1-1 What is life science?

Objective ▹ Identify and describe what is studied in some of the branches of life science.

TechTerms

▹ **specialization** (SPESH-uh-lih-zay-shun): studying or working in only one part of a subject

Studying Life Science Science is an organized collection of knowledge about the world. It also is a way of finding out why things happen as they do. It is a way of solving problems by testing possible answers to see if they work. The knowledge of science is based on observations.

The study of the areas of science that deal with living things is called life science. Life science is like a tree. It is made up of many different branches. One branch is biology (by-AHL-uh-jee). Biology is the study of living things. Table 1 lists some of the life sciences. Two—botany and zoology—are part of biology.

Analyze: What are four branches of life science?

Specialization As more and more is learned about the world, people must choose specific subjects to study. This is called **specialization** (SPESH-uh-lih-zay-shun). A person who studies or works in one part of a subject is called a specialist (SPESH-ul-ist). There are many life science specialists. For example, some zoologists (zoh-AHL-uh-jists) study only one group of animals. Some scientists study diseases that affect only animals. Other scientists study diseases in plants.

Describe: What is meant by specialization?

Importance of Life Science Life science is part of your everyday life. The study of living things affects your life in many ways. The medicine you take for a cold was developed based on scientific study. The causes and warning signs of cancer were learned from scientific research. Operations can be done because doctors know about the parts of the human body and how they work.

The kinds of foods you eat were grown by using information about plants. The making of some foods also uses knowledge of life science. Many cheeses could not be made without molds. Pickles could not be made without bacteria. People had to learn about bacteria and molds to use them to make these foods.

Explain: How was life science part of your life today?

Table 1 Branches of Life Science

BRANCH	WHAT IS STUDIED	CAREERS
Anatomy (uh-NAT-uh-mee)	parts that make up living things	Doctor Physical therapist
Physiology (fiz-ee-AHL-uh-jee)	how the parts of living things work	Physiologist Chiropractor
Botany (BAHT-un-ee)	plants	Horticulturist Florist
Zoology (zoh-AHL-uh-jee)	animals	Veterinarian Marine biologist
Microbiology (my-kroh-by-AHL-uh-jee)	microscopic living things	Microbiologist Pathologist
Ecology (ee-KAHL-uh-jee)	interaction of living things and their surroundings	Ecologist

Name _____ Class _____ Date _____

What is life science?

Lesson Review

Complete the following.

1. What is life science? _____

_____

2. What is anatomy? _____

3. What is specialization? _____

4. Give two examples of how life science affects your life. _____

_____

5. Name three branches of life science and describe what is studied in each. _____

_____

_____

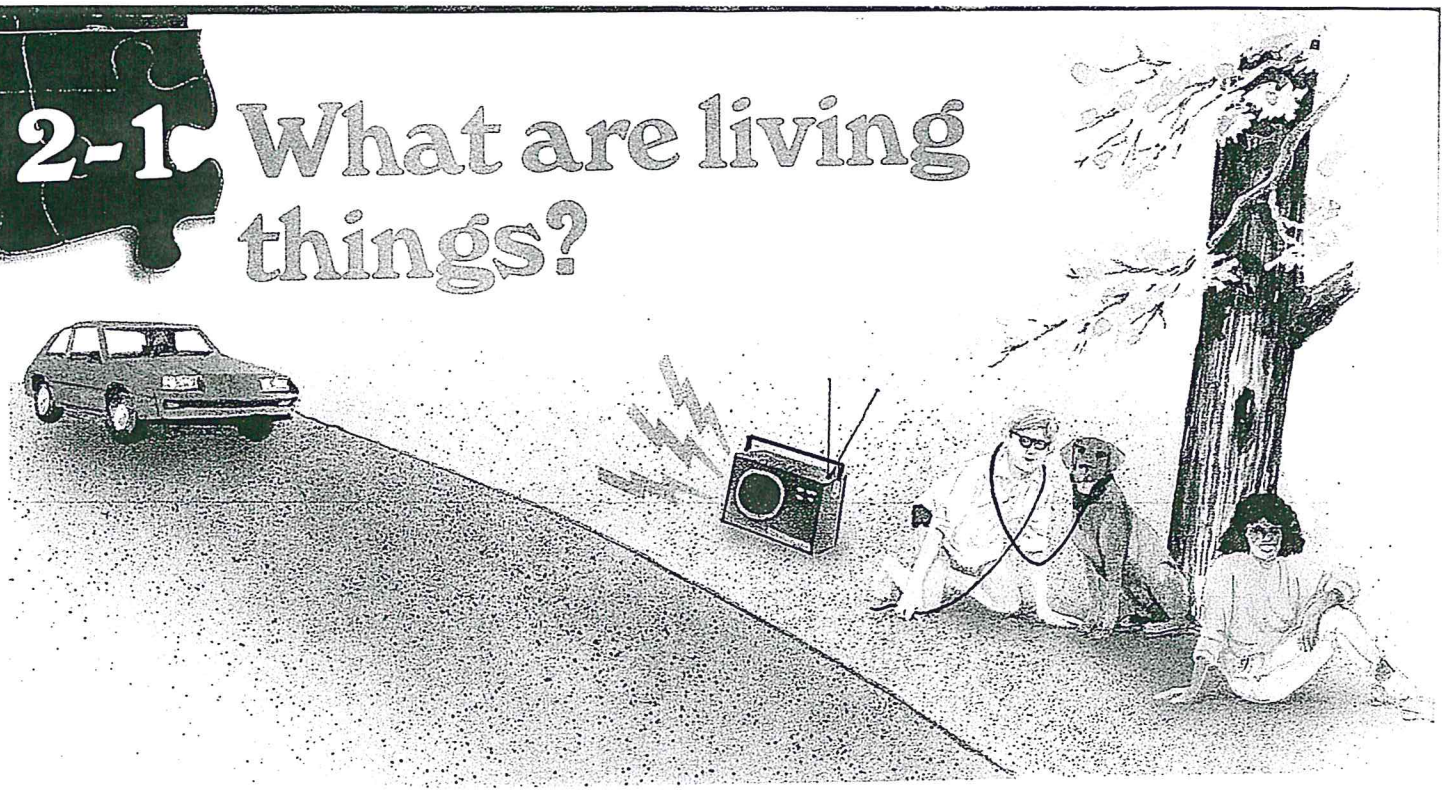
Skill Challenge

Skills: *applying definitions, inferring*

Complete the table by finding careers that relate to each branch of life science.
You may use a dictionary if necessary.

BRANCHES OF LIFE SCIENCE		
Branch	**What Is Studied?**	**Related Careers**
Anatomy (uh-NAT-uh-mee)	parts that make up living things	
Physiology (fiz-ee-AHL-uh-jee)	how the parts of living things work	
Botany (BAHT-uhn-ee)	plants	
Zoology (zoh-AHL-uh-jee)	animals	
Microbiology (my-kroh-by-AHL-uh-jee)	microscopic living things	
Ecology (ee-KAHL-uh-jee)	interaction of living things and their surroundings	

2-1 What are living things?



Objective ▹ List and describe the six characteristics of living things.

TechTerms

- ▹ **cell:** basic unit of structure and function in living things
- ▹ **organism** (AWR-guh-niz-um): any living thing
- ▹ **response** (ri-SPAHNS): reaction to a change

Organisms The world around you is made up of many different things. Some things, such as dogs and trees, are living. Living things are called **organisms** (AWR-guh-niz-ums). Other things, such as cars and radios, are nonliving.

Define: What is an organism?

Characteristics of Organisms It is not always easy to decide if something is living or nonliving. Nonliving things may do some of the same things as organisms. For example, a robot may move and speak like a person. A robot, however, is not living. Plants and animals grow, or get larger. Icicles also may seem to grow, but icicles are not living.

Biologists use six characteristics to classify something as a living thing. All living things have these six characteristics.

- ▹ Organisms are made up of one or more **cells.** A cell is the basic unit of structure and function in living things. In fact, cells often are called the "building blocks of life."
- ▹ Energy is the ability to do work. Organisms use energy. Sunlight is the source of energy for most living things. Plants use the energy in sunlight to make food. Animals get energy from the sun by eating plants or animals that have eaten plants.
- ▹ Organisms are adapted (uh-DAP-tud), or suited, to their surroundings. All organisms have features that help them survive in their surroundings. For example, fishes have gills. Gills are organs that allow fishes to breathe in water.
- ▹ Organisms react to changes in their surroundings. Any reaction to a change is called a **response** (ri-SPAHNS). You might respond to the honking of a car's horn by jumping. A bright light may cause you to close your eyes.
- ▹ Organisms produce more organisms of their own kind. Dogs produce more dogs. Pine trees produce more pine trees. The production of new organisms allows each kind of organism to continue living on the earth.
- ▹ Organisms grow and develop. Living things change, or develop during their lifetimes. One way organisms change is by growing. Living things also may change in appearance.

Identify: What is the source of energy for most living things?

Name _____ Class _____ Date _____

What are living things?

Lesson Review

PART A Complete the following.

1. Any living thing is called an _____ .
2. The basic unit of structure and function in living things is the _____ .
3. A reaction to a change in your surroundings is a _____ .
4. The source of energy for most living things is the _____ .
5. Everything around you is made up of _____ .
6. When two or more atoms from different elements join, they form a _____ .

