Reading and Writing in Science
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# EARTH’S ECOLOGY

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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**

**Abiotic factors** are ____________ parts of the ecosystem. These factors are necessary for the survival of all ____________ in the ecosystem.

**Decomposers** feed on and break down ____________ organisms. They return ____________ such as nutrients, nitrogen, and carbon dioxide to the environment.

**Producers** are organisms that rely on abiotic factors to make their own food through ____________. They produce ____________ and ____________ that animals need to survive.

**Consumers** cannot create their own food. Instead, they get their energy by feeding on ____________ or by eating the animals that feed on them.
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

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
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

Vocabulary

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

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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.

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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

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?

________________________________________________________________________

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Microscopic Organisms on Earth

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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

**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.

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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.

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.**

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


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

<table>
<thead>
<tr>
<th>carbon cycle</th>
<th>evaporation</th>
<th>nitrogen cycle</th>
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<tbody>
<tr>
<td>composting</td>
<td>nitrates</td>
<td>precipitation</td>
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<tr>
<td>condensation</td>
<td>nitrites</td>
<td>water cycle</td>
</tr>
</tbody>
</table>

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

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.

1. Living things in an ecosystem are
   A  microorganisms.  
   B  biotic factors.  
   C  abiotic factors.  
   D  populations.

2. A low pH indicates that soil is
   A  alkaline.  
   B  balanced.  
   C  spongy.  
   D  acidic.

3. A community is made up of
   A  environments.  
   B  populations.  
   C  habitats.  
   D  ecosystems.

4. A by-product of photosynthesis is
   A  sunlight.  
   B  oxygen.  
   C  water.  
   D  carbon.

5. The part of a plant that supports leaves and flowers is its
   A  stem.  
   B  petiole.  
   C  blade.  
   D  epidermis.

6. One way water is pulled through a plant is by
   A  stomata.  
   B  gravity.  
   C  transpiration.  
   D  photosynthesis.
7. Respiration is the process of
   A releasing energy.  
   B storing energy.  
   C storing carbon.  
   D releasing oxygen. 

8. Microscopic organisms that cannot be clearly classified as plant or animal are
   A prokaryotes.  
   B cyanobacteria.  
   C eukaryotes.  
   D protists. 

9. Cilia and flagella both aid in
   A eating.  
   B respiration.  
   C movement.  
   D communication. 

10. Animals that eat both producers and consumers are
    A omnivores.  
    B scavengers.  
    C herbivores.  
    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.  
    B collection.  
    C conservation.  
    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.

**Earth**

**Land Biomes**
- **Tropical rain forests:** biomes found near the equator
- **Deserts:**
- **Grasslands:** biomes where grasses are the main plant life
- **Taigas:**
- **Tundras:**
- **Deciduous forests:** biomes where leaves fall off many of the trees when winter comes

**Water Ecosystems**

**Freshwater**
- **Ponds and lakes:** still water that contains little salt
- **Streams and rivers:** moving water that contains little salt

**Saltwater**
- **Intertidal zone:**
- **Neritic zone:**
- **Bathyal zone:**
- **Abyssal zone:** deepest part of the oceanic zone
- **Estuaries:**
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

Match the correct letter with the description.

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

A biome is a region that has a particular climate. The climate in each biome is mainly determined by temperature and precipitation. For example, the rain forests located near the equator are hot and humid, with a lot of rainfall. In contrast, the tundra near the North Pole is cold and dry. Some plants and animals have adapted to the harsh conditions, but permafrost prevents trees and large plants from rooting. The taiga also has very cold winters, but it supports large forests of evergreen trees. One way animals adapt to desert conditions is by resting during the hot days and becoming active when the temperatures fall at night. Desert plants are able to conserve water. Rainfall is irregular and usually not plentiful in grasslands, 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

<table>
<thead>
<tr>
<th>benthos</th>
<th>hydrothermal vents</th>
<th>oceanic</th>
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<tr>
<td>chemosynthesis</td>
<td>intertidal zone</td>
<td>plankton</td>
</tr>
<tr>
<td>estuary</td>
<td>nekton</td>
<td>wetlands</td>
</tr>
</tbody>
</table>

## 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.
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 _______________ zone is 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.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Effect</th>
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</tbody>
</table>
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?

