

CALIFORNIA

Earth Science

Reading and Writing in Science



Macmillan
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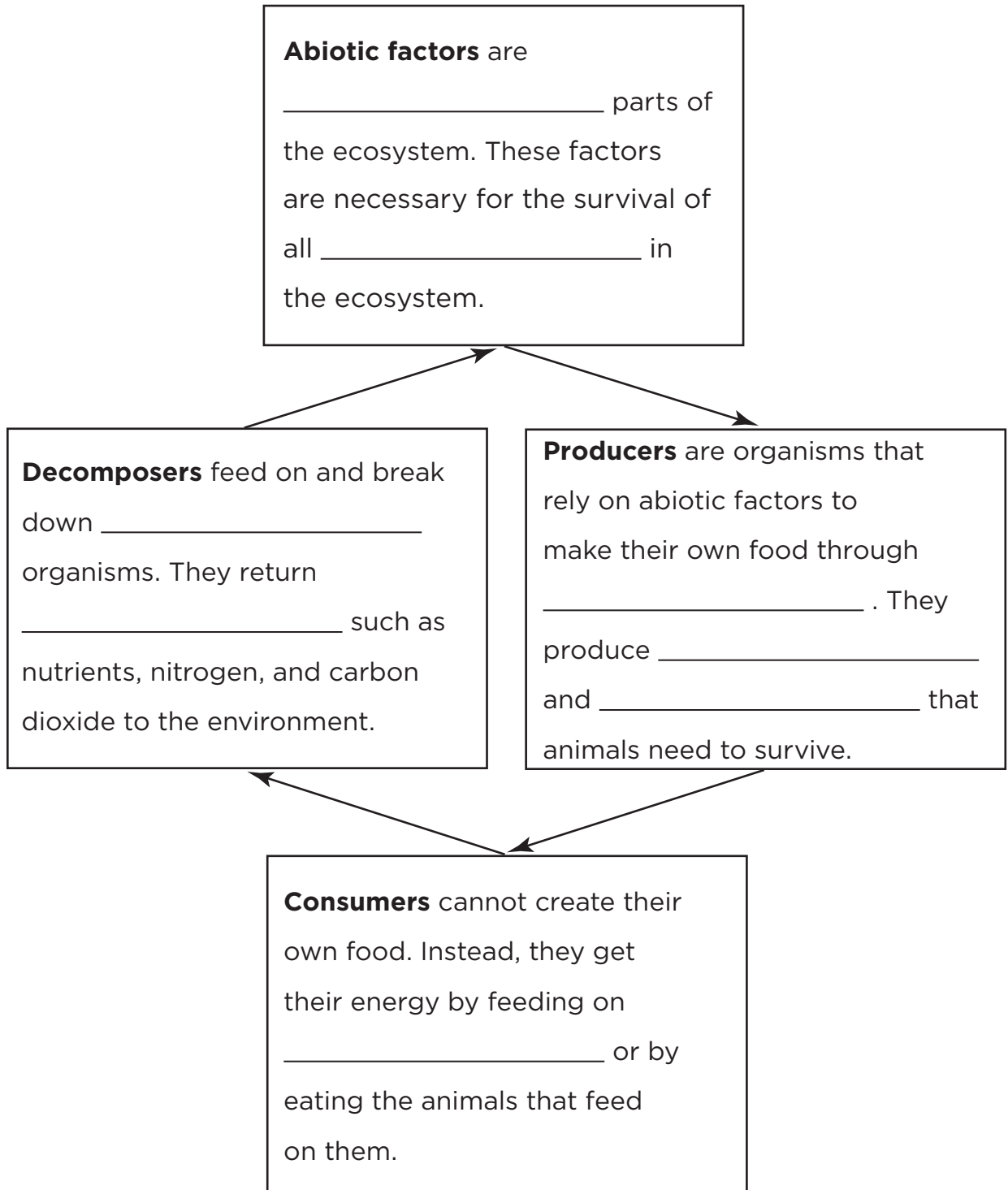
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Complete the concept map on the exchange of energy and nutrients in an ecosystem, using terms and phrases from your textbook.

Exchanging Energy and Nutrients



Behind the Redwood Curtain

by Natasha Wing

Read the Literature feature in your textbook.



Write About It

Response to Literature In this poem the author describes a forest. What is life like in this forest? What plants and animals live there? Write an essay explaining the main idea of the poem. Use details from the poem to show how the author makes her point.

Introduction to Earth's Ecosystems

Use your textbook to help you fill in the blanks.

What is an ecosystem?

1. In an ecosystem living things work together in systems and depend on the same _____ .
2. Any living thing that is part of an ecosystem is a(n) _____ .
3. The nonliving parts of the ecosystem that help make life possible are _____ .

Why are sunlight and temperature important?

4. The amount of sunlight a location receives directly _____ the temperature in that location.
5. The _____ in an area affects the number and types of animals that can survive in a location.
6. The parts of Earth that receive the least direct sunlight are the North and South _____ .
7. Seasonal variations in temperature cause some animals to _____ .

Why is water important?

8. Water is the body's main _____ system, carrying nutrients and oxygen to various parts of the body.
9. Water helps regulate body temperature, cooling skin and carrying excess _____ away from your cells.
10. When a plant does not receive enough water, the leaves and stems become weak, and the plant _____ .

Why is soil important?

11. Soil supplies plants with the water, _____, and air that they need to grow.
12. As plant and animal remains break down, they form _____, which adds nutrients to the soil.
13. The _____ scale measures the acidity or alkalinity of soil.

What lives in an ecosystem?

14. The _____ factors in an area influence what living things are found there.
15. Members of a(n) _____ breed with one another, produce offspring, and compete for resources.
16. All the organisms of the same kind make up a population; two or more of these make up a(n) _____.

What roles do organisms have?

17. In order for life to thrive in an ecosystem, the interactions among living things must be in _____.
18. Even if organisms share the same habitats, they may not occupy the same _____.
19. Populations depended on by many other organisms are called _____.

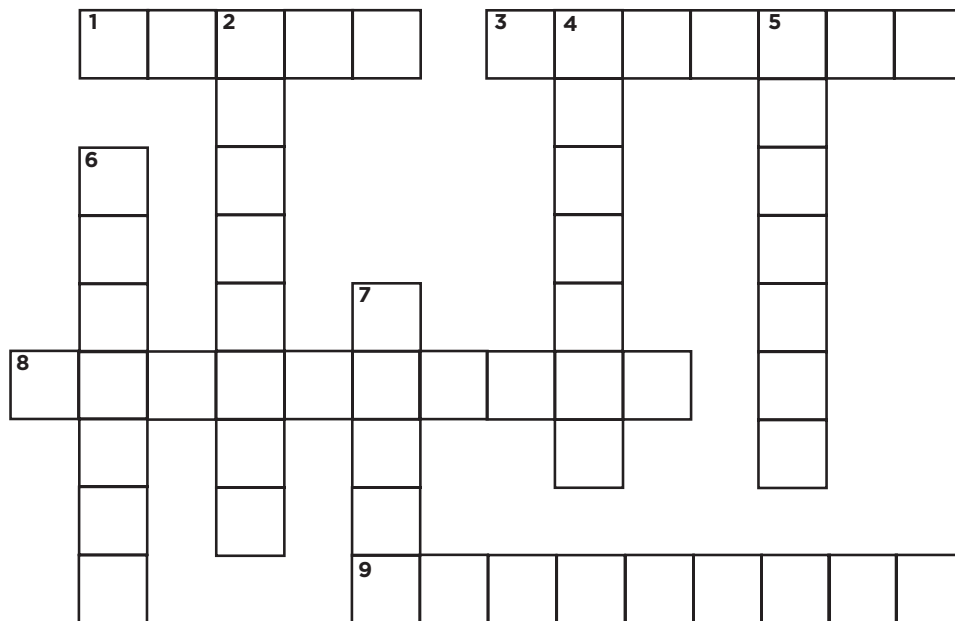
Summarize the Main Idea

20. What are three abiotic factors that the number and types of organisms in an ecosystem depend on?

Introduction to Earth's Ecosystems

acidity	ecosystem	minerals
alkalinity	habitat	niche
ecology	humus	topsoil

Use the clues to fill in the crossword puzzle.



ACROSS

- 1. the material in soil formed by the breakdown of plant and animal remains
- 3. the place in which a population lives
- 8. the amount of base in a substance
- 9. the living and nonliving things in an area that interact with one another

DOWN

- 2. naturally occurring solid materials of Earth's crust
- 4. the amount of acid in a substance
- 5. the upper layer of soil, which is made mostly of humus, minerals, water, and air
- 6. the study of organisms and how they interact in an ecosystem
- 7. the role of an organism in an ecosystem

Introduction to Earth's Ecosystems

abiotic factors	biotic factors	erosion	temperature
acidity	community	habitat	vegetation
alkalinity	ecosystem	populations	

Fill in the blanks.

A system is a group of things that form a unified whole. Living and nonliving things in an area interact with one another in a(n) _____ . The _____ in this area form a(n) _____ . Several _____ influence the number and kinds of living things that can survive in a(n) _____ . For example, in places with little rainfall, _____ is sparse. If _____ has occurred, there may not be enough fertile soil to support healthy plant growth. The kinds of plants that do grow are determined by the amount of _____ or _____ in the soil. Another factor is the _____ of the region. As you can see, nonliving elements directly affect _____ . These factors influence the number and types of organisms in an ecosystem.

Photosynthesis: The Basic Process of Life

Use your textbook to help you fill in the blanks.

Why is photosynthesis important?

1. Chlorophyll is a green substance in plants that _____ energy from sunlight.
2. Using sunlight, plants and other organisms convert water and _____ into sugar, or food, and oxygen.
3. During photosynthesis _____ and oxygen combine with carbon atoms to produce food.
4. Oxygen, which is given off by plants as a(n) _____ product during photosynthesis, enters the atmosphere.

What do roots and stems do?

5. Most roots hold plants in the soil and take in water and _____ to feed the plants.
6. Roots are also used to _____ some of the food that the plants produce.
7. The stem of a plant transports _____ and other substances between the roots and leaves.
8. Some plants have stems that help store energy or have photosynthetic _____ in their stems that can help make food.

What are leaves?

9. Simple leaves have one _____, and compound leaves have two or more.
10. The cuticle is a waxy coating secreted by the _____ of a leaf that prevents water from leaving the plant.
11. Water and minerals are brought through leaf blades by _____.
12. Some leaves store _____, and others are designed to protect the plant.
13. Leaves of certain trees change color in winter months when _____ disappears from them.

How does water move through plants?

14. Water is pushed upward into stems of small plants by _____ built up in the roots.
15. Most plants need forces that pull water upward, such as capillary action and _____.

What happens during respiration?

16. Respiration uses oxygen and _____ to produce water, carbon dioxide, and energy.
17. When an organism needs fuel, its cells can use oxygen to break apart _____.

Summarize the Main Idea

18. How does energy enter ecosystems, and how is the energy used?

Photosynthesis: The Basic Process of Life

chlorophyll

phloem

stem

chloroplasts

respiration

transpiration

photosynthesis

root

xylem

Fill in the blanks.

1. The release of energy in plants and animals from food is called _____ .
2. Structures found in the cells of leaves and stems of green plants are _____ .
3. A(n) _____ holds a plant in the soil and takes in water and minerals to feed the plant.
4. The part of a plant that supports leaves and flowers is the _____ .
5. Tubes called _____ carry water and minerals up from the roots through the plant to the leaves.
6. The green substance that absorbs energy from sunlight is _____ .
7. The process of making food by using sunlight is _____ .
8. The loss of water from the leaves of a plant is called _____ .
9. Food is carried from the leaves to other parts of the plant by _____ .

Photosynthesis: The Basic Process of Life

carbon dioxide	oxygen	releases	stores
chlorophyll	pull	root hairs	sunlight
chloroplasts	pushes	stem	veins

Fill in the blanks.

Energy enters ecosystems as sunlight, which is used by plants to make food. First, water and minerals enter the _____ of a plant. Pressure from the roots _____ water into the stem. Capillary action and transpiration _____ the water up into the _____. Tubes carry the materials to the _____ in the leaves. The substance _____ is located there. With exposure to _____ and air, plants can then carry out photosynthesis. Photosynthesis _____ energy. This process can be done only by organisms that have _____. All organisms perform respiration, which _____ energy. In photosynthesis _____ is absorbed, while respiration uses _____ to break apart food molecules. Plants store energy from the Sun in their cells.

Life in the Deep

Read the Writing in Science feature in your textbook.



Write About It

Main Idea Write a report telling how sunlight helps support your life. Engage your reader right away, and clearly state your purpose for writing. Introduce the main idea, and develop it with facts. Use supporting details and precise verbs, nouns, and adjectives to describe and explain your subject. Do print and online research. Summarize your findings at the end of the report.

Getting Ideas

Sometimes you choose your own topic to write about. Other times your teacher specifies the topic. Underline the topic in the assignment above. Now think about what you know about this topic, and gather information.

Write what you already know in the first column of the chart below. In the second column, write questions you have about the topic. This is the information you want to find out for your report. Then do some research to find answers to your questions. In the third column, write what you found out from your print and online research.

Topic: How Sunlight Supports Your Life

What I Already Know	What I Want to Know	What I Learned

Drafting

A good report begins with a thesis statement that focuses the topic and tells readers what to expect. Circle the thesis statement that is the better way for Armando to begin his report.

I do not like to think about what the world would be like without sunlight.
Without sunlight the world as we know it would cease to exist.

Now write your first draft. Use a separate piece of paper. Begin with a strong thesis statement. Introduce your main idea, explain your subject, and end with a summary of your findings.

Revising and Proofreading

Replace the underlined words in Armando's sentence with precise verbs, nouns, and adjectives. Rewrite the sentence on the lines below it.

The Sun heats Earth, causing water from the seas to dry and form clouds.

Now revise and proofread your own report. Ask yourself these questions:

- Have I written a thesis statement about how sunlight supports life?
- Does my introductory paragraph engage readers?
- Have I supported my ideas with relevant facts and details?
- Have I used precise verbs, nouns, and adjectives?
- Have I used transition words to connect ideas?
- Have I ended with a conclusion that summarizes my ideas?
- Have I corrected all grammar mistakes?
- Have I corrected all spelling, punctuation, and capitalization errors?

Microscopic Organisms on Earth

Use your textbook to help you fill in the blanks.

What are microscopic organisms?

1. Microorganisms include _____, which can make their own food, and consumers, which eat other organisms for food.
2. Microorganisms provide larger organisms with some of the _____ and oxygen they need to survive.
3. Scientists can study very small, nonliving organisms and other objects with a(n) _____ microscope.

What are microscopic organisms that make their own food?

4. Microscopic organisms are classified according to their _____ structure and by what they eat.
5. Prokaryotic producers, such as cyanobacteria, produced the _____ that first made Earth inhabitable for other living things.
6. Prokaryotes do not have a nucleus in each cell, while _____ do have a nucleus in each cell.
7. Many _____ are capable of producing their own food through photosynthesis.
8. Organisms called _____ make up a significant part of phytoplankton and are a major food source.

What are microscopic organisms that cannot make their own food?

9. The protozoans known as _____ have long, hairlike structures that whip and lash to help them swim.
10. Protists with small, hairlike projections extending from the outsides of their cells are called _____ .
11. Protists that use “false feet” to move and eat are called _____ .
12. Amoebas are found in _____ , salt water, and soil.

What roles do microscopic organisms have in ecosystems?

13. Microscopic producers and microscopic consumers are the main _____ source for larger consumers.
14. Microscopic producers supply the atmosphere with _____ of its oxygen.
15. Decomposers feed on dead organisms of all sizes and _____ organic matter back into the food chain.

Summarize the Main Idea

16. What is transferred from one organism to another at the microscopic level?

Microscopic Organisms on Earth

cilia

eukaryote

prokaryotes

diatom

flagella

protist

electron microscope

microscope

pseudopods

Fill in the blanks.

1. A single-celled eukaryotic organism that cannot be clearly classified as animal or plant is a(n) _____ .
2. A(n) _____ uses a beam of electrons, rather than a light source, to magnify samples.
3. A complex organism with a nucleus in each cell is called a(n) _____ .
4. Cyanobacteria are _____ and do not have a nucleus in each cell.
5. Small, hairlike projections extending from the outsides of the cells of some protists are called _____ .
6. A(n) _____ is an instrument that produces an enlarged image of an object.
7. Long, hairlike structures that whip and lash to propel microscopic organisms through the water are _____ .
8. A(n) _____ is a very small protist that can be in the shape of a straight line, circle, or square.
9. One group of protists has _____ , or “false feet.”

Microscopic Organisms on Earth

cyanobacteria

nucleus

protists

food chain

outsides

protozoans

hairlike structures

photosynthetic

pseudopods

Fill in the blanks.

Microscopic organisms are classified by their cell structure and by what they eat. The difference between prokaryotes and eukaryotes is the absence or presence of a(n) _____ in each cell. Both groups include _____ producers and consumers. The prokaryotic producers called _____ are found in many places, including fresh and salt water, hot springs, and the Arctic. Eukaryotic producers include _____ such as diatoms and dinoflagellates. Microscopic consumers such as ciliates and flagellates are types of _____. They move through the water with the help of _____ that project from the _____ of their cells. Amoebas have _____ that help them reach and ingest food. All of these organisms fill critical roles in the _____. They live and grow on every surface in the world.

Meet Maria Pia Di Bonaventura

Read the Reading in Science feature in your textbook. Look for the details that support the main idea.

Main Idea

Use the graphic organizer to list the main idea and the details of the article.

Main Idea	Details



Write About It

Main Idea Why do museums ask for help from scientists like Maria Pia Di Bonaventura? How does Maria Pia’s work help protect works of art and other artifacts?

Planning and Organizing

Write the problem that museums sometimes have with their artifacts and works of art.

Write a one-sentence summary of Maria Pia’s job.

Drafting

Now explain how Maria Pia’s area of expertise can help museums protect their works of art.

Earth's Food Chains, Webs, and Pyramids

Use your textbook to help you fill in the blanks.

What are producers, consumers, and decomposers?

1. Producers use energy from the _____ to make their own food.
2. Most producers on Earth live near the surface of the _____.
3. If consumers eat fish, chicken, or beef, they are _____ getting energy from a producer.
4. When decomposers such as worms and bacteria do their job, they _____ important substances into the environment.

What is a food chain?

5. The first link in a food chain consists of the _____ that absorb the Sun's energy.
6. The second link in a food chain consists of _____ consumers, such as mice, horses, and elephants.
7. Many birds are examples of _____ consumers, which make up the third link in a food chain.
8. A tertiary consumer is usually the _____ predator in a food chain.
9. The remains of plants and animals that are not eaten break down into _____ used by producers.

What is a land food web?

- 10. Food webs show the roles and relationships among all of the _____ in an ecosystem.
- 11. Land _____ have flat-edged teeth for tearing plant materials.
- 12. Carnivores eat other animals by using their _____ teeth and sharp incisors.
- 13. Raccoons are _____ that eat fruits, birds' eggs, fish, nuts, and rodents.
- 14. Predators hunt and kill prey, while _____ seek out the remains of dead animals to eat.

What is a marine food web?

- 15. The primary producers in the ocean are _____ .
- 16. Plankton live in the upper ocean zone, while deep-dwelling fish live in the _____ zone.

How are populations connected?

- 17. The number of consumers on the energy pyramid _____ as more energy is lost.
- 18. A decrease in resources can lead to an increase in _____ within a community.

Summarize the Main Idea

- 19. What is the difference between a food chain and a food web?

Earth's Food Chains, Webs, and Pyramids

- | | | |
|--------------------------|----------------------|----------------------|
| a. carnivores | e. food chain | i. producers |
| b. consumers | f. food web | j. predators |
| c. decomposers | g. herbivores | k. scavengers |
| d. energy pyramid | h. omnivores | |

Match the correct letter with the description.

- _____ primary consumers, or animals that eat producers
- _____ organisms that seek out the remains of dead animals to eat
- _____ shows all the food chains in an ecosystem and shows how they overlap
- _____ secondary and tertiary consumers, or animals that eat other animals
- _____ organisms that use energy from the Sun to make their own food
- _____ living things that hunt and kill other living things for food
- _____ shows how energy flows from one organism to another in an ecosystem
- _____ animals that eat both producers and consumers
- _____ organisms that get energy either by feeding directly on producers or by eating animals that feed on producers
- _____ organisms that break down dead organisms
- _____ a model that shows how energy moves through a food chain

Earth's Food Chains, Webs, and Pyramids

carnivores	overlap	primary consumers
consumers	producers	secondary consumers
energy	pyramid	tertiary consumers
omnivores	web	

Fill in the blanks.

Food chains show the flow of food from one organism to another. Food chains also help scientists learn about how _____ flows from one organism to another in an ecosystem. The first two links of a food chain are the _____ and the _____. The third link consists of _____, the organisms that get their energy by eating the consumers that eat producers. The top predators are usually _____. All the food chains in an ecosystem are shown in a food _____ that helps scientists see how food chains _____. This is important, since most _____ and _____ eat several types of _____ and producers. A(n) _____ shows how energy moves through a food chain and is lost at each level of the chain. Organisms also lose energy when they perform their daily activities.

