontal to vertical position, a tornado may occur.

C. High winds from opposite directions meet near a thunderstorm, creating a funnel that drops out of the sky to become a tornado.

D. When massive thunderclouds revolve in the air, they create a funnel effect, which may become a tornado.

9. Which of these conditions is necessary for a storm to become a hurricane?

A. wind and light rain on a hot day

B. a large thunderstorm colliding with dry winds

C. wind, rain, and a cold front from the north

D. thunderstorms moving over warm tropical ocean water