Reading and Writing in Science
Instructions for Copying

Answers are printed in non-reproducible blue. Copy pages on a light setting in order to make multiple copies for classroom use.
## LIFE SCIENCE

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Cells

Complete the concept map about cells. Some parts have been done for you.

<table>
<thead>
<tr>
<th>Animal Cell Part</th>
<th>Function</th>
<th>Plant Cell Part</th>
</tr>
</thead>
<tbody>
<tr>
<td>cell membrane</td>
<td>controls</td>
<td></td>
</tr>
<tr>
<td></td>
<td>sits outside cell membrane; provides</td>
<td></td>
</tr>
<tr>
<td></td>
<td>gel-like substance that fills cell</td>
<td></td>
</tr>
<tr>
<td>nucleus</td>
<td></td>
<td>nucleus</td>
</tr>
<tr>
<td></td>
<td>supply energy to the cell</td>
<td></td>
</tr>
<tr>
<td>vacuoles</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>large one stores excess water</td>
<td>vacuole</td>
</tr>
<tr>
<td></td>
<td>used to</td>
<td></td>
</tr>
<tr>
<td></td>
<td>has chemical called</td>
<td>chloroplast</td>
</tr>
</tbody>
</table>

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Types of Cells

Use your textbook to help you fill in the blanks.

What are cells?

1. All organisms, or living things, are made of ________________.

2. Every cell in every living thing comes from another cell that ________________.

3. A single-celled organism that can carry on all its life processes is called ________________.

4. Organisms made up of more than one cell are called ________________.

5. Scientists have identified more than ________________ different kinds of organisms.

6. They think that more than ________________ types of unicellular organisms exist.

What is inside an animal cell?

7. Both plant and animal cells perform life processes by using ________________.

8. All cells are surrounded by a(n) ________________ that controls the materials that move in and out of the cell.

9. The area inside the cell membrane is filled with ________________.

10. The cell’s control center is called the ________________.
11. The tiny power plants in the cell where food is burned and energy is released are called _________________.

12. A structure in a cell used for storage of water, food, and waste is the _________________.

**What is inside a plant cell?**

13. Plant cells have a(n) _________________; a rigid structure that serves as an outer covering.

14. A green structure, called a(n) _________________, uses the energy from the Sun to produce food for the plant.

**How are cells organized?**

15. Cells working together at the same job form a(n) _________________.

16. Groups of tissues working together form organs, and groups of organs working together form _________________.

**Critical Thinking**

17. Compare and contrast the cells of plants, animals, and unicellular organisms.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Types of Cells

Read each clue and fill in the crossword puzzle.

Across
2. the smallest unit of a living thing that can carry out the basic processes of life
3. similar cells working together at the same job
5. green chemical that uses the energy in sunlight
7. another name for a living thing

Down
1. organisms that contain many different types of cells
4. organs that work together to do a certain job
6. a group of tissues working together to perform a specific job
Types of Cells
Use the words in the box to fill in the blanks.

- cell membrane
- cytoplasm
- nucleus
- cell wall
- mitochondria
- organelles
- cells
- multicellular
- unicellular

When we talk about living things, we can break them down into smaller things. All living things are made up of units called ___________. Some organisms are ___________; that is, they consist of only one cell. More complex organisms, including plants and animals, are called ___________ organisms.

All cells are surrounded by a(n) ___________ that controls what moves into and out of the cell. The insides of cells are filled with a gel-like fluid called ___________. Within this liquid are the cell ___________. Both plant and animal cells contain a vacuole, a(n) ___________, and ___________, which supply energy for the cell. Plant cells have a(n) ___________ and chloroplasts. Chloroplasts contain chlorophyll, which uses energy from sunlight to produce food for the plant.
Photosynthesis: The Basic Process of Life

Use your textbook to help you fill in the blanks.

Why is photosynthesis important?

1. Organisms need _________________ to live and grow. Plants get their energy from the Sun.

2. The process of _________________ begins when plants take in carbon dioxide and water.

3. Special cells called chloroplasts use the Sun’s energy to turn these products into _________________, which is used for food, and _________________, which is released into the atmosphere.

What do roots and stems do?

4. The _________________ of plants have three jobs: They hold the plant in place, take in water and _________________ the plant needs to live, and store food.

5. Taproots are thick and strong and grow deep; _________________ roots form networks that branch out, sometimes forming thick mats.

6. Stems have structures called _________________ that carry water and minerals from the roots to the leaves.

7. Stems can store energy in the form of _________________.

What are leaves?

8. During photosynthesis, _________________ carry water to the edges of the leaf, while _________________ let in carbon dioxide.
9. Leaves use a(n) ________________ and the stomata to prevent loss of water from the plant.

10. The spines of a(n) ________________ plant prevent water loss and protect the plant from being eaten.

**How does water move through plants?**

11. Small plants use ________________ to bring water from the roots to the upper parts of the plant.

12. Larger plants need to use ________________ to carry out this important work.

13. The loss of water through plant leaves is called ________________.

**What happens during respiration?**

14. Respiration is the opposite of ________________ because it uses the sugar produced and stored by the plant.

15. By using ________________ to break up stored sugar, the plant produces energy along with carbon dioxide and ________________.

**Critical Thinking**

16. How do roots, stems, and leaves help a plant survive?
Photosynthesis: The Basic Process of Life

What am I?

Choose a word from the word box that answers each question and write the correct letter in the space provided.

<table>
<thead>
<tr>
<th>a. chloroplast</th>
<th>d. root</th>
<th>g. transpiration</th>
</tr>
</thead>
<tbody>
<tr>
<td>b. phloem</td>
<td>e. respiration</td>
<td>h. xylem</td>
</tr>
<tr>
<td>c. photosynthesis</td>
<td>f. stem</td>
<td></td>
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</tbody>
</table>

1. ______ I am the process plants use to turn the Sun’s energy into food. What am I?
2. ______ I am the tube that carries water and minerals from the plant’s roots to other parts of the plant. What am I?
3. ______ I am the structure inside a plant cell that helps plants produce their own food. What am I?
4. ______ I am the process plants use to turn stored food into energy. What am I?
5. ______ I am the structure that keeps plants in position in the soil and that gathers water and minerals that the plant needs. What am I?
6. ______ I am the structure that holds plants up and can be woody or soft. What am I?
7. ______ I am the process plants use to control how much water they have. What am I?
8. ______ I am the tube that carries plant sugars from leaves to other parts of the plant. What am I?
Photosynthesis: The Basic Process of Life

Use the words in the box to fill in the blanks.

<table>
<thead>
<tr>
<th>carbon</th>
<th>minerals</th>
<th>photosynthesis</th>
<th>xylem</th>
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<tr>
<td>chloroplasts</td>
<td>oxygen</td>
<td>respiration</td>
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</tr>
<tr>
<td>hydrogen</td>
<td>phloem</td>
<td>roots</td>
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Every organism needs food that provides energy for life. Plants make their own food using a process called __________. Leaves and __________ have different roles in this process. Roots absorb __________ and water from the soil. These substances travel up tubes called __________ inside the stem until they reach the leaves. Leaf cells have structures called __________ that use energy from sunlight to split water into __________ and oxygen. Then these chemicals are combined with __________ to make plant sugars.

The reverse of photosynthesis is __________. In this process, cells in the plant use __________ to break apart the plant sugars and provide energy. This food is carried in tubes called __________ to other parts of the plant. The leaves, stems, and roots of plants also provide energy to animals that eat them.
Saving Water the Yucca Plant Way

Read the Writing in Science feature in your textbook.

Write About It

**Explanatory Writing** Write an article for young gardeners. Explain the process of CAM photosynthesis. Research facts and details for your article.

Planning and Organizing

Help Ray create an outline for his article. Here are some topics he wants to cover. Place them in the outline form below.

- What happens during the day in CAM photosynthesis?
- What is the purpose of CAM photosynthesis?
- What is photosynthesis?
- What happens at night during CAM photosynthesis?
- How does the process of CAM photosynthesis work?

<table>
<thead>
<tr>
<th>I.</th>
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<tbody>
<tr>
<td>II.</td>
<td></td>
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<tr>
<td>III.</td>
<td></td>
</tr>
<tr>
<td>A.</td>
<td></td>
</tr>
<tr>
<td>B.</td>
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</table>

IV. Why is the yucca plant special?

Now create an outline for your own article on a separate sheet of paper. Make it as detailed as possible. Add A, B, C points and subpoints (1, 2, 3) under these as necessary.
Now use a separate sheet of paper to write the first draft of your article.

**Revising and Proofreading**

Here is part of the report that Ray wrote. Help him combine his sentences. Use the transition word in parentheses. Make sure you punctuate the new sentence correctly.

1. In CAM photosynthesis, the stomates open at night. The air is cooler and the humidity is higher. (when)

2. CAM photosynthesis is effective. It results in more efficient water use. (since)

Now revise and proofread your article. Ask yourself:

- Have I introduced my main idea about photosynthesis in yuccas?
- Have I included facts and details to show how this process works?
- Have I used examples and language appropriate for my audience?
- Have I used transition words and phrases to connect ideas?
- Have I ended with a strong conclusion about why yucca plants are special?
- Have I corrected all grammar errors?
- Have I corrected all problems in spelling, punctuation, and capitalization?
Microscopic Organisms on Earth

Use your textbook to help you fill in the blanks.

What are microscopic organisms?

1. Scientists need ________________ to study the tiny creatures called microorganisms.

2. In a compound microscope, the ________________ is placed near the object being studied. The ________________ is near the scientist’s eye.

3. These microscopes can ________________ objects as much as 2,000 times.

4. A(n) ________________ microscope is even more powerful. It can magnify objects as much as 300,000 times and show objects in ________________ dimensions.

What are microscopic organisms that make their own food?

5. Prokaryotes have simple cells that lack a(n) ________________ .

6. Another type of microorganism called the ________________ does have a nucleus.

7. Some microorganisms produce their own food, using ________________ .

8. They give off ________________ , which helps sustain life on Earth.

9. Some ________________ are like plants because they make their own food. Others are like animals because they must eat other organisms to survive.
What are microscopic organisms that cannot make their own food?

10. Microorganisms that need to find food develop ______________ on the outsides of their cells to help them move and eat.

11. One group of protists uses long tails called ______________ to move. By whipping this tail, they swim forward.

12. Another group of protists uses tiny hairs called ______________ to move through water.

13. A third group moves by extending a section called a(n) ______________ forward. That section then pulls the rest of the protist after it.

14. These protists have structures called ______________ in their cells where food is digested.

What roles do microscopic organisms have in ecosystems?

15. Microorganisms make about half the ______________ in the atmosphere.

16. These creatures are also important sources of ______________ for larger organisms.

17. Some, called ______________, serve another important function by feeding off organisms that have died.

Critical Thinking

18. What advantages does the scanning electron microscope have over a compound microscope?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Microscopic Organisms on Earth

What Am I?

Match the correct word to its definition by writing its letter in the space provided.

a. ciliate  
   d. flagellate  
   g. protists

b. cyanobacteria  
   e. parasite  
   h. pseudopod

c. eukaryote  
   f. prokaryote

1. ______ microorganism that moves by whipping a long tail
2. ______ large group of microorganisms that includes some that can produce their own food and some that must feed on other organisms
3. ______ microorganism that lives inside another organism and feeds off it
4. ______ microorganism that moves by beating many small hairlike structures
5. ______ an amoeba moves by extending this part of its body, also called a “false foot”
6. ______ microorganism that can make its own food and helps contribute half of the oxygen in the atmosphere
7. ______ more complex microorganism that does have a cell nucleus
8. ______ simple microorganism that does not have a cell nucleus
Microscopic Organisms on Earth

Use the words in the box to fill in the blanks.

<table>
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<tr>
<th>cyanobacteria</th>
<th>nucleus</th>
<th>protists</th>
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<tr>
<td>food chain</td>
<td>outsides</td>
<td>protozoans</td>
</tr>
<tr>
<td>hairlike structures</td>
<td>photosynthetic</td>
<td>pseudopods</td>
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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. As you read, look for the topic sentence in each paragraph. Then look for supporting details about each topic sentence.

Main Idea

Use the graphic organizer to record the topic sentence and supporting details for each paragraph of the article.

<table>
<thead>
<tr>
<th>Topic Sentence</th>
<th>Supporting Details</th>
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</tbody>
</table>
Write About It

Main Idea and Details

1. Why do museums ask for help from scientists such as Maria Pia Di Bonaventura?
2. How does Maria Pia’s work help protect works of art and other artifacts.

Planning and Organizing

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

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

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

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Drafting

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

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
**Cells**

Circle the letter of the best answer.

1. The flexible structure that surrounds all cells is called the
   a. cell membrane.
   b. cell wall.
   c. cytoplasm.
   d. vacuole.