________________________________________________________________________
________________________________________________________________________

Chapter 2 • Earth’s Land and Water Use with Lesson 3
Reading and Writing in Science
Ecosystems in California
**Ecosystems in California**

<table>
<thead>
<tr>
<th>a. abiotic factor</th>
<th>d. evergreen</th>
<th>g. scavenger</th>
</tr>
</thead>
<tbody>
<tr>
<td>b. chaparral</td>
<td>e. Joshua tree</td>
<td>h. serpentine</td>
</tr>
<tr>
<td>c. dormant</td>
<td>f. keystone species</td>
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</tr>
</tbody>
</table>

**Match the correct letter to the description.**

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

<table>
<thead>
<tr>
<th>agriculture</th>
<th>habitats</th>
<th>redwood</th>
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<tr>
<td>arid</td>
<td>latitude</td>
<td>root systems</td>
</tr>
<tr>
<td>flowering</td>
<td>Pacific Ocean</td>
<td>wildfires</td>
</tr>
</tbody>
</table>

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.

1. Cold deserts are found near the
   A coast.  
   B equator.  
   C poles.  
   D canopy.

2. Bison and prairie dogs might be found in
   A tropical rain forests.  
   B grasslands.  
   C deserts.  
   D deciduous forests.

3. A biome is classified according to its
   A animal species.  
   B plant life.  
   C location.  
   D climate.

4. Permafrost is a feature of
   A a taiga.  
   B an abyssal zone.  
   C a chaparral.  
   D a tundra.

5. Microorganisms that use photosynthesis to produce food are
   A zooplankton.  
   B bacteria.  
   C phytoplankton.  
   D plankton.

6. Flounder and tuna belong to the category of organisms called
   A floaters.  
   B plankton.  
   C benthos.  
   D nekton.

7. 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.  
   B  estuaries.  
   C  rivers.  
   D  lakes. 

9. Organisms that are both exposed to air and covered by water live in the
   A  bathyal zone.  
   B  abyssal zone. 
   C  neritic 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.  
    B  small predator.  
    C  primary consumer.  
    D  large predator. 

12. Deciduous trees conserve energy when their leaves
    A  decay.  
    B  change color.  
    C  fall off.  
    D  remain green. 

13. Blue whales feeding on plankton is an example of
    A  a food chain.  
    B  chemosynthesis.  
    C  conservation.  
    D  an abiotic process. 

14. One reason that some species in California are endangered is
    A  change in climate.  
    B  loss of habitat.  
    C  decrease in consumers.  
    D  lack of natural predators.
Complete the concept map on heat energy, using terms and phrases from your textbook.

Heat Energy

Heat Flow
Heat moves from a ____________ material to a ____________ material until ____________ materials are the same temperature.

Sources of Heat
A fuel provides energy when it is ____________. The fuel reacts with ____________ in the air and changes into heat and light energy.

Waves
The ____________ of a wave is the number of ____________ in a given period of time.

Conduction
Definition: the movement of energy through direct contact

Convection
Definition: ____________

Renewable Resources
Definition: ____________

Nonrenewable Resources
Definition: resources that cannot be replaced within a short period of time, if at all

Electromagnetic Waves
Definition: ____________

Sound Waves
Definition: ____________
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

<table>
<thead>
<tr>
<th>calorie</th>
<th>heat flow</th>
<th>potential energy</th>
</tr>
</thead>
<tbody>
<tr>
<td>conductor</td>
<td>insulator</td>
<td>temperature</td>
</tr>
<tr>
<td>energy</td>
<td>kinetic energy</td>
<td></td>
</tr>
</tbody>
</table>

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

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?

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
Vocabulary

<table>
<thead>
<tr>
<th>Waves</th>
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<tr>
<td>electromagnetic light</td>
<td>vibration</td>
</tr>
<tr>
<td>frequency</td>
<td>sound</td>
</tr>
<tr>
<td>wavelength</td>
<td>wave</td>
</tr>
</tbody>
</table>

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

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?