Earth's Cycles for Life

Use your textbook to help you fill in the blanks.

How does Earth have enough air and water to keep us alive?

1. The air we breathe and the water we drink do not run out, because the planet is always _____ them.
2. Water can change from a solid to a liquid to a(n) _____ and back again.
3. The Sun causes _____ when it heats the water in oceans, lakes, rivers, ponds, and puddles.
4. A process called _____ makes the water that hits Earth's surface soak into the ground.

What is the carbon cycle?

5. There is not a lot of carbon in the _____, so it must be recycled.
6. The buildup of gases that leads to global warming is the _____ effect.
7. Carbon is stored in the air as carbon dioxide and in organic matter in the _____.
8. The shells of some marine organisms contain _____ carbon dioxide.
9. Living things use _____ to break apart molecules during respiration.

What is the nitrogen cycle?

10. Nitrogen is needed to make _____ for the growth of muscles, skin, bones, blood, plant cell walls, and internal organs.
11. Lightning can change the nitrogen in the atmosphere into a(n) _____ compound.
12. Nitrogen-fixing _____ live in the roots of beans, peas, and peanuts and can extract nitrogen from the air.
13. The nitrogen-containing substance called _____ is a product of the breakdown of plant proteins by decomposers in the soil.
14. Plants absorb nitrates and nitrites and then use them to make _____ .

How are plants recycled?

15. Certain kinds of food scraps or yard cuttings can be recycled through the process of _____ .
16. Dead plants and animals are broken down into useful materials such as minerals and rich soils by _____ .

Summarize the Main Idea

17. What does Earth do with water and other substances such as carbon and nitrogen?

Earth's Cycles for Life

carbon cycle

evaporation

nitrogen cycle

composting

nitrates

precipitation

condensation

nitrites

water cycle

Fill in the blanks.

1. The continuous trapping of nitrogen gas into compounds in the soil and the returning of nitrogen gas to the air is the _____ .
2. Any form of water that falls to Earth is _____ .
3. Plants absorb _____ and _____ and use them to make protein.
4. The process in which a liquid changes into a gas is _____ .
5. Through the _____ , carbon is recycled between the atmosphere and living things.
6. The continuous movement of water between Earth's surface and the air is the _____ .
7. Organic matter is broken down by decomposers during _____ so it can be used as a natural fertilizer for gardening or farming.
8. The process in which a gas changes into a liquid is known as _____ .

Earth's Cycles for Life

absorb	condensation	gas	precipitation
carbon dioxide	decay	nitrates	
collection	decomposers	nitric acid	

Fill in the blanks.

If the planet did not recycle the air we breathe and the water we drink, they would run out. The first step in the water cycle is _____ . Water is then evaporated by the Sun, and the process of _____ begins, forming clouds. Eventually the water returns to Earth as _____ to start the process over again. Carbon escapes into the air and ground when plants and animals _____. Plants use the carbon from _____ in photosynthesis. Animals eat the animals that eat plants that _____ the nitrogen they need. Nitrogen-fixing bacteria extract nitrogen _____ from the air. Other bacteria convert nitrogen into nitrites or _____ , substances plants can use to make proteins. Rainwater and lightning make another usable form of nitrogen called _____. Organic matter is broken down into nitrogen by _____. They return important substances back into nature.

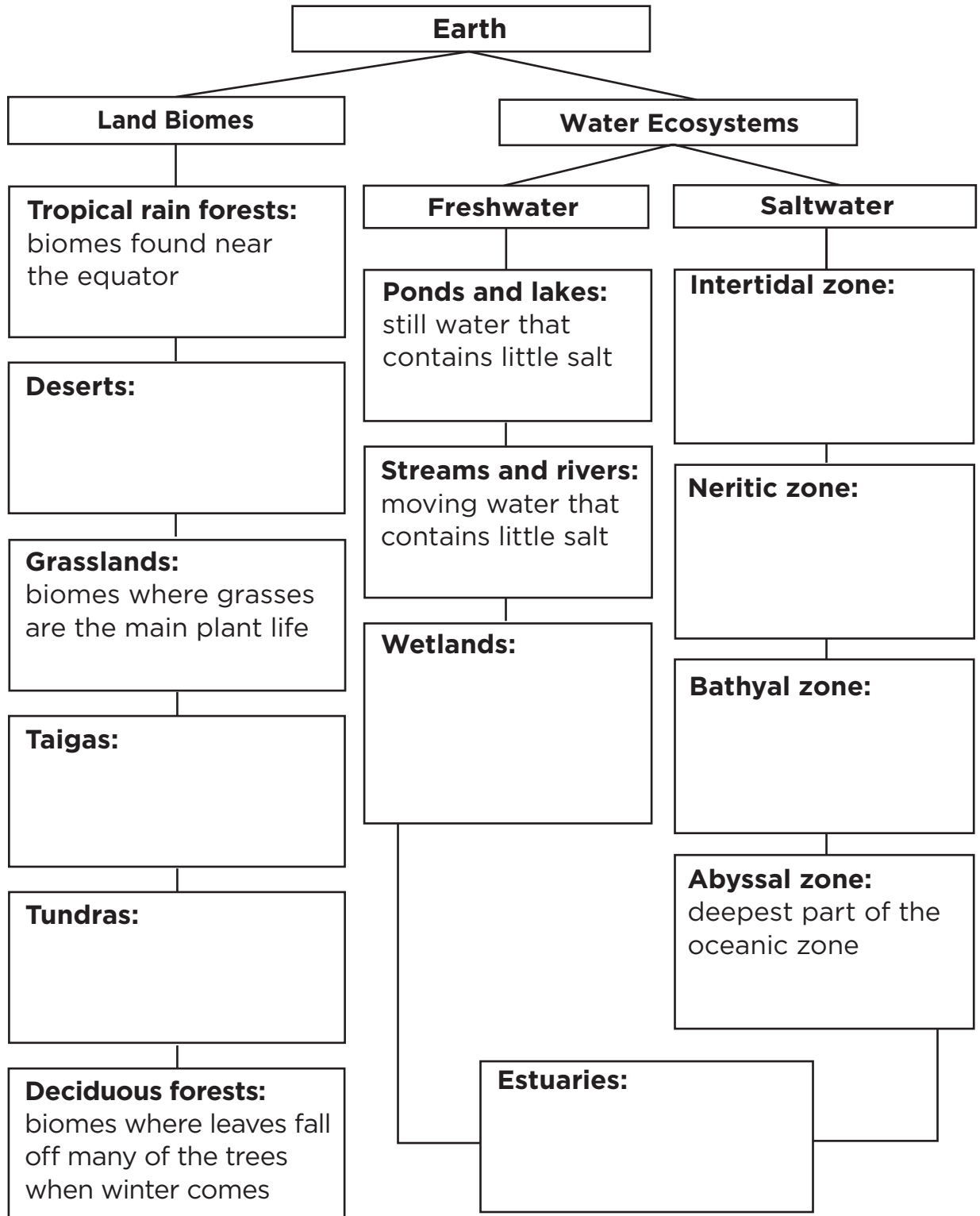
Earth's Ecosystems

Circle the letter of the best answer.

- Living things in an ecosystem are
 - microorganisms.
 - biotic factors.
 - abiotic factors.
 - populations.
- A low pH indicates that soil is
 - alkaline.
 - balanced.
 - spongy.
 - acidic.
- A community is made up of
 - environments.
 - populations.
 - habitats.
 - ecosystems.
- A by-product of photosynthesis is
 - sunlight.
 - oxygen.
 - water.
 - carbon.
- The part of a plant that supports leaves and flowers is its
 - stem.
 - petiole.
 - blade.
 - epidermis.
- One way water is pulled through a plant is by
 - stomata.
 - gravity.
 - transpiration.
 - photosynthesis.

- 7.** Respiration is the process of
- A** releasing energy. **C** storing carbon.
B storing energy. **D** releasing oxygen.
- 8.** Microscopic organisms that cannot be clearly classified as plant or animal are
- A** prokaryotes. **C** eukaryotes.
B cyanobacteria. **D** protists.
- 9.** Cilia and flagella both aid in
- A** eating. **C** movement.
B respiration. **D** communication.
- 10.** Animals that eat both producers and consumers are
- A** omnivores. **C** herbivores.
B scavengers. **D** carnivores.
- 11.** An animal that hunts and kills its food is a
- A** producer. **B** scavenger. **C** predator. **D** decomposer.
- 12.** Carnivores' teeth are best suited for eating
- A** meat. **B** plants. **C** insects. **D** grass.
- 13.** Heating of water results in
- A** precipitation. **C** conservation.
B collection. **D** evaporation.
- 14.** Bacteria in the soil can change ammonia into
- A** nitrites. **B** carbon. **C** water. **D** topsoil.

Complete the concept map on Earth's land and water, using terms and phrases from your textbook.



Mojave

by Diane Siebert

Read the Literature feature in your textbook.



Write About It

Response to Literature This poem describes how a desert changes with the seasons. What happens when spring arrives? What causes the changes to occur? Write a research report about flowering plants that grow in the desert. Explain when they bloom and what causes them to do so.

Earth's Land Biomes

Use your textbook to help you fill in the blanks.

What is a biome?

1. Land on Earth can be classified into _____ major areas called biomes.
2. The climate of a biome influences the kinds of plants and _____ that live in that region.

What are tropical rain forests?

3. The climate of tropical rain forests is _____ and humid with a lot of rainfall.
4. The top level of vegetation in a tropical rain forest is called the _____ layer.
5. Because the _____ shades the rain forest with a thick blanket of foliage, little sunlight reaches the lower two levels.
6. Tree trunks, shrubs, vines, and small plants make up the _____.

What are deserts?

7. The four major desert types are determined by their temperature ranges and the amount of _____ they receive.
8. Hot and dry deserts have extreme differences between their nighttime and daytime _____ in the summer.
9. Cool winters and warm summers characterize _____ deserts.

10. The Atacama Desert in Chile is Earth's _____ desert.

What are grasslands and savannas?

11. Grasslands are often used for _____, since they have some of the world's most fertile soils.
12. Savannas receive _____ rainfall than other grasslands, but natural fires occur during the dry season.

What are temperate deciduous forests?

13. In deciduous forests the leaves fall off many of the trees when _____ comes.
14. Deciduous forests are found in eastern North America, northeastern Asia, and western and central _____.

What are taigas and tundras?

15. A taiga is a cool _____ of cone-bearing evergreen trees.
16. A tundra is a very cold, dry biome that includes a frozen-soil layer called _____.

What lives in Earth's coldest places?

17. There is no land near the North Pole, while snow and ice near the South Pole cover the continent of _____.
18. Earth's largest land carnivore, the _____, can be found close to the North Pole.

Summarize the Main Idea

19. What are the classifications for the six major land areas on Earth?

Earth's Land Biomes

- | | | |
|---------------------|----------------------|--------------------------------|
| a. biome | d. grasslands | g. tropical rain forest |
| b. climate | e. savanna | h. tundra |
| c. deciduous | f. taiga | |

Match the correct letter with the description.

- _____ the average weather pattern of a region
- _____ grassland that stays warm year-round with very wet summers and long, dry winters
- _____ a very cold, dry biome that includes a layer of permanently frozen soil
- _____ tending to fall off during a particular season
- _____ biome located near the equator, where the Sun's rays strike Earth's surface most directly
- _____ a cool forest of cone-bearing evergreen trees
- _____ a region with a particular climate that contains certain types of plants and animals
- _____ biomes in which grasses are the main plant life

Earth's Land Biomes

conserve

grasslands

precipitation

equator

permafrost

resting

evergreen

Pole

taiga

Fill in the blanks.

A biome is a region that has a particular climate. The climate in each biome is mainly determined by temperature and _____ . For example, the rain forests located near the _____ are hot and humid, with a lot of rainfall. In contrast, the tundra near the North _____ is cold and dry. Some plants and animals have adapted to the harsh conditions, but _____ prevents trees and large plants from rooting. The _____ also has very cold winters, but it supports large forests of _____ trees. One way animals adapt to desert conditions is by _____ during the hot days and becoming active when the temperatures fall at night. Desert plants are able to _____ water. Rainfall is irregular and usually not plentiful in _____ , but like the deciduous forests, the soil is very rich and fertile, and the vegetation supports a variety of animals. All the organisms in a biome are adapted to live in the region's weather conditions.

Earth's Water Ecosystems

Use your textbook to help you fill in the blanks.

What are ocean ecosystems?

1. Water from the ocean is _____ by energy from the Sun, then the evaporated water rises and forms clouds, then it falls back to Earth as rain or snow.
2. Factors that affect ocean organisms include temperature, salt content, water pressure, tides, and the amount of _____ that penetrates the water.
3. During _____ tide, the intertidal zone of the ocean is covered by water.
4. The _____ zone extends from the low-tide line to the point where the ocean floor drops off.
5. Sharks, squid, and octopuses live in the _____ zone, the top level of the oceanic zone.
6. Organisms that live in the abyssal zone have adapted to the cold and _____ conditions.

What are ocean food chains like?

7. Chemosynthesis allows _____ deep in the ocean to produce food.
8. The plankton known as _____ can make food through photosynthesis.
9. Microscopic animals called _____ feed on phytoplankton and are eaten by small fish and other animals.

What are freshwater ecosystems?

10. The water in ponds, lakes, streams, rivers, and wetlands contains little _____ .
11. The water in most lakes and ponds is mostly still, while streams and rivers have _____ water.
12. You can conserve water by using less of it, reusing it, or cleaning and _____ it.
13. Wetlands serve as natural water _____ and provide flood protection and erosion control.

What happens when fresh water meets salt water?

14. Estuaries are the parts of _____ where fresh water meets the sea.
15. The water in an estuary contains less salt than the water in the _____ .
16. The change in the _____ causes the amount of salt in the estuary to change.
17. About three-fourths of all the _____ caught in the United States each year spent part of their lives in estuaries.

Summarize the Main Idea

18. Which organisms play roles similar to organisms in water ecosystems?

Earth's Water Ecosystems

benthos

hydrothermal vents

oceanic

chemosynthesis

intertidal zone

plankton

estuary

nekton

wetlands

Fill in the blanks.

1. Areas in which water is near the surface of the soil much of the time are called _____ .
2. The _____ is the shallowest part of the ocean.
3. The _____ zone includes the deepest part of the ocean.
4. Animals such as flounder, tuna, and squid that swim through the water are known as _____ .
5. A(n) _____ is the part of a river where fresh water meets the sea and is affected by tides.
6. Organisms that live on or near the ocean floor are called _____ .
7. Ocean food chains begin with _____ , microorganisms that live near the surface of the water.
8. Jets of hot water, rich in minerals, that come up through cracks in the ocean floor are called _____ .
9. The process of _____ is based on chemical reactions rather than light as an energy source.

Earth's Water Ecosystems

abyssal	burrow	intertidal	tube worms
bathyal	crabs	neritic	
benthos	habitats	nutrients	

Fill in the blanks.

The oceans are divided into regions in much the same way that land is divided into biomes. As you walk along the _____ zone of the ocean, you might see animals such as _____ . They _____ into the sand so they will not be washed away when the tide ebbs. The _____ zone is richer in plant life than any other part of the ocean. This zone has complex food chains because of the number of _____ and the amount of sunlight in the water. The top layer of the oceanic zone is the _____ zone, home to sharks and other species of fish. In addition to fish, many _____ , such as _____ , live in the dark and cold _____ zone of the ocean. Wetlands and estuaries are also important _____ for many species of birds and fish. Organisms in water ecosystems play roles similar to those of organisms in land biomes.

Meet Eleanor Sterling

Read the Reading in Science feature in your textbook. Look for cause-and-effect relationships.

Cause and Effect

Use the graphic organizer to identify causes and their effects.

Cause	➔	Effect
	➔	
	➔	
	➔	



Write About It

Cause and Effect What factors cause damage to coral reefs? How does damage to coral reefs affect the organisms that live in them?

Planning and Organizing

1. Identify some of the organisms found on a coral reef.

2. List causes of damage to coral reefs.

Drafting

Now explain how the conditions that cause damage to the coral reefs affect the organisms living there.

Ecosystems in California

Use your textbook to help you fill in the blanks.

What is a Mediterranean climate?

1. A Mediterranean climate has mild, rainy winters and _____, dry summers.
2. Areas with Mediterranean climates are usually found along the _____ coasts of continents.
3. Mediterranean climates are located about halfway between the _____ and the North Pole.

What is a chaparral?

4. There is a dense blanket of _____ and low trees in a chaparral.
5. Plants that have adapted to this dry region may have large, thick leaves or _____ leaves to reduce water loss.
6. Lightning or an untended campfire can ignite a chaparral and cause a(n) _____.
7. Nutrients are returned to the soil by the _____ from fires.

What are California's deserts like?

8. Death Valley, the lowest point in the United States, is located in the _____.
9. The Colorado Desert is the _____ desert in the United States.
10. The _____ bush has small, waxy leaves that limit water loss so it can produce enough food to stay alive.

Where are California's forests found?

11. The temperature and climate along the northern coast of California are ideal for _____ .
12. Magnificent forests of giant _____ are along the northern coast, and sequoias are found in areas away from the sea.

What are California's producers?

13. Diverse _____ in California support many different types of plants that produce food through photosynthesis.
14. The _____ of the Mojave Desert play an important role in the desert ecosystem.

What are California's consumers?

15. As the human _____ of California increases, so does the need to protect the state's natural resources.
16. California condors are _____ , feeding off the remains of dead animals.

Why are nonnative plants and animals dangerous to California's ecosystems?

17. Nonnative plants and animals often have no natural checks that prevent dramatic increases in their _____ .
18. Problems are often caused when nonnative plants _____ native plants.

Summarize the Main Idea

19. How does the environment define the ecological roles of organisms?

Ecosystems in California

a. abiotic factor**d.** evergreen**g.** scavenger**b.** chaparral**e.** Joshua tree**h.** serpentine**c.** dormant**f.** keystone species

Match the correct letter to the description.

- _____ an organism that feeds off the remains of dead animals
- _____ a dry region with thick brush and small trees
- _____ a tree that keeps its leaves all year
- _____ less active
- _____ a species upon which other animals depend
- _____ an unusual rock that contains minerals that are toxic to many plants
- _____ a nonliving part of an ecosystem
- _____ a food source and home for many animals found only in the Mojave Desert

Ecosystems in California

agriculture

habitats

redwood

arid

latitude

root systems

flowering

Pacific Ocean

wildfires

Fill in the blanks.

California has different ecosystems that are home to many native plant and animal species. The variety of the state's landforms and climates results in a diversity of _____. The central and southern parts of California share the same _____ and climate as areas around the Mediterranean Sea. The wet and mild winters and springs are good for _____. In the chaparral located near the Sierra Nevada, summer conditions increase the risk of _____. Plants in the chaparral adapt to the hot, dry summers by developing shallow _____ or broad, thick leaves. Two other _____ regions are the Mojave Desert and the Colorado Desert. After infrequent periods of rain, _____ plants attract butterflies. Northern California has _____ forests that thrive on summer fog and moist air from the _____. The large area of California, its different climates, and its regions at widely varying elevations help create diverse habitats.

Plants Fight Back!

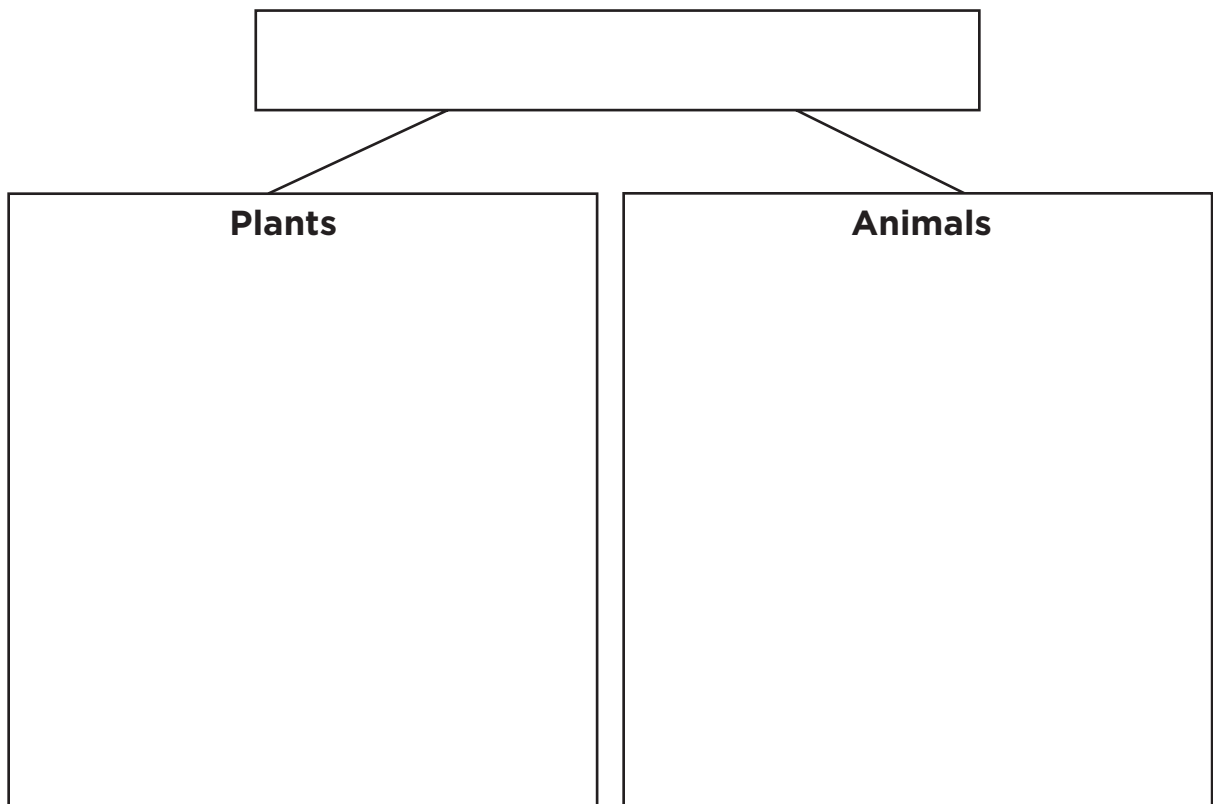


Write About It

Expository Writing Write an essay about the Mojave Desert and some of the plants and animals that live there. State the main idea and the purpose for writing at the beginning. Use supporting details for descriptions. Explain the threats that wildlife face in the Mojave Desert. Write a detailed summary linked to the purpose of your essay.