2. An amoeba is a type of
   a. ciliate.
   b. flagellate.
   c. prokaryote.
   d. eukaryote.

3. The process plants follow to make use of the food energy that they produce is
   a. photosynthesis.
   b. reproduction.
   c. respiration.
   d. transpiration.

4. Which of these structures is found in a plant cell but not in an animal cell?
   a. central vacuole
   b. mitochondrion
   c. nucleus
   d. organelle

5. Parasites are organisms that
   a. break down dead organisms and recycle their bodies.
   b. live inside other organisms and feed off them.
   c. make their own food through photosynthesis.
   d. make food by using sunlight and oxygen.

6. Which of the following is used to move the sugars in a plant’s leaves?
   a. cambium
   b. phloem
   c. stomata
   d. xylem

7. Cyanobacteria are similar to plants because they can make their own food and produce
   a. carbon dioxide.
   b. hydrogen.
   c. iron.
   d. oxygen.
Circle the letter of the best answer for each question.

8. Which of these is NOT a way that plant cells differ from animal cells?
   a. Plant cells have strong cell walls that give more support.
   b. Plant cells have one large central vacuole that can store more food.
   c. Plant cells have mitochondria that are used to produce energy.
   d. Plant cells have chloroplasts that are used to make food.

9. A carrot root is an example of
   a. an aerial root.
   b. a fibrous root.
   c. a prop root.
   d. a taproot.

10. What do stomata do?
    a. control the amount of water in a leaf
    b. move a cell in the search for food
    c. carry water and minerals up from roots
    d. turn sunlight into food

11. Which of the following is in correct order, from simplest to most complex?
    a. cell, tissue, organ, organism, organ system
    b. cell, tissue, organ, organ system, organism
    c. cell, organ, organ system, tissue, organism
    d. cell, tissue, organism, organ system, organ

12. How do prokaryotes differ from eukaryotes?
    a. They can make their own food.
    b. They cannot move without water.
    c. They do not have a nucleus.
    d. They have more than one cell.
Food Chains, Webs, and Pyramids

Complete the concept map about food chains and webs. Some parts have been done for you.

More Secondary Consumers

Consumers, such as __________ and omnivores: eat primary consumers

Primary consumers, such as __________: live by eating plants

Producers: make their own food using __________

Relationships Among Organisms

Food: shows connections of producers and __________

Food: shows connections between many food chains

Different organisms trying for same __________

Organisms develop relationship over __________
Food Chains

Use your textbook to help you fill in the blanks.

**What is a food chain?**

1. The way energy passes from one organism to another is shown in a(n) ____________ .

2. Plants are called producers because they ______________ make their own food.

3. Animals are called ______________ because they cannot make their own food.

4. Most food chains begin with ______________.

5. Plants, or ______________, are next in the food chain.

6. Decomposers break down organisms and return ______________ to the soil.

7. With each step of the food chain, matter and ______________ pass from one organism to another.

**What are herbivores?**

8. A(n) ______________ is an animal that mostly eats plants.

9. Deer, rabbits, and mice are examples of ______________, which are the first consumers in a food chain.

10. Other animals can consume ______________ for food.

11. An animal that is hunted by another animal is called ______________ .
LESSON 12.
An animal that hunts another animal for food is called a(n) ________________.

What are carnivores and omnivores?
13. Animals that eat other animals are called ________________.
14. Animals that eat both plants and animals are ________________.
15. Both carnivores and omnivores are also ________________.

What are decomposers?
16. Decomposers break down plants or animals that are no longer ________________.
17. Decomposers called ________________ break down wood that is rotting.

What are some examples of food chains?
18. All food chains start with a(n) ________________, contain ________________, and end with decomposers.

Critical Thinking
19. What might happen to a pond food chain if the herons disappeared?

__________________________________________________________
__________________________________________________________
__________________________________________________________
__________________________________________________________
__________________________________________________________
__________________________________________________________
__________________________________________________________
Vocabulary

Food Chains

Match the correct word to its description by writing its letter in the space provided.

1. _______ shows how energy passes from one organism to another as food
2. _______ eats mostly plants
3. _______ the beginning of a pond food chain
4. _______ eaten by primary consumers
5. _______ cannot make their own food
6. _______ break down organisms that have died and return nutrients to the soil
7. _______ animals that eat other animals
8. _______ plantlike decomposers that break down rotting wood
9. _______ animal that eats both plants and other animals

a. algae  d. decomposers  g. herbivores
b. carnivores  e. food chain  h. omnivore
c. consumers  f. fungi  i. producers
Food Chains

Use the words in the box to fill in the blanks.

<table>
<thead>
<tr>
<th>cannot</th>
<th>decomposers</th>
<th>fungi</th>
<th>producer</th>
</tr>
</thead>
<tbody>
<tr>
<td>carnivores</td>
<td>earthworm</td>
<td>herbivores</td>
<td></td>
</tr>
<tr>
<td>consumers</td>
<td>food chain</td>
<td>omnivores</td>
<td></td>
</tr>
</tbody>
</table>

Living things need energy to survive. A(n) _______ shows how energy passes from one organism to another as food. A plant, called a(n) _______, uses the Sun's energy to make its own food. Animals _______ make their own food. They are _______ because they eat plants or other animals. The chain continues until _______ break down the organisms and return nutrients to the soil.

A(n) _______ eats plant life that has already died. Another kind of decomposer is _______, which break down rotting wood and other plant parts.

Animals that eat plants, or _______, are prey for other animals in the food chain. Animals that eat other animals are called _______. Those that eat both plants and animals are _______. Plants and animals depend on one another for survival.
Food Webs

Outline

Food Webs

Use your textbook to help you fill in the blanks.

What is a food web?

1. A(n) _________________ shows a group of food chains linked together.

2. The struggle of several organisms for the same resource is called ________________.

How can food webs change?

3. Living things in a food web _________________ on one another.

4. All the members of a single type of organism in an environment make up a(n) ________________.

5. In the 1800s, too many sea otters were hunted for their ________________.

6. Without sea otters to eat them, the ________________ population grew.

7. Sea urchins began to eat more and more kelp, leaving less for ________________ to eat.

8. Because the sea-urchin population grew and the number of other creatures fell, the ________________ food web almost disappeared.

How do new organisms change food webs?

9. In 1935, Australia’s sugar cane fields were being destroyed by ________________ and ________________.
LESSON 10.

10. The ________________ was brought to the sugar cane fields to eat the beetles.

11. The toads changed the food web because they did not eat the beetles, but they did eat ________________.

What is an energy pyramid?

12. A picture that shows the amount of energy that passes through a food web is called a(n) ________________.

13. There are more ________________ than any other living thing in an energy pyramid.

14. The next level on the pyramid is the ________________, which eat plants to stay alive.

15. Each level of the pyramid gets only ________________ percent of the energy from the level below.

16. Animals at the top of the pyramid must eat a lot of food to get the ________________ they need to stay alive.

Critical Thinking

17. What would happen to the kelp-forest food web if the crab suddenly disappeared?

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________
Food Webs

Match the correct word to its description by writing its letter in the space provided.

| a. beetles | d. energy pyramid | g. kelp |
| b. cane toad | e. food web | h. population |
| c. competition | f. herbivores | i. producers |

1. ______ a group of food chains linked together
2. ______ the struggle of several organisms for the same resource
3. ______ a type of seaweed
4. ______ animals that badly damaged Australia’s sugarcane crop in the 1930s
5. ______ all examples of a particular type of organism living in the same environment
6. ______ organisms at the bottom of the energy pyramid
7. ______ animals that must eat plants to stay alive
8. ______ animals that were brought into Australia to eat the creatures eating the sugarcane there
9. ______ model that shows how much energy flows through a food web
Food Webs

Use the words in the box to fill in the blanks.

<table>
<thead>
<tr>
<th>bottom</th>
<th>energy</th>
<th>producers</th>
<th>top</th>
</tr>
</thead>
<tbody>
<tr>
<td>consumers</td>
<td>energy pyramid</td>
<td>smaller</td>
<td></td>
</tr>
<tr>
<td>decomposers</td>
<td>food web</td>
<td>sunlight</td>
<td></td>
</tr>
</tbody>
</table>

Plants and animals are linked together. They are joined by a set of connections called a(n) ________ . Energy passes from one living thing to another in this web. How the energy flows can be shown in a(n) ________ . At the ________ level of the pyramid are the producers. These organisms make their own food using ________ . Above them are several levels of ________ , which eat the ________ or other consumers.

Each level of the pyramid gets a(n) ________ percentage of energy than the level below it. Only about 10 percent of the ________ in one level goes to the next. Animals at the ________ of the pyramid must eat a lot of food to get the energy they need. Organisms called ________ feed off dead plants and animals. They return energy to the system.
Write About It
Write a persuasive letter to a community leader. Convince him or her that it is important to protect the environment.

Getting Ideas
Do some print and online research. List plants and animals that will be lost without protection.

Planning and Organizing
A persuasive letter has a special job. Its job is to persuade the reader to agree with your opinion. Here are two sentences Chris wrote. Does each sentence support his position? Write Yes or No in the blank.

Opinion: We must protect the environment.

1. The California condor is a beautiful creature. ________
2. Animals are hurt when places they live in are destroyed. ________

Write three sentences on a separate piece of paper. Include facts and details to support your opinion.

Drafting
Your assignment is to write a persuasive letter to a community leader. Use the guidelines below.

1. Write your complete address and the date.
2. Write the name and address of the community leader.
3. Write the word Dear, the name of the person, and a colon.
4. Write an introductory paragraph. Explain your position.
5. Provide facts and reasons that back up your position.
6. Tell what you want to happen in your last paragraph.
7. For the closing, write Sincerely yours, then a comma. Sign your name on the next line. Print your name under your signature.
Revising and Proofreading

Now revise and proofread your letter. Ask yourself:

- Have I used convincing facts and reasons to support my opinion?
- Have I corrected all grammar errors?
- Have I corrected all spelling, punctuation, and capitalization errors?
Relationships in Ecosystems

Use your textbook to help you fill in the blanks.

Why do organisms compete?

1. The struggle for the same resources among organisms in an ecosystem is called ________________.

2. Any resource that restricts the growth of populations in an ecosystem is a(n) ________________.

3. The largest size of the population that an area can support is its ________________.

How do organisms avoid competition?

4. An organism’s ________________ is the place in which it lives and hunts for food.

5. The specific role that an organism plays within a community is that organism’s ________________.

How do organisms benefit from interactions?

6. The reliance of organisms on one another for survival is known as ________________.

7. A relationship between organisms that lasts over time is called ________________.

8. A symbiotic relationship in which both organisms benefit is called ________________.
9. One example of mutualism is ________________,
   which is formed by a(n) ________________ and
   algae that live together.

10. A symbiotic relationship in which one organism benefits
    and the other is not harmed is ________________.

11. One example of this type of relationship is the growth
    of ________________ on the backs of whales; in this
    situation, no harm comes to the whales.

**What are parasites?**

12. A symbiotic relationship in which one organism benefits
    while the other is harmed is ________________.

13. In this type of relationship, a(n) ________________
    benefits by living in or on a(n) ________________.

14. Some parasites cause serious problems, giving people
    ________________ such as dysentery.

**Critical Thinking**

15. What keeps populations in a community from increasing
    constantly?

   __________________________________________
   __________________________________________
   __________________________________________
   __________________________________________
   __________________________________________
   __________________________________________
Relationships in Ecosystems

Use the words in the box to fill in the blanks.

<table>
<thead>
<tr>
<th>carrying capacity</th>
<th>limiting factor</th>
<th>parasitism</th>
</tr>
</thead>
<tbody>
<tr>
<td>commensalism</td>
<td>mutualism</td>
<td>symbiosis</td>
</tr>
<tr>
<td>habitat</td>
<td>niche</td>
<td></td>
</tr>
</tbody>
</table>

1. The particular role that an organism plays in a community is its ________________.

2. When two organisms benefit in a symbiotic relationship, the relationship is called ________________.

3. The place in which an organism lives and hunts for food is its ________________.

4. Water is a ________________ that restricts the growth of populations in an ecosystem.

5. A relationship that benefits one organism and does not harm the other is ________________.

6. Because each area has a certain ________________, it can support only a limited population.

7. In the type of symbiotic relationship called ________________, one organism benefits while the other is harmed.

8. A special relationship between organisms that lasts a long time is ________________.
Relationships in Ecosystems

Use the words in the box to fill in the blanks.

- carrying capacity
- exceeds
- plants
- commensalism
- host
- symbiosis
- compete
- parasitism

Each ecosystem has certain limiting factors that restrict the size of its populations. These include water, temperature, soil types, and the number of available for food. The population that any area can support is its . When the population of an area its carrying capacity, some plants or animals begin to die off.

Living things for resources in an ecosystem. However, limits competition as organisms develop relationships that allow them to live together. A symbiotic relationship that benefits only one organism but does no harm to the other is known as . In , a parasite harms the organism it lives on or in. In the relationship called mutualism, both organisms benefit.
Food Chains, Webs, and Pyramids

Circle the letter of the best answer.