PART B Place a check mark beside each statement that describes a characteristic that is true of all living things.

_____ 1. have cells

_____ 2. can move

_____ 3. grow or develop

_____ 4. produce more of their own kind

_____ 5. use sunlight to make food

_____ 6. use energy

_____ 7. respond to changes

_____ 8. have features that help them adapt to surroundings

Skill Challenge

Skills: *applying concepts, classifying*

Use the illustration below to answer the questions.

1. What is the source of energy for the puppies in the illustration? _____

_____

_____

2. In what ways will the puppies change to become more like their mother? _____

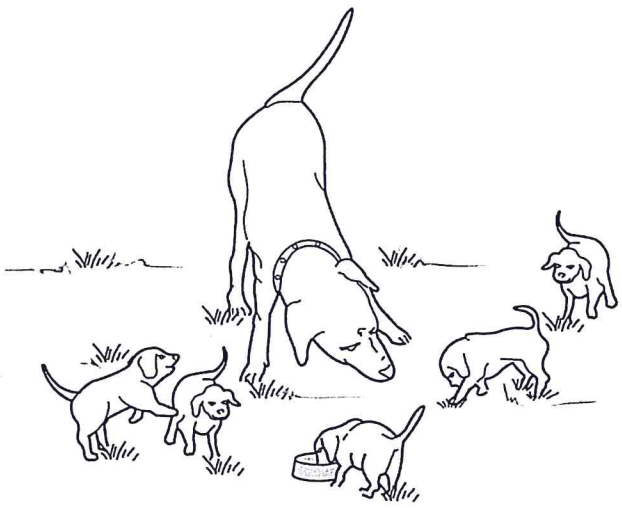
_____

_____

3. Which characteristics of living things are shown in the illustration? _____

_____

_____



2-4 Where do living things come from?

Objective ▷ Recognize that all life comes from existing life.

TechTerm

▷ **spontaneous generation** (spahn-TAY-nee-us jen-uh-RAY-shun): idea that living things come from nonliving things

Spontaneous Generation Do you believe that living things can grow from straw? Hundreds of years ago, people believed that mice came from straw. They also believed that worms and flies grew from rotting meat. The idea that living things came from nonliving things is called **spontaneous generation** (spahn-TAY-nee-us jen-uh-RAY-shun). Until the 1600s, many people believed in spontaneous generation.

Infer: Why do you think people who lived hundreds of years ago believed that frogs came from rotting wood and water?

Francesco Redi Francesco Redi was an Italian doctor. He lived during the seventeenth century. Redi did not think that living things came from nonliving things. He thought that living things could come only from other living things. To test his hypothesis, Redi performed an experiment.

Identify: What did Redi do to test his hypothesis about spontaneous generation?

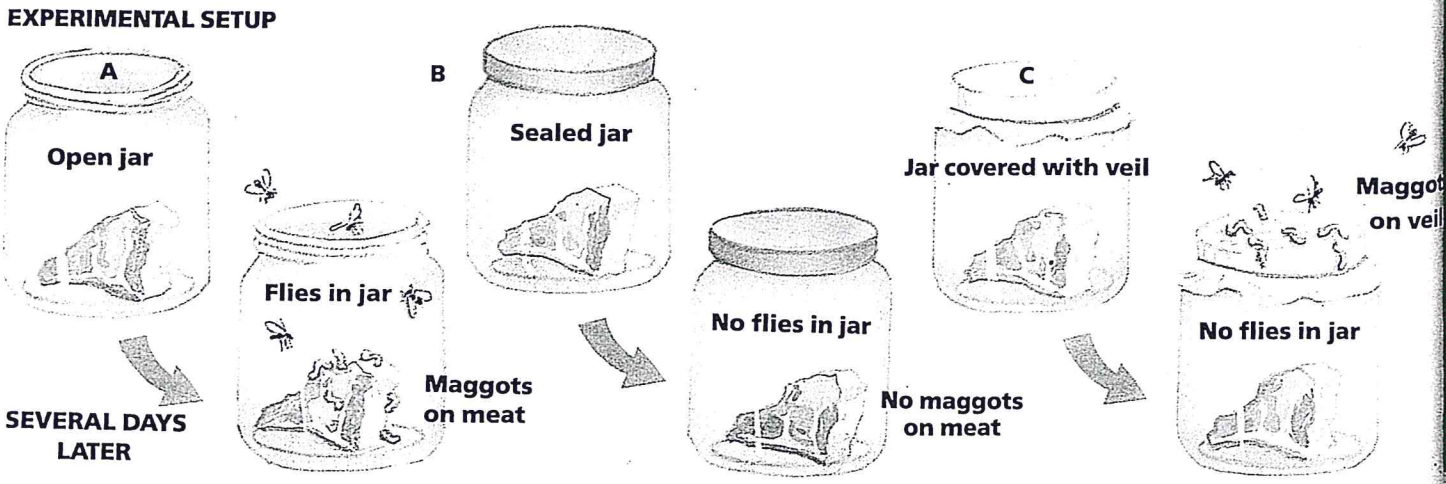
Redi's Experiment Redi put some spoiled meat into several jars. Some jars he left uncovered. Some jars he covered with a thin veil. Other jars were sealed tightly with lids. The jars with the lids were Redi's control. The setup for Redi's experiment is shown below.

After a few days, Redi observed wormlike animals on the meat in the uncovered jars. He also observed the wormlike animals on the veil covering some of the jars. There were no wormlike animals in the jars with lids.

The wormlike animals that Redi observed were maggots (MAG-uts). Maggots are a stage in the life cycle of a fly. The maggots hatched from eggs that flies had laid on the meat and veil. Redi showed that maggots did not come from the meat. Today, scientists know that flies often lay eggs on spoiled meat. The meat is food for the maggots. Scientists know that all living things come from other living things of the same kind.

Infer: Why did maggots not appear in the covered jars?

EXPERIMENTAL SETUP



Name _____ Class _____ Date _____

Where do organisms come from?

Lesson Review

Complete the following.

1. What is spontaneous generation? _____

_____

2. What was Francesco Redi's hypothesis about spontaneous generation? _____

_____

3. What did Redi do to test his hypothesis? _____

4. What did Redi's experiment show? _____

5. What was the control for Redi's experiment? _____

Skill Challenge

Skills: *interpreting, analyzing*

In the nineteenth century, Louis Pasteur performed an experiment to show that microscopic organisms did not come from broth or from air. Pasteur poured broth into two swan-necked flasks. The broth was made up of water, air, and nutrients. He then boiled the broth in both flasks. One flask was left standing straight up while the other was tilted. The broth in the tilted flask was able to come into contact with dust particles in the neck of the flask. The setup for Pasteur's experiment is shown below.

Use the diagrams and information above to answer the questions.