Getting Ideas

Use the diagram below to brainstorm ideas about plants and animals that live in the Mojave Desert. Write *Mojave Desert* in the top box of the diagram. Write facts and details about plants that live in the Mojave Desert in the box on the left. Write facts and details about animals that live there in the box on the right.



Drafting

Your thesis statement should create a strong impression of the Mojave Desert. Circle the better thesis statement below.

At first glance the Mojave Desert seems lifeless, but it is actually home to a wide array of plants and animals, many of which are in danger.

The Mojave Desert is located in California and is a beautiful place, but it looks like nothing lives there.

Now write your first draft. Use a separate piece of paper. Include an introductory paragraph and a conclusion to summarize your points.

Revising and Proofreading

Here are two sentences that Carlene wrote. Combine them by using the word *because*.

1. The number of frogs and other amphibians is declining. Their thin skin makes them vulnerable to many pollutants.

Now revise and proofread your essay. Ask yourself these questions:

- Have I written a strong thesis statement about the Mojave Desert?
- Does my introductory paragraph engage my readers?
- Have I included details to help my readers visualize the area?
- Have I described threats to the plants and animals and shown how they react to the threats?
- Have I connected sentences to show cause and effect?
- Have I ended with a conclusion that summarizes my main points?
- Have I corrected all grammar mistakes?
- Have I corrected all spelling, punctuation, and capitalization errors?

Earth's Land and Water

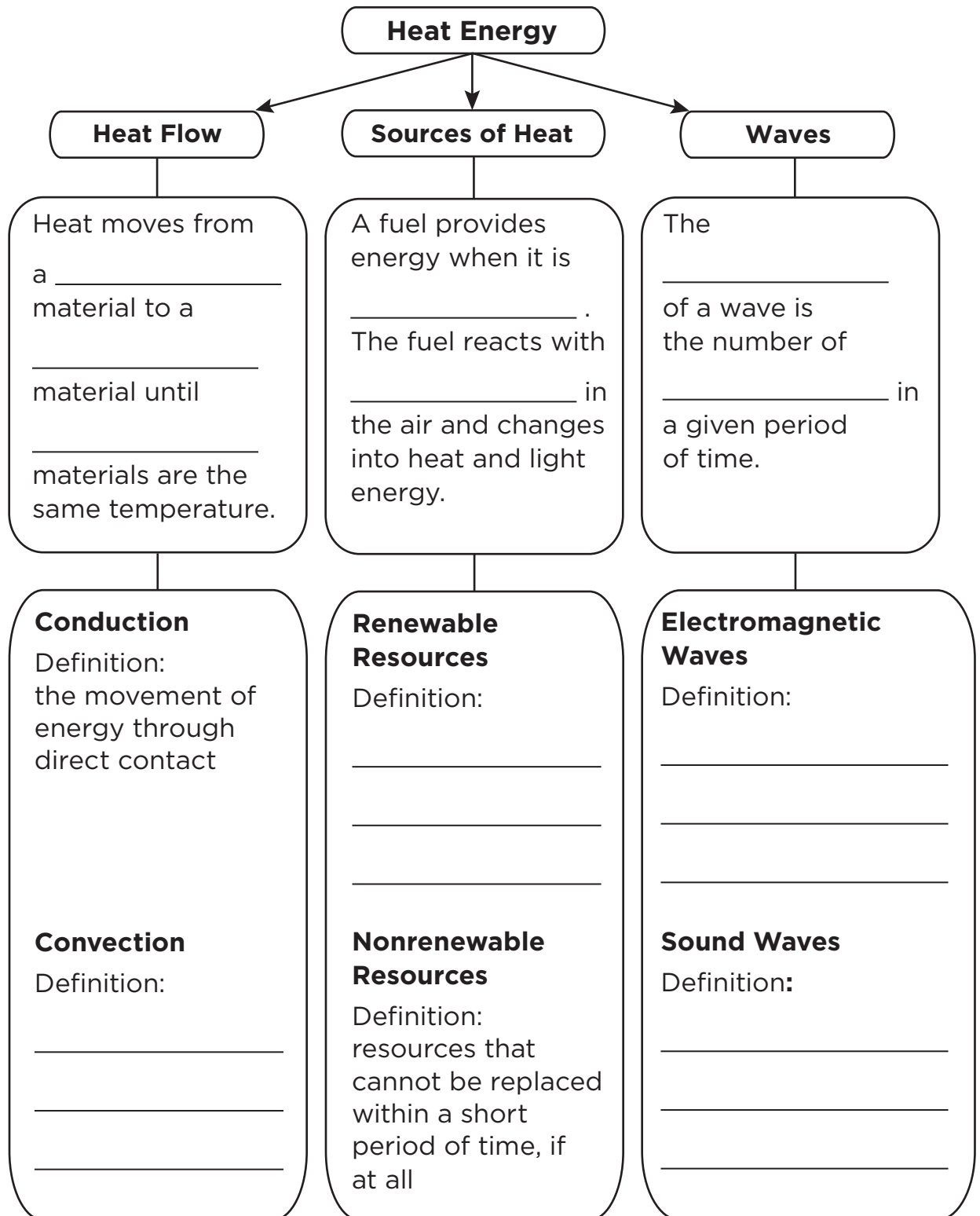
Circle the letter of the best answer.

- Cold deserts are found near the
A coast. **C** poles.
B equator. **D** canopy.
- Bison and prairie dogs might be found in
A tropical rain forests. **C** deserts.
B grasslands. **D** deciduous forests.
- A biome is classified according to its
A animal species. **C** location.
B plant life. **D** climate.
- Permafrost is a feature of
A a taiga. **C** a chaparral.
B an abyssal zone. **D** a tundra.
- Microorganisms that use photosynthesis to produce food are
A zooplankton. **C** phytoplankton.
B bacteria. **D** plankton.
- Flounder and tuna belong to the category of organisms called
A floaters. **B** plankton. **C** benthos. **D** nekton.
- Water lilies are found in
A ponds. **B** rivers. **C** streams. **D** inlets.

Circle the letter of the best answer.

8. A mix of fresh and salt water is found in
A wetlands. **C** rivers.
B estuaries. **D** lakes.
9. Organisms that are both exposed to air and covered by water live in the
A bathyal zone. **C** neritic zone.
B abyssal zone. **D** intertidal zone.
10. A dry region with thick, brush-like vegetation is a
A desert. **B** marsh. **C** chaparral. **D** steppe.
11. An animal that builds a home and then leaves it for others is a
A keystone species. **C** primary consumer.
B small predator. **D** large predator.
12. Deciduous trees conserve energy when their leaves
A decay. **C** fall off.
B change color. **D** remain green.
13. Blue whales feeding on plankton is an example of
A a food chain. **C** conservation.
B chemosynthesis. **D** an abiotic process.
14. One reason that some species in California are endangered is
A change in climate. **C** decrease in consumers.
B loss of habitat. **D** lack of natural predators.

Complete the concept map on heat energy, using terms and phrases from your textbook.



Sun-Powered Speed

by Fiona McCormack

Read the Literature feature in your textbook.



Write About It

Response to Literature This article describes how people use energy from the Sun to run solar cars. In what other ways do people use the Sun’s energy? Is the Sun’s energy always useful? Write a personal narrative about how the Sun affects your life. What role does the Sun play in your activities?

Heat Flow

Use your textbook to help you fill in the blanks.

How is energy related to motion?

1. Almost all matter can exist as a solid, a(n) _____, or a gas.
2. Molecules usually move faster in _____ and slower in liquids and solids.
3. In _____ molecules vibrate back and forth.
4. The ability to bring about changes or to do work is _____.
5. The energy of any moving object is called _____ energy.
6. The energy stored in an object by changing its location is called _____ energy.

How is temperature different from heat?

7. The _____ of a substance is the average kinetic energy of its molecules.
8. Molecules in a gas move about rapidly, _____ with one another.
9. The molecules in a solid have _____ energy than the molecules in a gas.
10. The most common unit used to measure heat is the _____.

Why does heat flow from one object to another?

11. Heat flow is the _____ of energy from a warmer object to a cooler one.
12. Energy is _____ from one object to another because of the difference in temperature.
13. When you put your hand into a glass of cold water, _____ passes out of your hand into the cold water.
14. The heat from a hot liquid causes molecules in an object to heat up and vibrate _____ .

What is insulation?

15. A(n) _____ is an object that absorbs heat and distributes it evenly throughout an object.
16. Metals are not good insulators, but _____ is an example of a good insulator.
17. People use _____ to prevent heat from flowing into or out of a material.
18. To insulate a wall, wrap it with a material that is not a good conductor of _____ .

Summarize the Main Idea

19. How must heat energy flow from object to object, and how long does it flow?

Heat Flow

calorie	heat flow	potential energy
conductor	insulator	temperature
energy	kinetic energy	

Fill in the blanks.

1. The average kinetic energy of the molecules in a substance is its _____ .
2. An object that absorbs heat evenly and distributes it evenly is a(n) _____ .
3. The transfer of energy from a warmer object to a cooler object is _____ .
4. It takes _____ to move yourself up a hill, to light a house, or to cook a dinner.
5. Moving an object upward against gravity is one way to give it _____ .
6. The energy of any moving object is called _____ .
7. The amount of energy needed to raise the temperature of 1 gram of water by 1°C is called a(n) _____ .
8. An object that absorbs heat but does not distribute it evenly is called a(n) _____ .

Heat Flow

calories	energy	kinetic	slower	warmer
conductor	gas	liquid	solid	
cooler	insulator	moving	thermal	

Fill in the blanks.

Almost all matter can exist in three states. It can be a(n) _____, a(n) _____, or a(n) _____. Matter is made of molecules that are always _____. The motion of molecules is a type of _____. The energy of any moving object is called _____ energy. Molecules in a solid move _____ than molecules in a gas. When you heat a material, you increase its _____ energy. Heat always moves from a _____ object to a _____ object. The amount of heat in an object is measured in _____. If you want heat to travel through an object, choose a good _____ such as metal. If you do not want heat to travel through an object, choose a good _____ such as wood. Heat energy flows between two or more objects until their temperatures are equal.

Waves

Use your textbook to help you fill in the blanks.

What is a wave?

1. A wave is a(n) _____ that carries energy from one place to another without a net movement of matter.
2. The movement of a wave, either back and forth or up and down, is sometimes called a(n) _____.
3. The _____ of a wave tells the number of vibrations it makes in a given period of time, usually 1 second.
4. The distance from the top of one crest to the top of the next is the _____ of a wave.
5. A wave's _____ is the distance from the midpoint to the crest (or trough) of the wave.

What is sound?

6. Like other forms of energy, sound travels as _____.
7. A sound wave carries vibrations from the vibrating object outward in _____ directions.
8. A sound wave is produced by the _____ of an object.
9. The highness or lowness of a sound depends on its _____.
10. Low-pitched sound waves vibrate at a(n) _____ speed than high-pitched sound waves.

How do sound waves travel?

11. Sound waves are _____ waves that move by compressing and expanding matter.
12. In sound waves the molecules of matter in the wave move back and forth in the same _____ as the wave.
13. Matter conducts sound waves _____ from the vibrating object that produces them.
14. Sound can travel through solids, liquids, and gases, but air is a poor _____ of sound.

What are electromagnetic waves?

15. An electromagnetic wave _____ back and forth across the direction in which the wave travels.
16. Electromagnetic waves do not need _____ to carry them.
17. Radio waves and microwaves have lower frequencies than _____, which we feel as heat.
18. The higher-frequency waves include visible light and _____.

Summarize the Main Idea

19. What is a wave, and what are the three ways in which waves can be measured?

Waves

electromagnetic

light

vibration

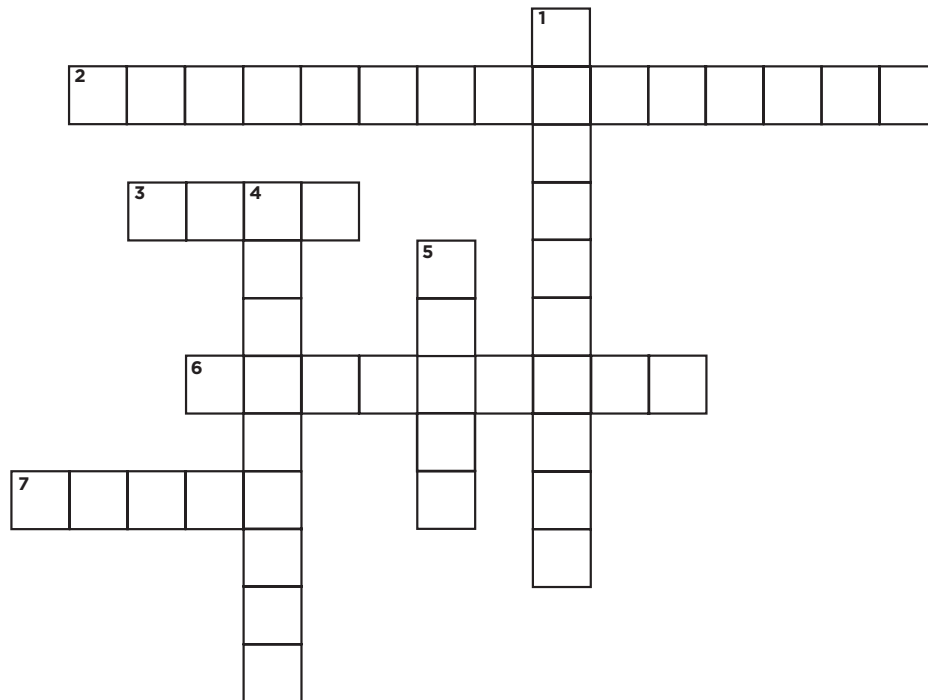
wavelength

frequency

sound

wave

Use the clues to fill in the crossword puzzle.



ACROSS

2. type of wave made up of alternating electric and magnetic fields
3. a disturbance that carries energy from one place to another
6. number of vibrations a wave makes in a given period of time
7. the visible part of the electromagnetic spectrum

DOWN

1. the distance from the bottom of one trough in a wave to the bottom of the next
4. the back-and-forth or up-and-down motion of a wave
5. type of wave produced by the vibration of an object

Waves

amplitude	electromagnetic	radio waves	X rays
compression	light	sound	
conductor	matter	wavelength	

Fill in the blanks.

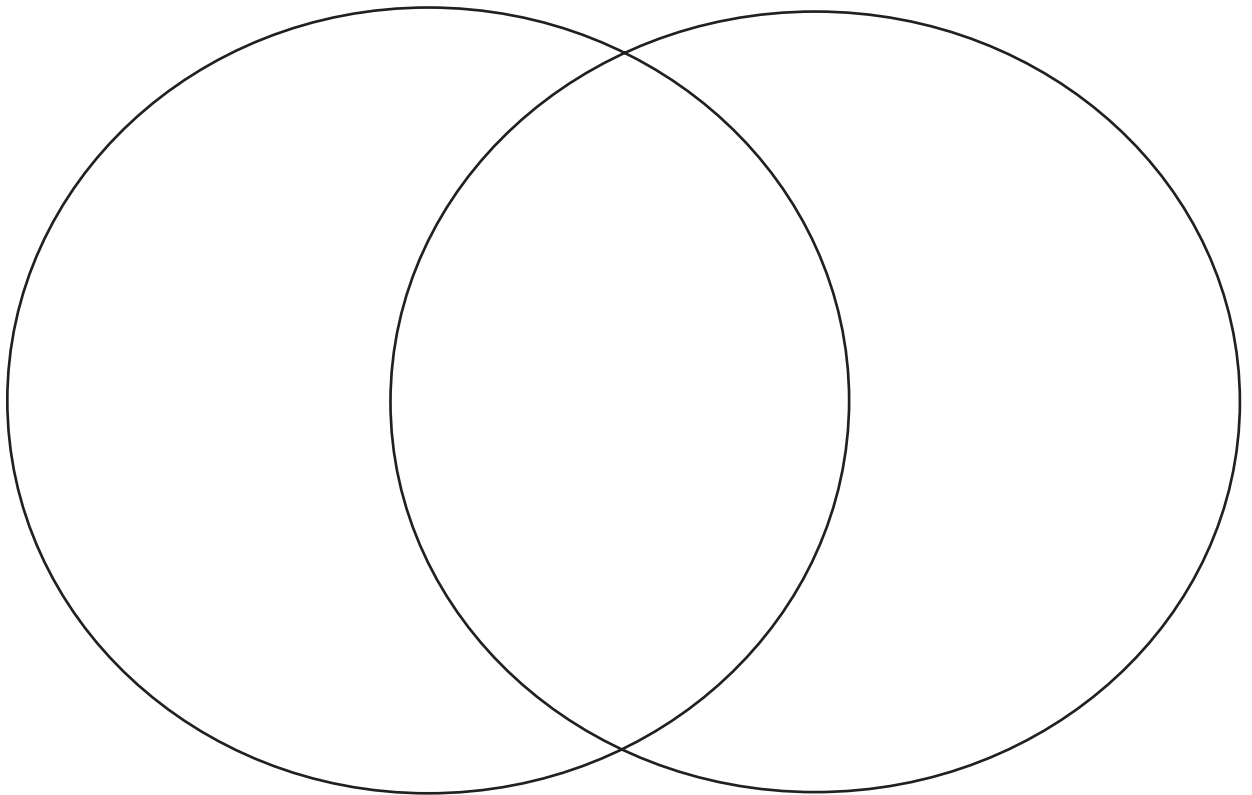
Energy often moves in waves and can be measured in different ways. The _____ of a wave is the distance between the top of one crest and the top of the next. The _____ of a wave is the distance between the midpoint and the crest or trough. A(n) _____ wave is produced by the vibration of an object, while an electromagnetic wave carries energy from the Sun to Earth. Sound waves are _____ waves that move by expanding and contracting matter. Therefore, sound waves can only travel in _____. Sound waves will travel faster in a good _____, such as steel, than in a poor one, such as air. A(n) _____ wave does not need matter to carry it. The visible part of the electromagnetic spectrum is composed of _____ waves. The electromagnetic spectrum also includes lower-frequency _____ and higher-frequency _____. Electromagnetic waves such as light also carry energy.

Seeing in Infrared

Read the Reading in Science feature in your textbook. Look for information you can compare and contrast.

Main Idea

Use the graphic organizer to compare and contrast topics in the article.



**Write About It**

Compare and Contrast How is infrared radiation different from visible radiation? What do the bolometer, night-vision goggles, and the Spitzer Space Telescope have in common?

Planning and Organizing

Write additional details for each of the following terms:

infrared radiation:

visible radiation:

bolometer:

night-vision goggles:

Spitzer Space Telescope:

Drafting

Now, explain the differences between infrared radiation and visible radiation.

Next, explain the similarities between the bolometer, night-vision goggles, and the Spitzer Space Telescope.

Fuels: Our Major Energy Source

Use your textbook to help you fill in the blanks.

What are fuels?

1. A fuel is a material that releases heat when it is _____, providing energy.
2. Coal, _____, and natural gas are examples of fossil fuels.
3. Fossil fuels are _____ resources, which cannot be replaced.
4. Wood and water are examples of _____ resources if they are not used up too quickly.
5. Since fossil fuels give off large amounts of _____ when they burn, they are widely used.

What happens when fuel burns?