1. The first consumers in a food chain are
   a. carnivores.
   b. herbivores.
   c. omnivores.
   d. producers.

2. Organisms at the bottom of an energy pyramid are
   a. consumers.
   b. herbivores.
   c. producers.
   d. decomposers.

3. Carnivores eat
   a. other animals.
   b. plants.
   c. plants and animals.
   d. rotting plants and animals.

4. Organisms that cannot make their own food are
   a. producers.
   b. decomposers.
   c. herbivores.
   d. consumers.

5. Some plants rely on certain insects to pollinate their flowers. Which type of symbiotic relationship is this?
   a. commensalism
   b. competition
   c. mutualism
   d. parasitism

6. In a parasitic relationship,
   a. neither host nor parasite is harmed.
   b. the host is harmed.
   c. the parasite is harmed.
   d. both parasite and host are harmed.

7. When many members of a population die off because of overcrowding, the population has exceeded its
   a. carrying capacity.
   b. energy pyramid.
   c. food web.
   d. limiting factors.
Circle the letter of the best answer.

8. What does an omnivore eat?
   a. other animals
   b. plants
   c. plants and animals
   d. decomposing plants and animals

9. The struggle of several animals for the same resources is called
   a. adaptation.
   b. competition.
   c. photosynthesis.
   d. population.

10. A group of food chains linked together form a(n)
    a. energy pyramid.
    b. food chain.
    c. food pyramid.
    d. food web.

11. Which of the following is NOT a limiting factor for an organism?
    a. population size
    b. space to grow
    c. soil and water
    d. weather and temperature

12. An energy pyramid is smaller at the top than the bottom to show that
    a. the organisms at the top are better adapted.
    b. the organisms at the top are better developed.
    c. the flow of energy builds as it moves from top to bottom.
    d. the flow of energy decreases as it moves up each level.

13. Organisms that eat rotting plants and animals are called
    a. decomposers.
    b. herbivores.
    c. primary consumers.
    d. producers.

14. What does a food chain represent?
    a. all the animals in an environment
    b. all the plants in an environment
    c. The carrying capacity of a habitat
    d. energy passing from one organism to the next
Ecosystems

Complete the concept map about ecosystems. Some parts have been done for you.

**Land**
- Grasslands:
  - somewhat
  - climate
  - large expanses of
  - but few trees
  - rich soil except in savannas
  - common in dry season
  - different names in different places

- Rain forest:
  - climate
  - thin, poor
  - number of layers

**Ecosystems**

**Water**
- Categories of Organisms:
  - ____________________
    - Nekton eat plants or
    - Benthos act as

- Freshwater ecosystems:
  - ____________________
    - water, such as rivers
    - standing water, such as

- Saltwater ecosystems:
  - ____________________
    - where organisms are
      covered by water or
      exposed to air
    - rich in plant life
    - oceanic, with upper and
      lower layers

**Changing**

**Causes:**
- ____________________
  - disasters
  - actions of

**Permanent changes:**
- ____________________
  - organisms must
  - leave the ecosystem, or

**Temporary:**
- ____________________
  - leads to
  - and
  - of climax community
Types of Ecosystems

Use your textbook to help you fill in the blanks.

What is an ecosystem?

1. An ecosystem includes ____________ and their nonliving environment.
2. Plants, animals, and microorganisms, such as bacteria, are ____________ in an ecosystem.
3. Rainfall and temperature are ____________ in an ecosystem.
4. Plants that live in a pond need ____________.
5. A specific ____________ will help plants grow well in the ecosystem.

What is a grassland ecosystem?

6. Grasslands are dominated by grasses and have few trees.
   Rainfall can be ____________, and fires often take place in the dry season.
7. These ecosystems usually have rich, ____________ soil and are good for farming. African grasslands called ____________ are an exception.
8. The grasslands of Russia are called ____________, and those of Argentina are called ____________.
9. All these grasslands are home to many ____________, that eat the grass and to the other animals that prey on them.
What is a rain-forest ecosystem?

10. More life is found in the ________________ than any place on Earth.

11. The ________________ are called the emergent layer of the rain forest.

12. Snakes and tree frogs can be found in the ________________ layer of the rain forest.

13. Below the rain forest canopy is the ________________ layer.

14. Very few plants grow on the ________________ because there is little sunlight.

What is a coral-reef ecosystem?

15. Organisms that are no longer living form ________________ .

16. Dead coral is a(n) ________________ of the reef ecosystem.

17. Coral reefs form in ________________ water near the coasts of tropical areas.

Critical Thinking

18. Why are abiotic factors important in an ecosystem?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
**Types of Ecosystems**

Match the correct word to its description by writing its letter in the space provided.

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>abiotic</td>
<td>d.</td>
<td>climate</td>
<td>g.</td>
<td>grassland</td>
</tr>
<tr>
<td>b.</td>
<td>biotic factors</td>
<td>e.</td>
<td>ecosystem</td>
<td>h.</td>
<td>understory</td>
</tr>
<tr>
<td>c.</td>
<td>canopy</td>
<td>f.</td>
<td>emergent layer</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. ______ a layer of the rain forest just below the emergent layer
2. ______ a group of living things and their nonliving environment
3. ______ the typical weather patterns of an area
4. ______ a type of ecosystem with a lot of grass and few trees
5. ______ all of the living things in an ecosystem
6. ______ the area beneath the rain forest canopy
7. ______ nonliving things in an ecosystem
8. ______ the tops of the tallest trees
Types of Ecosystems

Use the words in the box to fill in the blanks.

<table>
<thead>
<tr>
<th>biotic factors</th>
<th>emergent</th>
<th>rainfall</th>
<th>water</th>
</tr>
</thead>
<tbody>
<tr>
<td>canopy layer</td>
<td>grasslands</td>
<td>sunlight</td>
<td></td>
</tr>
<tr>
<td>coral reefs</td>
<td>rain forest</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

An ecosystem includes all living things and their nonliving environment. You can find plants and animals that are called ________________ in an ecosystem.

Abiotic factors such as ________________ and temperature are also found in an ecosystem. Animals living in a desert ecosystem get their ________________ from the food they eat. Some of those that live in ________________ depend on eating grass.

More living things are found in the ________________ than in any other ecosystem. The top layer of the rain forest is the ________________ layer. Underneath the emergent layer are the ________________ and the ________________ layer. The forest floor gets very little ________________ . Dead organisms in reef ecosystems form ________________ . Coral is an abiotic factor in these ecosystems.
# A Year in the Life of a Forest

Read the passage in your textbook. The passage about the Howland Forest of Maine contains five paragraphs. In the blanks provided in the graphic organizer, write a sentence that summarizes the main idea of the first three paragraphs, followed by two sentences that contain supporting details. Use your own words. The first item has been done for you.

<table>
<thead>
<tr>
<th>Main Idea</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paragraph 1 Main Idea: Scientists measure gas levels in forests throughout the year.</td>
<td>Howland Forest is a deciduous forest in Maine. The change in seasons affects the levels of carbon dioxide there.</td>
</tr>
<tr>
<td>Paragraph 2 Main Idea:</td>
<td></td>
</tr>
<tr>
<td>Paragraph 3 Main Idea:</td>
<td></td>
</tr>
</tbody>
</table>
Write About It

Main Idea and Details 1. Tell how the levels of carbon dioxide change in the Howland Forest throughout the year. 2. Research other biomes, and explain how they change during the year.

Now, use the information in your graphic organizer to write a paragraph telling how the levels of carbon dioxide change in the Howland Forest throughout the year.

_________________________________________

_________________________________________

_________________________________________

_________________________________________

_________________________________________

Next, you will be conducting research about the yearly changes to another biome.

1. What biome do you choose to research? __________________________

2. What types of organisms live in this biome? __________________________

3. What changes can be observed in this biome as the seasons change? __________________________

4. Compare your biome research with that of the students seated closest to you. Why do seasonal changes in the different biomes vary? Give your opinion.
Water Ecosystems

Use your textbook to help you fill in the blanks.

What are water ecosystems?

1. There are freshwater ecosystems and ________________ ecosystems.

2. Organisms that drift in the water are called _________________. Active swimmers such as fish are called _________________.

3. The creatures that live in the deepest part of a body of water are the _________________. Many bottom-living creatures are scavengers or _________________.

4. Producers, which live at or near the surface, release much of the _________________ that allows most other water organisms to live in surface waters.

What are freshwater ecosystems?

5. Organisms in running-water ecosystems are adapted to how _________________ the water flows.

6. In standing-water ecosystems, such as lakes, most organisms live in the shallow water of the _________________ zone.

7. Many nekton live in the _________________ zone, which is away from the shore.

8. Benthos, including worms and mollusks, live in the _________________ zone beneath the open-water zone.
What are ocean ecosystems?

9. Organisms of the shallow ______________ zone are covered and uncovered each day by the rise and fall of tides.

10. Sunlight allows producers and the animals that depend on them to live in the ______________ zone.

11. Large organisms live near the surface in the top part of the ______________ zone, which is called the bathyal zone.

12. Few creatures can live in the cold, dark waters at the bottom of the oceanic zone, which is called the ______________ zone.

Where do salt and fresh water meet?

13. The place where a river empties into the ocean is called a(n) ______________. Some low areas around estuaries are ______________.

14. When the tide comes in, an estuary’s waters are mostly ______________, but the waters are mostly ______________ when the tide goes out.

15. Wetlands protect coastal regions during ______________ by soaking up excess water.

Critical Thinking

16. How is sunlight a limiting factor in water ecosystems?

______________________________________________________________

______________________________________________________________

______________________________________________________________
Water Ecosystems

Match the correct word or words with their descriptions and fill in the crossword puzzle.

<table>
<thead>
<tr>
<th>benthos</th>
<th>estuary</th>
<th>intertidal zone</th>
<th>nekton</th>
<th>neritic</th>
<th>plankton</th>
<th>shore zone</th>
</tr>
</thead>
</table>

Across
2. place where salt and fresh water meet
5. zone of ocean where algae, kelp, and other producers grow
6. place where organisms are covered and uncovered daily by the waters of changing tides
7. the larger, active swimmers in a body of water

Down
1. creatures that drift freely in the water
2. the shallow water in standing-water ecosystems
3. organisms that live in the deepest part of a body of water
Water Ecosystems

Use the words in the box to fill in the blanks.

Water ecosystems have many forms of life. Organisms in water ecosystems are classified as plankton that float in the water; ________________ that are large, free swimmers; and ________________ that live in the deepest part of the water. In general, more organisms live in the ________________ layers of the water.

Freshwater ecosystems are divided into ________________ bodies, standing-water bodies, and wetlands ecosystems.

Organisms such as kelp, fish, and whales live in the ocean’s ________________ zone. Sharks, squid, and octopii live in the upper part of the ocean’s ________________ zone. Few animals live in the lower part of this zone.

Organisms of the ocean’s ________________ zone must be adapted to rise and fall of ________________ . Organisms that live in estuaries are adapted to survive in both fresh and salty waters.
Keep Our Water Clean

Write About It
Write a letter to the mayor of your town. Explain a need that the students in your community have and why people should help. State your opinion clearly and support it with relevant facts and evidence organized in a logical way.

Getting Ideas
Think of an issue that clearly affects life in your community. Form an opinion about it. Write this opinion in the top box in the chart below. Then jot down reasons that support this opinion in the bottom boxes.

Planning and Organizing
Kristin's opinion is that the town should ban power boats from the lake. Here are three statements she wrote. Write Yes if the statement supports her opinion. Write No if it does not.

1. _______ Power boats can pollute the water.

2. _______ Power boats are a fun way to spend time on the lake.

3. _______ Power boats kill fish and other water life.
Drafting
Write a statement to begin your letter. Make sure it clearly tells the issue you are concerned about and states your opinion.

Now write your letter to the mayor on a separate piece of paper. Use the form of a business letter. Start the body of your letter with the sentence you wrote above. Include reasons that will persuade the mayor to support your opinion. End by stating what you think should be done. Remember to be polite and respectful.

Revising and Proofreading
Now revise and proofread your writing. Ask yourself:

- Did I clearly state my opinion about a need that the students in my community have?
- Did I provide relevant reasons to support this opinion?
- Did I correct all mistakes in grammar, spelling, capitalization, and punctuation?
Changes in Ecosystems

Use your textbook to help you fill in the blanks.

How can ecosystems change?

1. Ecosystems are changed by living ____________________ that change the environment around them, and by ____________________ events such as floods.

2. Humans can change or destroy the ____________________ of organisms when they cut ____________________ to build homes.

What happens when ecosystems change?

3. Some organisms respond to changes in ecosystems by adapting or ____________________ to another place.

4. When a species cannot respond to changes in an ecosystem, it may become ____________________.

5. When a species is in danger of extinction, it is called an ____________________ species.

6. Species that could become endangered because of their low populations are known as ____________________ species. The biggest threat to a species is the loss of ____________________.