1. What variable was tested in Pasteur's experiment? _____

_____

2. Which part of Pasteur's experiment represents the control? _____

_____

3. Why do you think the broth was boiled first?

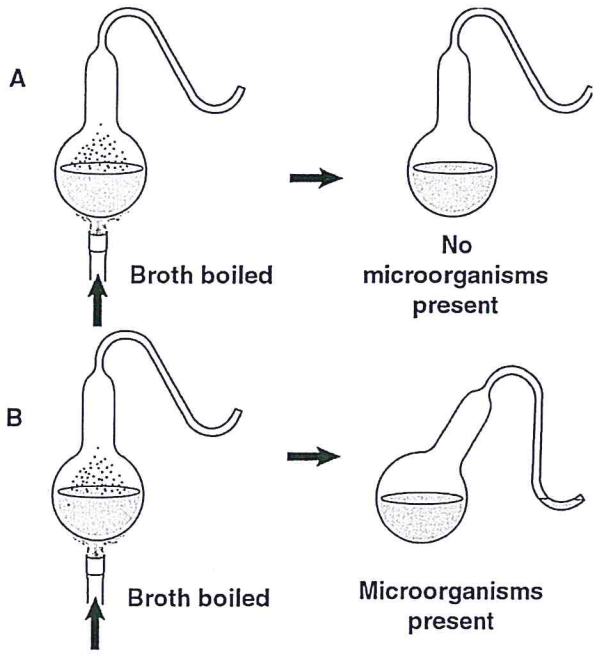
_____

_____

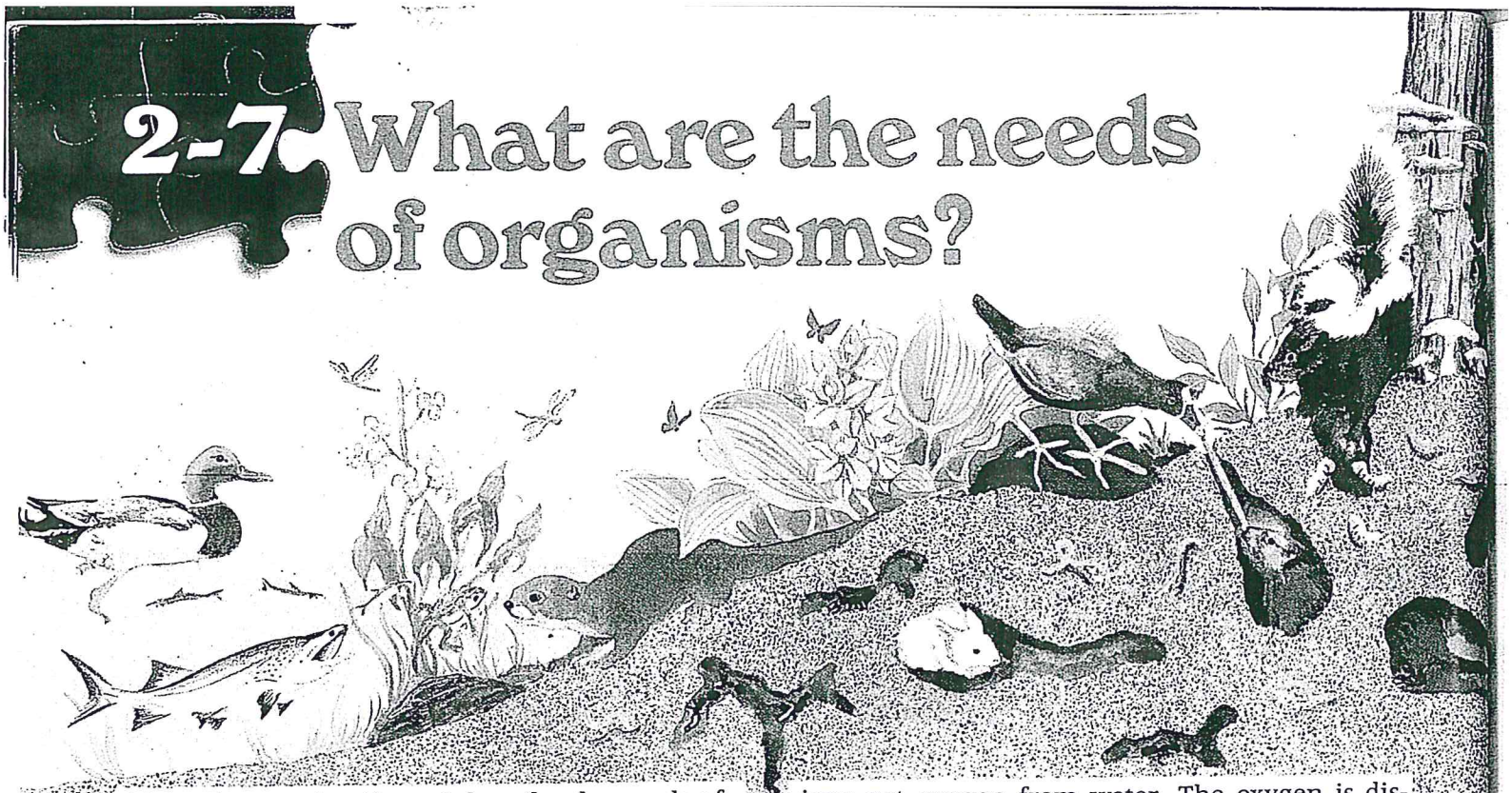
4. How is the experiment performed by Pasteur similar to the experiment performed by Redi?

_____

_____



2-7 What are the needs of organisms?



Objective ▹ Identify and describe the needs of living things.

TechTerm

▹ **homeostasis** (hoh-mee-oh-STAY-sis): ability of a living thing to keep conditions inside its body constant

Food and Water All organisms need food for growth and energy. Organisms also need water. Without water, all plants and animals would die. Plants use water to make food. About two-thirds of your body is water.

Most substances dissolve in water. These dissolved substances can then be transported throughout a living thing. Most chemical changes in living things cannot take place without water.

Analyze: What is the most common substance in your body?

Air Without air, most living things would die in minutes. Air is a mixture of gases. Oxygen is one of the gases in air. Oxygen is needed by most living things to change food into energy. Land organisms get oxygen from the air. Water organisms get oxygen from water. The oxygen is dissolved in the water.

Analyze: How does a fish get oxygen?

Temperature The temperature of the environment is important to living things. Living things need a proper temperature to carry out their life processes. Most living things could live only within a small temperature range if it were not for **homeostasis** (hoh-mee-oh-STAY-sis). Homeostasis is the ability of a living thing to keep conditions inside its body constant. When changes in temperature or other parts of the environment occur, homeostasis keeps things working properly inside a living thing.

Define: What is homeostasis?

Living Space All organisms need living space. An organism's living space must provide enough air, water, sunlight, food, and shelter. In any environment, living space is limited. All the organisms in the environment compete for living space. They compete for food, water, sunlight, and so on.

Name: List five needs of living things.

Name _____ Class _____ Date _____

What are the needs of organisms?

Lesson Review

Write *true* if the statement is true. If the statement is false, change the underlined term to make the statement true. Write your answers in the spaces provided.

_____ 1. All organisms require food and water for growth and energy.

_____ 2. An autotroph is an organism that cannot make its own food.

_____ 3. Many living things get the oxygen they need from the air or water.

_____ 4. Most living things need oxygen to change food into energy.

_____ 5. Living space provides an organism with air, water, food, and shelter.

_____ 6. The ability of an organism to keep conditions inside its body constant is called homeostasis.

_____ 7. An organism that can make its own food is a heterotroph.

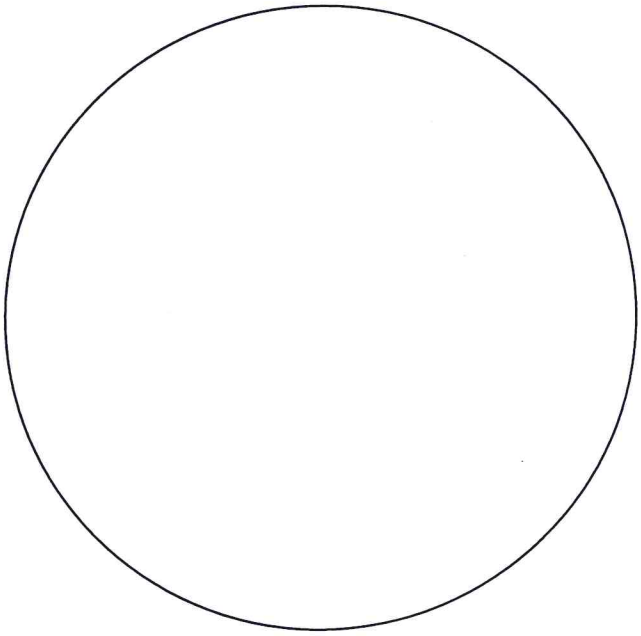
_____ 8. Living things need a proper temperature to carry on their life processes.

Skill Challenge

Skill: *graphing*

Make a circle graph that shows the percentages of the gases that make up air. Use the information in the Data Table below to make your graph.

DATA TABLE: GASES IN AIR	
Oxygen	21%
Nitrogen	78%
Argon	0.94%
Carbon dioxide	0.04%
Other gases	0.02%



3-1 What is ecology?

Objective ▸ Understand how organisms interact with their environments.

TechTerms

- **ecology** (ee-KAHL-uh-jee): study of living things and their environments
- **environment** (in-VY-run-munt): everything that surrounds an organism
- **interact:** to act upon each other

Ecology Everything that surrounds a living thing makes up its **environment** (in-VY-run-munt). Living things are affected by their environments. Living things also have an effect on their environments.

The study of living things and their environments is **ecology** (ee-KAHL-uh-jee). Scientists who study ecology are ecologists. Ecologists study the relationships between living things and their environments. They also study how living things are adapted, or suited, to their environments.

Define: What is ecology?

Importance of the Environment All living things need materials to carry out their life processes. Organisms get all the materials they need from their environments. Some materials, called nutrients (NOO-tree-unts), are used by living things for growth and energy. Green plants get nutrients and water from soil. They take carbon dioxide from the air. They use sunlight and carbon dioxide to grow and make food for energy. Plants also need oxygen. Some animals get nutrients and energy by eating plants. Some animals eat other animals. Most animals get oxygen from the air. Fish get oxygen that is dissolved in water.

List: What are some materials that organisms get from their environment?

Interactions Look at Figure 1. It shows a plain in Africa. There are many different kinds of organisms that live on the plain. The plain is the environment for these organisms. The organisms on the plain **interact,** or act upon each other. The organisms also interact with the nonliving parts of the environment. The gnus (NOOS) eat grasses growing in soil. The wastes produced by the gnus enrich the soil. The enriched soil makes the grasses grow better. The grasses, soil, and gnus each have an effect on each other. An interaction also takes place between the lions and the gnus. Lions eat gnus. If there are many lions hunting gnus, the number of gnus will go down. With fewer gnus, some lions will die from a lack of food. As a result, the number of lions will go down.

Infer: What will happen to the number of gnus if the number of lions goes down?