6. Burning is a _____, a change in matter that produces new substances.
7. The original substances in such reactions are called _____.
8. For any fuel to burn, _____ must be present.
9. The chemical reaction between oxygen and fuel when it is heated releases heat energy and _____ energy.
10. Chemical reactions can release products, such as _____ and carbon dioxide.

How can energy be used to do work?

11. The use of force to move an object through a distance is _____ .
12. The energy released when a fuel _____ can be used to do work.
13. A gasoline engine does work by burning fuels and using _____ energy to move the parts of the engine.
14. The friction of tires against a road _____ a car.
15. When you rub your hands together, the heat you feel is a result of _____ .

How does potential energy change into kinetic energy?

16. Potential energy is _____ energy, and kinetic energy is the energy of motion.
17. A rock rolling down a steep hill has kinetic energy until it stops _____ .
18. Burning a(n) _____ is one way to change potential energy into kinetic energy.
19. A match has _____ energy in its chemical bonds that becomes kinetic energy when the match is lit.

Summarize the Main Idea

20. What happens to stored chemical energy when a fuel burns?

Fuels: Our Major Energy Source

- | | | |
|------------------------------|----------------------------------|----------------|
| a. biomass conversion | f. nonrenewable resources | k. work |
| b. chemical reaction | g. potential energy | |
| c. fossil fuels | h. product | |
| d. friction | i. reactants | |
| e. kinetic energy | j. renewable resources | |

Match the correct letter with the description.

- _____ a change in matter that produces new substances with different properties from the original substances
- _____ energy sources formed by the remains of plants and animals beneath Earth's surface
- _____ the use of force to move an object through a distance
- _____ the energy of motion
- _____ resources that cannot be replaced within a short period of time, if at all
- _____ a new substance formed by a chemical reaction
- _____ a method for changing plant and animal materials into high-quality fuels
- _____ the force that acts when two surfaces rub against each other
- _____ resources that can be replaced in a relatively short period of time
- _____ the original substances in chemical reactions
- _____ stored energy

Fuels: Our Major Energy Source

burn	fossil fuels	products	wood
chemical reaction	heat	reactants	
coal	natural gas	renewable	
energy	nonrenewable	solar energy	

Fill in the blanks.

People, animals, and plants use food as a fuel. A fuel is a material that releases _____ when it is burned, providing _____ . Fuels known as _____ are formed from the remains of plants and animals buried deep beneath Earth's surface. Examples of fuels formed this way are _____ , oil, and _____ . These fuels are _____ , because they cannot be easily replaced. Other fuels, such as _____ , wind, water, and _____ , can be replaced in a relatively short time and are called _____ resources. A(n) _____ takes place when any fuel burns, creating new substances, which are the _____ . The original substances in the reaction are called the _____ . When fuels _____ , they release heat energy. This energy can be used to do work.

Kid Power for California!

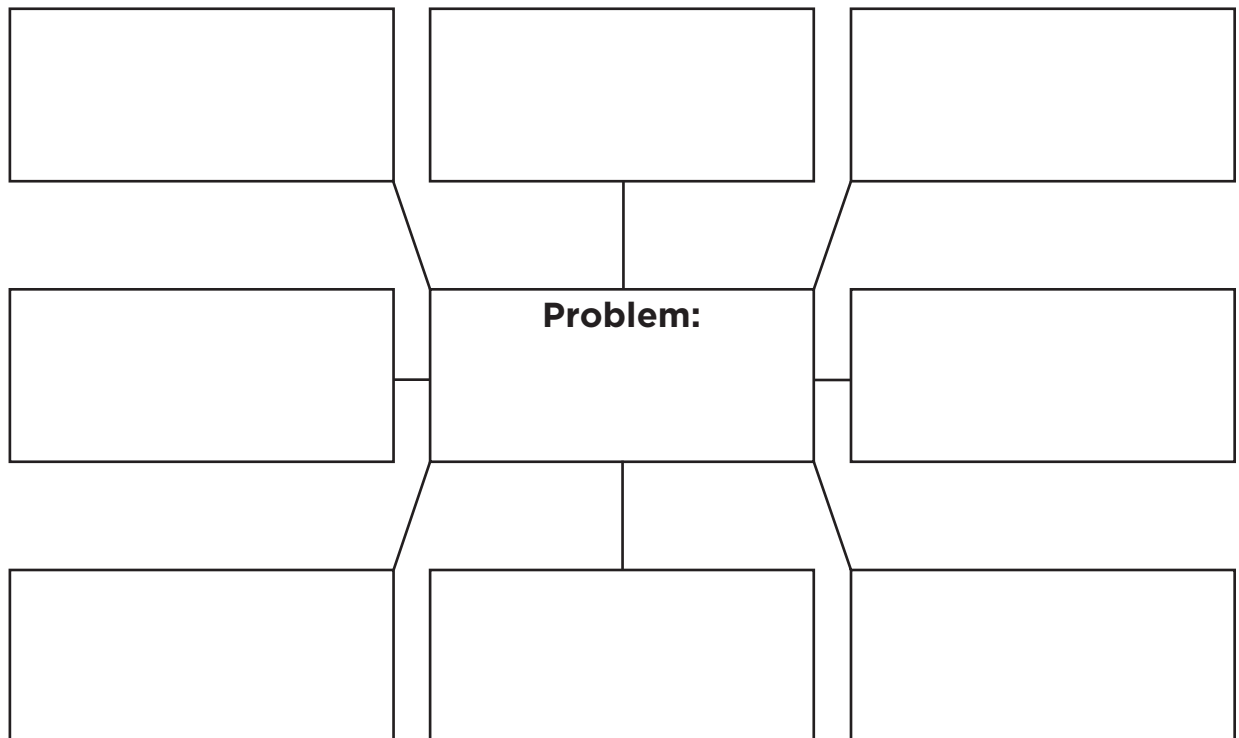


Write About It

Persuasive Writing Write a persuasive letter to your local representative in the California State Assembly about an energy-related environmental problem in your area. State your opinion, and support it with convincing reasons and evidence arranged in a logical order. Include arguments for ways to conserve energy and solve the problem. Use print and online sources to research this topic. Use the correct form for a formal letter.

Getting Ideas

Choose an energy-related environmental problem in your area. Write it in the center of the chart below. Then do some research using print and online resources. Write facts about the problem in the outer boxes.



Drafting

Follow these directions to create a formal letter:

1. Write or type your complete address.
2. Write or type the date.
3. Write or type the name, organization, and address of the person you are writing to.
4. Write or type the salutation, or greeting. Put a colon at the end of it.
5. Write or type an introductory paragraph. Explain why you are writing, and give your opinion about the problem.
6. Support your opinion with the causes and effects of the problem.
7. In your last paragraph, tell what you want to happen.
8. Use words such as “Sincerely yours” or “Yours sincerely” to end the letter. Put a comma after these words.
9. Sign your name. Write or type your name under your signature.

[1]	_____

[2]	_____
[3]	_____

[4]	_____
[5]	_____

[6]	_____

[7]	_____

[8]	_____
[9]	_____

Now write your first draft. Use a separate piece of paper. Use the correct form for a formal letter.

Revising and Proofreading

Now revise and proofread your own letter. Ask yourself:

- Have I stated my opinion in the first paragraph?
- Have I included reasons to support that opinion?
- Have I organized this information to show causes and effects?
- Have I followed the form for a formal letter?
- Have I used precise verbs, nouns, and adjectives?
- Have I ended with a conclusion that tells what I want to happen?
- Have I corrected all grammar mistakes?
- Have I corrected all spelling, punctuation, and capitalization errors?

Heat Transfer in Solids and Fluids

Use your textbook to help you fill in the blanks.

How is heat transferred?

1. Heat travels from _____ objects to cooler objects until all objects are the same temperature.
2. The movement of energy through direct contact is _____ .
3. Two materials must be _____ for heat to be conducted from one material to the other.
4. Atoms in liquids and gases are not as close to each other as they are in _____ .
5. Conduction is the only way that _____ can travel through solids.
6. As a solid heats up, its atoms vibrate more quickly, and its temperature _____ .

What is convection?

7. The transfer of energy by the flow of a liquid or a gas is called _____ .
8. Convection can occur in liquids and in gases but not in _____ .
9. Warmer air rises because it has a lower _____ than cooler air.
10. The upward force on an object or a substance that is in a liquid or a gas is called _____ .

11. When hot fluid rises from its source of heat, it may cool and become _____ .
12. The circulation of hot and cold fluids resulting from warming and cooling is called a(n) _____ .
13. One object can be denser than another but weigh _____ .
14. Cooler air is denser than warmer air and _____ .

Do some materials warm faster than others?

15. The rate at which a material warms up when absorbing heat is a(n) _____ property.
16. A good conductor, such as _____ , absorbs heat faster than a poor conductor such as wood.
17. Substances with _____ thermal-conductivity values conduct heat better.
18. Scientists use thermal conductivity to _____ the abilities of substances to conduct heat.

Summarize the Main Idea

19. How does heat flow in solids and fluids?

Heat Transfer in Solids and Fluids

buoyancy

convection

thermal conductivity

conduction

convection current

Fill in the blanks.

1. Because most gases and liquids become less dense when they are heated, _____ occurs.
2. When a pot is heated on an electric stove, energy is transferred from atom to atom through _____.
3. The circulation caused by the warming and cooling of liquids or gases creates a(n) _____.
4. An object in a liquid or gas experiences an upward force called _____.
5. A physical property used to compare the ability of substances to conduct heat is _____.

Heat Transfer in Solids and Fluids

absorb	convection currents	metal	solids
conduction	dense	rise	wood
convection	gases	sink	

Fill in the blanks.

Heat travels from warmer objects to cooler objects until their temperatures are equal. When two materials are touching, heat travels through them by a process called _____.

This process is the only way that heat can travel through _____ . However, heat also travels through liquids and _____ by the process of _____ .

This process occurs because most gases and liquids are less _____ when they are heated. As a result heated gases and liquids _____ , and cooler gases and liquids _____ . This movement can create _____ . Not all materials _____ heat at the same rate. A good conductor, such as _____ , absorbs heat faster than a poor conductor such as _____ . Scientists use this information to compare the ability of substances to conduct heat and to tell one material from another.

Heat Energy

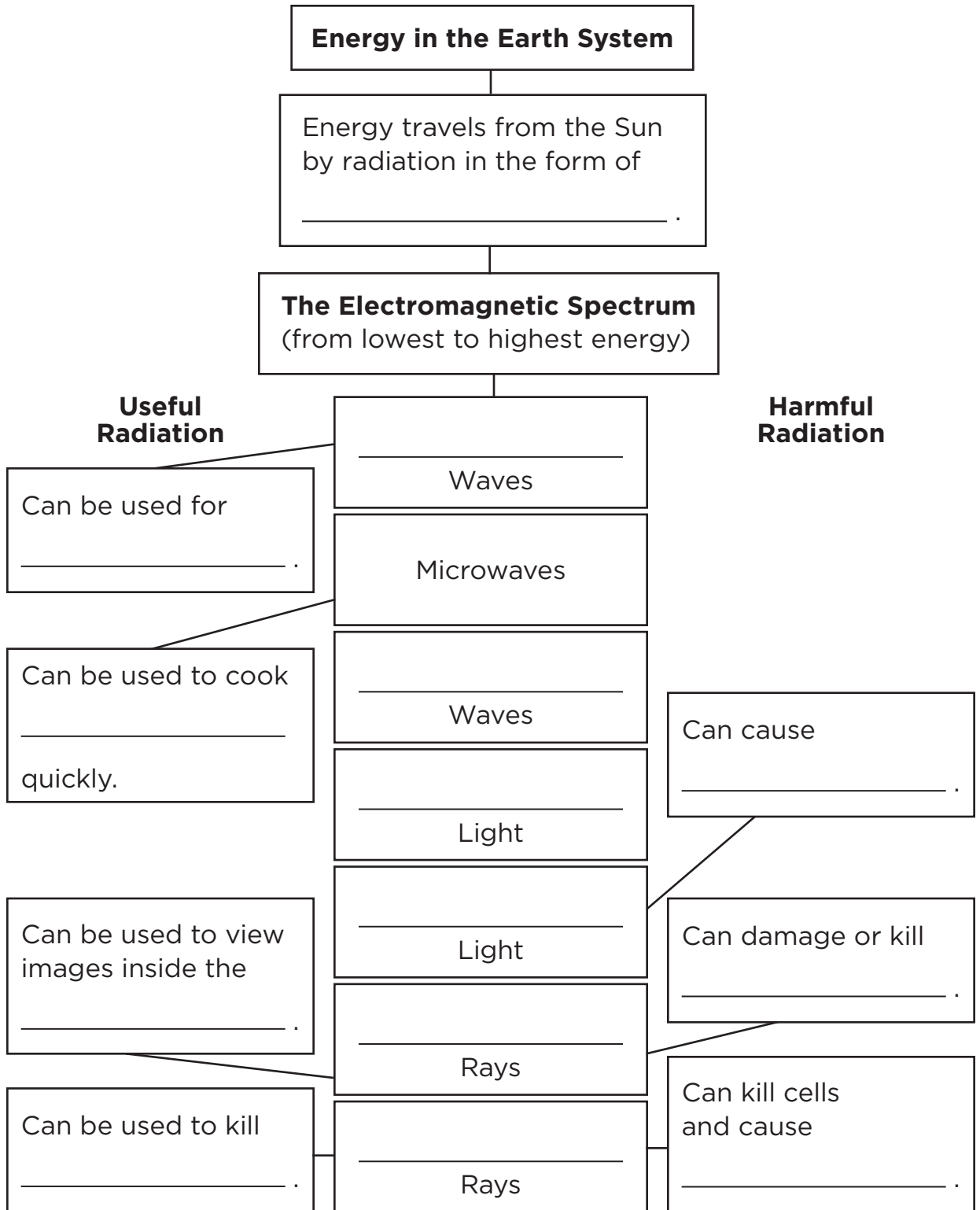
Circle the letter of the best answer.

- The energy of a moving object is called
 - potential energy.
 - a chemical reaction.
 - a fossil fuel.
 - kinetic energy.
- The movement of energy from one substance to another is
 - work.
 - heat.
 - temperature.
 - cold.
- To prevent heat from flowing into or out of a material, builders use
 - conduction.
 - convection.
 - insulation.
 - vibration.
- In a wave the distance from the top of one crest to the top of the next is the
 - frequency.
 - amplitude.
 - wavelength.
 - buoyancy.
- The vibration of an object produces
 - a sound wave.
 - an electromagnetic wave.
 - a light wave.
 - a radio wave.
- A disturbance that carries energy from one place to another without a net movement of matter is a
 - convection current.
 - vibration.
 - wave.
 - chemical reaction.
- The visible part of the electromagnetic spectrum is composed of
 - microwaves.
 - X rays.
 - light waves.
 - compression waves.

Circle the letter of the best answer.

8. Coal, oil, and natural gas are examples of
- A** renewable resources. **C** liquids and gases.
B fossil fuels. **D** kinetic energy.
9. Biomass conversion creates high-quality fuels from
- A** nonrenewable resources. **C** electricity.
B wind, water, and wood. **D** plant and animal materials.
10. A change in matter that produces a new substance with different properties from the original substance is a
- A** chemical reaction. **C** biomass conversion.
B convection current. **D** physical reaction.
11. The force that acts when two surfaces rub together is
- A** convection. **C** work.
B heat flow. **D** friction.
12. The movement of energy through direct contact is called
- A** conduction. **C** friction.
B convection. **D** insulation.
13. The transfer of energy by the flow of a liquid or gas is
- A** vibration. **C** conversion.
B conduction. **D** convection.
14. An upward force on an object that is in a liquid or gas is
- A** convection. **C** buoyancy.
B thermal conductivity. **D** biomass conversion.

Complete the concept map on energy in the Earth system, using terms and phrases from your textbook.



Lasers: A Scientific Breakthrough

Read the Literature feature in your textbook.



Write About It

Response to Literature In this article the author tells about the invention of the laser. How did this invention come about? What impact has it had on science? Write an essay comparing and contrasting lasers and other forms of light. What do they have in common? How do they differ?

Electromagnetic Spectrum

Use your textbook to help you fill in the blanks.

What is the electromagnetic spectrum?

1. Energy from the Sun is carried to Earth by _____ waves.
2. A shorter wavelength has _____ energy than a longer wavelength.
3. Wavelengths of _____ light that we see as colors are in the middle of the electromagnetic spectrum.
4. Rays that have very short wavelengths and can pass through metals and concrete are called _____.

How does electromagnetic radiation reach Earth?

5. The Sun is a source of _____ energy, which does not require two objects to be touching.
6. The most common example of radiation is the production of light by the _____.
7. Dark objects _____ some electromagnetic radiation, while light-color objects reflect more radiation.
8. The Sun's incoming energy may be absorbed, _____, or scattered.
9. Wavelengths of visible light are able to reach Earth's surface, so they are not greatly absorbed in the _____.
10. The sky appears blue because blue light _____ more easily than red or yellow light.

What forms of radiation are useful?

11. Non-ionizing radiation falls at the _____ end of the electromagnetic spectrum.
12. The radiation used to kill cancer cells and generate electricity is an example of _____ radiation.
13. Electromagnetic radiation is generally _____ in small quantities when used properly.

What forms of radiation are harmful?

14. Radiation that can cause harm in large quantities has the _____ energy on the electromagnetic spectrum.
15. Children under the age of 18 are at greater risk from _____ radiation because their skin is more sensitive.
16. In large quantities, _____ can harm living tissue, but small doses are not considered harmful.
17. Nuclear explosions and radioactive elements emit _____ rays, which in large amounts can destroy cells and cause some types of cancer.

Summarize the Main Idea

18. How does heat travel from the Sun to Earth?

Electromagnetic Spectrum

absorption

ionizing

radiation

electromagnetic spectrum

non-ionizing

solar radiation

emission

radiant energy

wavelength

Fill in the blanks.

1. During a process called _____, absorbed electromagnetic waves are given off.
2. The electromagnetic radiation emitted by the Sun is called _____.
3. The _____ is the wide range of electromagnetic radiation ordered by wavelength.
4. Radiation that falls at the long-wavelength end of the spectrum is _____ radiation.
5. The transfer of energy by electromagnetic waves is called _____.
6. Radiation that has extremely high energy is called _____ radiation.
7. The distance along a wave before it repeats is called a(n) _____.
8. The process of taking in radiant energy is called _____.
9. The energy given off by the Sun is called _____.

Electromagnetic Spectrum

absorb	gamma rays	radiation
cool	hotter	reflect
electromagnetic	infrared	ultraviolet
emit	radiant	visible

Fill in the blanks.

The most important source of energy for Earth is the Sun. The Sun emits _____ energy that travels to Earth in _____ waves. Most of the energy from the Sun is in the _____ and _____ parts of the electromagnetic spectrum. Light-color objects _____ most of the Sun's energy. Dark objects _____ more radiant energy and feel _____ than light-color objects. Dark objects _____ more radiation but also _____ faster than similar light-color objects. Exposure to _____ rays may lead to skin cancer. Another type of harmful _____ that can cause cancer is _____, which have very high frequencies. These high-energy waves are given off by nuclear explosions and by radioactive elements.

Solar Radiation

Use your textbook to help you fill in the blanks.

How is the Sun an important energy source?

1. Plants convert solar radiation into _____ energy, which can be used by other organisms.
2. The energy contained in a plant or animal when it dies becomes food for _____ .
3. Solar radiation helped create fossil _____ such as coal, oil, and natural gas.
4. Winds and ocean currents occur when there is _____ heating of Earth's surface.
5. Solar energy drives the water cycle and influences a region's _____ and climate.

How does the Sun affect the water cycle?

6. The water cycle is the _____ of water between Earth's surface and its air.
7. During evaporation, solar radiation warms the _____ on Earth's surface.
8. Since more than 70% of Earth's surface is covered by oceans, an enormous amount of _____ rises into the atmosphere every day.
9. When less energy from the Sun is available, water molecules in the atmosphere slow down and ultimately form _____ .

How does the Sun affect climate and weather?

- 10. Earth's surface _____ heat from sunlight, and the surface heats the air above.
- 11. Energy from the Sun can affect a region's _____ by warming the air, land, and oceans.
- 12. Sunlight shines most directly at the _____, so areas there receive the most heat energy.
- 13. Areas closer to the poles have cool climates because the Sun's rays strike Earth at a(n) _____ angle.
- 14. Some of the local conditions that make up _____ are air pressure, clouds, and precipitation.
- 15. As air is heated by the Sun, the molecules in the air move _____ and move farther apart from one another.

How does Earth gain and lose energy?

- 16. Almost all of the heat on Earth comes from the Sun, but Earth also radiates heat into _____.
- 17. A disruption in the _____ of heat energy on Earth can cause the average temperature to rise or fall.
- 18. Only about half of incoming sunlight reaches Earth's _____ and is absorbed by it.

Summarize the Main Idea

- 19. What is the source for almost all the energy on Earth, and how does its energy affect Earth?

Solar Radiation

air pressure

precipitation

weather

condensation

solar radiation

wind

evaporate

water cycle

Fill in the blanks.