How do ecosystems come back?

7. Over time, one group of species in an ecosystem is replaced by a different group of species through a process called ____________________.
8. In a region where few if any species existed before or where previous species were wiped out, ________________ occurs.

9. The first species to take hold in barren areas are ________________ species, such as mosses and lichens.

10. As larger plants and predators begin to live in an area, the community may become a(n) ________________, such as a prairie.

11. With enough moisture, ________________ may start to grow in a grassland.

12. In time, a fully developed ecosystem will support a(n) ________________ community, which is the final stage of succession.

What is secondary succession?

13. When a new community develops where a community had once existed, it is called ________________ succession.

14. Secondary succession might occur in a forest that has been burned by a(n) ________________ or at an abandoned farm.

Critical Thinking

15. A volcano erupts and lava flows over what had once been a fertile farm field. Describe the type of succession that will occur, and explain why.

__________________________________________________________________________________

__________________________________________________________________________________
Changes in Ecosystems

Use the words in the box to fill in the blanks.

<table>
<thead>
<tr>
<th>climax community</th>
<th>pioneer community</th>
<th>secondary succession</th>
</tr>
</thead>
<tbody>
<tr>
<td>endangered species</td>
<td>pioneer species</td>
<td>successions</td>
</tr>
<tr>
<td>extinct</td>
<td>primary succession</td>
<td></td>
</tr>
</tbody>
</table>

1. The first living community to develop in an area that used to be lifeless is called a(n) _________.

2. When a species dies out completely, the species is _________.

3. The establishment of a new community where a community had already existed is called _________.

4. The process of one ecosystem gradually changing into a different type of ecosystem is called _________.

5. A species that is in danger of becoming extinct is a(n) _________.

6. In the final stages of succession, a(n) _________.

7. One of the first species to live in an area that used to be lifeless is a(n) _________.

8. Succession that occurs where few, if any, living things exist is _________.

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Changes in Ecosystems

Use the words in the box to fill in the blanks.

animal       plants       species
habitat      primary succession       trees
pioneer      secondary succession

Ecosystems change over time. People cause some of the changes, through pollution, ________________
destruction, or hunting, or by introducing or removing ________________. However, many ecosystem changes are natural.

When new species occupy land burned by a fire or a farm field that is abandoned, ________________ occurs. New ________________ begin to grow in the soil. Weeds, then shrubs, and finally ________________ grow. When few, if any, living things exist in an area, ________________ takes place. The first organisms to live in the area are called ________________ species. After soil is established, larger plants can grow and larger ________________ species can arrive. Eventually, forests develop. Finally, in the last stage of succession, a climax community is established.
Ecosystems

Choose the letter of the best answer.

1. An ecosystem with rich soil that often has fires in the dry season is the
   a. grassland.
   b. northern forest.
   c. tropical rain forest.
   d. wetland.

2. The oceanic zone that includes the most plant life is the
   a. abyssal zone.
   b. bathyal zone.
   c. neritic zone.
   d. oceanic zone.

3. All the living and nonliving things in an area interact to form a(n)
   a. community.
   b. ecosystem.
   c. environment.
   d. habitat.

4. Which kind of species is in near danger of totally disappearing from Earth?
   a. threatened
   b. endangered
   c. extinct
   d. pioneer

5. In the last stage of succession, the plants and animals in an ecosystem form a(n)
   a. pioneer community.
   b. endangered community.
   c. climax community.
   d. primary community.

6. Which type of succession would occur after a fire has burned a forest?
   a. primary succession
   b. tertiary succession
   c. secondary succession
   d. climax succession
Choose the letter of the best answer.

7. The highest layer in the rain forest is the
   a. canopy layer.
   b. emergent layer.
   c. forest crown.
   d. treetop layer.

8. The abiotic factors in an ecosystem include
   a. both plants and animals in the system.
   b. the animals but not the plants.
   c. the plants but not the animals.
   d. all the nonliving things in the system.

9. Marshes are often found in
   a. coral reefs.
   b. estuaries.
   c. running-water ecosystems.
   d. standing-water ecosystems.

10. Creatures that drift freely in water ecosystems are called
    a. plankton.
    b. benthos.
    c. nekton.
    d. crustaceans.

11. Large, active swimmers, such as fish and whales, are called
    a. mollusks.
    b. benthos.
    c. plankton.
    d. nekton.

12. The organisms that live along the bottom of water ecosystems are the
    a. benthos.
    b. nekton.
    c. plankton.
    d. shellfish.
Adventures in Eating

Read the Literature feature in your textbook.

Write About It

Response to Literature  This article tells about different adaptations for eating. Research two more animals that have interesting adaptations. Write a report that explains how these adaptations help the animals eat. Compare these adaptations to the ones you read about in the article.
Our Dynamic Earth

Complete the concept map about changes on Earth. Some parts have been done for you.

Changes on Earth

Running water in [ ] and [ ] water in glaciers can change the land.

A(n) [ ] is a giant wave usually caused by an earthquake.

Strong storms like [ ] and tornadoes can damage property and change the land. Heavy rain can produce flooding that [ ] the soil.

Earthquakes occur when plates suddenly move along [ ]

[ ] form along Earth’s moving plates and at hot spots in Earth’s crust.
Earthquakes

Use your textbook to help you fill in the blanks.

What are earthquakes?

1. Fast changes take place on Earth’s ________________, or the crust.

2. The crust is made up of ________________, giant slabs of rock that fit together like the pieces of a puzzle.

3. A place where the plates come together is called a(n) ________________.

4. A(n) ________________ occurs when the plates along Earth’s faults shift suddenly.

5. Many earthquakes occur in the ________________, where some of Earth’s plates meet.

What causes an earthquake?

6. Earthquakes happen where Earth’s ________________ meet.

7. Different kinds of faults form because Earth’s plates move in ________________.

8. Plates pull apart in a(n) ________________, and rocks above the fault surface move down.

9. Plates push together in a(n) ________________, and rocks above the fault move upward.

10. The San Andreas Fault is a(n) ________________, where rocks slide past each other in different directions.
11. The _________________ of an earthquake are strongest where the earthquake first begins.

12. Earthquakes’ vibrations move in _________________ through Earth’s crust.

What is a tsunami?

13. A giant ocean wave called a(n) _________________ is usually caused by an earthquake on the ocean floor.

14. As a tsunami moves closer to shore, it slows and gets _________________.

15. A tsunami may be one _________________ of water or a series of _________________.

What are some safety tips for earthquakes and tsunamis?

16. Your family should hold _________________ and arrange a meeting place outside your home for when the earthquake is over.

17. If outside during an earthquake, you should move quickly to a(n) _________________.

18. If you live near the coast, you should listen for warnings about tsunamis after a(n) _________________ occurs.

19. If there is a tsunami warning for your area, you should _________________ right away.

Critical Thinking

20. Why should you move to higher ground if a tsunami is coming?
Earthquakes

Match the correct word to its description by writing the letter of the word in the space provided.

<p>| | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>b.</td>
<td>c.</td>
<td>d.</td>
<td>e.</td>
<td>f.</td>
<td>g.</td>
<td>h.</td>
</tr>
<tr>
<td>creep</td>
<td>earthquake</td>
<td>fault</td>
<td>normal fault</td>
<td>plates</td>
<td>reverse fault</td>
<td>strike-slip fault</td>
<td>tsunami</td>
</tr>
</tbody>
</table>

1. ______ gigantic slabs of rock that make up Earth's crust
2. ______ movement in Earth's crust caused by a sudden shift in Earth's plates
3. ______ crack where plates come together and rocks move along one or both sides
4. ______ rocks sliding past one another in different directions
5. ______ giant ocean wave caused by an earthquake
6. ______ slow movement along faults
7. ______ plates pushing together and rocks above the fault moving upward
8. ______ to shake
9. ______ plates pulling apart, and rocks above the fault surface moving down
Earthquakes

Use the words in the box to fill in the blanks.

<table>
<thead>
<tr>
<th>begins</th>
<th>Pacific Ocean</th>
<th>shift</th>
</tr>
</thead>
<tbody>
<tr>
<td>fault</td>
<td>plates</td>
<td>strike-slip</td>
</tr>
<tr>
<td>normal fault</td>
<td>reverse fault</td>
<td>tsunamis</td>
</tr>
</tbody>
</table>

Earth’s surface is always changing. Earth’s crust is made up of gigantic slabs of rock called ____________ that fit together like the pieces of a puzzle. A place where plates come together and move along one or both sides is called a _____________. Earthquakes occur when Earth’s plates undergo a sudden _____________ . Many earthquakes happen in an area around the _____________.

A ____________ occurs when plates pull apart and rocks above the fault surface move down. When plates push together and rocks above the fault move upward, a ____________ occurs. Rocks that slide past one another in different directions form a ____________ fault. The vibrations from an earthquake are strongest where the earthquake _____________. Earthquakes on the ocean floor can cause giant waves called _____________. These waves can bring heavy damage to coastal areas.
Volcanoes

Use your textbook to help you fill in the blanks.

What is a volcano?

1. A(n) __________ is a mountain that builds up around an opening in __________.

2. A(n) __________ occurs when melted rock, gases, and pieces of rock are __________ of a volcano.

3. Gases that are trapped build up pressure in magma and can cause a(n) __________.

4. Magma can rise through a(n) __________ called a(n) __________.

5. Magma is called __________ once it reaches the __________, where it cools and hardens to form a(n) __________.

Where do volcanoes form?

6. When one Earth plate is pushed beneath another, the plate moving down melts and is changed to __________.

7. Heated magma __________ up through Earth’s crust to form __________.

8. Volcanoes that form in the middle of a plate may occur when magma partially melts through Earth’s crust in an area called a(n) __________.
What are some kinds of volcanoes?

9. A(n) ________________ has steep sides and is formed when gases in thick magma explode and cause lava to burst into the air.

10. A cuplike shape around the vent called a(n) ________________ forms when lava falls in pieces around the volcano.

11. A(n) ________________ has wide, flat sides and is formed by layers of lava that flow gently in all directions.

12. A(n) ________________ is made up of layers of ________________ and ________________.

13. Eruptions seem to take turns: a(n) ________________ eruption is followed by a quiet period when lava flows gently.

14. The layers of a composite volcano build up to form a(n) ________________ that is ________________, with the shape of one side matching the shape on the other side.

How can you be safe around volcanoes?

15. If you live near a volcano, you should have a(n) ________________ for each family member.

Critical Thinking

16. Why do high mountains NOT form around shield volcanoes?

__________________________________________

__________________________________________

__________________________________________
Volcanoes

Match the correct word to its description by writing the letter of the word in the space provided.

1. _______ melted rock beneath Earth’s surface
2. _______ a mountain that builds up around an opening in Earth’s crust
3. _______ a volcano that forms along the edges of spreading plates
4. _______ a volcano with steep sides that forms when pieces of lava fall around the vent
5. _______ a cuplike shape that forms around the vent of a volcano
6. _______ the forcing of melted rock, gases, and pieces of rock out of a volcano
7. _______ a wide, flat volcano formed by layers of lava that build up over time
8. _______ a cone-shaped volcano that has explosive eruptions and quiet periods when lava flows gently
9. _______ central opening in a volcano
10. _______ place where magma partially melts through Earth’s crust
11. _______ melted rock that reaches Earth’s surface
Volcanoes

Use the words in the box to fill in the blanks.

<table>
<thead>
<tr>
<th>active volcano</th>
<th>dormant volcano</th>
<th>rift volcanoes</th>
</tr>
</thead>
<tbody>
<tr>
<td>cinder-cone volcanoes</td>
<td>eruption</td>
<td>shield volcanoes</td>
</tr>
<tr>
<td>composite volcanoes</td>
<td>lava</td>
<td>vent</td>
</tr>
</tbody>
</table>

A volcano is a mountain that builds up around an opening in Earth’s crust. This opening is called a(n) _____________.

Gases trapped in melted rock beneath Earth’s surface can be forced out of a volcano during a(n) _____________.

Once magma reaches Earth’s surface, it is called _____________.

Volcanoes that form along the edges of spreading plates are called _____________. A volcano that is still erupting is a(n) _____________, and a volcano that is no longer erupting is a(n) _____________. Volcanoes with steep sides that form from explosive eruptions are _____________.

Volcanoes with wide, flat sides that form from layers of lava that build up over time are _____________. Volcanoes that are made up of layers of lava and ash are _____________.

People can do many things to stay safe in areas where volcanoes are active.
Meet Ro Kinzler

Read the passage in your textbook about Ro Kinzler. Then list the places that Ro Kinzler and some of the other scientists have traveled.

1. ____________________________
2. ____________________________

Where do Ro and the other scientists perform experiments to test their findings?

__________________________________________________________________________

What are some of the things they have done with their samples and observations?