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

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__________________________________________________________________________
## Fuels: Our Major Energy Source

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<table>
<thead>
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<tbody>
<tr>
<td>a.</td>
<td>biomass conversion</td>
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<tr>
<td>b.</td>
<td>chemical reaction</td>
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<tr>
<td>c.</td>
<td>fossil fuels</td>
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<tr>
<td>d.</td>
<td>friction</td>
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<tr>
<td>e.</td>
<td>kinetic energy</td>
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<tr>
<td>f.</td>
<td>nonrenewable resources</td>
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<tr>
<td>g.</td>
<td>potential energy</td>
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<tr>
<td>h.</td>
<td>product</td>
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<td>i.</td>
<td>reactants</td>
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<tr>
<td>j.</td>
<td>renewable resources</td>
</tr>
<tr>
<td>k.</td>
<td>work</td>
</tr>
</tbody>
</table>

### Match the correct letter with the description.

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

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 ________________.
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.

1. The energy of a moving object is called
   A potential energy.  
   B a chemical reaction.  
   C a fossil fuel.  
   D kinetic energy.

2. The movement of energy from one substance to another is
   A work.  
   B heat.  
   C temperature. 
   D cold.

3. To prevent heat from flowing into or out of a material, builders use
   A conduction.  
   B convection.  
   C insulation.  
   D vibration.

4. In a wave the distance from the top of one crest to the top of the next is the
   A frequency.  
   B amplitude.  
   C wavelength.  
   D buoyancy.

5. The vibration of an object produces
   A a sound wave.  
   B an electromagnetic wave.  
   C a light wave.  
   D a radio wave.

6. A disturbance that carries energy from one place to another without a net movement of matter is a
   A convection current.  
   B vibration.  
   C wave.  
   D chemical reaction.

7. The visible part of the electromagnetic spectrum is composed of
   A microwaves.  
   B X rays.  
   C light waves.  
   D compression waves.
Circle the letter of the best answer.

8. Coal, oil, and natural gas are examples of
   A  renewable resources.
   B  fossil fuels.
   C  liquids and gases.
   D  kinetic energy.

9. Biomass conversion creates high-quality fuels from
   A  nonrenewable resources.
   B  wind, water, and wood.
   C  electricity.
   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.
    B  convection current.
    C  biomass conversion.
    D  physical reaction.

11. The force that acts when two surfaces rub together is
    A  convection.
    B  heat flow.
    C  work.
    D  friction.

12. The movement of energy through direct contact is called
    A  conduction.
    B  convection.
    C  friction.
    D  insulation.

13. The transfer of energy by the flow of a liquid or gas is
    A  vibration.
    B  conduction.
    C  conversion.
    D  convection.

14. An upward force on an object that is in a liquid or gas is
    A  convection.
    B  thermal conductivity.
    C  buoyancy.
    D  biomass conversion.
Complete the concept map on energy in the Earth system, using terms and phrases from your textbook.

**Energy in the Earth System**

Energy travels from the Sun by radiation in the form of ____________.

**The Electromagnetic Spectrum**
(from lowest to highest energy)

**Useful Radiation**

- Can be used for ____________.
- Can be used to cook ____________ quickly.
- Can be used to view images inside the ____________.
- Can be used to kill ____________.

**Harmful Radiation**

- Can cause ____________.
- Can damage or kill ____________.
- Can kill cells and cause ____________.
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

<table>
<thead>
<tr>
<th>absorption</th>
<th>ionizing</th>
<th>radiation</th>
</tr>
</thead>
<tbody>
<tr>
<td>electromagnetic spectrum</td>
<td>non-ionizing</td>
<td>solar radiation</td>
</tr>
<tr>
<td>emission</td>
<td>radiant energy</td>
<td>wavelength</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>absorb</th>
<th>gamma rays</th>
<th>radiation</th>
</tr>
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<tbody>
<tr>
<td>cool</td>
<td>hotter</td>
<td>reflect</td>
</tr>
<tr>
<td>magnetic</td>
<td>infrared</td>
<td>ultraviolet</td>
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<tr>
<td>emit</td>
<td>radiant</td>
<td>visible</td>
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</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>air pressure</th>
<th>precipitation</th>
<th>weather</th>
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<tbody>
<tr>
<td>condensation</td>
<td>solar radiation</td>
<td>wind</td>
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<tr>
<td>evaporate</td>
<td>water cycle</td>
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</tbody>
</table>

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 ________________.
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

Match the correct letter with the description.