1. The movement of water between Earth's surface and its air is called the _____ .
2. The different kinds of _____ provide water for living things and fill Earth's oceans, lakes, rivers, and streams.
3. Energy from the Sun causes water molecules in the ocean to heat up and _____ .
4. The force put on an area by the weight of the air above it is called _____ .
5. Energy from the Sun that shines on Earth's surface is called _____ .
6. Differences in air pressure cause _____ , or moving air.
7. When molecules in water vapor cool down, they join together as drops of water through _____ .
8. The state of the atmosphere at a given place and time is called _____ .

Solar Radiation

air pressure

energy

precipitation

chemical

evaporate

solar radiation

climate

food chain

vapor

condense

molecules

water cycle

Fill in the blanks.

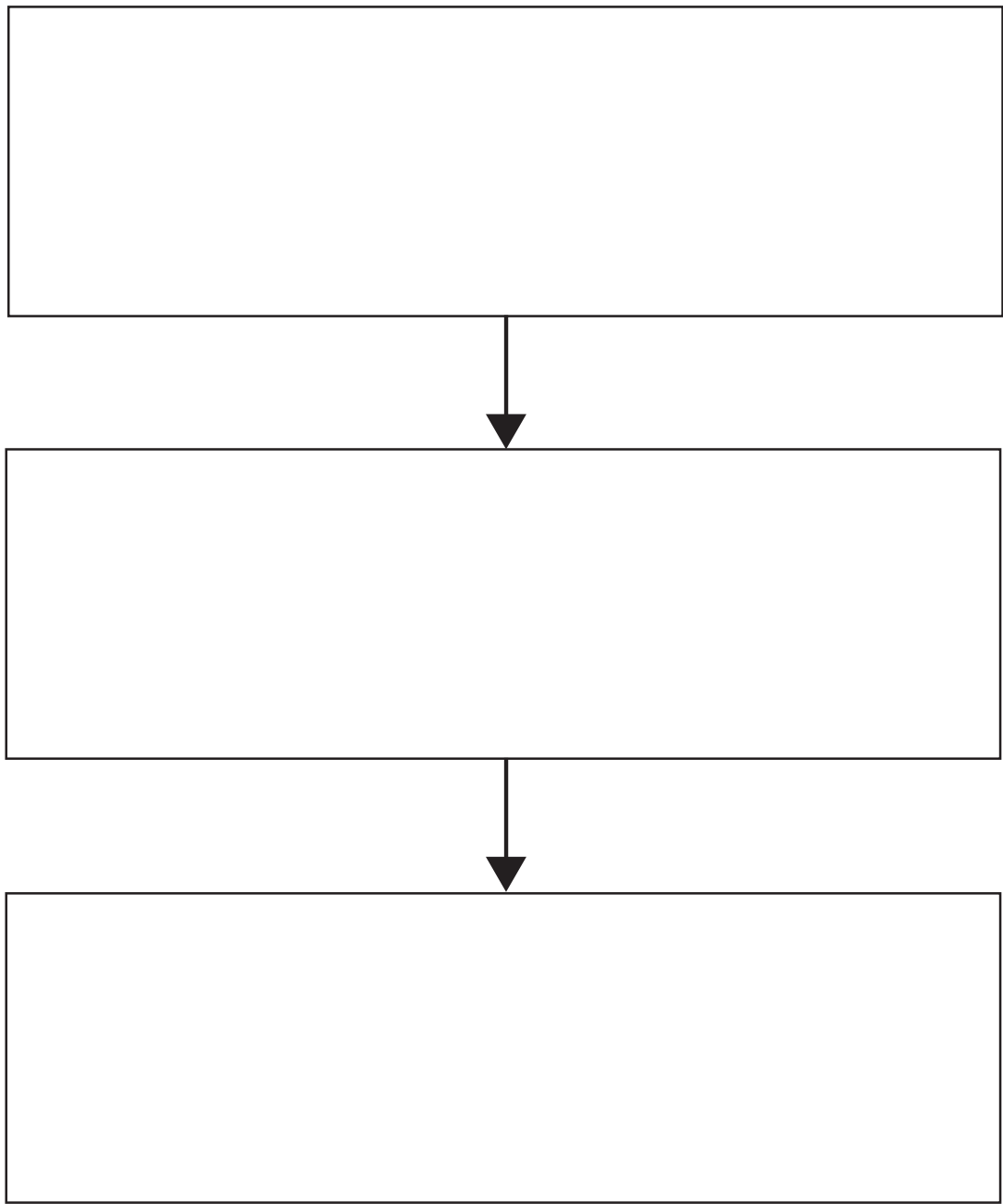
The Sun's energy is reflected and absorbed by the atmosphere. If we received all of the _____ from the Sun, Earth's surface would be much hotter. The atmosphere lets in _____ from the Sun that is used in many ways. During photosynthesis producers convert it into _____ energy. This energy is passed along the _____ . The Sun's energy also contributes to the _____ . When energy from the Sun heats water, molecules move faster and _____. They enter the air as water _____. When the molecules cool down, they begin to _____ , and finally they fall to Earth as _____. The Sun also affects _____ and weather. For example, when air is heated, the _____ in the air move faster. As a result the _____ decreases. Heat energy from the Sun also affects wind patterns.

Wildfire Alert

Read the Reading in Science feature in your textbook. Look for the events in the article, and notice the sequence in which they occur.

Sequence

Use the graphic organizer to record the sequence of events in the article.



**Write About It**

Sequence How do the Santa Ana winds affect vegetation before the outbreak of a wildfire? What happens if the Santa Ana winds blow during a wildfire?

Planning and Organizing

Write a sentence that explains how the Santa Ana winds occur.

Write a sentence that explains how the Santa Ana winds affect vegetation.

Drafting

Now, explain what happens when a wildfire starts.

Next, tell what happens when the Santa Ana winds blow during a wildfire.

The Power of Convection Currents

Use your textbook to help you fill in the blanks.

What are convection currents?

1. Convection currents can occur in the air, in the ocean, and in the thick rock of Earth's _____ .
2. Plate tectonics and different types of _____ are affected by convection currents.
3. The Gulf Stream and its warm currents are convection currents that enable _____ plants to thrive in unlikely spots.

What makes wind blow?

4. The ultimate source of wind is the _____ , since the uneven heating of Earth's surface by the Sun produces convection currents.
5. The up-and-down motions of air that occur during the convection process cause _____ in air pressure.
6. Winds that can blow from any direction and cover short distances are called _____ winds.
7. Typically covering longer distances, _____ winds blow from a specific direction.
8. In California the hot _____ winds dry out vegetation in the area, providing fuel for raging wildfires.
9. The paths of global winds are curved due to the slow, eastward _____ of Earth.

What causes ocean currents?

10. Ocean currents form because of _____ heating of Earth's surface by the Sun.
11. Density, which is affected by _____ and temperature, influences the movements of ocean currents.
12. The climate of the northwest United States is kept cool by the _____.
13. The water in _____ currents moves much slower than the water in surface currents.

What is El Niño/Southern Oscillation?

14. When El Niño occurs, little water is pushed across the _____, and the ocean stays warm.
15. There is a(n) _____ in the ocean-atmosphere system in the Pacific Ocean when El Niño occurs.

How do convection currents work underground?

16. The rocks in Earth's interior insulate the surface from the heat of the _____.
17. Convection currents can cause _____ or produce hot spots such as the Hawaiian Islands.

Summarize the Main Idea

18. How does most heat transfer in the atmosphere, in the ocean, and in Earth's interior occur?

The Power of Convection Currents

- | | | |
|------------------------------|-------------------------|---------------------------|
| a. California Current | e. jet stream | i. Santa Ana winds |
| b. ENSO | f. local winds | j. wind |
| c. global winds | g. ocean current | |
| d. Gulf Stream | h. salinity | |

Match the correct letter with the description.

- _____ one of the strongest ocean currents in the world
- _____ winds that begin with an area of high pressure to the north and east of Southern California
- _____ winds that blow from a specific direction and typically cover longer distances
- _____ air that moves horizontally near Earth's surface
- _____ the amount of salt in water
- _____ the disruption of the ocean-atmosphere system in the Pacific Ocean and the impact on weather around the globe
- _____ a continuous flow of water along a definite path
- _____ carries cold water toward the equator along the west coast of the United States
- _____ winds that can blow from any direction and cover short distances
- _____ a current of fast-moving air in the upper atmosphere

The Power of Convection Currents

currents	Gulf Stream	solar radiation
denser	high	winds
equator	low	
global	poles	

Fill in the blanks.

Convection currents distribute heat in the atmosphere, in the ocean, and within Earth’s interior. The energy that circulates in most convection currents comes from _____ . Convection currents produce the _____ that blow horizontally along Earth’s surface. These movements of air travel from areas of _____ pressure to areas of _____ pressure. Energy from the Sun heats air at the _____ , making this air less dense. It moves toward the _____ , where the air is cooler and _____ . This convection pattern, plus the rotation of Earth, creates the circular pattern of the _____ winds. Ocean _____ are produced by both wind and convection. Winds blow across the ocean to create strong surface currents, such as the _____ . Deep-water currents are produced by differences in density and temperature.

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Underground Homes



Write About It

Expository Writing Choose one of these topics to compare and contrast:

1. Compare and contrast the price of an energy-saving air conditioner or refrigerator to the savings in energy costs. How long would it take the appliance to save as much as it costs?
2. Compare and contrast two brands of refrigerators. Which is more energy efficient?

Getting Ideas

One way to organize a comparison-and-contrast essay is through a point-by-point analysis. Use the Internet and the Energy Guide labels on appliances to gather information for the chart below. List the names of the two items you are comparing in the top row. List the attributes of each item that you are using to make your comparison in the left-hand column.

	Item:	Item:
Attribute:		
Attribute:		
Attribute:		

Drafting

A good comparison-and-contrast essay contains a thesis statement that states the main idea. It should state the items that you are comparing and contrasting and the basis on which they are being compared and contrasted. Circle the sentence that Lee should use to state his main idea about his energy-saving device.

1. In a point-by-point analysis, the TriStar Deluxe refrigerator proved to be more efficient than the Kitchen Pro.
2. I like the TriStar Deluxe refrigerator better than the Kitchen Pro.

Now write your first draft. Use a separate piece of paper. Using a point-by-point analysis, include an introduction that states the items that will be compared and contrasted. The body of your essay should include details from your point-by-point analysis.

Revising and Proofreading

Some words and phrases signal comparison—for example, *as*, *likewise*, *similarly*, and *in comparison*. Some words and phrases signal contrast—for example, *although*, *but*, and *on the other hand*.

Now revise and proofread your own comparison-and-contrast essay. Ask yourself these questions:

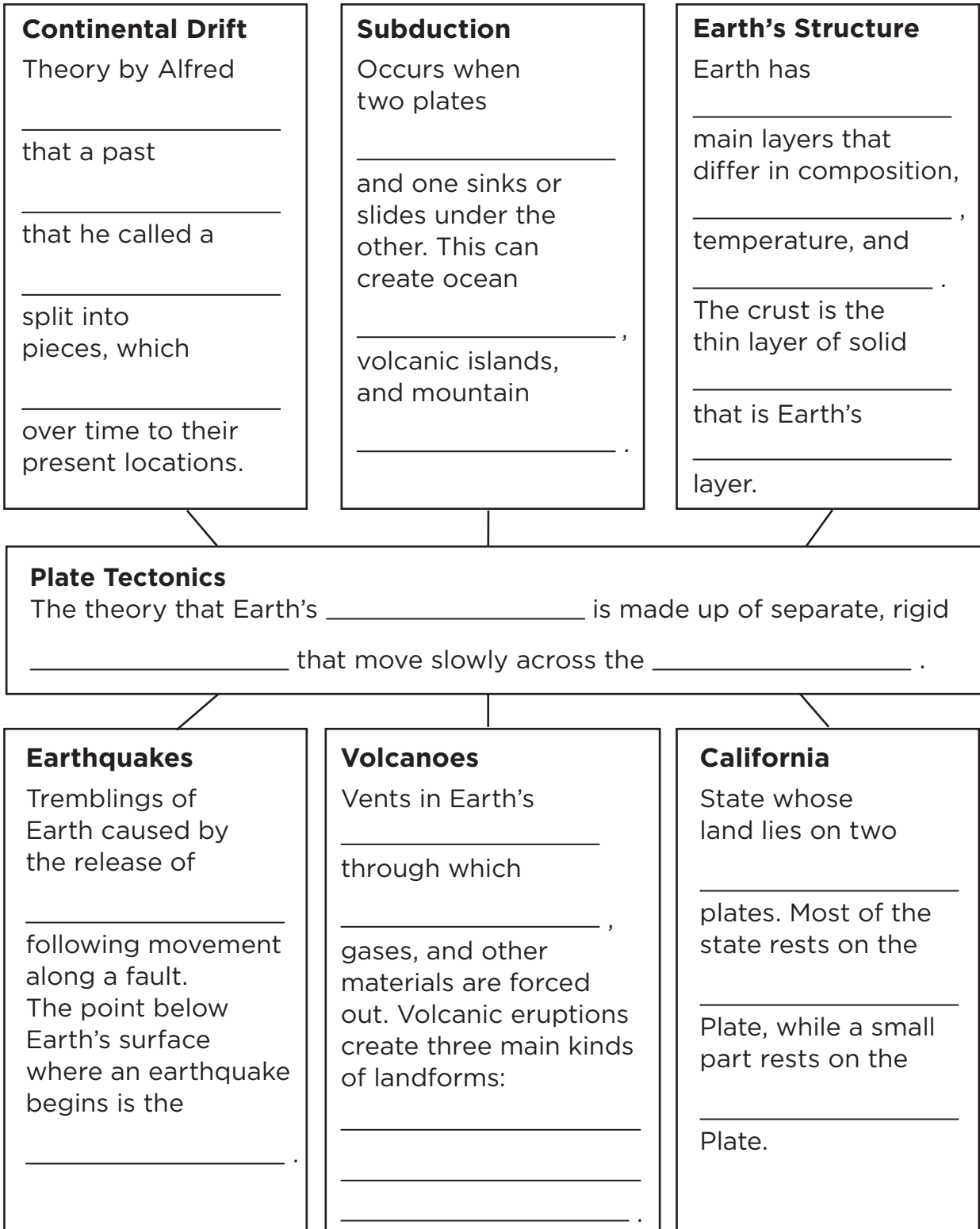
- Have I written a thesis statement about the energy-saving devices?
- Have I explained how the two items are similar?
- Have I explained how the two items are different?
- Have I balanced the information equally for each item?
- Have I used signal words effectively?
- Have I ended with a conclusion based on the evidence presented?
- Have I corrected all grammar mistakes?
- Have I corrected all spelling, punctuation, and capitalization errors?

Energy in the Earth System

Circle the letter of the best answer.

- The electromagnetic spectrum is organized by
A density. **B** wavelength. **C** pressure. **D** color.
- The transfer of energy by electromagnetic waves is
A radiation. **B** absorption. **C** reflection. **D** ionization.
- The process of taking in radiant energy is
A reflection. **B** emission. **C** transmission. **D** absorption.
- The process of giving off electromagnetic waves is
A condensation. **C** convection.
B evaporation. **D** emission.
- Ionizing radiation is radiation that has enough energy to
A create friction between objects.
B move molecules in any material.
C travel through empty space.
D remove electrons from an atom.
- Nuclear explosions give off harmful radiation in the form of
A X rays. **C** visible light.
B microwaves. **D** gamma rays.
- The energy used by plants to carry out photosynthesis comes from
A convection currents. **C** global winds.
B solar radiation. **D** ionizing radiation.

Complete the concept map on plate tectonics, using terms and phrases from your textbook.



Earth's Moving Plates

Use your textbook to help you fill in the blanks.

What forces shape Earth?

1. German scientist Alfred _____ proposed a theory to explain changes in Earth's surface over long time periods.
2. Wegener hypothesized that Earth once had one single landmass that he called _____, or "supercontinent."
3. During Wegener's lifetime, few geologists accepted his theory of continental _____.
4. New _____ in the 1960s led geologists to begin to reconsider Wegener's work.

What evidence supports continental drift?

5. One clue that supports Wegener's theory is the fact that similar rock _____ line up across today's continents.
6. Deposits of _____ in North America and Antarctica support Wegener's conclusion.
7. Rock formations can provide _____ about past events that took place in a location.
8. The ancient fossils of three _____ and one plant that lived on land have been found on continents separated by vast oceans today.
9. In _____ there are fossils of living things that would not be able to survive there today due to the extreme cold.

What clues are found on the ocean floor?

10. Geologists discovered that Earth's crust is made of a number of large pieces called _____ .
11. These large pieces may move apart, move together, or _____ past one another.
12. Scientists found evidence of new rock that built up an underwater mountain chain called the _____ .
13. In a process called _____ , rock moves away from ridges in opposite directions.

What other events occur at plate boundaries?

14. A(n) _____ is a place where molten rock, hot gases, and solid rock erupt through an opening in the crust.
15. A(n) _____ occurs when the ground shakes due to plates' shifting and changing positions.
16. In some places where plates move toward each other, rocks crumple and fold and are _____ up onto the continents.
17. As a result of plates' movement toward each other, folded bands of _____ may form mountain ranges.

Summarize the Main Idea

18. What evidence indicates that Earth's continents have moved apart?

Earth's Moving Plates

continental drift

mid-ocean ridge

seafloor spreading

earthquake

ocean trench

volcano

geologist

Pangaea

Fill in the blanks.

1. As a(n) _____, Alfred Wegener was interested in Earth's origin, history, structure, composition, and processes.
2. A(n) _____ can cause great damage when plates shift and change position.
3. Wegener's theory of _____ explains that a past supercontinent split apart into pieces that drifted over time to their present locations.
4. The Challenger Deep, the deepest part of the Pacific Ocean, is part of a(n) _____ in the western Pacific.
5. Wegener believed that millions of years ago, Earth had one single landmass that he called _____.
6. Iceland is part of the _____, a vast underwater mountain chain.
7. A place where molten rock, hot gases, and solid rock erupt through an opening in Earth's crust is called a(n) _____.
8. The process of new rock from below being added to plates moving apart under the oceans is called _____.

Earth's Moving Plates

Antarctica	fossils	moved
cold	landmass	ocean
continents	mid-ocean ridge	plates

Fill in the blanks.

Alfred Wegener developed the theory of continental drift. Evidence supports the idea that the continents were once a single _____ . Scientists found _____ of the same animals on different _____ . These land species could not have crossed the _____ . Fossils of reptiles and plants were even found on _____ , which today has a climate much too _____ for those species to have survived. These clues helped convince many geologists that the continents have _____ apart. Geologists began to investigate the movements of large pieces of Earth's surface called _____ . These movements created the underwater mountain chain called the _____ . When plates move together, they can create ocean trenches if one plate sinks under the other.

Plate Tectonics: A Unifying Theory

Use your textbook to help you fill in the blanks.

How do scientists study Earth's structure?

1. Scientists study features on Earth's _____ to determine how and when they were formed.
2. To learn about Earth's _____, scientists study the seismic waves that travel through Earth.
3. Earthquakes, _____, and sometimes explosions are the causes of seismic waves.
4. Of the two kinds of seismic waves, _____ can travel through gases, liquids, and solids.
5. A(n) _____ travels only through solids, and it vibrates at a right angle to its direction of travel.

What are the main layers of Earth?

6. By studying seismic waves, scientists have learned that Earth has _____ main layers.
7. Earth's _____ is the thin layer of solid rock that makes up its outermost part.
8. Due to great pressure and high _____ in the mantle, some of the rock in this layer can move or flow slowly.
9. The central part of Earth is the _____, a dense sphere made of iron and nickel.
10. The deep layers of Earth are under great pressure because of the _____ of the materials above them.

How are the main layers of Earth subdivided?

11. Continental crust makes up Earth's land, and _____ crust is the floor of the ocean.
12. Rocks in the _____ are semimolten, so they can flow, bend, stretch, and compress.

What moves the plates?

13. Most scientists agree that Earth's plates move because of a circular pattern known as _____ flow.
14. Hotter, less-dense rock at the bottom of the mantle _____ toward the bottom of the plates.

What is plate tectonics?

15. Earth's plates are all _____ like Earth's surface, and they all move at different speeds.
16. Boundaries between plates that are moving away from each other or pulling apart are _____.

What is a unifying theory?

17. Plate tectonics is a unifying theory that explains much about the _____ of Earth.
18. Plate tectonics _____ the theory of continental drift with other evidence that supports it.

Summarize the Main Idea

19. What are the three main layers of Earth, and where are they located?

Plate Tectonics: A Unifying Theory

- | | | |
|---------------------------|---------------------------|------------------------|
| a. asthenosphere | e. lithosphere | i. seismic wave |
| b. convective flow | f. magma | j. semimolten |
| c. core | g. mantle | k. subduction |
| d. crust | h. plate tectonics | |

Match the correct letter with the description.