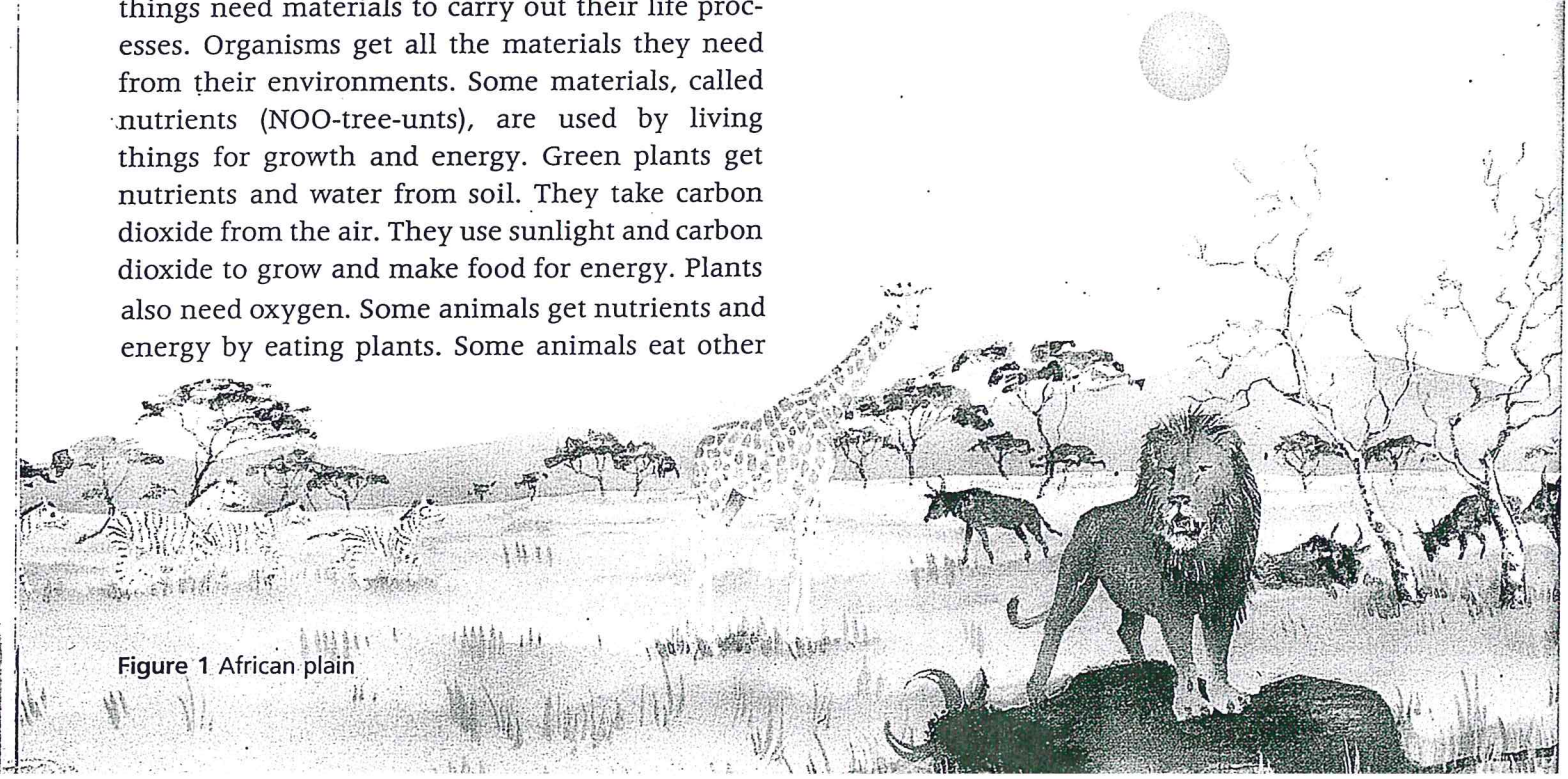


Figure 1 African plain

Name _____ Class _____ Date _____

What is ecology?

Lesson Review

Write the term that best completes each statement in the space provided.

1. The study of the relationship between living things and their environments is _____ .
2. Scientists who study ecology are _____ .
3. Everything that surrounds a living thing and acts upon it is its _____ .
4. The process of organisms acting upon one another or on the nonliving parts of their environment is called _____.
5. Living things get all the materials they need from their _____ .
6. Plants use sunlight, water, minerals and carbon dioxide to grow and make _____ for energy.
7. Animals get nutrients by eating _____ or by eating other animals.
8. Most animals get the oxygen they need from the _____ and _____ .
9. Fish get their oxygen from the _____ in water.
10. Water and soil are considered _____ parts of the environment.

Skill Challenge

Skills: *applying, interpreting visuals*

Explain how the pairs of living and nonliving things below interact with each other.

1. periwinkle, cord grass _____

_____

_____

2. periwinkle, soil _____

_____

_____

3. soil, grass _____

_____

_____

4. gull, periwinkle _____

_____

_____

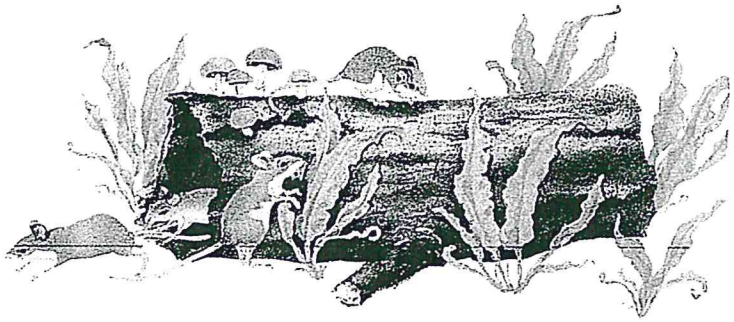
3-2 What is an ecosystem?

Objective ▹ Describe the parts of an ecosystem.

TechTerms

- **community:** all the populations that live in a certain place
- **ecosystem** (EE-koh-sis-tum): living and nonliving things in an environment, together with their interactions
- **population:** group of the same kind of organism living in a certain place

Populations A **population** is all of the same kind of organism living in a certain place. Different populations may live in the same environment. Look at the rotting log. There are five mushrooms growing on the log. These five mushrooms make up one population of the log. Count the number of mice living in the log. There are four. The mouse population is four.



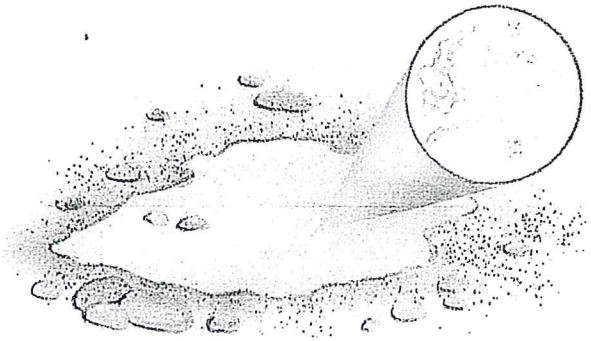
Observe: What is the fern population on the rotting log?

Communities All the populations living on the rotting log make up a **community.** A community is all the populations that live in a certain place. It includes all the different kinds of living things that live together.

Define: What is a community?

Ecosystem The organisms in a community interact with the nonliving parts of the environment. The organisms in the community also interact with each other. The living and nonliving things in an environment, together with their interactions, make up an **ecosystem** (EE-koh-sis-tum).

There are many kinds of ecosystems. They are different sizes and have different makeups. An ecosystem can be as large as a desert or as small as a rotting log. Ecosystems can be rivers, lakes, or ponds. Even a puddle of water can be an ecosystem.



Identify: What is an ecosystem?

A Self-Supporting Unit An ecosystem is a self-supporting unit. Four processes occur in an ecosystem to make it self-supporting.

- **Production of Energy** The sun is the source of energy in most ecosystems.
- **Transfer of Energy** Energy is transferred from the sun to plants that make their own food. The stored energy in plants is transferred to animals that eat the plants. Energy is transferred to other animals when they eat the plant-eating animals.
- **Breaking Down of Materials** When organisms die, their bodies decompose, or break down. The chemicals are reused by other living things.
- **Recycling** The materials needed by organisms in an ecosystem are recycled, or used over and over.

List: What are the four processes that make an ecosystem self-supporting?

Name _____ Class _____ Date _____

What is an ecosystem?

Lesson Review

PART A Circle the term that best completes each statement.

1. All the populations that live in a certain place and can interact with one another make up (a community / an ecosystem).
2. A group of the same kind of organisms living in a certain place is a (population / community).
3. A group of communities interacting with one another and the nonliving things in an environment make up an (ecology / ecosystem).
4. A lake or river can be (an ecosystem / a community).
5. When organisms die, their bodies (produce energy / decompose).
6. (Living / Nonliving) parts of an environment include water, air, and soil.
7. The (Sun / air) is the source of energy in most ecosystems.
8. Energy is transferred from the Sun to (plants / animals) that make their own food.
9. The materials needed by organisms in an ecosystem are (recycled / wasted).
10. An ecosystem is a (self-supporting / unsupported) unit.

Skill Challenge

Skills: *identifying, applying concepts*

An ecosystem is a self-supporting unit. In the spaces provided, list and describe the four processes that make an ecosystem self-supporting.

1. _____

_____

_____

2. _____

_____

_____

3. _____

_____

_____

4. _____

_____

_____

3-3 What are habitats and niches?