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

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.
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.

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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.

1. The electromagnetic spectrum is organized by

2. The transfer of energy by electromagnetic waves is

3. The process of taking in radiant energy is

4. The process of giving off electromagnetic waves is

5. 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.

6. Nuclear explosions give off harmful radiation in the form of

7. The energy used by plants to carry out photosynthesis comes from
8. Energy from the Sun directly affects the water cycle by causing
   A condensation.  C absorption.
   B evaporation.    D precipitation.

9. The Sun’s light shines most directly on Earth at
   A the poles.    C the equator.
   B sea level.    D mountain peaks.

10. Convection currents in the air above Earth’s surface produce

11. The drying winds that blow through Southern California from the deserts toward the coast are called the
   A West Wind Drift.  C California Current.
   B Santa Ana winds.  D North Pacific Drift.

12. A continuous flow of water along a definite path is a(n)
    A sea breeze.    C mountain breeze.
    B surface current.  D ocean current.

13. The eastern coast of the United States is warmed by the
    A California Current.  C West Wind Drift.
    B Gulf Stream.  D North Atlantic Drift.

14. ENSO affects organisms in some areas by
    A indirectly increasing temperatures in surface water.
    B creating unusually strong global winds.
    C reversing the movements of ocean currents.
    D producing strong winds along coastal regions.
Complete the concept map on plate tectonics, using terms and phrases from your textbook.

**Continental Drift**
Theory by Alfred that a past that he called a split into pieces, which over time to their present locations.

**Subduction**
Occurs when two plates and one sinks or slides under the other. This can create ocean volcanic islands, and mountain .

**Earth’s Structure**
Earth has main layers that differ in composition, temperature, and . The crust is the thin layer of solid that is Earth’s layer.

**Plate Tectonics**
The theory that Earth’s is made up of separate, rigid that move slowly across the .

**Earthquakes**
Tremblings of Earth caused by the release of following movement along a fault. The point below Earth’s surface where an earthquake begins is the .

**Volcanoes**
Vents in Earth’s through which gases, and other materials are forced out. Volcanic eruptions create three main kinds of landforms:

**California**
State whose land lies on two plates. Most of the state rests on the Plate, while a small part rests on the Plate.
Cracked Plates
by Nicola Jones

Write About It
Response to Literature In this article the author describes a string of volcanoes in the Pacific Ocean. Some of these volcanoes make up the Hawaiian Islands. Others are located on the seafloor. Which volcanoes are older? Which ones are most active? Write a story about a scientific expedition to study the volcanoes of the Pacific. Describe how the researchers would travel and what they might find.
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

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 ____________________________.
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

Match the correct letter with the description.

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

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
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 _________________.

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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 ___________________________.


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

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

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.

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<th>Web Site</th>
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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

Match the correct letter with the description.

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

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

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 _________________.

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

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.

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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.

1. The idea that Earth once had a single landmass that split into pieces is part of the theory of
   A  seafloor spreading.  C  continental drift.
   B  convective flow.  D  plate tectonics.

2. Ocean trenches can form when one tectonic plate slides under another in a process called
   A  subduction.  C  divergence.
   B  convergence.  D  buckling.

3. Earth’s mantle includes the rigid rocks of the
   A  San Andreas Fault.  C  mountain belt.
   B  crust.  D  lithosphere.

4. Molten, or melted, rock below the surface of Earth is called

5. The central part of Earth is a sphere made of iron and nickel called the
   A  Pangaea.  C  asthenosphere.
   B  mantle.  D  core.

6. The pattern of movement caused by materials heating and cooling within Earth is called
   A  convective flow.  C  a convergent boundary.
   B  the asthenosphere.  D  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

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

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

14. The majority of California’s land rests on the
    B  Pacific Plate.  D  Los Angeles Basin.
Complete the concept map on the processes that reshape Earth, using terms and phrases from your textbook.