- _____ the continuous circular pattern of materials as they are heated and cooled
- _____ the layer of semimolten mantle rock that lies directly below the lithosphere
- _____ almost melted
- _____ the process of one plate sinking or sliding underneath another when they converge
- _____ a vibration that travels through Earth
- _____ the central part of Earth
- _____ the thin layer of solid rock that makes up the outermost part of Earth
- _____ molten, or melted, rock deep below the surface of Earth
- _____ the thick layer of solid and molten rock that lies beneath the crust
- _____ the theory that Earth's surface is made up of separate, rigid plates that move slowly across the mantle
- _____ the rigid outer part of Earth made up of rocks in the crust attached to the upper part of the mantle

Plate Tectonics: A Unifying Theory

asthenosphere	convergent	lithosphere	plates
continental crust	core	mantle	three
convective flow	liquid	oceanic crust	

Fill in the blanks.

The theory of plate tectonics explains how and why Earth has changed. This theory includes the division of Earth into _____ main layers. The outermost layer is the crust, which is divided into _____ and _____. Underneath this layer is the thick _____, which includes the rigid rock of the _____ as well as the semimolten rock of the _____. The innermost layer of Earth is the _____, a dense sphere that has a(n) _____ outer part and a solid center. Movements in the mantle can cause Earth's _____ to shift and move through a process of heating and cooling called _____. A boundary between plates moving toward each other is called a(n) _____ boundary. The movements of plates continuously change Earth's surface over time.

Earthquakes

Use your textbook to help you fill in the blanks.

Can earthquakes happen anywhere?

1. When an earthquake happens, energy is released by movements along a(n) _____.
2. Areas in which there are many interconnected faults are called _____.
3. The vibrations that radiate away from an earthquake are _____ waves.
4. In California earthquakes are common in the fault zone that includes the _____ Fault.

How do scientists learn about earthquakes?

5. Scientists use a(n) _____ to detect, measure, and record the energy of earthquake vibrations.
6. P waves and S waves travel at different _____, allowing scientists to calculate the distances the waves travel.
7. Seismographs can help scientists find an earthquake's _____ and epicenter.
8. The place on Earth's surface where the strongest shocks and greatest damage occur is the _____.
9. Using information from at least three seismograph stations to find an epicenter is called _____.

How is the strength of an earthquake measured?

10. The measure of how far the wavy lines on a seismograph go above or below a central baseline is _____ .
11. On the _____ scale, magnitude is expressed in whole numbers and decimals.
12. The strength of an earthquake is measured by the _____ that can be felt at the surface.
13. The _____ scale measures what people feel and observe during an earthquake.

How can we prepare for earthquakes?

14. Buildings and highways that are designed to keep from collapsing during earthquakes are described as _____ .
15. Buildings with shock absorbers _____ during an earthquake instead of collapsing.
16. Newer, more _____ building materials have a better chance of bending without breaking during an earthquake.
17. Highways are made seismically safe by special _____ structures.

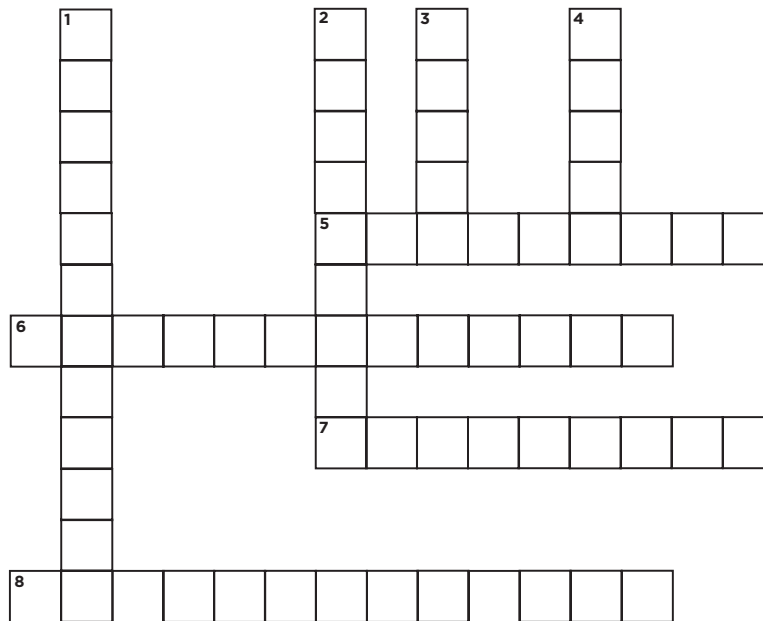
Summarize the Main Idea

18. What are faults, and what do movements along faults cause?

Earthquakes

epicenter	focus	magnitude	Richter scale
fault	intensity	Mercalli scale	triangulation

Use the clues to fill in the crossword puzzle.



ACROSS

- 5. the strength of an earthquake that can be felt at the surface
- 6. a way of using information from at least three seismic stations to find the location of the epicenter
- 7. the point on the surface of Earth directly above the focus
- 8. a measure of what people feel and observe when an earthquake occurs

DOWN

- 1. a set of numbers used to describe the magnitude of an earthquake
- 2. the measure of the energy released during an earthquake
- 3. a break, or crack, in the rocks of the lithosphere along which movements take place
- 4. the point below the surface of Earth where an earthquake begins

Earthquakes

absorb

Mercalli

seismographs

epicenter

Richter

travel

intensity

seismic

Fill in the blanks.

Earthquakes take place along faults. Plates moving along these breaks release energy that travels in _____ waves.

Researchers use _____ to measure the vibrations caused by an earthquake. The vibrations can help them locate the

focus and _____ of the earthquake. The

_____ scale uses scientific calculations to describe

the magnitude of an earthquake. The _____ scale

uses people's observations to evaluate the _____ of

an earthquake. These measurements can help scientists learn how

earthquake waves _____ . Architects can use this

information to design seismically safe buildings and highways that will

_____ much of the wave motion of an earthquake.

We cannot prevent earthquakes, but we can take steps to minimize

the effects.

Giant Waves

Read the Writing in Science feature in your textbook.



Write About It

Explanatory Writing Do online research using the keywords *earthquake safety tip* to find information about how to stay safe during an earthquake. Work with a small group to write and illustrate an information booklet for people moving to California. Use time-order words or spatial words in your instructions.

Getting Ideas

Use your computer's search engine to find information about how to stay safe during an earthquake. Type in the keywords *earthquake safety tip*. Scan through the Web sites listed, and click on the links that are the most appropriate. Read through the information in the sites, and select five sites that you think will be particularly helpful. Write their Web site names and complete Web addresses in the T-chart below.

Web Site	Web Address

Drafting

One way to organize your earthquake-safety tips is to divide them into three categories: *before*, *during*, and *after*. Also include an introduction, summary, and illustrations. Decide which student will be responsible for each task. Here are three tips that Jason's group wrote. Write the word *before*, *during*, or *after* by each step.

- _____ 1. Stay away from windows, mirrors, and any other large objects made of glass.
- _____ 2. Identify a place in each room that would give you protection.
- _____ 3. Check yourself and others for injuries, and administer first aid.

Now write your first draft. Compile the pages, and put them in order.

Revising and Proofreading

Time-order words and spatial words make instructions clearer. Examples include: *under*, *until*, *against*, *away*, and *when*.

Now revise and proofread the booklet. Ask yourself these questions:

- Have we written an introduction that explains the importance of earthquake safety?
- Have we included information from several online sources?
- Have we given step-by-step instructions?
- Have we included clear details that are easy to follow?
- Have we used time-order words or spatial words?
- Have we provided pictures to illustrate the steps?
- Have we corrected all grammar mistakes?
- Have we corrected all spelling, punctuation, and capitalization errors?

Volcanoes

Use your textbook to help you fill in the blanks.

What are volcanoes?

1. All volcanoes are _____ in Earth's crust through which materials are forced out.
2. Rock in the mantle becomes magma when movements of tectonic plates cause it to _____.
3. Over time, gas-filled magma rises because it is less _____ than the solid rock around it.
4. Volcanic eruptions can create new _____ and enlarge existing ones.

What are the three main types of rocks?

5. Basalt is a(n) _____ rock that forms from lava that has cooled and hardened very quickly.
6. Rocks that are made from bits and pieces of other rocks are called _____ rocks.
7. Rocks that have been changed and are often formed deep underground are called _____ rocks.

What kinds of volcanic landforms are there?

8. When a(n) _____ volcano erupts, the lava shoots into the air and breaks into small fragments.
9. When a(n) _____ volcano erupts, lava flows from a vent and spreads out in all directions.
10. The largest shield volcano, _____, in Hawaii is taller than Mount Everest.

How do eruptions differ?

11. Scientists who study volcanoes classify eruptions according to their _____ .
12. Volcanoes that erupt at fairly frequent intervals are called _____ .
13. Volcanoes are considered _____ if they have not erupted within recorded history.

What are subduction zones, island arcs, and hot spots?

14. When two oceanic plates move toward each other, one may be _____ , forming a volcano.
15. The Pacific Basin is encircled by the _____ , a region where earthquakes and volcanic activity are common.
16. Hot spots are places where volcanoes erupt in the middle of a(n) _____ plate.

What are geysers, fumaroles, and hot springs?

17. A(n) _____ is a place where magma heats water that flows out of the ground continuously.
18. A(n) _____ shoots hot water and steam into the air at regular or irregular intervals.
19. If only steam reaches the surface through a vent, this vent is called a(n) _____ .

Summarize the Main Idea

20. Where are volcanoes and related features located?

Volcanoes

- | | | |
|-------------------------------|-------------------------|-------------------------------|
| a. cinder cone volcano | e. hot spring | i. shield volcano |
| b. composite volcano | f. mountain belt | j. volcanic island arc |
| c. geyser | g. Ring of Fire | |
| d. hot spot | h. rock cycle | |

Match the correct letter with the description.

- _____ a zone of frequent earthquakes and volcanic eruptions that encircles the Pacific Basin
- _____ a fountain of hot water and steam that shoots into the air at regular or irregular intervals
- _____ a landform made up of layers of lava flows alternating with layers of ash, cinders, and rocks
- _____ a landform made up of small rock particles, or cinders
- _____ a landform made up of layers of lava rocks
- _____ a long, curved chain of volcanic islands
- _____ a never-ending cycle in which rocks are continually changed from one type to another
- _____ a region of volcanic activity in the middle of a tectonic plate
- _____ a stream of hot, bubbling water that flows out of the ground continuously
- _____ several mountain ranges that lie parallel to one another

Volcanoes

active	flows	plate
cinder cone	fragments	shield
composite	hot spot	vent
dormant	intermittent	

Fill in the blanks.

You can tell a lot about a volcano by its shape. If a volcano looks like a small cone with steep sides, it is probably a(n) _____ volcano. When this volcano erupts, the lava breaks into small _____ that cool and harden as they fall to the ground. If the volcano has broad, gently sloping sides, it is probably a(n) _____ volcano. It was created when lava flowed to the surface from a(n) _____ and slowly cooled. A volcano that looks like a very high cone but has sides that curve inward is probably a(n) _____ volcano. It was created by alternating lava _____ and rock, cinder, and ash. A place in the middle of a tectonic _____ where volcanic activity happens is a(n) _____. If a volcano is erupting while you watch, it is a(n) _____ volcano. If it erupts fairly frequently, it is an _____ volcano. A(n) _____ volcano has not erupted for a long time. Volcanoes that have not erupted within recorded history are considered extinct.

How Plate Tectonics Affects California

Use your textbook to help you fill in the blanks.

What parts of California lie on different plates?

1. The state of California occupies land on _____ lithospheric plates.
2. Most of California is part of the _____ Plate, which includes all of North America and part of the Atlantic Ocean.
3. The _____ is a deep crack in Earth's crust between California's lithospheric plates.
4. The _____ Plate consists of the Pacific Ocean and a narrow piece of California.

Which features of California are the result of plate tectonics?

5. Many _____ visible in California today were created by the Pacific Plate's pushing into the North American Plate.
6. The _____ is the largest valley in California, covering about one-sixth of the state.
7. Frequent earthquakes occur in the _____ Basin and the _____ Basin.
8. The ridges of the Coast Ranges are made up of layers of _____ that are separated by valleys.
9. Long ago, the _____ Mountains, now located along California's northern border, were an island.
10. The _____ was formed when a large block of rock was lifted up and tilted.

What are some of California's notable features?

11. The Sierra Nevada is one of the _____ mountain ranges of its kind in the world.
12. The three national parks in the Sierra Nevada are _____, Kings Canyon, and Sequoia.
13. The lowest point in the continent of North America is in _____ Valley.
14. Mount Shasta is an extinct volcano in _____ Volcanic National Park.
15. California has many national _____ and state parks where some of its most interesting and unusual features can be seen.

Summarize the Main Idea

16. What created many of the different landforms visible in California today?

How Plate Tectonics Affects California

Central Valley	North American Plate	Sierra Nevada
Coast Ranges	Pacific Plate	Ventura Basin
Los Angeles Basin	San Andreas Fault	

Fill in the blanks.

1. The _____ is bordered by the Sierra Nevada to the east and the Coast Ranges to the west.
2. Between the Transverse and Peninsular ranges, you will find the _____ .
3. The _____ is a depression in the Transverse and Peninsular ranges.
4. Most of California rests on the _____ , which includes all of North America and part of the Atlantic Ocean.
5. A small part of California rests on the _____ , which consists of the Pacific Ocean and a narrow piece of California west of the North American Plate.
6. In California, the North American Plate and the Pacific Plate slide past each other along a deep crack in Earth's crust called the _____ .
7. The _____ are a series of narrow, low ridges in California that rise abruptly from the sea.
8. The highest of California's mountain ranges, and one of the world's largest, is the _____ .

How Plate Tectonics Affects California

Cascade	Pacific	south
Coast	San Andreas Fault	plate-tectonic
northwest	San Francisco	Ventura

Fill in the blanks.

California lies on two lithospheric plates, with the larger part of the state being part of the North American Plate. A small part of California is part of the _____ Plate. The deep crack that separates these two plates is called the _____ . It begins to the north of _____ and runs about 1,300 kilometers (800 miles) to the _____ into Mexico and the Gulf of California. The Pacific Plate moves to the _____ along this fault line. Other parts of California are affected by different types of _____ activity. The _____ Ranges were shaped by rock that lifted up and folded. The _____ Range was formed by volcanic activity. The Los Angeles Basin and the _____ Basin are depressions where rock material has accumulated. There are frequent earthquakes in these locations due to plate-tectonic activity.

Quake Predictors

Read the Reading in Science feature in your textbook. Look for clues in the article that help you draw conclusions about earthquakes.

Main Idea

Use the graphic organizer to draw conclusions.

Text Clues	Conclusions



Write About It

Draw Conclusions Before the invention of the seismometer, how do you think people measured earthquakes? Why are satellites a useful source of information about movement on Earth’s surface?

Planning and Organizing

Explain one way to measure earthquakes that people could have used before the seismometer was invented.

Drafting

Now draw a conclusion about how satellites provide information about movements on Earth’s surface.

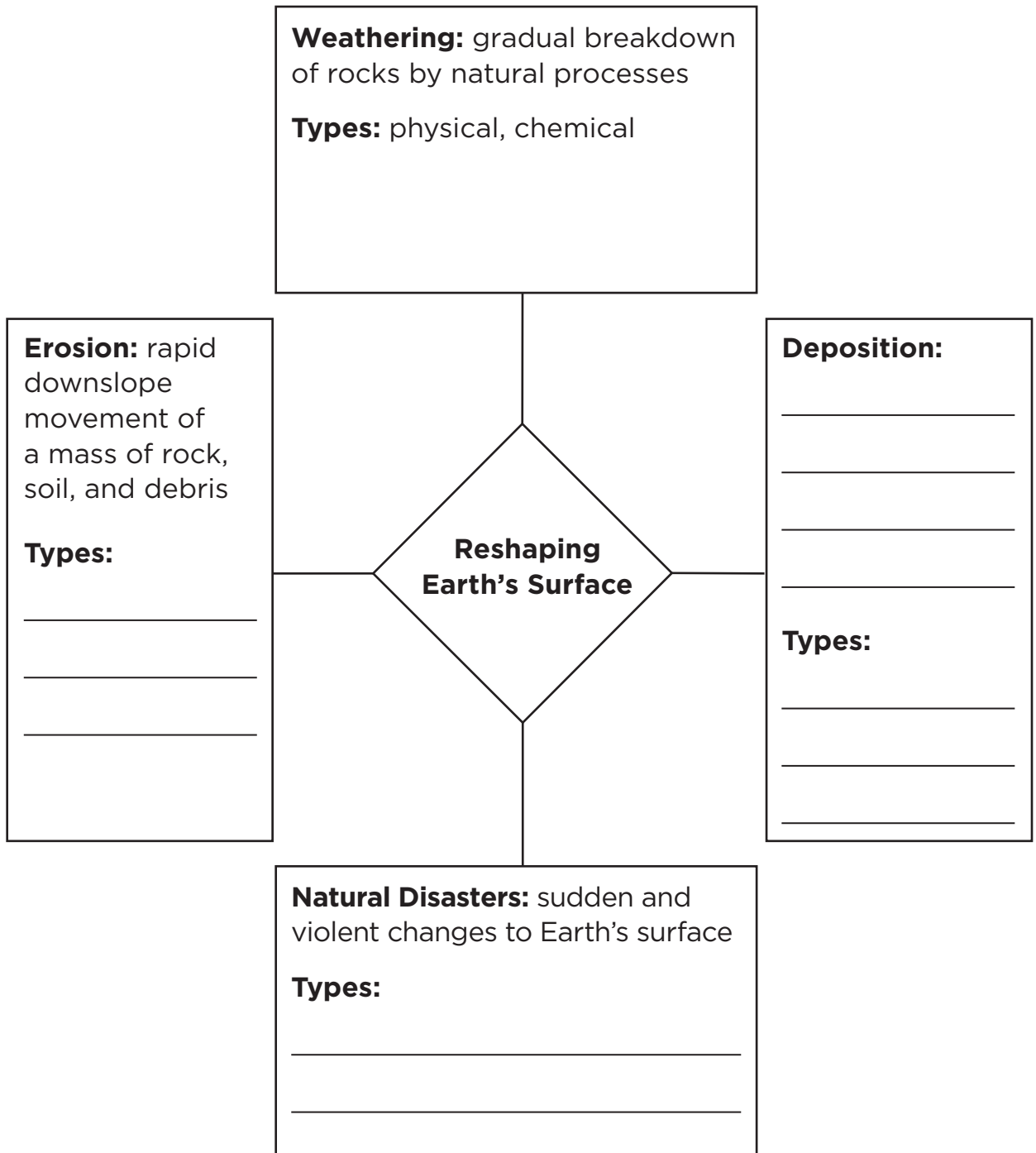
Plate Tectonics and Earth's Structure

Circle the letter of the best answer.

- The idea that Earth once had a single landmass that split into pieces is part of the theory of
 - seafloor spreading.
 - convective flow.
 - continental drift.
 - plate tectonics.
- Ocean trenches can form when one tectonic plate slides under another in a process called
 - subduction.
 - convergence.
 - divergence.
 - buckling.
- Earth's mantle includes the rigid rocks of the
 - San Andreas Fault.
 - crust.
 - mountain belt.
 - lithosphere.
- Molten, or melted, rock below the surface of Earth is called
 - a fault zone.
 - a hot spot.
 - lava.
 - magma.
- The central part of Earth is a sphere made of iron and nickel called the
 - Pangaea.
 - mantle.
 - asthenosphere.
 - core.
- The pattern of movement caused by materials heating and cooling within Earth is called
 - convective flow.
 - the asthenosphere.
 - a convergent boundary.
 - volcanic activity.

7. Earthquake waves are also called
- A** lithospheric waves. **C** volcanic waves.
B seismic waves. **D** oceanic waves.
8. In order to measure the energy of earthquake vibrations, scientists use a
- A** barometer. **B** fumarole. **C** hot spring. **D** seismograph.
9. The place on Earth's surface where the strongest shocks of an earthquake are felt is the
- A** focus. **C** fault zone.
B epicenter. **D** asthenosphere.
10. The Richter scale is used to measure an earthquake's
- A** magnitude. **B** focus. **C** amplitude. **D** epicenter.
11. A fault zone is usually located along a
- A** volcanic mountain range. **C** boundary between plates.
B volcanic island arc. **D** mountain belt.
12. A landform created by liquid lava flowing to the surface and cooling is called a
- A** composite volcano. **C** shield volcano.
B cinder cone volcano. **D** seismic volcano.
13. Volcanic activity in the middle of a tectonic plate occurs near a
- A** hot spring. **B** fumarole. **C** hot spot. **D** geyser.
14. The majority of California's land rests on the
- A** San Andreas Fault. **C** North American Plate.
B Pacific Plate. **D** Los Angeles Basin.

Complete the concept map on the processes that reshape Earth, using terms and phrases from your textbook.



Atmospheric Pressure, Temperature, and Weather

Use your textbook to help you fill in the blanks.

What is the difference between climate and weather?