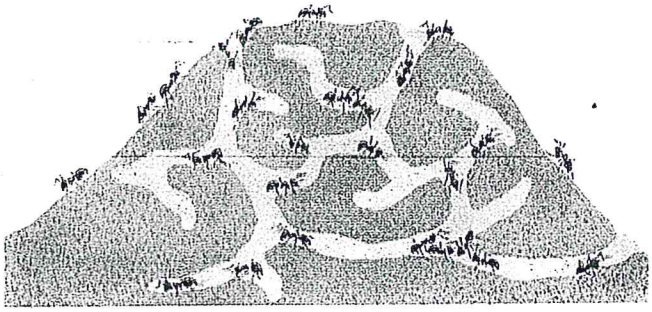
Objective ▹ Explain how organisms may have the same habitat but not the same niche.

TechTerms

- ▹ **habitat** (HAB-i-tat): place where an organism lives
- ▹ **niche** (NICH): organism's role, or job, in its habitat

Habitat The place where an organism lives is its **habitat** (HAB-i-tat). The habitat of an organism has the food and water the organism needs to live. An organism's habitat also provides shelter and a place to reproduce.

There are many different kinds of habitats. Habitats can be very large or very small. There are land habitats and water habitats. An entire ocean is the habitat of a whale. The habitat of a woodpecker is the trees in a forest. An anthill also is a habitat.



Infer: What is your habitat?

Niche What is your role or job in life? Did you answer that you are a student? Student is the job or role that you do where you live. Organisms also have jobs or roles in their communities. The job or role of each organism is its **niche** (NICH). It includes everything an organism does and everything it needs.

Identify: What is a niche?

Different Niches Many kinds of organisms share the same habitat. Tigers and deer both live in the same habitats in Asia. Each kind of organism has different needs and roles in the habitat. Tigers hunt deer and other animals. Deer eat grasses. Tigers have one kind of shelter. Deer have another. The activities of these two kinds of organisms are different. They have the same habitat, but they do not have the same niche.

Two populations cannot have the same niche for very long. For example, one animal may be able to hunt better and also find shelter better than another animal. One animal may be able to run away from its enemies faster than another animal. The population of animals that hunt or run better will survive and reproduce. After a while, members of the other populations will be crowded out.

Infer: Do a lobster and a starfish share the same habitat? The same niche?

Name _____ Class _____ Date _____

What are habitats and niches?

Lesson Review

Answer the following questions.

1. What is a habitat? _____
2. Name four things that a habitat provides for an organism. _____

   _____
3. What is a niche? _____
4. What can happen if two populations share the same niche? _____

   _____
5. Name three organisms that share the same habitat. _____

   _____

Skill Challenge

Skills: *classifying, researching*

Identify the habitat in which each organism listed in the table below is most likely to live. Place a check mark in the correct column. Some organisms may have more than one habitat. Use reference materials if necessary.

HABITATS				
Organism	**Desert**	**Forest**	**Salt Water**	**Fresh Water**
1. Woodpecker				
2. Cactus				
3. Shark				
4. Scorpion				
5. Brook Trout				
6. Rabbit				
7. Seaweed				
8. Tarantula				
9. Fern				
10. Oyster				
11. Crayfish				
12. Rattlesnake				

3-4 What are limiting factors?

Objective ▹ Recognize why organisms live where they do.

TechTerms

- ▹ **carrying capacity:** largest amount of a population that can be supported by an area
- ▹ **limiting factors:** conditions in the environment that put limits on where an organism can live
- ▹ **range** (RAYNJ): area where a type of animal or plant population is found

Limiting Factors Certain conditions in the environment limit where an organism can live. These conditions are called **limiting factors.** Suppose a plant needs warm temperatures and a lot of water. It cannot live where it is cold and dry. Temperature and amount of water are limiting factors for the plant. Other limiting factors for plants are the amount of sunlight and the type of soil. Animals also are limited by conditions in the environment. Limiting factors for animals include temperature, water, food supply, and shelter.

List: What are four limiting factors for plants?

Plants as Limiting Factors The number of green plants in a community is a limiting factor for the animals in the community. Suppose many green plants in a meadow died. Some of the mice that eat the plants would starve. With fewer mice to eat, some of the owls also would starve. Even though owls do not eat plants, the number of owls is affected by the number of plants. The sizes of animal populations are limited by the sizes of plant populations.

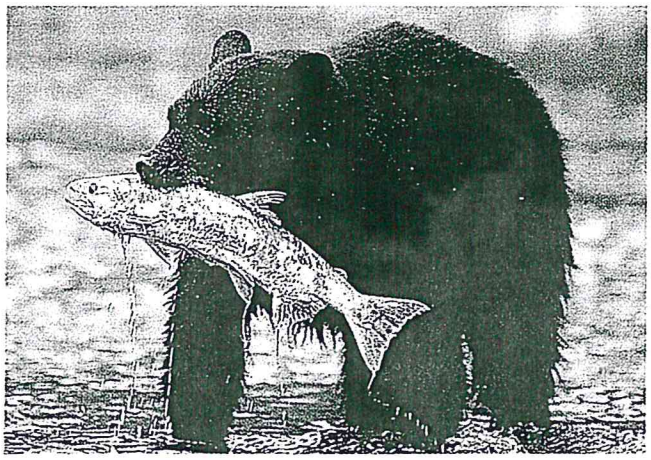
Predict: How would the number of mice and owls change if more plants grew than usual?

Carrying Capacity The largest amount of a population that can be supported by an area is the area's **carrying capacity.** An area has different carrying capacities for different populations. When a population becomes too large, some of its members must move. They must find a similar habitat with fewer organisms. The spread of organisms from one area to another is called dispersal (dis-PUR-sul). Many animals have no trouble dispersing. They move by walking, running, crawling, swimming, or flying.

Define: What is carrying capacity?

Range The area where a kind of population lives is called its **range** (RAYNJ). The size of an organism's range is determined by its limiting factors. For example, black bears can eat a large variety of foods. As a result, the range of black bears is large. Giant pandas eat only bamboo. The range of the giant panda is very small.

Relate: What is the relationship between an organism's diet and its range?



Name _____ Class _____ Date _____

What are limiting factors?

Lesson Review

Write *true* if the statement is true. If the statement is false, change the underlined term to make the statement true.

_____ **1.** The largest population size that can be supported by the available resources of an area is its <u>limiting factor</u>.

_____ **2.** The conditions in an environment that put limits on the size a population can grow to are <u>limiting factors</u>.

_____ **3.** The size of all other populations that can live in an area is determined by the size of the <u>animal</u> populations.

_____ **4.** The amount of <u>sunlight</u> an area receives is a limiting factor for plants.

_____ **5.** The size of an organism's <u>range</u> is determined by the limiting factors of the area.

_____ **6.** Organisms that eat only a few kinds of food have a <u>larger</u> range than organisms that eat many kinds of food.

_____ **7.** The area where a type of plant or animal is found living is the <u>carrying capacity</u> of the organism.

_____ **8.** Limiting factors for animals include <u>temperature</u>, water, food supply, and shelter.

Skill Challenge

Skills: *classifying, identifying*

Decide whether each limiting factor listed below directly affects plants or animals or both. Complete the table by placing check marks in the correct columns.

LIMITING FACTORS		
Factor	**Affects Plants**	**Affects Animals**
1. Amount of water		
2. Amount of sunlight		
3. Amount of food		
4. Type of soil		
5. Proper temperature		
6. Shelter		
7. Animals in area		
8. Plants in area		

3-6 What are producers and consumers?

Objective ▷ Identify producers and different feeding levels of consumers in an ecosystem.

TechTerms

- **consumer** (kun-SOO-mur): organism that obtains food by eating other organisms
- **decomposer** (dee-kum-POHZ-er): organism that breaks down the wastes or remains of other organisms
- **producer** (pruh-DOOS-ur): organism that makes its own food
- **scavenger** (SKAV-in-jur): animal that eats only dead organisms

Producers Organisms that make their own food are called **producers** (pruh-DOOS-urz). Producers use energy from the sun to make food. On land, the main producers are plants. The main producers in lakes and oceans are algae (AL-jee).