1. ____________________________
2. ____________________________

Write About It

Cause and Effect  Read the article with a partner. Fill out a cause-and-effect chart to record why Ro visits volcanoes and collects lava samples. Tell what happens as a result of her work.
Cause and Effect

Use the answers to the questions to complete the cause-and-effect chart.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ro travels to the ________________________</td>
<td>She collects active lava samples to study.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Ro goes to the ocean floor.</td>
<td>She creates ____________________________________________</td>
</tr>
<tr>
<td></td>
<td>of the ocean floor based on careful observations of rock formations.</td>
</tr>
</tbody>
</table>

Guidelines—What to write in the chart:

- Look for why something happened. This is the cause.
- Look for what happened as a result. This is the effect.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ro would go just about anywhere.</td>
<td>She finds out more about ___________________________________</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Ro does experiments on lava.</td>
<td>She finds out how lava _____________________________________</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Ro goes to the ________________________</td>
<td>She sees underwater volcanoes.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Ro observes underwater ____________________</td>
<td>She creates maps of the ocean floor.</td>
</tr>
</tbody>
</table>
Weathering and Erosion

Use your textbook to help you fill in the blanks.

**What is weathering?**

1. The slow process that breaks rocks into smaller pieces is called ________________.

2. A rock is broken apart by ________________ weathering if the rock type does not change.

3. If a rock contains iron, air and water can react with the iron through ________________ and form rust.

**What is erosion?**

4. Weathered pieces of rock are moved from one place to another during ________________.

5. Erosion can be caused by glaciers, wind, moving water, and ________________.

6. When the Colorado River eroded the land around the river in Arizona, the ________________ was formed.

**How do glaciers shape the land?**

7. Glaciers form in very cold places as thick ________________ of ice.

8. Glaciers move because a thin layer of ________________ forms on the bottom of them.

9. Deposits left behind by a glacier are called ________________ and ________________.
10. The mounds that form where till builds up are called ________________.

**How do people shape the land?**

11. Most processes change land slowly, but people can change the land ________________.

12. One way people change the land is by ________________ it to get minerals, metals, or fuels.

**Critical Thinking**

13. Which do you think changes the land more: frozen water or flowing water?

______________________________________________________________________________________________
______________________________________________________________________________________________
______________________________________________________________________________________________
______________________________________________________________________________________________
______________________________________________________________________________________________
______________________________________________________________________________________________
______________________________________________________________________________________________
______________________________________________________________________________________________
______________________________________________________________________________________________
Weathering and Erosion

Use the words in the box to answer each clue by writing the answer in the correct squares in the puzzle. Then figure out what the secret word is, and fill in the rest of the letters.

Across
1. rocks or gravel left by a glacier  
2. a slow process that breaks rocks into smaller pieces  
3. the carrying away of weathered pieces of rock  
4. weathering that breaks down rock without changing the rock type  
5. a mixture of debris dropped by a glacier in a new place  
6. the downhill end of a glacier  
7. a feature that forms where glacial till builds up

Write the secret word that is running down the puzzle.
Weathering and Erosion

Use the words in the box to fill in the blanks.

Rocks are constantly broken down by the process of weathering. Rocks can be broken down into smaller pieces without changing the type of rock through _____________. Minerals in rocks can be changed to other minerals through _____________. The roots of _____________ can cause weathering, too.

Erosion moves weathered rock from one place to another through _____________. _____________, and _____________. Huge masses of ice and snow, called _____________, also erode land. Moving glaciers pick up rocks, gravel, and sand and deposit them as glacial till and _____________. Gravity causes erosion by moving weathered rock downhill.
Changes Caused by the Weather

Use your textbook to help you fill in the blanks.

How do floods and fires change the land?

1. An overflow of water onto land that is normally dry is called a(n) __________.

2. Flood waters usually come from heavy ________________ or quickly melting snow.

3. A flood can help the land by depositing rich ________________ on it.

4. A fire can be caused by a natural source such as ____________.

5. Burned areas ________________ when plants and animals eventually return.

How do storms change the land?

6. The storm caused by a column of air that spins rapidly is called a(n) ________________.

7. Usually, tornadoes form with severe ________________.

8. Tornadoes are common in the ________________ region of the United States.

9. A swirling system of winds, huge walls of clouds, and pounding rains make up a(n) ________________.

10. Hurricanes form over warm ________________.
11. Hurricanes can last for many days and stretch for hundreds of _________________.

**How do landslides change the land?**

12. Rocks and water-soaked soil move quickly down a hillside during a(n) _________________.

13. Tons of snow and ice move suddenly down a mountain during a(n) _________________.

14. One of the causes of landslides and avalanches is _________________.

**Critical Thinking**

15. Which do you think causes more damage to Earth: too much water or not enough water?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Changes Caused by the Weather

Match the correct word to its description by writing the letter of the word in the space provided.

1. ______ a column of air that spins rapidly
2. ______ a swirling system of winds, huge clouds, and pounding rains
3. ______ an event that can be fueled by dry plants and spread by wind
4. ______ an overflow of water onto land that is normally dry
5. ______ the force that pulls large masses of earth from a high place to a low place
6. ______ sliding ground caused when a hillside is soaked with rainwater
7. ______ the sudden movement of tons of snow and ice down a hill or mountain
8. ______ movement that can erode soil and wash away trees and anything else in its path

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Chapter 4 • Our Dynamic Earth
Reading and Writing

Use with Lesson 4
Changes Caused by the Weather
Changes Caused by the Weather

Use the words in the box to fill in the blanks.

<table>
<thead>
<tr>
<th>fire</th>
<th>hurricane</th>
<th>soil</th>
<th>tornado</th>
</tr>
</thead>
<tbody>
<tr>
<td>flood</td>
<td>landslide</td>
<td>thunderstorms</td>
<td></td>
</tr>
</tbody>
</table>

Violent weather, or storms, can cause quick changes in the land. A column of air that spins rapidly is called a(n) _________. Tornadoes usually form with severe _________. A larger and longer-lasting storm with heavy rain and swirling winds is called a(n) _________.

When heavy rain soaks the ground on a hillside, a(n) _________. can occur. Heavy rains or melting snow can also cover land that is usually dry, causing a(n) _________. Floods destroy property, but they also leave rich _________. on the land. When there is not enough rain, plants become dry, and _________. can damage the land. Fires can be started by natural events, such as lightning.
Land Over Time

Write About It

Expository Writing Write a paragraph that summarizes “Land Over Time.” Include the main idea and the most important details.

Getting Ideas
Think about what you read in “Land Over Time.”
Then fill in the summary chart.

Planning and Organizing

Brandon wrote three sentences. Write “MI” next to the sentence that tells the main idea. Write “D” next to each sentence that tells a detail.

1. _______ Water freezes when the temperature drops below 32°F.
2. _______ When water freezes, it expands, and the cracks in rocks get bigger.
3. _______ Weather changes land over a long period of time.
Revising and Proofreading

Here are some sentences that Brandon wrote. He wants to join them together. Read the sentences. Then look at the pair of words. Circle the word that best fits to join the sentences. Then write the new sentence on the line. Put a comma before the word.

1. Rocks have small cracks. The rain fills the cracks. and but

2. Roots get thicker. The cracks widen over time. but so

3. Mountains are very sturdy landforms. They are being worn down. so but

Drafting

Begin your summary. Start with a topic sentence that tells the main idea.

Now write your summary. Use a separate piece of paper. Start with the topic sentence you wrote above. Include only important facts and details from “Land Over Time.” Put them in your own words.

Now revise and proofread your writing. Ask yourself:

- Did I tell only the most important information?
- Did I draw a conclusion based on the information presented?
- Did I correct all mistakes?
Our Dynamic Earth

Circle the letter of the best answer.

1. What is the outermost layer of Earth?
   a. the crust
   b. the inner core
   c. the mantle
   d. the outer core

2. Which of the following is NOT a way in which mountains form?
   a. folding rock
   b. landslides moving large amounts of land
   c. rocks moving along a fault
   d. volcanoes erupting

3. The volcano with the widest and flattest sides is a
   a. cinder-cone volcano.
   b. composite volcano.
   c. dormant volcano.
   d. shield volcano.

4. Mounds of land formed by glaciers are called
   a. cones.
   b. moraines.
   c. mountains.
   d. tills.

5. A tsunami usually happens after
   a. an earthquake.
   b. a flood.
   c. a hurricane.
   d. a thunderstorm.

6. Which statement is true about volcanoes?
   a. Only lava comes out of an erupting volcano.
   b. Volcanoes erupt only on land.
   c. Volcanoes form where two plates meet.
   d. Volcanoes form over cold spots.
7. A large, slow-moving slab of rock on Earth’s crust is called a
   a. continent.
   b. fault.
   c. fold.
   d. plate.

8. Acid and oxygen can change the minerals in rocks to other minerals. What is this process called?
   a. chemical weathering
   b. deposition
   c. erosion
   d. physical weathering

9. Which of the following was formed by erosion?
   a. the Grand Canyon
   b. the Great Plains
   c. the Hawaiian Islands
   d. the Mississippi River

10. What is a large, slow-moving buildup of snow and ice?
    a. an avalanche
    b. a flood
    c. a glacier
    d. a landslide

11. The unsorted mixture of rocks dropped by a glacier along its end or sides is called
    a. debris.
    b. glacial till.
    c. a moraine.
    d. a terminus.

12. What is happening when water covers land that is usually dry?
    a. a fire
    b. a flood
    c. a hurricane
    d. a tornado

13. What kind of storm forms over an ocean?
    a. a flood
    b. a hurricane
    c. a thunderstorm
    d. a tornado
Land and Water

Complete the concept map about the structure of the Earth. Some parts have been done for you.

<table>
<thead>
<tr>
<th>Studying Earth</th>
<th>Inside Earth</th>
<th>Landforms</th>
<th>Land Under the Ocean</th>
<th>Shore</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>crust, where</td>
<td>raised land:</td>
<td>near shore:</td>
<td>coastline:</td>
</tr>
<tr>
<td></td>
<td>appear</td>
<td>hills, cliffs</td>
<td>shelf</td>
<td></td>
</tr>
<tr>
<td></td>
<td>with solid and</td>
<td>flat land: plains,</td>
<td>nearly half of</td>
<td>deposits of</td>
</tr>
<tr>
<td></td>
<td>almost-melted</td>
<td></td>
<td>ocean floor:</td>
<td>sand with shallow</td>
</tr>
<tr>
<td></td>
<td>rock</td>
<td></td>
<td></td>
<td>water above</td>
</tr>
<tr>
<td></td>
<td>core, with</td>
<td>lower lands:</td>
<td>raised land:</td>
<td>barrier island: large</td>
</tr>
<tr>
<td></td>
<td>metal</td>
<td>canyons</td>
<td>mid-ocean ridges</td>
<td>sandbars that form</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>lowlands: trenches,</td>
<td>submarine</td>
<td>steplike structure</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>canyons, rift</td>
<td>onshore</td>
</tr>
</tbody>
</table>
Earth’s Landforms

Use your textbook to help you fill in the blanks.

What are landforms?

1. A physical feature on Earth’s surface is a(n) _________________.
2. The highest of Earth’s physical features are _________________.
3. A low area between mountains or hills is a(n) _________________.
4. Wide, flat areas of land are called _________________.
5. A large, flat area higher than the land around it is a(n) _________________.
6. Earth’s largest bodies of water are its saltwater _________________.
7. Natural streams of flowing water that empty into lakes, oceans, or other bodies of water are _________________.
8. A body of water with land all around it is a(n) _________________.

What are the features of the ocean floor?

9. A large landform under the ocean is an ocean _________________.
10. Shallow waters cover the _________________, the gently sloping part of the ocean floor along the coast.
11. The sharp drop from the continental shelf to the continental rise is the _________________.

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12. A wide, flat area covering about 40 percent of the ocean floor is the ________________.

13. The deepest areas of the ocean floor are ________________.

**How are Earth's features mapped?**

14. Measurements taken by a(n) ________________ are used to make maps.

15. Elevations are shown with shading on a(n) ________________ map.

16. Lines are used to show elevation and steepness of slopes on a(n) ________________ map.

**What are Earth's layers?**

17. The layer of air around Earth is the ________________.

18. Earth’s waters make up Earth’s ________________.

19. Earth is made of three main layers: the crust, the ________________, and the core.

20. The part of Earth that is home for living things is the ________________.

**Critical Thinking**

21. Compare the mantle and core of the Earth.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Earth’s Landforms

Match the correct word with its description, and fill in the crossword puzzle.

Across

3. a physical feature on Earth’s surface
5. the layer of air that surrounds Earth
6. the central part of Earth

1. formed by Earth’s liquid and solid water
2. the rocky upper layer of Earth that contains continents and ocean basins
3. the crust and the top of the upper mantle
4. the layer of Earth’s interior below the crust

Down

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>
Earth's Landforms

Use the words in the box to fill in the blanks.