1. Climates vary by _____ and by altitude.
2. Areas closer to the equator receive more of the _____ radiation and are therefore warmer.
3. The temperature on top of a mountain is cooler because the thinner air has fewer _____ to absorb heat.
4. Some of the factors that make up our weather include temperature, air pressure, and _____.

What is air pressure?

5. The force caused by the weight of the air _____ is called air pressure.
6. Differences in air pressure around the world exist due to differences in the amount of _____ radiation.
7. If you experience a “popping” in your ears during a trip up a mountain, your body is attempting to _____ the air pressure.
8. A(n) _____ system often brings cloudy weather and thunderstorms.
9. A cool, _____ system typically brings clear skies and pleasant weather.

What causes rain?

10. When humid air _____, its air pressure and temperature fall.
11. When droplets formed by _____ become too large and heavy to stay in the air, they fall to Earth as precipitation.
12. The amount of water vapor in the air compared to the amount that will saturate the air is measured by _____ humidity.

How does wind change weather?

13. Air currents pushed to the west or east by Earth's rotation are called _____ winds.
14. The _____ causes winds to change direction as a result of the rotation of Earth.

How else does wind affect weather?

15. Low-pressure systems called _____ often bring thunderstorms, tornadoes, and other stormy weather.
16. A(n) _____ is an area of high pressure that usually brings fair weather.

Summarize the Main Idea

17. What do differences in air pressure and temperature cause?

Atmospheric Pressure, Temperature, and Weather

anticyclone

dew point

humidity

condensation

eddy

precipitation

Coriolis effect

evaporation

weather

Fill in the blanks.

1. The shift in wind direction caused by Earth's rotation is known as the _____.
2. When a gas changes into a liquid, _____ occurs.
3. All the forms of water that fall to the ground are called _____.
4. The amount of water vapor in the air is called _____.
5. The day-to-day conditions in an area are referred to as _____.
6. The changing of liquid into a gas is known as _____.
7. The _____ is the temperature at which condensation occurs.
8. A small, spinning air current formed by the flow of wind over an obstruction is a(n) _____.
9. A(n) _____ is an area of high pressure that usually brings fair weather.

Atmospheric Pressure, Temperature, and Weather

atmosphere	distance	humidity	sea breeze
closer	fair	land breeze	snow
cloudy	greater	low-pressure	
dew	high-pressure	rain	

Fill in the blanks.

Temperature is an important element of the weather. The temperature of the _____ determines whether precipitation falls as rain, sleet, _____, or hail. Drops in temperature at night cause the _____, or water vapor in the air, to become _____. Temperature also affects the _____ between air molecules. Molecules of cooler air are _____ together, and air pressure is _____. Low-pressure systems result in _____ weather. High-pressure systems usually bring _____ weather. Winds blow from _____ areas to _____ areas. For example, at night on the beach, the daytime _____ may change to a(n) _____. This is due to the land cooling more quickly than the water.

Weathering, Erosion, and Deposition

Use your textbook to help you fill in the blanks.

What is weathering?

1. One way that Earth's surface is _____ or broken down is through weathering.
2. One example of physical weathering is the freezing and _____ of water in a rock crack.
3. Tiny rock fragments carried by wind and water wear down landforms through a process called _____.
4. When minerals in rock _____ with chemicals in water and air, the rock and minerals break down.

How is Earth's surface reshaped?

5. The primary agent in shaping the landscape in both California and the rest of the world is _____.
6. Water, wind, gravity, and ice loosen and carry bits of rock that are then _____ in new places.
7. The flowing water in streams and rivers is one of the most important causes of _____ to Earth's surface.
8. The wind can pile sand into _____ hundreds of meters high.
9. Layers of sediment may build up and be pressed together, eventually changing back into _____.

What are landslides?

- 10.** Since landslides happen so _____ and often involve large amounts of soil and rock, they can be very dangerous.
- 11.** The main force in landslides is _____, but water and extremely steep slopes are also factors.

How do glaciers reshape Earth's surface?

- 12.** Glaciers hold most of Earth's _____ water and can erode the land just as liquid water and wind do.
- 13.** The rocks and pebbles in a glacier act like sandpaper, _____ the land beneath and depositing it downslope.
- 14.** A glacier can carry huge boulders many kilometers until the ice melts and the rocks are _____.
- 15.** The farmlands of the Midwest and the wide fields of the Dakotas were created by _____ deposits.

Summarize the Main Idea

- 16.** How do wind and water gradually reshape Earth's surface?

Weathering, Erosion, and Deposition

- | | | |
|-------------------------------|-------------------------------|----------------------|
| a. abrasion | e. glacier | i. sediment |
| b. chemical weathering | f. landslide | j. weathering |
| c. deposition | g. physical weathering | |
| d. erosion | h. sand dunes | |

Match the correct letter with the description.

- _____ weathered rock particles carried away by wind or water
- _____ a large mass of moving ice that formed over hundreds or thousands of years
- _____ the process by which eroded soil and rocks are put down in new places
- _____ the gradual breakdown that changes the composition of rock
- _____ the moving and scraping of sand, stones, and pebbles across Earth's surface
- _____ the rapid, downslope movement of a mass of rock, soil, and debris
- _____ the gradual breakdown of rock into smaller pieces by natural processes
- _____ the wearing away of Earth's surface by the breakdown and transportation of rock and soil
- _____ mounds formed by the wind blowing the smallest particles of sand across the surface of a desert and depositing them
- _____ breaks rock apart into smaller and smaller pieces that retain the characteristics of the original rock

Weathering, Erosion, and Deposition

abrasion	glaciers	physical weathering
chemical weathering	gravity	sediment
composition	minerals	slope
deposition	particles	wear

Fill in the blanks.

There are two kinds of weathering that rock can undergo. Rock is broken into smaller pieces by _____. Tiny rock fragments wear down landforms through _____, polishing Earth’s surface. A second type of weathering is called _____. This forms new _____ by changing the _____ of rocks. Both types of weathering create _____. When these _____ of rock are carried away, they _____ away Earth’s surface. Several factors, including _____, the speed and force of wind and water, and the _____ of the land, affect the rate of erosion. New landforms are created through the _____ of soil and rock. For example, _____ transport soil and rocks that create small hills. They can also create flat fields, such as the wide fields of the Dakotas.

The Danger of Shifting Sand

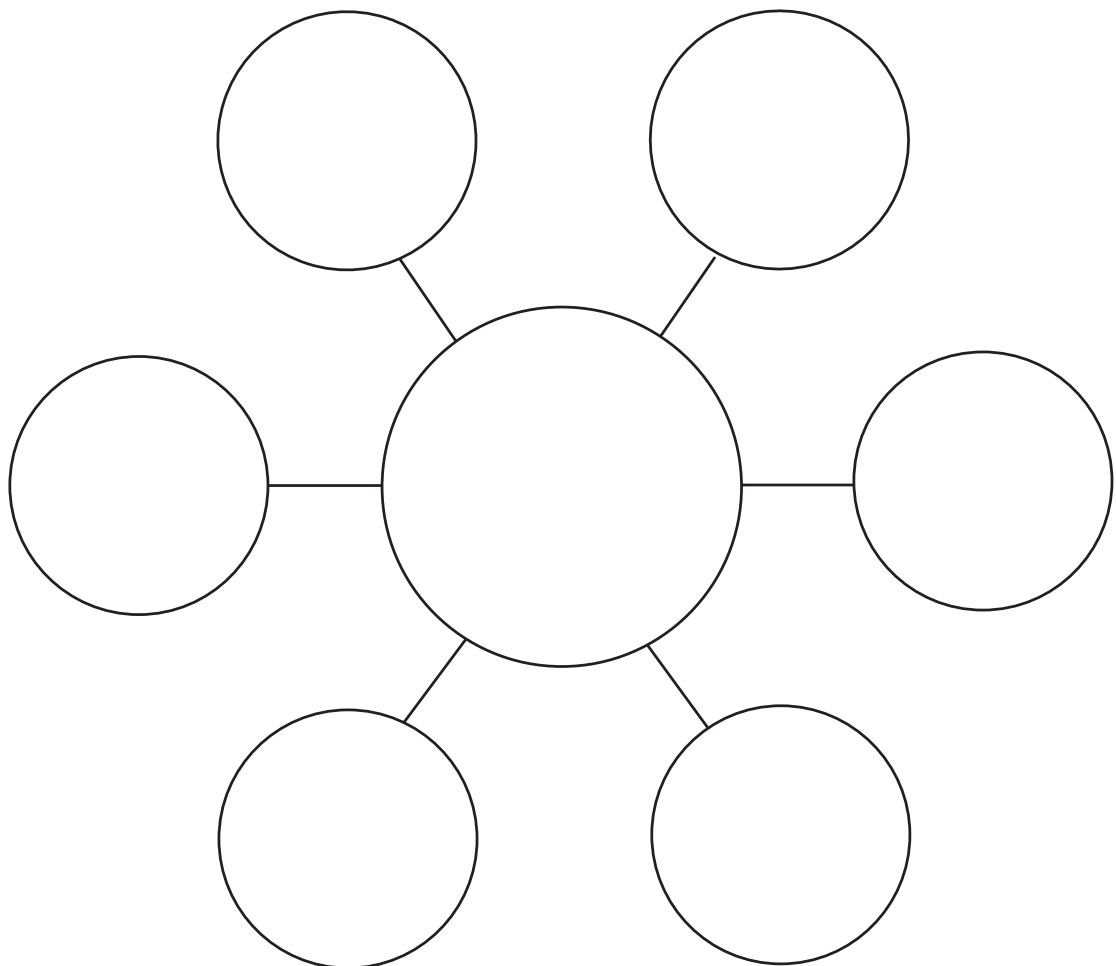


Write About It

Narrative Writing Tell a personal story about the effects of beach erosion and protecting beaches. Use descriptive details, and retell events in a logical order. Use the first-person point of view, and use dialogue, if appropriate. Using print and online research, include information about why beaches are important.

Getting Ideas

Write the term *beach erosion* in the center of the star web below. Then write ideas about beach erosion in the outer circles. You can add circles to the web if you like.



Drafting

A personal story usually begins with an attention-grabbing sentence that makes readers want to read on to find out more. Circle the sentence below that is the better way for Jasmine to begin her narrative.

I learned a lot about erosion by watching the public beach.

I thought beaches were forever, but like everything else, they are not!

Now write your first draft. Use a separate piece of paper. Remember to write in the first-person point of view. Begin with your attention-grabbing sentence, and use ideas from your star web throughout your story.

Revising and Proofreading

When you write a personal narrative, you must maintain a consistent point of view. Make sure that the events are in chronological order, from first to last.

Now revise and proofread your own narrative. Ask yourself these questions:

- Have I described a personal experience?
- Have I told events in a logical order?
- Have I provided facts and details about erosion and protection?
- Have I expressed my feelings clearly?
- Have I maintained a consistent, first-person point of view?
- Have I corrected all grammar mistakes?
- Have I corrected all spelling, punctuation, and capitalization errors?

Rivers and Streams

Use your textbook to help you fill in the blanks.

What affects how a river or stream flows?

1. The speed of flowing water can be affected by _____ .
2. As more water enters a river or stream, its water level rises, and its speed _____ .
3. A flood plain is formed when a river overflows its banks and deposits layers of _____ .
4. When water _____ , it deposits particles and forms mounds or layers on the riverbed.

What are the stages of stream development?

5. A young stream moves swiftly down steep slopes and may have white-water rapids and _____ .
6. Streams in the mature stage develop broad curves called _____ .
7. The flat valley floor formed by a meandering stream or river is the _____ .
8. As an old stream flows slowly through a flat flood plain, it deposits its load of sediment and forms a(n) _____ .
9. Some streams flow from springs, lakes, or the ends of _____ .
10. The place where a river ends is called its _____ .

How does flowing water affect a watershed?

11. Water flow and the resulting _____ and deposition in a watershed vary with the seasons.
12. During the dry months of summer, rivers slow and become _____.
13. Most of the time, deep V-shaped valleys known as _____ are dry because of infrequent rainfall.
14. Sometimes _____ causes riverbanks to collapse or a stream to change its course.

What are the characteristics of a stream's mouth?

15. All rivers eventually flow into a(n) _____ body of water, such as a lake or ocean.
16. When sediment at a river's mouth builds up, blocking the river's channel, a(n) _____ is formed.
17. If a stream enters a plain or a flat valley and drops sediment at its mouth, _____ are formed.
18. A(n) _____ is an area where a freshwater river meets the saltwater ocean.

Summarize the Main Idea

19. What are the three ways that rivers and streams change Earth's surface?

Rivers and Streams

alluvial deposits

delta

oxbow lake

arroyo

flood plain

watershed

bank

meanders

Fill in the blanks.

1. The fan-shaped land deposits at the mouth of a stream are known as _____ .
2. The area from which water is drained or the region that contributes water to a river or river system is a(n) _____ .
3. A(n) _____ is a small, water-carved channel with steep banks located in a dry area.
4. The triangular-shaped deposit of soil particles that forms where a river enters a larger body of water is called a(n) _____ .
5. Streams in the mature stage often develop broad curves called _____ .
6. The rising ground that borders a river or stream is its _____ .
7. A(n) _____ is a portion of a stream channel that is cut off from the rest of the stream by erosion.
8. The _____ is the flat area of land on both sides of a river.

Rivers and Streams

alluvial deposits

floodplain

V-shaped

banks

level

watershed

delta

matures

white-water

erosion

meanders

young

Fill in the blanks.

Flowing water can change Earth's surface. A(n) _____ stream flows swiftly and often carves out _____ valleys. It may have _____ rapids and waterfalls. It travels swiftly down steep slopes and _____ when it reaches _____ ground. At this stage the stream develops _____ as a result of the _____ of its banks. A meandering stream forms a(n) _____. If melting snows or spring rains cause a(n) _____ to carry too much water into the stream, its _____ may overflow onto the flood plain. In its last stage, the stream flows slowly and may form a(n) _____. Sometimes there are _____ at the mouth of a stream. This occurs when the stream enters a plain or flat valley.

The Changing Salton Sea

Read the Reading in Science feature in your textbook. Look for clues that you can combine with your own knowledge to make accurate inferences.

Make Inferences

Use the graphic organizer to make inferences about what you read about the Salton Sea.

Clues	What You Know	Inference



Write About It

Make Inferences Why did people build levees when the Colorado River burst through the irrigation channels? How do environmental groups view the diversity of life in and around the Salton Sea?

Planning and Organizing

State the impact of the levees on the flow of the Colorado River.

List the types of wildlife found in and around the Salton Sea.

Explain why environmentalists are concerned about the changes taking place in the Salton Sea.

Drafting

Now explain how environmental groups view the diversity of life in and around the Salton Sea.

Beaches and Wave Erosion

Use your textbook to help you fill in the blanks.

How do waves change the shoreline?

1. The carbon dioxide in seawater helps _____ the salt in rocks, slowly breaking them down.
2. A series of _____ may be carved out as the ocean level rises and falls over time.
3. A(n) _____ washes back into the ocean at an angle, creating a zigzag movement of sand down the beach.
4. Beach _____ can move sand and pebbles hundreds of meters every day.
5. The movement of sediment along the shore depends on the _____, the size of the sand grains, and the pattern of breaking waves.

What is sand?

6. Most sand is _____ rock, made of the same material as the rock it comes from.
7. Black or green beaches get their sand from _____ rock.
8. The white sand on tropical beaches is formed from the _____ of sea creatures.
9. Sand flowing into the ocean can build up and create different land formations, such as _____.
10. Large formations of sand formed away from the shore are called _____.

How can you identify the weathered parts of sand?

11. Geologists may be able to tell where sand on a beach came from by studying the _____ in it.
12. Sands that are weathered from rocks on land are called _____ sands.
13. The groups of minerals known as _____ and quartz are common minerals found in Earth's crust.
14. Magnetite is a nonsilicate mineral that is released as a result of the _____ of silicate minerals.
15. When lava cools and forms a rock called _____, some ocean islands may be formed.
16. Beaches on islands in the middle of the ocean may be made up almost entirely of _____ sands.
17. Carbonate sands closer to the continents may form from eroded _____, a white rock.
18. Construction materials such as _____, brick, and glass use silicates.

Summarize the Main Idea

19. How does the movement of ocean waves change a shoreline?

Beaches and Wave Erosion

- | | | |
|--------------------------|--------------------------|--------------------|
| a. barrier island | e. feldspar | i. sandbar |
| b. beach drift | f. magnetite | j. silicate |
| c. beach erosion | g. marine terrace | |
| d. breakers | h. quartz | |

Match the correct letter with the description.

- _____ a group of minerals that makes up almost 60% of Earth's crust
- _____ waves that break into foam against the shore
- _____ a black mineral with magnetic properties
- _____ a sandbar more than 100 meters (328 feet) wide
- _____ a flat step of rock formed in an exposed, windy area where the waves pound hard against the shore
- _____ the second most common mineral found in Earth's crust
- _____ a formation that occurs where waves deposit sand and cause shallow water to be collected
- _____ a process by which waves pick up sand particles and move them along the shore
- _____ the pulling of sand particles sideways along a beach
- _____ any rock that contains silicon and oxygen

Beaches and Wave Erosion

barrier islands	carbon dioxide	offshore
beach erosion	continents	sideways
calcium	erode	silicate
carbonate	marine terraces	weathered rock

Fill in the blanks.

Ocean waves change the shoreline. The process known as _____ results from the force of the waves. Waves move sand particles _____ down the beach. They also _____ rock to form _____ . The _____ in ocean water helps in this formation. Waves also deposit sand _____ , sometimes in quantities large enough to build _____ . The waves also create beaches from _____ deposited by rivers into the ocean. These beaches of _____ sand are found on _____ . Sands in areas without rivers are most likely _____ and contain _____ . This gives them their white color.

Changing Habitats

Use your textbook to help you fill in the blanks.

How do natural disasters affect habitats?

1. Natural disasters can cause sudden and violent _____ to Earth's surface.
2. When a habitat is damaged during a natural disaster, the plants, _____, and people in the area may lose their homes.
3. As a result of the eruption of Lassen Peak, heat from the lava melted the snow and started a mudflow, or a(n) _____.
4. An area can be buried under tons of rock and soil, and plants and animals can be carried away, by _____.
5. A region can be covered with water and mud during a(n) _____, killing plants and animals.
6. A(n) _____ can start fires, trigger landslides, or cause tsunamis.

How do tsunamis affect habitats?

7. An earthquake or a(n) _____ beneath or near the ocean can cause a tsunami.
8. Usually each wave in a tsunami is smaller than the previous one, until the water _____ itself out again.
9. Since tsunamis often take hours to travel across the ocean, it may be possible to _____ people before the waves reach shore.

How do floods affect habitats?

10. Floodwater carries tons of _____ and other debris that can damage or kill crops.
11. Future crops can _____ from a flood, because the nutrient-rich mud that remains makes the soil more fertile.

How do earthquakes and landslides affect habitats?

12. One consequence of an earthquake in a populated area can be _____ caused by broken power and gas lines.
13. If the ground shifts vertically during an earthquake, it can produce a(n) _____ or change a river's course.

How can people predict and plan for natural disasters?

14. Signs such as _____ or eruptions of ash and steam might indicate the possibility of a volcanic eruption.
15. Houses in areas prone to flooding can be built on stilts, and buildings in earthquake zones should have strong _____.

What are the long-term effects of natural disasters?

16. Some natural disasters can affect the _____ for both short and long periods of time.
17. Landslides, floods, and volcanic eruptions can give rise to new _____ of animals and plants.

Summarize the Main Idea

18. What are three types of natural disasters that affect both human and wildlife habitats?

Changing Habitats

floods

landslide

seismic waves

lahar

levee

tsunami

Fill in the blanks.

1. A mud flow of volcanic ash and rock is called a _____ .
2. A _____ is a wall or a large mound of earth built along a river to prevent it from flooding.
3. A large amount of rainfall in a short period of time or melting spring snow can cause _____ .
4. A series of huge waves caused by an earthquake or volcanic eruption beneath or near the ocean is a _____ .
5. When huge amounts of rocks and soil become dislodged from the ground and fall downward, a _____ occurs.
6. Vibrations caused by an earthquake are _____ .

Changing Habitats

flood plains

landslides

tsunamis

habitats

level

volcanic

hurricanes

mud

landscape

shore

Fill in the blanks.

Sometimes the land changes suddenly due to natural disasters. Huge waves are produced by _____. They crash onto the _____, destroying everything in their paths. Too much rain, _____, and even melting snow can cause floods. Rivers overflow onto their _____, and animals' food sources are buried by _____. Earthquakes can _____ buildings and damage highways. They may change the _____ greatly. Sometimes earthquakes can lead to _____. Powerful _____ explosions can send huge amounts of gases and particles of ash into the air. Although natural disasters may cause great harm, they can create new _____ that may introduce new species of animals and plants to an area. They can also bring fresh minerals to Earth's surface.