**Weathering:** gradual breakdown of rocks by natural processes

**Types:** physical, chemical

**Erosion:** rapid downslope movement of a mass of rock, soil, and debris

**Types:**

**Deposition:**

**Natural Disasters:** sudden and violent changes to Earth's surface

**Types:**

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Surf vs. Sand
by Kim Y. Masibay

Write About It
Response to Literature  This article outlines the problem of beach erosion. Geologists and engineers are working on solutions to the problem. Do you think they should take the concerns of surfers or sunbathers into account? Write a persuasive essay explaining your point of view.
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?

________________________________________________________________________

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________________________________________________________________________

________________________________________________________________________
**Atmospheric Pressure, Temperature, and Weather**

<table>
<thead>
<tr>
<th>anticyclone</th>
<th>dew point</th>
<th>humidity</th>
</tr>
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<tbody>
<tr>
<td>condensation</td>
<td>eddy</td>
<td>precipitation</td>
</tr>
<tr>
<td>Coriolis effect</td>
<td>evaporation</td>
<td>weather</td>
</tr>
</tbody>
</table>

**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.
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 _______________.

Name ______________________ Date ____________
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?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
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________________________________________________________________________
Weathering, Erosion, and Deposition

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<table>
<thead>
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</thead>
<tbody>
<tr>
<td><strong>a.</strong> abrasion</td>
<td><strong>e.</strong> glacier</td>
<td><strong>i.</strong> sediment</td>
</tr>
<tr>
<td><strong>b.</strong> chemical weathering</td>
<td><strong>f.</strong> landslide</td>
<td><strong>j.</strong> weathering</td>
</tr>
<tr>
<td><strong>c.</strong> deposition</td>
<td><strong>g.</strong> physical weathering</td>
<td></td>
</tr>
<tr>
<td><strong>d.</strong> erosion</td>
<td><strong>h.</strong> sand dunes</td>
<td></td>
</tr>
</tbody>
</table>

Match the correct letter with the description.

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

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

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.

Vocabulary

alluvial deposits delta oxbow lake
arroyo flood plain watershed
bank meanders
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.

<table>
<thead>
<tr>
<th>Clues</th>
<th>What You Know</th>
<th>Inference</th>
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<tbody>
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</table>

Chapter 6 • Shaping Earth’s Surface
Reading and Writing in Science
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?

________________________________________________________________________

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Beaches and Wave Erosion

<table>
<thead>
<tr>
<th>a. barrier island</th>
<th>e. feldspar</th>
<th>i. sandbar</th>
</tr>
</thead>
<tbody>
<tr>
<td>b. beach drift</td>
<td>f. magnetite</td>
<td>j. silicate</td>
</tr>
<tr>
<td>c. beach erosion</td>
<td>g. marine terrace</td>
<td></td>
</tr>
<tr>
<td>d. breakers</td>
<td>h. quartz</td>
<td></td>
</tr>
</tbody>
</table>

Match the correct letter with the description.

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

<table>
<thead>
<tr>
<th>floods</th>
<th>landslide</th>
<th>seismic waves</th>
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</thead>
<tbody>
<tr>
<td>lahar</td>
<td>levee</td>
<td>tsunami</td>
</tr>
</tbody>
</table>

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 ______________________.
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.

1. The amount of solar radiation an area receives is determined by its
   A  altitude.  C  vegetation.
   B  latitude.  D  humidity.

2. At higher elevations there is less
   A  air pressure.  C  precipitation.
   B  sunlight.  D  wind resistance.

3. Dew is a product of
   A  evaporation.  C  condensation.
   B  gravity.  D  solar radiation.

4. The impact of Earth’s rotation on winds is described by the
   A  Richter scale.  C  sea breezes.
   B  trade winds.  D  Coriolis effect.

5. A change in the composition of rock results from
   A  abrasion.  C  chemical weathering.
   B  freezing.  D  physical weathering.