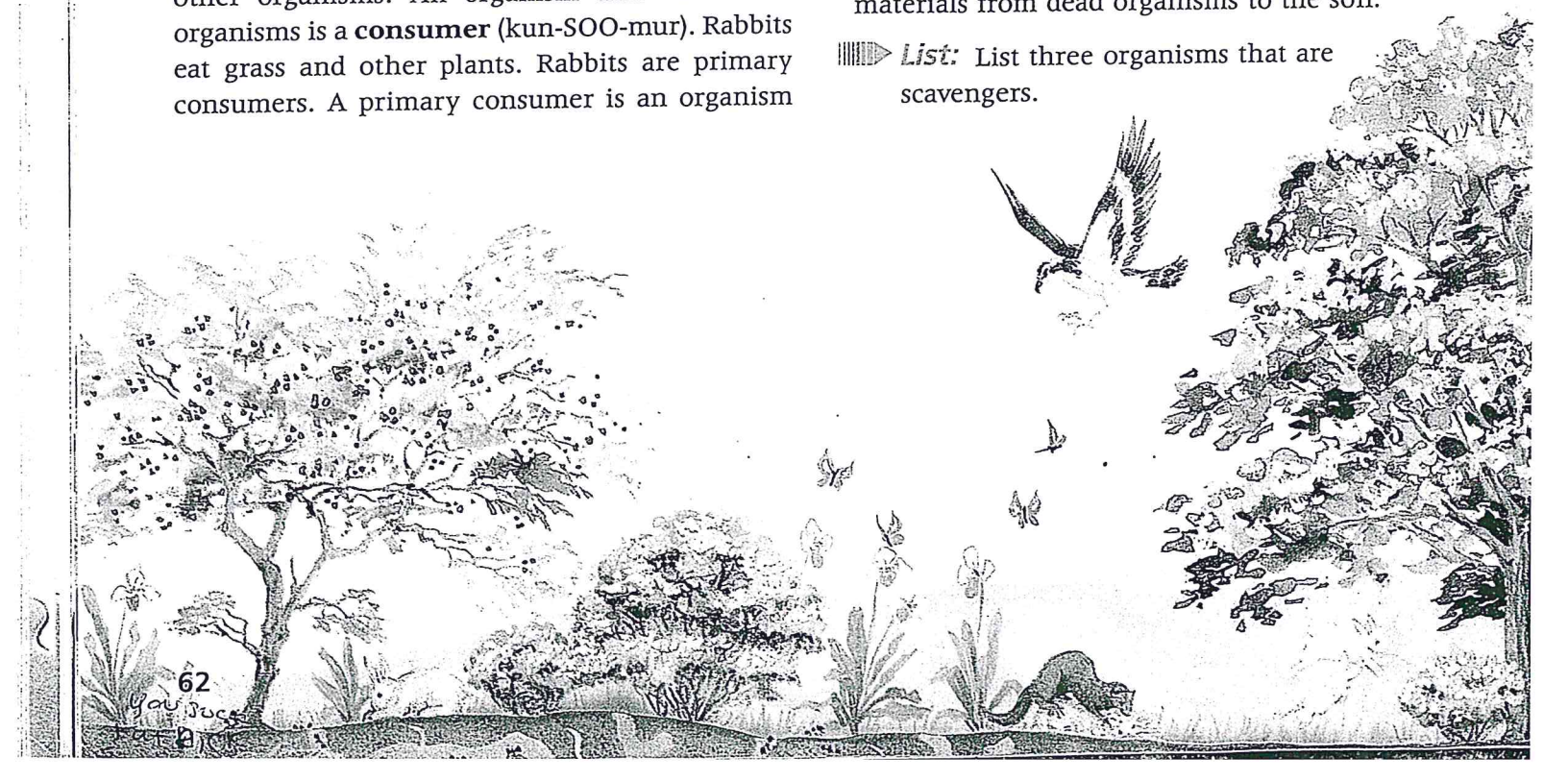
Observe: Name all the producers shown on this page.

Consumers Most organisms get food by eating other organisms. An organism that eats other organisms is a **consumer** (kun-SOO-mur). Rabbits eat grass and other plants. Rabbits are primary consumers. A primary consumer is an organism that eats producers. Consumers that eat primary consumers are secondary consumers. Weasels eat small plant-eating animals, such as rabbits. Weasels are secondary consumers. Consumers that eat secondary consumers are tertiary consumers. Hawks eat small meat-eating animals, such as weasels. Hawks are tertiary consumers. Some animals, such as hawks, are both secondary and tertiary consumers. Most people are primary, secondary, and tertiary consumers.

Classify: Ducks eat plants and small insects or animals. Are ducks primary, secondary, or tertiary consumers?

Scavengers and Decomposers Some animals feed upon dead animals. These animals are **scavengers** (SKAV-in-jurz). Scavengers eat animals that have died or been killed by other animals. Vultures, hyenas, and certain ants, beetles, and worms are scavengers. Scavengers are both secondary and tertiary consumers. Organisms that break down the wastes or remains of organisms are **decomposers** (dee-kum-POHZ-ers). Decay bacteria are decomposers. Decomposers return materials from dead organisms to the soil.

List: List three organisms that are scavengers.



Name _____ Class _____ Date _____

What are producers and consumers?

Lesson Review

Match each term in **Column B** with its description in **Column A**. Write the letter of the correct term in the space provided.

	Column A	Column B
_____	1. organism that makes its own food	a. producer
_____	2. animal that eats dead organisms	b. secondary consumer
_____	3. animal that eats plant-eating animals	c. decomposer
_____	4. organism that breaks down the wastes or remains of other organisms	d. tertiary consumer
		e. scavenger
_____	5. animal that eats meat-eating animals	f. algae and phytoplankton
_____	6. main producers in lakes and oceans	g. omnivore
_____	7. consumer that eats only plants	h. herbivore
_____	8. consumer that eats only animals	i. carnivore
_____	9. consumer that eats both plants and animals	

Skill Challenge

Skills: *classifying, applying concepts*

Classify each organism listed in the table as a producer, consumer, scavenger, or decomposer. Place a check mark in the correct column.

CLASSIFYING ORGANISMS				
Organism	**Producer**	**Consumer**	**Scavenger**	**Decomposer**
1. Seaweed				
2. Duck				
3. Hawk				
4. Hyena				
5. Bacteria				
6. Vulture				
7. Rabbit				
8. Grass				
9. Apple tree				
10. Fungus				

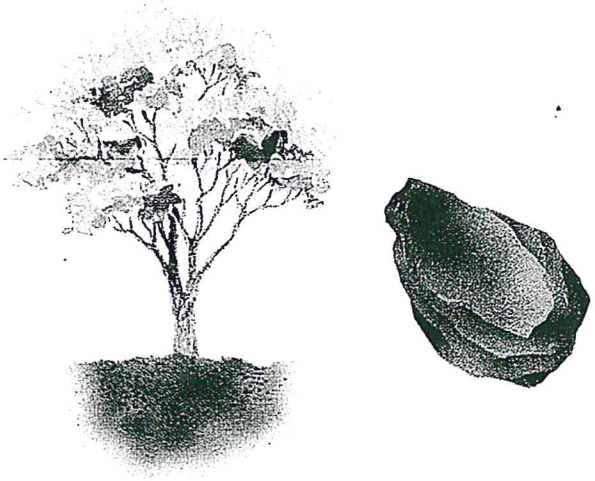
3-10 What are natural resources?

Objective ▹ Distinguish between renewable and nonrenewable natural resources.

TechTerms

- ▹ **conservation** (kon-sur-VAY-shun): wise use of natural resources
- ▹ **natural resources** (REE-sowrs-ez): materials found in nature that are used by living things
- ▹ **nonrenewable resources:** natural resources that cannot be renewed or replaced
- ▹ **renewable resources:** natural resources that can be renewed or replaced

Natural Resources Living things use materials found in nature to survive. These materials are called **natural resources** (REE-sowrs-ez). Air and water are natural resources needed by almost all organisms. People use other natural resources such as oil, coal, and gas as fuels.



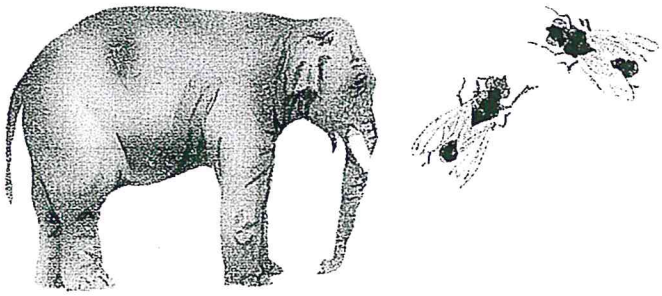
Classify: What other natural resources can you name?

Renewable Resources Some natural resources can be reused or replaced. These resources are called **renewable resources.** Air, water, soil, and living things are renewable resources.

Define: What is a renewable resource?

Nonrenewable Resources Some natural resources cannot be reused or replaced. These resources are called **nonrenewable resources.** Oil, coal, natural gas, and minerals are examples of nonrenewable resources. Nonrenewable resources need millions of years to form. Once existing supplies of these resources are used up, they cannot be replaced.

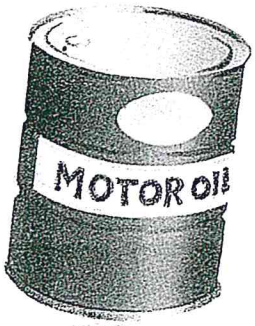
Contrast: What is the difference between renewable and nonrenewable resources?



Conservation The wise use of natural resources is called **conservation** (kon-sur-VAY-shun). Conservation of all natural resources, including renewable resources, is important. Even though renewable resources are replaced by the environment, the supply of these resources is limited. People must be careful not to use renewable resources faster than they can be replaced.

Since nonrenewable resources cannot be replaced, it is especially important to use them wisely. One way of conserving nonrenewable resources is by using energy-efficient products. Driving cars that get more miles per gallon of gasoline is a way of conserving fuel.

Identify: Why is it necessary to conserve renewable resources?



Name _____ Class _____ Date _____

What are natural resources?

Lesson Review

Write the term that best completes each statement in the space provided.

1. The wise use of natural resources is _____ .
2. Materials found in nature that are used by living things are _____ .
3. Natural resources that cannot be reused or replaced are _____ resources.
4. Natural resources that can be reused or replaced are _____ resources.
5. The use of energy-efficient products is an example of _____ .
6. Oil, coal, and gas are considered _____ resources.
7. Renewable resources should be conserved so that their supply is not used up _____ than they can be replaced.