- crust
- elevation
- hydrosphere
- inner core
- landforms
- mantle
- oceans
- outer core
- surveyor

The physical features of the Earth are part of the Earth's surface. Earth's surface has many types of ________________, from high mountains to deep valleys. There are also physical features under Earth's largest bodies of water, the ________________. These underwater features look like the mountains, valleys, and cliffs on land.

Landforms are measured by a(n) ________________. One important measurement is ________________, or the height of land above sea level.

Earth has several layers. Earth's waters are its ________________. The planet itself is divided into the surface ________________, the ________________ beneath it, and the core. The crust and mantle are rock. Earth's core is made of metal. The ________________ is liquid, and the ________________ is solid. The core makes up the central part of the Earth.
Oceans and Shorelines

Use your textbook to help you fill in the blanks.

How do shorelines change?

1. Ocean __________________ roll onto shore, and their power can change the shape of land on the coast.

2. Through ________________, waves move sand to smooth out some areas and create bays and cliffs in others.

3. Carbon dioxide in ocean water __________________ salt in rocks along the shore, breaking the rock down.

4. The cliffs that waves cut out from rock are called __________________.

5. Waves hit beaches at an angle and can move sand along the beach sideways, an action called ________________.

What is sand?

6. Sand is formed from __________________ rock or other material that has been eroded over time.

7. Sand has different __________________ depending on the kind of rock it came from. Black sand is worn from __________________.

8. Beaches in the Caribbean have white sand because that material is made from worn-down __________________.

9. Sand that is carried back into the ocean can build up into formations called __________________.
10. A large sandbar that breaks the surface of the water becomes a(n) ________________.

**What are ocean currents?**

11. Large-scale, continuing movements of water in the ocean are called ________________.

12. One of those currents, the ________________, carries warm water from the equator along eastern North America and then toward the northern Atlantic Ocean.

13. Currents ________________ heat by moving warm water away from the equator and cold water away from the poles.

14. Heat from the Sun ________________ warm water, turning it into water vapor and warming the air.

15. When warm water vapor meets cooler air, it ________________ and turns into liquid again.

**What causes the tides?**

16. The Moon's and Sun's ________________ pulls on Earth's oceans, causing the level of water to rise and fall.

17. These rising and falling movements are called ________________.

**Critical Thinking**

18. How do barrier islands protect a coast? What would happen if they disappeared?

__________________________________________________________________________
### Oceans and Shorelines

Match the correct word to its description by writing its letter in the space provided.

<table>
<thead>
<tr>
<th>a. barrier island</th>
<th>d. current</th>
<th>g. neap tides</th>
</tr>
</thead>
<tbody>
<tr>
<td>b. beach drift</td>
<td>e. marine terrace</td>
<td>h. spring tides</td>
</tr>
<tr>
<td>c. breaker</td>
<td>f. sandbar</td>
<td></td>
</tr>
</tbody>
</table>

1. ______ area of built-up sand away from the shore and within the ocean
2. ______ higher high tides and lower low tides that occur twice a month when the gravity of the Moon and that of the Sun pull the oceans in the same direction
3. ______ mound of sand formed off the coast that is at least 100 meters (328 feet) wide
4. ______ flat step of rock formed by strong waves pounding the shore
5. ______ waves that strike the shore at one angle, break into foam, and wash back at a different angle
6. ______ lower high tides and higher low tides that occur twice a month when the gravity of the Moon and that of the Sun pull in opposite directions
7. ______ sideways movement of sand along a beach
8. ______ an ongoing movement of ocean water
Wind blowing over the ocean causes waves, which strike the shore and change the land. Waves and the carbon dioxide in seawater can break apart rocks into smaller pieces, forming _______ . Some sand is made by the wearing down of _______ . The type of material that produces the sand determines the color of the sand. Sand made from volcanic _______ is black. Waves that cause a sideways movement of sand are called _______ . This movement of sand is known as _______ .

The pull of the Moon's _______ affects how far up the shore waves reach. A higher than normal level is called _______ . The opposite part of the ocean experiences _______ . These tides tend to happen twice a day.
Pollution and Conservation

Use your textbook to help you fill in the blanks.

What is pollution?

1. All the living and nonliving things in an area make up the _________________.

2. Dangerous or harmful materials cause __________________ when they are added to the environment.

3. Pollution can be caused by ________________ events or human _________________.

4. Waste gases in the air cause ___________________.
   They create __________________ or combine with water droplets to create _________________.

5. Oil spills, fertilizers, and pesticides in oceans and streams can cause ________________ pollution.

6. If trash is not stored in the right way, it can cause ________________ pollution.

How can we protect the soil and water?

7. One way to protect the environment is to use ________________ wisely by practicing _________________.

8. Soil conservation includes activities that keep soil healthy for growing _________________.

Chapter 5 • Land and Water
Reading and Writing

Use with Lesson 3
Pollution and Conservation
9. Towns and cities conserve their water supply by cleaning wastewater at _________________-treatment plants.

10. People practice _________________ conservation whenever they run only full washing machines.

What are the 3 Rs?

11. The 3 Rs are the main ways to _________________ resources.

12. People can conserve resources and _________________ waste by using less of something.

13. People can _________________ things instead of throwing them away after one use.

14. People conserve when they _________________ by making something new from used materials.

Critical Thinking

15. Do you think that reducing pollution and practicing conservation work better in big cities or small cities? Why?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Pollution and Conservation

Use the clues below to help you find the words hidden in the puzzle.

1. The air, water, and land in a certain area make up its ____________________.

2. Harmful materials found in the environment cause ____________________.

3. Waste gases combined with water droplets form ____________________.

4. Using resources wisely is ____________________.

5. A fertilizer made from decaying table scraps and dead plants is ____________________.

6. The 3 Rs of conservation are ____________________, ____________________, and ____________________.

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Chapter 5 • Land and Water
Reading and Writing

Use with Lesson 3
Pollution and Conservation
Pollution and Conservation

Use the words in the box to fill in the blanks.

| acid rain | forest fires | smog     |
| conservation | pollution | volcanoes |
| fertilizers | resources | water    |

Living things get what they need from their environment. Living things need clean air, clean ____________, and healthy land to survive. Harmful materials enter the environment and cause _____________. Natural events, such as ____________ and erupting ____________, can pollute the environment with smoke and ashes. Waste gases from burning fossil fuels can produce _____________. These gases may also combine with water droplets in the air and produce _____________.

Pesticides and ____________ pollute both the water and the land. People can help control pollution by using ____________ wisely and practicing _____________. People must practice the 3 Rs of conservation: reduce, reuse, and recycle.
Saving the Soil

Read the passage in your textbook. As you read, write down the topic of each paragraph. Also, pay attention to the supporting details about saving the soil.

Topic sentences:
1. 
2. 
3. 
4. 

Write About It
Main Idea and Details

1. Why do farmers need to protect the soil?
2. What are some ways that farmers protect the soil? List the advantages and disadvantages of these methods.
Use the Main Idea and Details graphic organizer to record information about what farmers do to save the soil.

<table>
<thead>
<tr>
<th>Main Idea</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contour plowing is helpful.</td>
<td>It is used on a ________________ to stop ________________ from flowing downhill and carrying away soil and ________________.</td>
</tr>
<tr>
<td>Contour plowing is not easy.</td>
<td>It takes more ________________ and uses more ________________ than straight plowing.</td>
</tr>
<tr>
<td>Some farmers do not plow their fields after a harvest.</td>
<td>Instead, they ________________ holes in the ground.</td>
</tr>
<tr>
<td>After the harvest, some farmers plant cover crops, such as ________________.</td>
<td>This adds ________________ and ________________ the ground.</td>
</tr>
<tr>
<td>Some farmers use ________________ instead of plowing.</td>
<td>They dig ________________ and drop in ________________. Farmers may have to use ________________ to kill weeds that plowing would have removed.</td>
</tr>
</tbody>
</table>
Land and Water

Circle the letter of the best answer.

1. The strong, foamy waves that strike the shore at an angle are called
   a. breakers.
   b. current waves.
   c. shoreline waves.
   d. tidal waves.

2. Relief maps differ from topographical maps because they show
   a. depths of features on the ocean floor.
   b. elevation using contour lines.
   c. elevation using shading.
   d. the structure inside the Earth.

3. The atmosphere is the layer of Earth's
   a. gases.
   b. pollution.
   c. metals.
   d. rocks.

4. The part of the ocean floor nearest the shore is the
   a. abyssal plain.
   b. continental rise.
   c. continental shelf.
   d. rift valley.

5. Which is the layer of Earth where landforms such as mountains and valleys are found?
   a. core
   b. crust
   c. lower mantle
   d. upper mantle

6. Acid rain is formed when water vapor in the air is mixed with gases from
   a. burning fossil fuels.
   b. spreading fertilizers.
   c. treating wastewater.
   d. using pesticides.
Circle the letter of the best answer.

7. Which method of conservation involves making less waste?
   a. recycle
   b. reduce
   c. refigure
   d. reuse

8. Using table scraps to make compost is an example of
   a. benchmarking.
   b. crop rotation.
   c. pollution.
   d. recycling.

9. Farmers use contour plowing to
   a. help conserve soil.
   b. make the soil more fertile.
   c. prevent water pollution.
   d. save nutrients in soil.

10. All of Earth’s liquid and frozen water is in the layer called the
    a. asthenosphere.
    b. atmosphere.
    c. hydrosphere.
    d. lithosphere.

11. Which of these is NOT the result of the action of waves near the shore?
    a. barrier island
    b. current
    c. marine terrace
    d. sandbar

12. When high tides are higher and low tides are lower, an area is experiencing
    a. fall tides.
    b. late phase tides.
    c. neap tides.
    d. spring tides.

13. Acid rain, smog, and damage to soil from fertilizer are all examples of
    a. conservation.
    b. littering.
    c. pollution.
    d. waste.

14. Wastewater can be reused after it is passed through
    a. conservation stations.
    b. recycling centers.
    c. sewer lines.
    d. treatment plants.
Understanding Earthquakes

Read the Literature feature in your textbook.

Write About It

Response to Literature  This article describes the study of earthquakes over the centuries. It explains how human knowledge about earthquakes has changed. Research a major earthquake that occurred in the past. Then write an essay describing the earthquake and its effects on people’s lives.
Matter and Changes

Complete the following sentences and the concept map about matter and how it changes. Some parts have been done for you.

1. Matter has six properties. They are mass, _______________ , _______________ , density, _______________ , and state.

2. The three states of matter are _______________ , _______________ , and _______________ .

<table>
<thead>
<tr>
<th>Name of Process</th>
<th>Speed of Process</th>
<th>Initial Phase</th>
<th>Final Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiling</td>
<td>slow</td>
<td>liquid</td>
<td>gas</td>
</tr>
<tr>
<td></td>
<td>slow/fast</td>
<td>gas</td>
<td>liquid</td>
</tr>
</tbody>
</table>
Properties of Matter

Use your textbook to help you fill in the blanks.

How can you describe matter?

1. The amount of matter in an object is its ________________.
2. The mass of an object is measured in ________________ or kilograms.
3. A measure of how strongly gravity pulls on an object is the object’s ________________.
4. The greater the ________________ of an object, the greater its weight.
5. Weight is measured in ________________.
6. The amount of space an object takes up is its ________________.
7. To measure liquid volume in ________________, scientists use tools such as beakers or graduated cylinders.
8. The volume of solids is measured in ________________.
9. Anything that has mass and volume is ________________.

What is density?

10. The amount of mass for each milliliter of a substance is that substance’s ________________.
11. To calculate density, divide an object’s ________________ by its ________________.
Outline

LESSON 12. Buoyancy depends on ________________, which depends on mass and volume.

13. Changing the mass or volume of an object changes its density and ________________.

14. If an object covers a large enough area of the water’s surface, it can float on the water because of the ________________ of water particles.

What forms can matter have?

15. Matter can exist as a solid, a(n) ________________, or a gas.

16. A solid has a definite ________________ and volume.

17. A liquid has a definite ________________, but it takes the shape of the container holding it.

18. A gas does not have a definite volume or a definite ________________.

Critical Thinking

19. How can matter be described?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Properties of Matter

Use the clues to fill in the crossword puzzle.

Across
4. the amount of space that matter takes up
5. the metric unit used to measure weight
6. anything that has mass and volume
7. the amount of mass for each milliliter of a substance

Down
1. the property of water that helps certain objects float
2. an object’s resistance to sinking
3. how strongly gravity pulls on an object
6. the amount of matter in an object
We describe matter in a number of ways. Matter can exist as a ________, a liquid, or a _________. Scientists use these and other ________ to identify matter.

The amount of matter in an object is the object’s _________, a property that is _________. However, the _________ of an object changes as the force of gravity changes. The amount of space that an object takes up is its _________. Scientists also measure the amount of matter for each milliliter of a substance, or its _________. An object’s resistance to sinking is _________. When an object is placed on a fluid, the object and the fluid ________ against each other.

If the fluid is denser, the object will _________. If the object is denser, the object will _________. Matter is anything that has mass and volume.
Changes of State

Use your textbook to help you fill in the blanks.