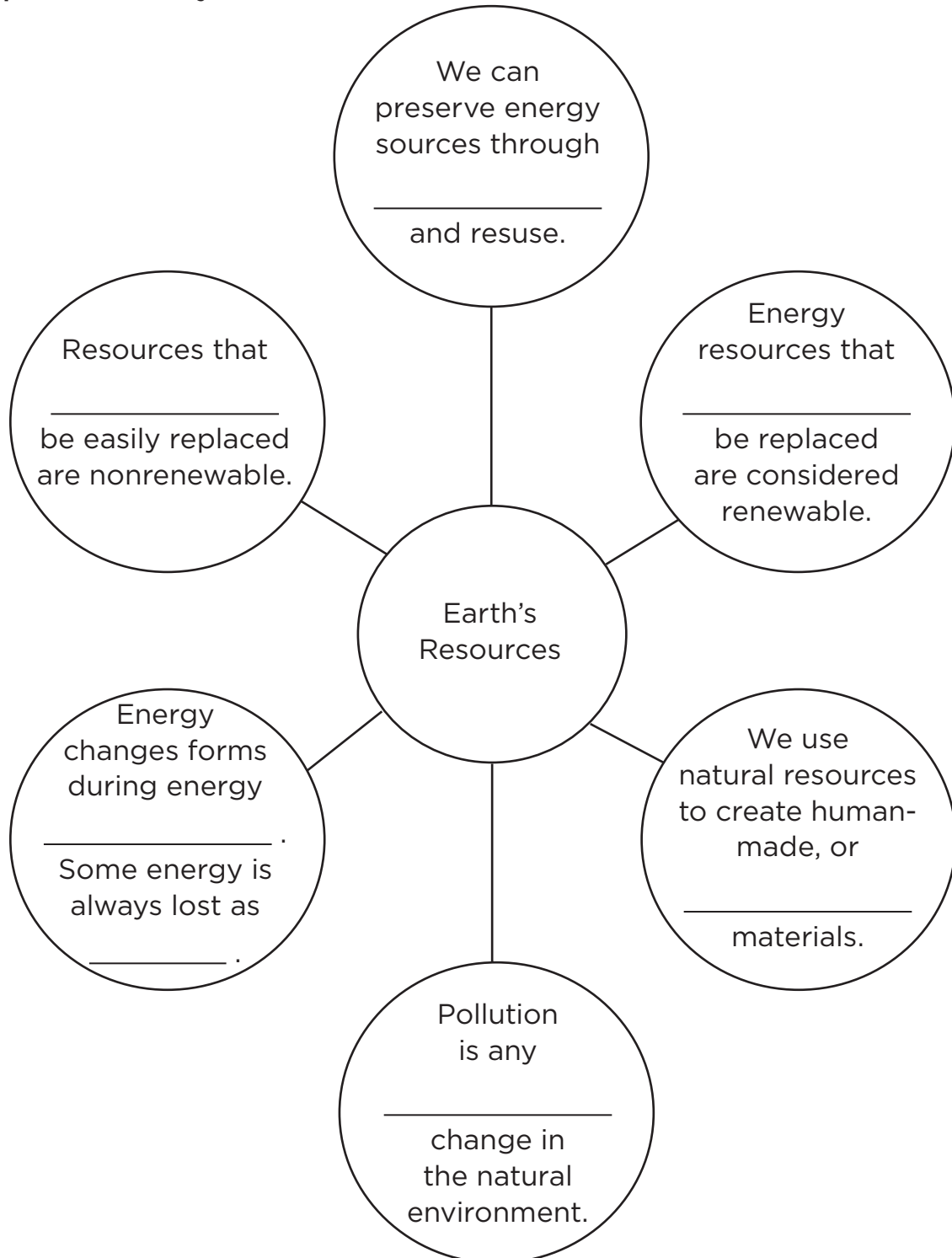
Shaping Earth's Surface

Circle the letter of the best answer.

- The amount of solar radiation an area receives is determined by its
 - altitude.
 - latitude.
 - vegetation.
 - humidity.
- At higher elevations there is less
 - air pressure.
 - sunlight.
 - precipitation.
 - wind resistance.
- Dew is a product of
 - evaporation.
 - gravity.
 - condensation.
 - solar radiation.
- The impact of Earth's rotation on winds is described by the
 - Richter scale.
 - trade winds.
 - sea breezes.
 - Coriolis effect.
- A change in the composition of rock results from
 - abrasion.
 - freezing.
 - chemical weathering.
 - physical weathering.
- Rock particles carried by wind and water are called
 - sediment.
 - sand.
 - alluvial deposits.
 - beach drift.

7. Marine terraces are the result of
- A** glacial movement. **C** landslides.
B beach erosion. **D** tsunamis.
8. Good farmland can be found on a river's
- A** banks. **C** tributaries.
B watershed. **D** flood plain.
9. Erosion caused by heavy rains and flooding can carve a deep
- A** stream. **C** lake.
B levee. **D** arroyo.
10. The grains of silicate sands are
- A** white minerals. **C** black minerals.
B weathered rock. **D** shell fragments.
11. Carbonate sand is primarily made of
- A** carbon. **B** feldspar. **C** quartz. **D** calcium.
12. The blockage of a river's flow by sediment dropped at its mouth results in
- A** erosion. **B** an island. **C** a delta. **D** meanders.
13. Volcanic eruptions underwater may cause
- A** breakers. **B** tsunamis. **C** precipitation. **D** lahars.
14. When snow melts in the spring, it may cause
- A** floods. **C** eruptions.
B hurricanes. **D** wildfires.

Complete the concept map on Earth's resources, using terms and phrases from your textbook.



Plug In to the Moon

by Leonard David



Write About It

Response to Literature This article describes a plan for a solar-energy system. What problem is the system designed to address? What is the proposed solution? Write a summary describing the problem and the author's idea for solving it. Include the steps involved in transforming solar energy into a usable form.

Sources of Energy

Use your textbook to help you fill in the blanks.

Why is energy important?

1. Power plants burn fossil fuels to generate _____ .
2. Coal, oil, and natural gas are _____ fuels that are burned to release energy.
3. Oil can be made into _____ , other fuels, and plastics.
4. Generators can be powered by _____ or wind turning a wheel that then spins an axle attached to the generator.
5. Solar cells convert sunlight into electrical energy and are used in _____ cars.

How is energy converted to usable forms?

6. The stored chemical energy in a flashlight's _____ is converted into light energy and heat energy when the flashlight is turned on.
7. In your body chemical energy from food is converted into heat and _____ energy that you use to move.
8. The motor in a solar-powered car converts electricity to _____ energy to propel the car.
9. When a car engine runs, the chemical energy in _____ is converted into heat energy as it is burned.
10. When coal is burned, it gives off heat and creates _____ , which is then converted into electricity.

How does cost affect energy use?

11. To determine the cost-effectiveness of an energy source, the cost and effects of using it are _____ .
12. Today many _____ energy sources require technology that is expensive.
13. Less-expensive appliances may not be the most _____ , and they may cost more to run.

What are the consequences of energy use?

14. The burning of fossil fuels in power plants, factories, and automobiles releases many _____ .
15. During the process of _____ , the land is damaged when topsoil is peeled away and coal is exposed.
16. When coal is burned, sulfur is released into the atmosphere, and this can lead to _____ .
17. Thick clouds of _____ are formed when pollutants build up in the atmosphere.

What are the nonmonetary costs of energy use?

18. Pollution and long-term _____ problems are examples of the nonmonetary costs of fossil fuels.
19. The excess _____ released by nuclear power plants can destroy habitats and kill the animals that live in them.

Summarize the Main Idea

20. What are two costs to consider when deciding which energy source is best for a particular purpose?

Sources of Energy

- | | | |
|-----------------------------|-------------------------------|-----------------------------|
| a. coal | e. nonmonetary costs | i. solar energy |
| b. energy conversion | f. nuclear power plant | j. geothermal energy |
| c. energy sources | g. oil | |
| d. natural gas | h. pollution | |

Match the correct letter with the description.

- _____ the process by which energy changes from one form into another
- _____ the environmental consequences of energy use
- _____ a thick, black liquid that forms underground over millions of years from the remains of sea creatures and plants
- _____ a facility that generates electric power through the use of nuclear reactions
- _____ a hard, black substance that formed from plants that lived about 300 million years ago
- _____ any form of energy radiated by the Sun
- _____ heat energy produced inside Earth
- _____ where the light, heat, or electrical energy people use comes from
- _____ a harmful change in the natural environment
- _____ a mixture of gaseous hydrocarbons formed from marine organisms

Sources of Energy

coal	hydroelectric power	pollutants
cost-effective	nonmonetary	solar energy
energy source	nuclear power plant	technology

Fill in the blanks.

There is no such thing as a perfect source of energy. Every _____ has advantages and disadvantages. The most common fossil fuel is _____, but removing this fuel from the ground can destroy topsoil. Burning fossil fuels creates energy but also releases many _____ into the air. Fossil fuels are _____, because they are less expensive to use than many energy sources. Although _____, or radiant energy from the Sun, is all around us, the _____ needed to collect this energy is expensive. The _____ produced by dams creates electricity, yet the dams can flood habitats and disturb water cycles. A _____ can produce enormous amounts of power, but it also produces radioactive waste. When evaluating energy sources, we must think beyond price and consider _____ costs. Damage to the environment is a very real cost of using many types of energy.

Renewable and Nonrenewable Resources

Use your textbook to help you fill in the blanks.

What are natural resources?

1. Earth's natural resources can be classified by the processes and the _____ needed to produce them.
2. Nonrenewable resources are available in fixed quantities, while _____ resources can be replaced by nature.

What are nonrenewable resources?

3. The two main types of nonrenewable resources are fossil fuels and _____.
4. Since they contain the elements of hydrogen and _____, fossil fuels give off large amounts of energy.
5. More than 90% of fossil fuels _____ are used for fuel, while the other 10% are used to make other products.
6. When _____ are split apart in a controlled chain reaction, nuclear energy is produced.
7. Nuclear reactors use nuclear fuels such as _____ as a source of energy.
8. Uranium-235 is a rare substance that is used for _____, a process in which atoms are split into pieces.

What are renewable resources?

9. Solar energy, wind, and water are examples of _____ renewable energy sources.
10. Due to the enormous reserves of heat below Earth's surface, _____ energy is almost inexhaustible.
11. Nuclear _____ is similar to the reaction that produces the energy given off by the Sun and other stars.
12. Plant and animal remains can be changed into high-quality fuels through the process of _____ .

How is hydroelectric power dependent on solar energy?

13. The Sun drives the _____ cycle, which hydroelectric power depends on.
14. Water sources for hydroelectric power depend on _____ to maintain their levels.

How can energy resources be conserved?

15. Choosing to walk or ride a bike instead of riding in a car is one way to _____ energy.
16. Some waste products can be _____ to create new products, decreasing the demand on Earth's natural resources.
17. Items can be _____ , instead of thrown away, to conserve resources.

Summarize the Main Idea

18. What are some examples of the two types of natural resources?

Renewable and Nonrenewable Resources

- | | | |
|------------------------|-------------------------------|--------------------------|
| a. conservation | d. hydroelectric power | g. petrochemicals |
| b. fission | e. natural resources | h. recycling |
| c. fusion | f. nuclear fuels | i. sustainability |

Match the correct letter with the description.

- _____ energy that harnesses the force of falling or running water
- _____ materials that can be used in nuclear reactors as sources of energy
- _____ using natural resources wisely by limiting their use to times of need
- _____ materials people take from Earth
- _____ the idea that people should fulfill present needs without endangering the ability of future generations to fulfill their needs as well
- _____ the creation of new products by the reuse of materials that would otherwise be treated as waste
- _____ the process of merging nuclei with smaller masses to make a nucleus with a larger mass
- _____ products that come from petroleum or natural gas
- _____ the splitting of atoms into pieces

Renewable and Nonrenewable Resources

conservation	nuclear	recycle	sustainability
energy	nonrenewable	renewable	
fossil	polluted	reuse	

Fill in the blanks.

We need to make smart choices about how we use natural resources. Many resources are _____, so when we use up our supply of them, we will not be able to get more. The two main types of these resources are _____ fuels and _____ fuel. However, even resources that are _____ must be carefully managed. For example, water can be replaced, but if it becomes _____, our useful supply will be harmed, and there will be shortages. Ideally we need to develop resource strategies that focus on _____.

We must meet our _____ needs for today and protect the needs of future generations. A wise use of resources is _____, or only using energy when it is essential. We can _____ resources by changing waste materials into other useful products. We can also _____ materials that we might otherwise throw away. These are all strategies for saving natural resources.

Clean Steam

Read the Reading in Science feature in your textbook. Look for details that help you summarize the article.

Main Idea

Use the graphic organizer to summarize the information in the article, listing main points from the article in the top boxes and a summary below.

The graphic organizer consists of three rectangular boxes arranged horizontally at the top. Each of these three boxes is connected by a diagonal line to a single, larger rectangular box centered below them. This layout is designed for students to list three main points from the article in the top boxes and provide a summary in the larger bottom box.



Write About It

Summarize In general how does the use of fossil fuels affect the environment? How is geothermal energy used to generate electricity?

Planning and Organizing

Write a brief sentence explaining how the use of fossil fuels affects the amount of resources in the environment.

Write a brief sentence that tells how the use of fossil fuels affects the air.

Drafting

Now write a brief summary about how geothermal energy is used to generate electricity. Include only the most important details in your summary.

Uses of Resources

Use your textbook to help you fill in the blanks.

Where do everyday materials come from?

1. Bauxite ore is the main source of _____ , which can be shaped into objects such as cans and foil.
2. Examples of products made from _____ include lumber, paper, cotton, soap, ink, and rubber.
3. Concrete, glass, bricks, and ceramics are products that come from _____ and minerals.
4. Iron and steel are used for tools, building materials, and railway lines because of their _____ .

What is plastic?

5. Plastic is an example of a(n) _____ , which can be heated and made into fibers, sheets, or molds.
6. Many cleaning fluids are packaged in plastic bottles, since most plastics are _____ to harmful chemicals.
7. Plastics are used in microwave cookware, pot handles, and cooking utensils because plastics are good _____ .

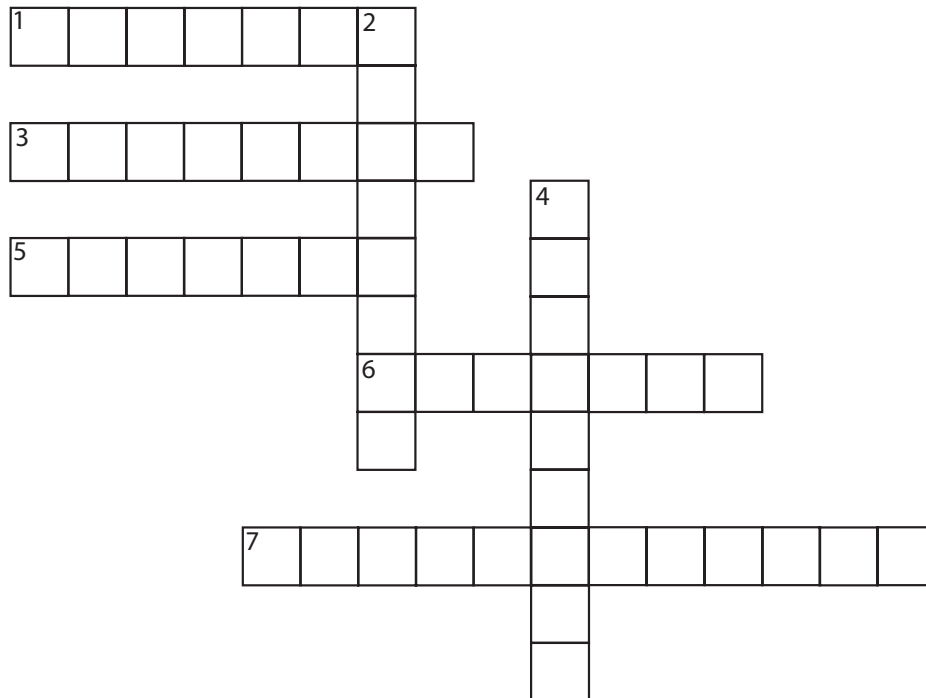
How are textiles produced?

8. Textiles can be made from natural sources, including _____ products.
9. Nylon, polyester, acrylic, and olefin are made from crude _____ and natural gas.
10. Plastic can be used to make clothing such as fleece pullovers from _____ plastic bottles.

Use of Resources

concrete	polymer	smelting	textile
plastic	raw materials	synthetic	

Use the clues to fill in the crossword puzzle.



Across

- 1. a synthetic substance derived from petroleum
- 3. the process that turns alumina into aluminum
- 5. a substance made of repeating patterns of atoms linked together
- 6. any type of fabric
- 7. the building blocks of products

Down

- 2. a mixture of sand, gravel, and pebbles in a binding material
- 4. materials derived from natural resources that are modified by chemical processes

Use of Resources

asphalt	nylon	steel	wood
build	petroleum	synthetic	wool
insulator	processed	textiles	

Fill in the blanks.

The things we use every day come from natural resources. Many natural resources must be _____ in order to be useful. For example, _____ can be turned into anything from tires to eyeglasses. Natural materials include _____ and many other _____, such as silk and cotton. Other materials are artificial, or _____. One example is plastic, which is a good _____ and can be reshaped many times. Synthetic textiles such as _____ are often very strong and easy to care for. We use many natural resources to _____ homes. Many homes are built on strong foundations, which are sometimes reinforced with _____ rods. The frame of the house is often built with beams made of _____. Shingles made from _____ make sure the roof keeps out water. Take a look around to determine what natural resources you use every day.

A World Without Plastic



Write About It

Narrative Writing Write a science-fiction story about a future time when a substance we use now, such as plastic, is scarce. Describe the setting and how the main character in your story tries to solve the problem. You can use the information from “A World Without Plastic” and find other information online. Use an appropriate point of view, and use dialogue to make your story come alive.

Getting Ideas

Narrative writing should contain a beginning, a middle, and an end. The beginning sets the scene by introducing the characters, the setting, and the problem. The middle is the main body of the story; it tells how the characters try to deal with the problem. The end describes how the problem is solved. Fill in the story map below with your ideas.

BEGINNING	Characters (Who)
	Setting (Where, When)
	Problem or Goal
MIDDLE	Plot Outline
END	Resolution

Drafting

Elena came up with two ideas for the problem for her story. Think about the situation—a world where plastic is scarce. Then circle the problem that is more appropriate for her story.

1. Elena must overcome her fear of heights to climb out on the ledge to save her cat.
2. Elena must track down the spy who stole the government's new formula for making plastic.

Now write the first draft. Use a separate piece of paper. Build on the ideas you thought of for the story map, and use dialogue to make your story come alive.

Revising and Proofreading

It is important to use details in narrative writing. Details are used to describe the setting and the events that occur.

Now revise and proofread your own short story. Ask yourself these questions:

- Have I created a setting in a future time when a resource is scarce?
- Does my story have an interesting beginning, middle, and end?
- Have I included a plot that revolves around the scarce resource and the problems this scarcity causes?
- Have I created characters who move the story along?
- Have I used dialogue to make my story come alive?
- Have I ended with a solution to the problem?
- Have I corrected all grammar mistakes?
- Have I corrected all spelling, punctuation, and capitalization errors?

Earth's Resources

Circle the letter of the best answer.

- Every form of energy we use comes from
 - a power plant.
 - an energy source.
 - hydroelectric power.
 - electromagnetic waves.
- The fossil fuel that is a liquid is
 - sulfur.
 - coal.
 - petroleum.
 - water.
- The most plentiful fossil fuel is
 - oil.
 - water.
 - petroleum.
 - coal.
- Energy radiated by the Sun is
 - geothermal energy.
 - solar energy.
 - chemical energy.
 - mechanical energy.
- During energy conversion, energy
 - moves from one place to another.
 - is reflected away from an object.
 - is converted from water to electricity.
 - changes from one form to another.
- Currently many alternative fuels are less cost-effective than fossil fuels because they
 - are more common than fossil fuels.
 - require expensive technology to be made.
 - rely mostly on nonrenewable resources.
 - do serious damage to the environment.

7. In a comparison of two cars, the car with the more fuel-efficient engine will
- A** use less gasoline. **C** provide unlimited energy.
B create more pollution. **D** damage the environment.
8. A harmful change in the natural environment, such as acid rain, is
- A** conservation. **C** strip mining.
B pollution. **D** polymerization.
9. Hydroelectric power is generated by the construction of
- A** dams. **B** solar panels. **C** mines. **D** power plants.
10. Uranium is an example of a
- A** nuclear fuel. **C** plastic.
B synthetic material. **D** polymer.
11. Heat from below Earth's surface can be used to produce
- A** wind energy. **C** geothermal energy.
B solar energy. **D** nuclear energy.
12. The Sun and other stars produce energy in a reaction similar to
- A** fission. **C** polymerization.
B conservation. **D** fusion.
13. A material that is made in a laboratory, such as plastic or nylon, is
- A** organic. **B** recycled. **C** ionized. **D** synthetic.
14. Processing waste materials to use them in a new way is an example of
- A** conservation. **B** reuse. **C** fusion. **D** recycling.