Skill Challenge

Skills: *classifying, applying concepts*

Decide whether each natural resource listed in the table below is renewable or nonrenewable. Complete the table by placing a check mark in the correct column.

CLASSIFYING NATURAL RESOURCES		
Natural Resource	**Renewable**	**Nonrenewable**
1. Oil		
2. Living things		
3. Coal		
4. Air		
5. Water		
6. Soil		
7. Minerals		
8. Natural gas		

3-11 What is balance in an ecosystem?

Objective ▷ Recognize that every organism is part of an ever-changing environment.

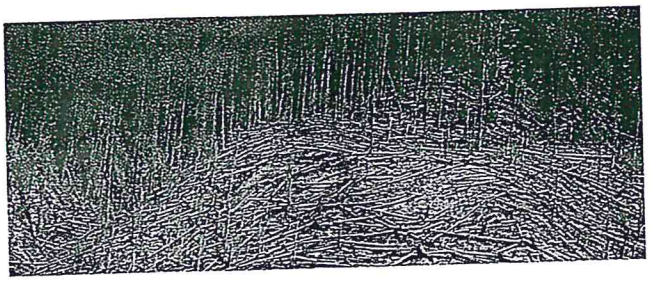
TechTerms

- ▷ **endangered species** (in-DAYN-jurd SPEE-sheez): kinds of living things that are in danger of dying out
- ▷ **pollution:** release of harmful materials into the environment

Balance An environment is constantly changing. Sometimes, the changes work together to keep the environment the same. Then the environment is balanced. In a balanced environment, the size of a population may go up and then go down. However, the average size of the population remains the same over time. Sometimes, the balance in an environment is upset. A change in the balance of just one species can be harmful to the other organisms in the environment.

Define: What is the balance of nature?

Natural Disturbances Natural causes such as a volcano or forest fire can upset the balance of an environment. These disturbances destroy organisms and their habitats. There is great loss of

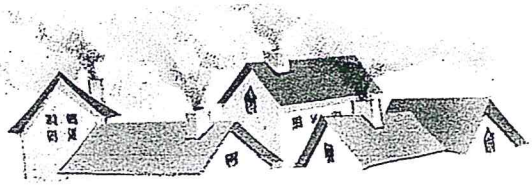


wildlife. It may take many years for the environment to return to its original condition.

Infer: What other natural disturbances can upset the balance of nature?

The Role of People People also can upset the balance of an environment. Often the actions of people destroy the habitats of organisms. They cut down forests to create farms and towns. They build dams and dig mines. Unfortunately, the disturbances caused by people are often permanent. The environment cannot return to normal.

People also damage the environment by causing pollution. **Pollution** is the release of harmful substances into the environment. Harmful gases from cars, power plants, and factories pollute the air. Wastes and chemicals pollute the water. Improper disposal of waste materials pollutes the land. All of these acts upset the balance of nature.



Explain: How do people upset the balance of nature?

Endangered Species Upsets in the balance of an environment have made it hard for many species to survive. Living things in danger of dying out are called **endangered species** (in-DAYN-jurd SPEE-sheez). The whooping crane, giant panda, elephant, and humpback whale are all endangered species.

Predict: What will happen to the number of endangered species if people continue to pollute the environment?

Name _____ Class _____ Date _____

What is balance in an ecosystem?

Lesson Review

Write the term that best completes each statement in the space provided.

1. In a balanced environment, the _____ size of the populations remains the same over time.
2. A change in only one population in an ecosystem can be _____ to the balance of the ecosystem.
3. Harmful substances released into the environment are called _____ .
4. Harmful gases released from factories can pollute the _____ .
5. Living things that are in danger of becoming extinct are classified as _____ .
6. Volcanoes and forest fires are examples of _____ causes that can upset the balance in an environment.
7. When people cut down forests and dig mines, they destroy the _____ of other organisms.

Skill Challenge

Skills: *classifying, researching*

Use reference materials to identify which organisms listed in the table are classified as endangered species. Write *yes* or *no* in the right-hand column to indicate whether the animal is considered endangered. Then, answer the questions that follow.

RECOGNIZING ENDANGERED SPECIES	
Organism	**Endangered?**
1. Gorilla	
2. Domestic cat	
3. Giant panda	
4. Black rhinoceros	
5. African elephant	
6. Bengal tiger	
7. Robin	
8. Whooping crane	
9. Cardinal	
10. Black bear	

11. Why are some of the species listed in the table endangered? _____

_____

_____

_____

12. What can be done to help some of these endangered species? _____

_____

_____

_____

_____

4-4 How do plant and animal cells differ?

Objective ▹ Compare plant cells and animal cells.

TechTerms

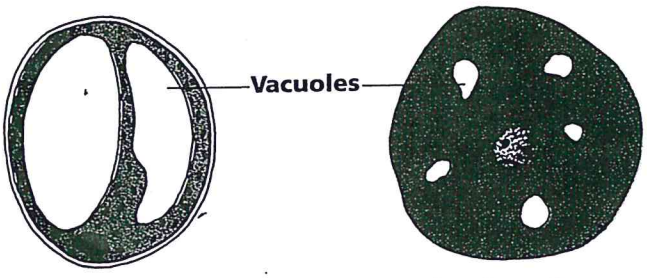
- **cellulose** (SEL-yoo-lohs): hard, nonliving material that makes up the cell wall of a plant cell
- **cell wall:** outer, nonliving part of a plant cell
- **chlorophyll** (KLOR-uh-fil): green material in chloroplasts that is needed for plants to make food
- **chloroplast** (KLOR-uh-plast): green structure in a plant cell that contains chlorophyll

Cell Wall All plant cells have a **cell wall.** Animal cells do not have a cell wall. The cell wall surrounds the cell membrane. The cell wall is nonliving. It is made up of a hard material called **cellulose** (SEL-yoo-lohs). Wood is made up mostly of cellulose.

The cell wall has three jobs. It protects a plant cell and gives the cell its shape. It also gives a plant cell support. Large plants, such as trees and bushes, do not need a skeleton because each cell has support from the cell wall.

Name: What substance makes up most of the cell wall?

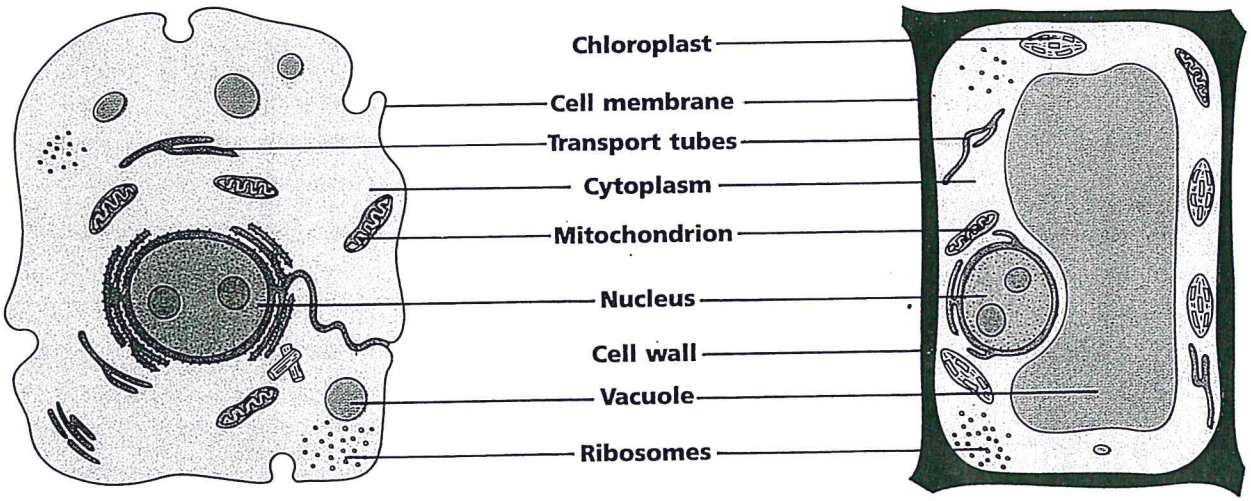
Vacuoles The number and size of vacuoles is different in plant and animal cells. Plant cells have only one or two vacuoles. The vacuoles are usually very large. Animal cells have many small vacuoles.



Observe: How many vacuoles does the plant cell have?

Chloroplasts Most plant cells have **chloroplasts** (KLOR-uh-plasts). Chloroplasts are round, green structures. They contain a green material called **chlorophyll** (KLOR-uh-fil). Chlorophyll gives a plant its green color. Chlorophyll is very important to plant cells. Plants need chlorophyll to make food. Animal cells do not have chloroplasts or chlorophyll.

Explain: Why are most plants green?



Name _____ Class _____ Date _____

How do plant and animal cells differ?