How can matter change state?

1. Altering the form or organization of an object without changing the type of matter within it is called a(n) ________________.

2. The three states of matter are ________________, liquid, and ________________.

3. The state of matter of an object is a(n) ________________ property.

4. The average vibration of molecules in an object is measured by ________________.

5. When a solid gains heat energy, its molecules begin vibrating too quickly to stay together, so the solid becomes a(n) ________________.

6. When gases lose heat, they ________________ into liquids.

7. A liquid loses heat and ________________ into a solid.

8. When a solid changes directly into a gas, it ________________.

9. Most liquids become ________________ when they change to a solid.
When does matter change states?

10. When a substance melts or boils, it absorbs ________________.

11. The temperature at which a substance changes from a solid to a liquid is its ________________.

12. The temperature at which a substance changes from a liquid to a gas is its ________________.

13. The temperature at which a substance changes from a liquid to a solid is its ________________.

14. Nonmetals are weakly attracted to one another, so they have ________________ melting and boiling points.

15. The slow change from a liquid to a gas at temperatures below the boiling point is called ________________.

What are expansion and contraction?

16. An increase in an object’s volume when it is heated is called ________________; a decrease in its volume when it is cooled is called ________________.

Critical Thinking

17. How does water change when heat is added or removed?

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________
Changes of State

Use the clues to fill in the crossword puzzle.

Across

2. A change from a solid directly to a gas is _______________.

4. Water becomes a liquid at its _______________ point.

5. A decrease in an object’s volume because of a change in temperature is thermal _______________.

Down

1. The temperature at which water changes from a liquid to a solid is its _______________ point.

3. The temperature at which water changes from a liquid to a gas is the _______________ point.
Changes of State

Use the words in the box to fill in the blanks.

All substances have three common forms called physical states. These states are ____________, liquid, and _____________. The physical state of matter is changed when ____________ is added or taken away. A measure of the average heat energy that a substance has (the average vibration of its molecules) is its _____________. When a solid is heated to its _____________, its molecules start moving faster, and the solid changes into a _____________. When the liquid is heated to its _____________, its molecules move even faster, and the liquid turns into a gas. The melting point of water is 0°C, and its boiling point is 100°C. Sometimes a solid changes directly into a gas without passing through the liquid state, a process called _____________. When a liquid is cooled to its _____________, it becomes a solid. When a gas is cooled, it condenses and becomes a liquid.
Mixtures

Use your textbook to help you fill in the blanks.

What are mixtures?

1. A physical combination of substances that remain the same is a(n) _____________.
2. Mixtures can be _______________ into their original substances.
3. Mixtures with different parts that can be plainly seen with the naked eye are called _______________ mixtures.
4. Mixtures that look smooth to the naked eye but speckled under a microscope are called _______________.
5. Over time, one or more parts of a suspension can _______________.
6. A heterogeneous mixture with parts that do not settle out is called a(n) _______________.

What are solutions?

7. A mixture that looks the same everywhere, even under a microscope, is called a(n) _______________.
8. The part of a solution that is dissolved is the _______________.
9. The part of a solution that dissolves the other substance is called the _______________.
10. A solution of two or more solids is a(n) ________________.

11. Because it can dissolve many things, water is called the ________________.

How can you take mixtures apart?

12. To separate one part of a mixture from another, you can use a(n) ________________.

13. When two liquids in a mixture have different boiling points, they can be separated by ________________.

14. Because liquids travel at different speeds up an absorbent paper, they can be separated by ________________.

How are mixtures used?

15. Cheese, gelatin, marshmallows, and paint are all examples of useful ________________.

16. Copper is alloyed with zinc to make ________________.

Critical Thinking

17. Suppose you were to mix together salt, water, and mud. Identify the type of mixture you have made. Describe how you could separate the parts of the mixture from one another.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Mixtures

What am I?

Choose a word from the word box that answers each question and write the correct letter in the space provided.

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>a. alloy</td>
<td>c. distillation</td>
<td>e. solubility</td>
<td>g. solution</td>
<td></td>
</tr>
<tr>
<td>b. colloid</td>
<td>d. mixture</td>
<td>f. solute</td>
<td>h. solvent</td>
<td></td>
</tr>
</tbody>
</table>

1. ______ I am smoke, cheese, and foam. I am a mixture that does not settle. What am I?
2. ______ I am the water in sugar water. What am I?
3. ______ I am the sugar in sugar water. What am I?
4. ______ I am steel and I am brass. What am I?
5. ______ I am the maximum amount of solute that can go into a solvent. What am I?
6. ______ Using evaporation and condensation, I can separate the liquids in a mixture. What am I?
7. ______ I am a combination of two or more materials, but none of my parts are chemically combined. What am I?
8. ______ I can be made with solids, liquids, and gases. All my parts blend so that I look the same everywhere, even under a microscope. What am I?
Mixtures

Use the words in the box to fill in the blanks.

<table>
<thead>
<tr>
<th>alloys</th>
<th>distillation</th>
<th>liquids</th>
</tr>
</thead>
<tbody>
<tr>
<td>boiling points</td>
<td>heterogeneous</td>
<td>solids</td>
</tr>
<tr>
<td>condensing</td>
<td>homogeneous</td>
<td>suspensions</td>
</tr>
</tbody>
</table>

Several substances that are physically mixed together but not chemically combined make a mixture. Mixtures can include various combinations of solids, liquids, and gases. Liquids in a mixture may have different _________________. Boiling and ________________ the liquids, a process called ________________, can be used to separate them.

There are two kinds of mixtures: those that are the same throughout (_______________) and those that are not (_______________). Homogeneous mixtures, such as sugar water, are called solutions. Gases form solutions more easily than ________________ do, and liquids form solutions more easily than ________________ do. Solutions of two or more solids are called ________________.

The different parts of some heterogeneous mixtures can clearly be seen by the naked eye. These are called ________________. Some suspensions settle to the bottom.
Compounds and Chemical Changes

Use your textbook to help you fill in the blanks.

What are compounds?

1. A combination of two or more elements is called ________________.
2. A compound has different properties than do the ____________ that formed it.
3. Rust is a combination of iron and ____________.
4. The chemical name for rust is ____________.
5. The chemical formula for rust is ____________.

What are chemical changes?

6. Changing one substance into another is a(n) ________________.
7. When atoms break their old links and form new links with other atoms, a(n) ________________ has occurred.
8. Chemists keep track of which substances are used and created in a chemical reaction by writing ____________.
9. Chemicals on the left side of a chemical equation are called ____________; chemicals on the right side are called ____________.
10. In every chemical reaction, the total mass of the reactants always equals the total mass of the products. This fact is known as the ____________.
LESSON Outline

Name ___________________________ Date ____________

How can you spot a chemical change?

11. A color change on metal that is caused by a chemical change is called ________________.

12. Bubbles form when baking soda and vinegar are mixed, indicating that a(n) ________________ has taken place.

13. A solid that forms when two solutions are mixed is called a(n) ________________.

14. If a chemical reaction produces heat and light, then reversing the reaction should ________________.

How can you use chemical changes?

15. Plants use a chemical reaction called ________________ to produce sugars by using the energy from sunlight.

16. Plants and animals use a chemical reaction called ________________ to burn sugars for energy.

17. Chemical reactions are used to produce a variety of products, such as ________________.

Critical Thinking

18. Write the equation for the chemical change that produces water from two hydrogen molecules and one oxygen molecule. Label the reactants and the products. (Hint: Remember to take into account the conservation of mass.)

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Compounds and Chemical Changes

Use the words in the box to fill in the blanks.

<table>
<thead>
<tr>
<th>chemical</th>
<th>photosynthesis</th>
<th>reactants</th>
</tr>
</thead>
<tbody>
<tr>
<td>compound</td>
<td>precipitate</td>
<td></td>
</tr>
<tr>
<td>equations</td>
<td>products</td>
<td></td>
</tr>
</tbody>
</table>

1. The ____________ are on the left side of a chemical equation.
2. The ____________ are on the right side of a chemical equation.
3. The chemical reaction that plants use to produce sugar is known as ____________.
4. A solid that is a product of a chemical reaction is called a(n) ____________.
5. Atoms break their old links and form new links during a(n) ____________ change.
6. Chemists keep track of chemical reactions by using chemical ____________.
7. A color change in metal caused by a chemical change is called ____________.
8. A chemical combination of two or more elements is a(n) ____________.
Compounds and Chemical Changes

Use the words in the box to fill in the blanks.

<table>
<thead>
<tr>
<th>chemical equations</th>
<th>C₆H₁₂O₆</th>
<th>H₂O</th>
</tr>
</thead>
<tbody>
<tr>
<td>chemical formulas</td>
<td>compounds</td>
<td>left</td>
</tr>
<tr>
<td>CO₂</td>
<td>elements</td>
<td></td>
</tr>
</tbody>
</table>

A chemical change results in one or more products that are different from the reactants. Atoms break their links and form new links with other atoms to form new _________________.

Chemists describe what goes on in a chemical change by writing _________________. The substances to the ________________ of the arrow in a chemical equation are the reactants; the substances to the right of the arrow are the products. The compounds in a chemical equation are written as _________________. A chemical formula tells which ________________ are in a compound and how many atoms there are of each. For example, the chemical formula for water is ________________, and the chemical formula for carbon dioxide is _________________. The chemical equation for photosynthesis is 6H₂O + 6CO₂ → ________________ + 6O₂.

The numbers of atoms of each element are the same on each side of the equation.
The Case of the Mystery Compounds

Write About It
Expository Writing  Do research and write a report about how scientists can test water for pollutants and dangerous chemical compounds. Which chemical reactions do they use to perform the test? Give the steps of the process in order.

Getting Ideas
As you do research on how scientists test water, fill out the chart below. Write the steps in order.

| First |
|       |
|       |
|       |

| Next |
|      |

| Last |
|      |

Planning and Organizing
Organize the steps that Sean wrote about testing water for chlorine.

1. Chlorine will turn the litmus paper red, then white. _______

2. Place a sample of the water in a test tube. _______

3. Dip blue litmus paper in the water. _______
Drafting
Write a sentence to begin your report. Tell an important idea about testing water for pollutants and dangerous chemical compounds.


Now write your report. Use a separate piece of paper. Begin with the sentence you wrote above. Then tell the steps scientists follow to test water. Be sure to include important facts and details about chemical reactions.

Revising and Proofreading
Here are some sentences Sean wrote. They are very wordy. Read each pair. Combine each pair into one sentence by cutting out unnecessary words. Write the new sentence on the line.

1. Make sure the test tube you use is clean and sterile.

2. The chemical reaction may produce changes in color. It may produce changes in smell.

3. Test the sample quickly. Do the test within two hours.

Now revise and proofread your writing. Ask yourself:

- Did I tell the steps of testing water in order?
- Did I explain the chemical processes involved?
- Did I correct all errors?
Matter and Changes

Circle the letter of the best answer.

1. Which of the following is a physical change?
   a. paper burning
   b. egg frying
   c. water boiling
   d. baking soda and vinegar fizzing

2. Snow changing to water vapor is an example of
   a. sublimation.
   b. boiling.
   c. melting.
   d. thermal contraction.

3. When most liquids freeze, they undergo
   a. thermal expansion.
   b. thermal contraction.
   c. condensation.
   d. sublimation.

4. When a gas loses heat, it
   a. evaporates.
   b. freezes.
   c. sublimates.
   d. condenses.

5. The temperature at which alcohol changes to a gas is its
   a. sublimation point.
   b. freezing point.
   c. boiling point.
   d. melting point.

6. Steel is an example of
   a. an alloy.
   b. a colloid.
   c. a heterogeneous mixture.
   d. a suspension.

7. Which of the following can form a solution most easily?
   a. two liquids
   b. two gases
   c. two solids
   d. a gas and a liquid

8. In a saltwater solution, the salt is
   a. an alloy.
   b. a colloid.
   c. a solvent.
   d. a solute.
Circle the letter of the best answer.

9. Which of the following is an example of a colloid?
   a. gelatin
   b. brass
   c. sugar water
   d. orange juice

10. Which of the following is a compound?
    a. brass
    b. rust
    c. iron
    d. steel

11. Two liquids with different boiling points can be separated by
    a. buoyancy.
    b. condensation.
    c. distillation.
    d. evaporation.

12. Which of the following indicates that a chemical change has taken place?
    a. a change from a liquid to a gas
    b. an increase in the volume of a substance
    c. a change from a solid to a liquid
    d. a change in the color of a substance

13. The amount of matter in an object is its
    a. density.
    b. mass.
    c. volume.
    d. weight.

14. In the chemical reaction that produces table salt, what are the reactants?
    a. carbon and hydrogen
    b. hydrogen and oxygen
    c. iron and oxygen
    d. sodium and chloride

15. Volume is measured in
    a. cubic centimeters or milliliters.
    b. grams or kilograms.
    c. pounds or Newtons.
    d. meters or kilometers.
Using Forces

Fill in the concept map below about forces. Some parts have been done for you.