6. Rock particles carried by wind and water are called
   A  sediment.  C  alluvial deposits.
   B  sand.  D  beach drift.
7. Marine terraces are the result of
   A  glacial movement.  
   B  beach erosion.  
   C  landslides.  
   D  tsunamis.

8. Good farmland can be found on a river’s
   A  banks.  
   B  watershed.  
   C  tributaries.  
   D  flood plain.

9. Erosion caused by heavy rains and flooding can carve a deep
   A  stream.  
   B  levee.  
   C  lake.  
   D  arroyo.

10. The grains of silicate sands are
    A  white minerals.  
    B  weathered rock.  
    C  black minerals.  
    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.  
    B  hurricanes.  
    C  eruptions.  
    D  wildfires.
Complete the concept map on Earth's resources, using terms and phrases from your textbook.

We can preserve energy sources through __________ and reuse.

Resources that ______________ be easily replaced are nonrenewable.

Energy resources that ______________ be replaced are considered renewable.

Energy changes forms during energy __________. Some energy is always lost as __________.

We use natural resources to create human-made, or __________ materials.

Pollution is any __________ change in the natural environment.

Earth's Resources
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.

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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.

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

There is no such thing as a perfect source of energy. Every source has advantages and disadvantages. The most common fossil fuel is coal, but removing this fuel from the ground can destroy topsoil. Burning fossil fuels creates energy but also releases many pollutants into the air. Fossil fuels are cost-effective, because they are less expensive to use than many energy sources. Although solar energy, or radiant energy from the Sun, is all around us, the technology needed to collect this energy is expensive. The energy produced by dams creates electricity, yet the dams can flood habitats and disturb water cycles. A nuclear power plant can produce enormous amounts of power, but it also produces radioactive waste. When evaluating energy sources, we must think beyond price and consider nonmonetary 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  
b. fission  
c. fusion  
d. hydroelectric power  
e. natural resources  
f. nuclear fuels  
g. petrochemicals  
h. recycling  
i. sustainability

Match the correct letter with the description.

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

11. Many house foundations are made of ________________, which is a mixture of sand, gravel, and pebbles.

12. Asphalt roof shingles made from ________________ ensure that a house is waterproof.

13. Many houses are covered with ________________ made from materials such as wood, stone, brick, and vinyl.

How are natural resources used for transportation?

14. Most ________________ is refined into gasoline and used to power cars, trucks, and buses.

15. Most ________________ cars use both gasoline and electricity to operate and emit less pollution than traditional cars.

Summarize the Main Idea

16. What are some of the many things people use each day that come from Earth’s natural resources?

________________________________________________________________________

________________________________________________________________________

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________________________________________________________________________
Use of Resources

<table>
<thead>
<tr>
<th>concrete</th>
<th>polymer</th>
<th>smelting</th>
<th>textile</th>
</tr>
</thead>
<tbody>
<tr>
<td>plastic</td>
<td>raw materials</td>
<td>synthetic</td>
<td></td>
</tr>
</tbody>
</table>

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

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.

<table>
<thead>
<tr>
<th>BEGINNING</th>
<th>MIDDLE</th>
<th>END</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characters (Who)</td>
<td>Plot Outline</td>
<td>Resolution</td>
</tr>
<tr>
<td>Setting (Where, When)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problem or Goal</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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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.

1. Every form of energy we use comes from
   A. a power plant.                 C. hydroelectric power.
   B. an energy source.             D. electromagnetic waves.

2. The fossil fuel that is a liquid is
   A. sulfur.                      B. coal.
   C. petroleum.                   D. water.

3. The most plentiful fossil fuel is
   A. oil.                         B. water.
   C. petroleum.                   D. coal.

4. Energy radiated by the Sun is
   A. geothermal energy.           C. chemical energy.
   B. solar energy.                D. mechanical energy.

5. During energy conversion, energy
   A. moves from one place to another.
   B. is reflected away from an object.
   C. is converted from water to electricity.
   D. changes from one form to another.

6. Currently many alternative fuels are less cost-effective than fossil fuels because they
   A. are more common than fossil fuels.
   B. require expensive technology to be made.
   C. rely mostly on nonrenewable resources.
   D. 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

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

14. Processing waste materials to use them in a new way is an example of