Lesson Review

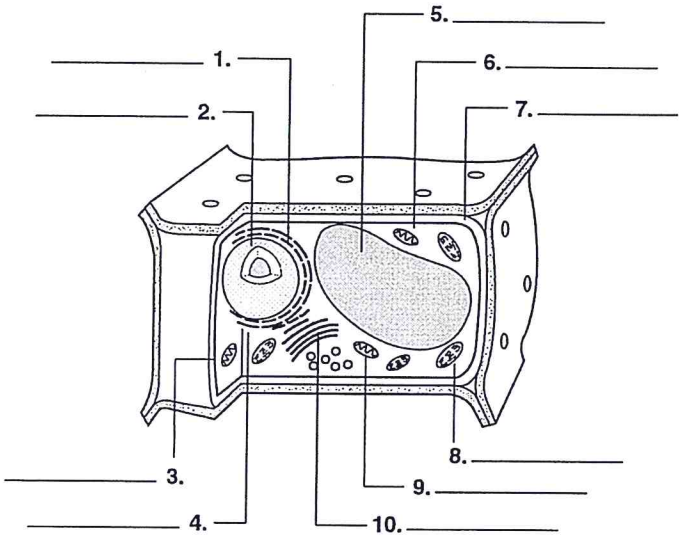
Complete the table by writing *yes* if the cell contains the structure or substance indicated on the left and *no* if the cell does not contain the structure or substance indicated.

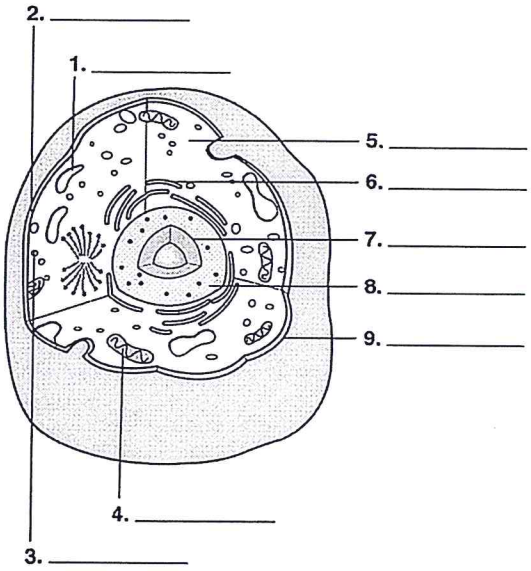
COMPARING PLANT AND ANIMAL CELLS		
Structure or Substance	**Plant Cell**	**Animal Cell**
1. cellulose		
2. nucleus		
3. chlorophyll		
4. cell wall		
5. cytoplasm		
6. cell membrane		
7. mitochondria		
8. ribosomes		
9. vacuoles		
10. chloroplast		

Skill Challenge

Skills: *diagramming, labeling*

Label the parts of the plant and animal cells in the spaces provided.





4-7 Why do cells have different shapes?

Objective ▸ Describe the structures and functions of different kinds of cells.

TechTerms

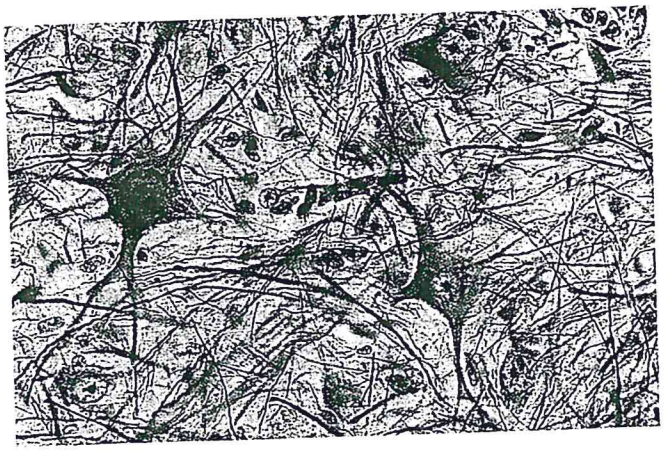
- **guard cell:** cell in a plant that helps control the passage of materials into and out of the stomates
- **red blood cell:** blood cell that carries oxygen
- **white blood cell:** blood cell that helps destroy germs

Cell Size and Shape In one-celled organisms, the one cell carries on all the life processes. Large animals and plants are made up of many cells. The cells are not all the same. They have different sizes and shapes. Look at the different shapes of the cells shown. Different kinds of cells have different jobs. The shapes of most cells help them to do their jobs.

Explain: How are cells different?

Nerve Cells Nerve cells are the "telephone wires" of the body. They carry messages from one part of the body to another. The message carried by a nerve cell is called an impulse. Nerve cells are long and thin. Some nerve cells are the longest cells in your body. The longest cells are the nerve cells in a giraffe's leg. They are 2 m long.

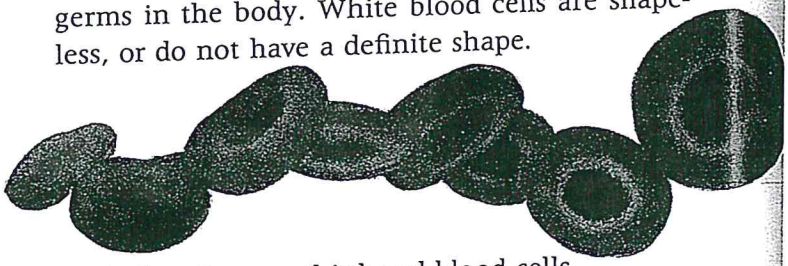
Define: What is an impulse?



Muscle Cells Muscle cells are long and thin. The shape of muscle cells can change. Muscle cells can become shorter. Some muscles are attached to bone. When cells in these muscles shorten, they make the bones move.

Explain: What is the job of some muscles?

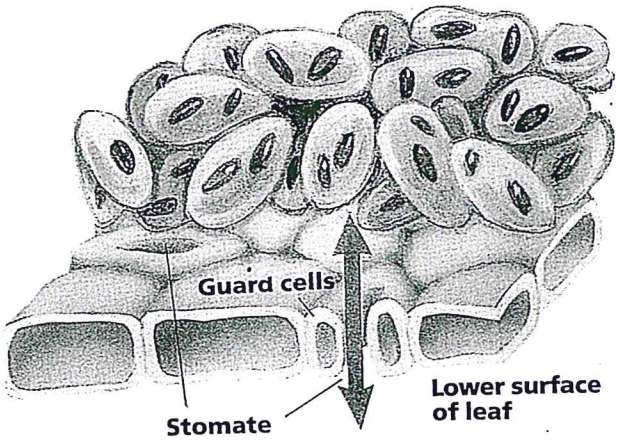
Blood Cells There are two main kinds of blood cells. **Red blood cells** are round. They do not have a nucleus. The job of a red blood cell is to carry oxygen. **White blood cells** help destroy germs in the body. White blood cells are shapeless, or do not have a definite shape.



Infer: Do you think red blood cells reproduce themselves? Why?

Guard Cells A stomate is a tiny opening on the lower surface of a plant leaf. A stomate takes in carbon dioxide from the air and gives off oxygen and water. Two bean-shaped cells called **guard cells** surround each stomate. Guard cells control the size of the stomate. When the guard cells swell, the stomate opens. When the guard cells shrink, the stomate closes.

Predict: Does carbon dioxide enter a plant when the guard cells swell or shrink?

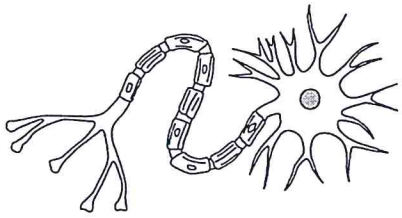


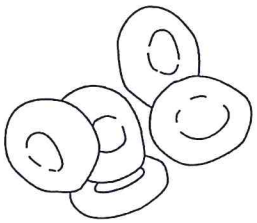
Name _____ Class _____ Date _____

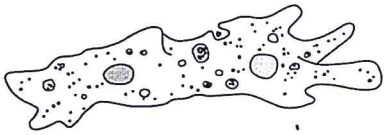
Why do cells have different shapes?

Lesson Review

PART A Identify each of the three types of cells shown in the diagrams below in the space provided.







1. _____ 2. _____ 3. _____

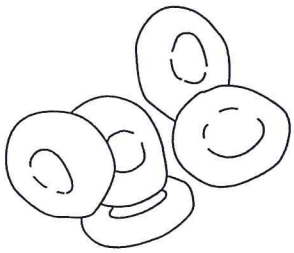
PART B Circle the term in parentheses that best completes each statement.

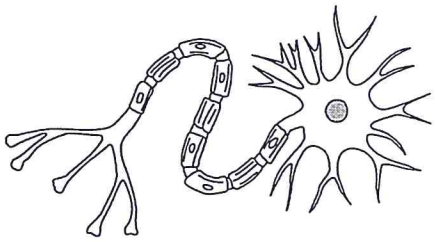
1. The job of nerve cells is to carry (oxygen / messages) throughout the body.
2. The job of (nerve / red blood) cells is to carry oxygen.
3. A type of cell that does not have a nucleus is a (red blood / guard) cell.
4. Amoeba are unicellular organisms that live in (water / air).
5. The tiny opening on the lower surface of a plant leaf is a (stoma / guard cell).
6. Guard cells control the size of (stomata / red blood cells).

Skill Challenge

Skills: *contrasting, describing, analyzing*

Study the diagrams of the cells shown below. Then, answer the questions that follow.





1. What is the main job of red blood cells? _____
2. What is the main job of nerve cells? _____
3. Describe the shape of red blood cells. _____
4. Describe the shape of the nerve cells. _____
5. How are the shapes of each cell related to their functions? _____

_____