1. Motion is a change in an object’s ___________ over time.

2. Speed is a measure of how fast an object’s position changes. A measurement of an object’s speed and its direction is ___________.
   A change in an object’s velocity is ___________.

3. A force is a push or a(n) ___________ exerted on an object.

4. Newton’s three laws describe how ___________ affect ___________. He found that objects at ___________ stay at rest unless acted on by a(n) ___________ force.

5. Magnetism is a special force. Through it, two objects ___________ each other.

6. Wrapping wire in a(n) ___________ around a magnet and running ___________ through it produces an electromagnet, which can be used in many ways.
Motion

Use your textbook to help you fill in the blanks.

What is motion?

1. The location of an object is its ________________. A change in the position of an object over time is motion.
   Motion has two parts: ________________ and ________________.

2. Distance can be measured in ________________, ________________, ________________, or ________________.

3. To measure direction, you can use a(n) ________________ and units of ________________.

4. You need a(n) ________________ from which to measure position or motion.

What is speed?

5. To calculate speed, divide the ________________ by the ________________.

6. Units of speed can be ________________ or ________________.

7. The calculated speed over an entire trip is ________________ speed.

8. To state the velocity of an object, you need to know the object’s ________________ and its ________________.
What is acceleration?

9. Any change in the velocity of an object is a(n) ________________.

10. If the speed of a car traveling south is increasing 5 m/s, its acceleration is ________________.

11. An acceleration can be a change in speed or a change in ________________. Negative acceleration is called ________________.

What is momentum?

12. An object’s mass multiplied by its velocity is its ________________.

13. An object with a mass of 1 kg and a velocity of 10 m/s has a momentum of ________________.

14. The more mass an object has, the ________________ its inertia.

Critical Thinking

15. Would it be more difficult to stop a truck carrying a heavy load or stop the same truck empty? Explain your answer, using the concepts of inertia and momentum.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Motion

Read the clues. Use the words in the word box to finish the puzzle.

acceleration  momentum  position  speed
inertia  motion  reference  velocity

Across
2. tendency of an object to resist a change in motion
4. measurement of an object’s speed and direction of motion
5. a frame from which you can measure position or motion
8. mass times velocity

Down
1. location of an object
3. change in velocity over time
6. the rate at which an object’s position is changing over time
7. any change in position
Motion

Use the words in the box to fill in the blanks.

acceleration  momentum  time
motion  speed  velocity

to describe how an object moves, you need a frame of reference, or a group of objects from which you can measure position. You can then measure the object’s ____________, or change in position. By dividing the distance an object moved by the ____________ it took to move that distance, you describe an object’s average _____________. If you also measure the direction in which the object moved, you can describe its _____________. If you know an object’s instantaneous speed at the beginning and end of a time interval, you can describe the object’s ____________ over that time interval.

An object’s mass multiplied by its velocity is its _____________. The greater an object’s inertia or resistance to a change in its motion, the greater its momentum.
The Positions of Earth and the Sun

Read the Reading in Science feature in your textbook.

Main Idea and Details
Use the table below to record the main idea and details described in the time line portion of the reading passage in your textbook.

<table>
<thead>
<tr>
<th>Main Idea</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Many people throughout history have made discoveries that help us determine how the planets and stars move.</td>
<td>Aristotle developed a model showing the __________________________ around __________________.</td>
</tr>
<tr>
<td></td>
<td>Ptolemy used Aristotle’s model and __________________________ to predict the way the Sun, Moon, and planets would appear in the __________________.</td>
</tr>
<tr>
<td></td>
<td>________________ first proposed that the Sun is at the center of the solar system.</td>
</tr>
<tr>
<td></td>
<td>Galileo’s discovery of ________________ circling ________________ supported Copernicus’s theory.</td>
</tr>
<tr>
<td></td>
<td>Einstein explained how ________________ works, helping us understand the movement of planets and stars.</td>
</tr>
<tr>
<td></td>
<td>________________ worked on the first 3-D map of the __________________.</td>
</tr>
</tbody>
</table>
Identifying the Main Idea

The main idea is the central point of the passage. It tells you what the passage is about. Review the graphic organizer to find the main idea of the passage. Write that idea on the lines below.

________________________________________________________________________

________________________________________________________________________

Identifying Supporting Details

Details are important parts of the passage that support the main idea. Look for the supporting details within the list of scientists that follows the opening paragraphs. Give one detail from the article that supports the main idea. You can choose one supporting detail from your table.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Forces and Motion

Use your textbook to help you fill in the blanks.

What are forces?
1. Units of force are the ________________________ and the ________________________.

2. An arrow can be used to represent the ________________________ and ________________________ of a force.

3. Four types of force act on an airplane: weight, ________________________, lift, and ________________________.

What are gravity and friction?
4. The force that pulls all objects together is called ________________________.

5. The amount of friction depends on two factors: the roughness of the ________________________ of the objects and how much force is required to ________________________ the two objects together.

6. When friction occurs, ________________________, is produced.

What is Newton’s first law?
7. According to the law of inertia, an object at rest tends to ________________________, and an object in motion tends to ________________________, unless acted upon by an ________________________.
What is Newton’s second law?

8. According to Newton’s second law, an object’s acceleration increases as the amount of unbalanced force on it _____________; an object’s acceleration decreases as the object’s mass _____________.

What is Newton’s third law?

9. When one object pushes on a second object, the second object pushes back on the first object with the same amount of _____________.

10. According to Newton’s third law, for every action there is a(n) _____________ but ______________ reaction.

Critical Thinking

11. Suppose that you are walking down the street. Describe the forces acting on you, and use Newton’s laws of motion to describe your motion.

________________________________________

________________________________________

________________________________________

________________________________________

________________________________________

________________________________________

________________________________________
Forces and Motion

What am I?

Choose a word or words from the word box below that answers each question, and write the correct letter in the space provided.

<table>
<thead>
<tr>
<th>a. action force</th>
<th>d. friction</th>
<th>g. unbalanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>b. balanced</td>
<td>e. inertia</td>
<td></td>
</tr>
<tr>
<td>c. force</td>
<td>f. reaction force</td>
<td></td>
</tr>
</tbody>
</table>

1. ______ I am the word that scientists use for any push or pull. What am I?
2. ______ I am the force that sometimes makes sliding difficult. What am I?
3. ______ I am a force whose effect is offset by other forces, so I won’t change your motion. What type of force am I?
4. ______ I am a force whose effect is not offset, so I change your motion in some way. What type of force am I?
5. ______ I am the first force in a pair. Whatever I push pushes back on whatever caused me. What am I?
6. ______ I am the second force in a pair. If something gets pushed, I push back. What am I?
7. ______ I am the tendency of an object in motion to stay in motion. What am I?
Forces and Motion

Use the words in the box to fill in the blanks.

The motion of any object can be explained using the laws that Newton discovered more than 300 years ago. His universal law of _______________ states that objects with more _______________ have more force of _______________ between them. Objects that are separated by more _______________ have less force of gravity between them.

According to Newton’s first law, also called the law of _______________, an object at rest tends to stay at rest, and an object in motion tends to stay in motion, unless acted upon by a(n) _______________ force. The second law can be summed up with the equation \( F = ma \). This equation means that an object accelerates more as the size of the unbalanced _______________ on it increases and that more massive objects _______________ less for a given force. Newton’s third law states that for every action force there is an equal and opposite reaction force.
Magnetism

Use your textbook to help you fill in the blanks.

What is magnetism?

1. When a magnet is cut in half, each of the two pieces has
   a(n) _____________________ pole and a(n) _____________________ pole.

2. Like poles of a magnet ___________________
   each other, and unlike poles ___________________ each other.

3. The Earth is a giant permanent ___________________.

4. Iron, nickel, and some other metals are attracted by
   ___________________ forces.

5. The ___________________ together the lines of a magnetic
   field, the stronger the magnetic force.

What are electromagnets?

6. An electric current that produces a magnetic field is called
   a(n) ___________________.

7. A magnetic field goes in ___________________ around a
   straight wire when current is flowing through it.

8. Wrapping many loops of wire together ___________________
   the magnetism of the coil.

9. You can increase the strength of an electromagnet in three
   ways: ___________________ , place an iron rod inside the
   coils, or ___________________.
10. As the electric current rises and falls in the ________________ of a speaker, its magnetic field changes, causing a cone of paper or metal to vibrate.

11. In an electric motor, a coil acting as an electromagnet rotates between the poles of a(n) ________________.

**How can magnets produce electricity?**

12. A generator creates an electric current by spinning a coil of wire between the poles of a powerful ________________.

13. The energy needed to spin the coils in an electric generator can come from ________________ in a hydroelectric dam.

**What is magnetic levitation?**

14. Two electromagnets can push against each other to ________________ an object.

15. Scientists have designed ________________ trains that are held just above their tracks by electromagnets, greatly reducing the amount of energy lost to ________________.

**Critical Thinking**

16. In what way is an electric generator the opposite of an electric motor?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Magnetism

What am I?
Choose a word or words from the word box below that answers each question, and write the correct letter in the space provided.

1. ______ When my wire coils are spun between the poles of my powerful magnet, I produce electricity. What am I?

2. ______ I move back and forth through a wire, changing directions many times per second. What am I?

3. ______ I use magnetic forces to lift objects. I can even lift an entire train! What am I?

4. ______ I am magnetic when an electric current flows through me. What am I?

5. ______ When you have me, you can push or pull on another object that also has me. What am I?

6. ______ I describe the strength and direction of a magnet’s force. If you sprinkle iron filings near a magnet, you can see me. What am I?

a. alternating current
d. magnetic field
b. electromagnet
e. magnetic levitation
c. generator
f. magnetism
Magnetism

Use the words in the box to fill in the blanks.

- electric current
- magnetic field
- poles
- electric motor
- north
- south
- electromagnet
- permanent magnet
- spin

Permanent magnets are made of metals such as iron. They have two _______________, north and south, and a(n) _______________ around them. An iron core with a wire coil wrapped around it is called a(n) _______________. When a(n) _______________ passes through the wire coil, a magnetic field with a(n) _______________ and a(n) _______________ pole is generated.

Electric motors and electric generators have an electromagnet between the poles of a very strong _______________. In a(n) _______________, current is sent through the wire coil. The poles of the electromagnet switch back and forth, causing it to _______________ between poles of the permanent magnet. In an electric generator, energy from falling water or some other source is used to spin the wire coil past the poles of the permanent magnet, generating electricity in the wire coil.
Using Forces

Circle the letter of the best answer.

1. Which type of force makes an object slow down when it is moving?
   a. balanced force
   b. inertial force
   c. stopping force
   d. unbalanced force

2. Which statement about magnets is true?
   a. Like poles attract each other.
   b. Unlike poles attract each other.
   c. Unlike poles repel each other.
   d. Poles have no effect on each other.

3. Friction increases if the object being moved
   a. has wheels.
   b. has a stronger motor.
   c. lifts off the ground.
   d. is heavy.

4. Scientists who measure both speed and direction of motion are determining an object’s
   a. gravity.
   b. inertia.
   c. velocity.
   d. weight.

5. Which of these is NOT a use for electromagnets?
   a. in bicycles
   b. in generators
   c. in motors
   d. in speakers

6. The force that pulls everything on Earth toward Earth is
   a. drag.
   b. friction.
   c. gravity.
   d. pressure.

7. Which of these will decrease friction?
   a. a rough surface
   b. more weight
   c. greater force pressing down
   d. downhill motion
Circle the letter of the best answer.

8. Speed is measured by multiplying
   a. distance and time.
   b. force and time.
   c. velocity and time.
   d. direction and time.

9. A device that changes electrical energy into a spinning motion is a(n)
   a. electric generator.
   b. electric motor.
   c. electromagnet.
   d. transformer.

10. According to Newton, an object at rest tends to stay at rest because of
    a. electricity.
    b. gravity.
    c. inertia.
    d. magnetism.

11. You need a frame of reference in order to judge
    a. inertia.
    b. friction.
    c. motion.
    d. magnetism.

12. Magnetic levitation uses the properties of magnets to
    a. drag objects.
    b. lift objects.
    c. pull objects.
    d. move objects.

13. Momentum takes into account velocity and
    a. height.
    b. length.
    c. mass.
    d. weight.

14. Which of these do scientists look at to measure acceleration?
    a. decreases in gravity
    b. the force of friction
    c. the impact of drag
    d. speed and direction

15. Which of these is NOT a force that acts on a plane that is taking off?
    a. drag
    b. inertia
    c. magnetism
    d. thrust
The Great Jump in China

Read the Literature feature in your textbook.

Write About It

Response to Literature  This article describes how an athlete used a ramp to jump over a large object. If you were a professional athlete, what other kinds of devices might you use? Write a fictional narrative describing your device and its uses.