

14-1 What is the environment?

Objective: Describe cycles in nature and define pollution.

TECH TERMS

- ▶ **environment** (in-VY-run-munt): everything that surrounds a living thing
- ▶ **pollutants** (puh-LOOT-ents): harmful substances in the environment
- ▶ **pollution** (puh-LOO-shun): anything that harms the environment

Environment Living things get everything they need from the **environment** (in-VY-run-munt). The environment is everything that surrounds a living thing. The atmosphere, hydrosphere, and lithosphere are parts of the environment. The atmosphere, or air, supplies living things with important gases. The hydrosphere is the part of the earth that is water. Living things get water from the hydrosphere. The lithosphere, or solid part of the earth, supplies living things with important materials such as minerals and soil.

Describe: What is the environment?

Cycles in Nature Some materials in the environment pass through cycles. You may recall that the water cycle allows the earth's water to be used again. Carbon dioxide, oxygen, and nitrogen also cycle through the environment.

The repeated movement of oxygen and carbon dioxide through the environment is called the oxygen-carbon dioxide cycle. Animals take in oxygen from the air when they breathe in. Animals give off carbon dioxide when they breathe



Figure 1 The oxygen-carbon dioxide cycle

out. The oxygen in the air is not used up by animals because plants release oxygen into the air. Plants use the carbon dioxide that is given off by animals.

The nitrogen cycle is shown in Figure 2. In the nitrogen cycle, bacteria in the soil use nitrogen gas from the air to form compounds. The nitrogen compounds are used by plants and animals. When the plants and animals die, the nitrogen compounds are broken down. Nitrogen gas is released back in the air.

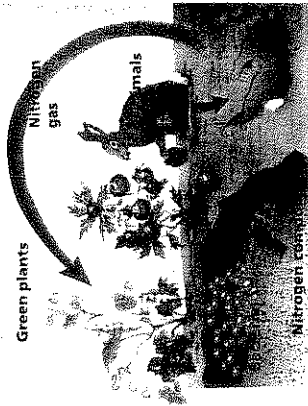


Figure 2 The nitrogen cycle

Identify: What gas do animals release when they breathe out?



Pollution You probably know that pollution (puh-LOO-shun) is a major problem. Pollution is anything that harms the environment. Pollution occurs when harmful substances, or **pollutants** (puh-LOOT-ents), are released into the environment. Pollutants are harming the earth's air, water, and land. This upsets the balance of nature's cycles.

Define: What is pollution?

14-1 What is the environment?

Lesson Review

Identify the part of the environment to which each item in the table relates. Place a check mark in the proper column. Then, answer the questions.

Table 1 Living Things and Their Environments

Material Supplied	Atmosphere	Hydrosphere	Lithosphere
1. Soil			
2. Water			
3. Oxygen			
4. Carbon dioxide			
5. Minerals			
6. Nitrogen			

7. What is the environment? _____
8. What is pollution? _____
9. List four substances that cycle through the environment. _____
10. What are pollutants? _____

Skill Challenge

Skills: Identifying, interpreting diagrams

Label the numbered parts of each diagram. Use the terms oxygen, carbon dioxide, evaporation, condensation, and precipitation. Then, answer the questions.

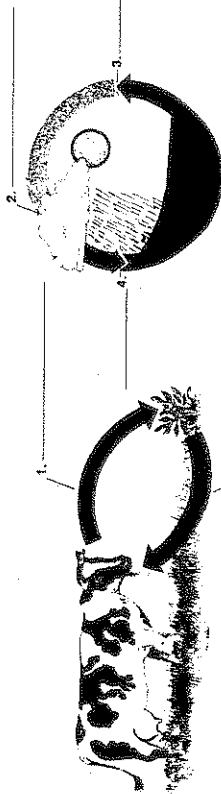


Figure 1

Figure 2

6. What is shown in Figure 1? _____
7. What is shown in Figure 2? _____
8. What substance do animals take in when they breathe in? _____
9. What substance do animals give off when they breathe out? _____
10. Name four kinds of precipitation. _____

14-2 What causes air pollution?



Objective ▶ Identify causes of air pollution and explain how pollution harms the environment.

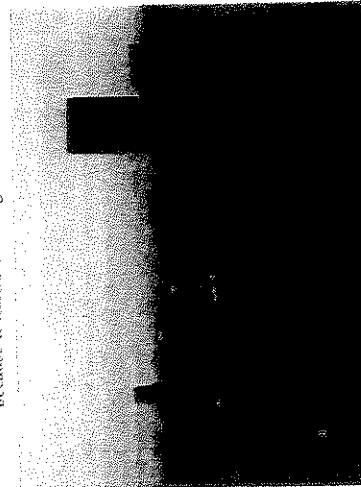
TechTerms

- ▶ **acid rain:** rain containing nitric acid and sulfuric acid
- ▶ **smog:** mixture of smoke, fog, and chemicals

Air Pollution The burning of fossil fuels is the major cause of air pollution. When fuels are burned, harmful substances are released into the air. Air pollution occurs when these harmful substances enter the atmosphere.

Have you ever seen thick black smoke coming from a chimney? Smoke contains dust and soot. Dust and soot are air pollutants. They can remain in the air for a long time. Heavier pieces of dust and soot may settle on almost everything around you. Dust and soot may irritate your eyes, lungs, and air passages.

Many cities have a **smog** problem. Smog is a mixture of smoke, fog, and chemicals. Smog is harmful to people who have breathing problems because it harms the lungs.



Identify: What is the major cause of air pollution?

Acid Rain Cars and factories release carbon dioxide and other gases into the air. Some of these gases mix with water in the air and form acids. The acids then fall to the earth as **acid rain**. Acid rain is harmful to living and nonliving things. Acid rain that falls into lakes and streams kills fish. Acid rain also causes brick, stone, and metal structures to weather, or break apart.

Explain: How does acid rain form?

Carbon Dioxide Levels Fuels need oxygen to burn. When fuels burn, they give off carbon dioxide. Carbon dioxide traps the heat energy from the sun. Scientists think that the increase of carbon dioxide in the air is causing the temperature of the atmosphere to rise. This rise in temperature may cause climate changes.

Relate: Why might an increase of carbon dioxide in the air cause air temperature to rise?

Protecting the Air Many countries have laws to help control pollution. In the United States, cars must have anti-pollution devices (dub-VEESES). These devices prevent some pollutants that are given off by burning fuels from entering the air. Factories use filters on their smokestacks. One of the easiest ways to reduce air pollution is to use less fossil fuel.

Hypothesize: Why will using less fossil fuel reduce air pollution?

14-2 What causes air pollution?

Lesson Review

Fill in each space with the term that best completes each statement.

1. The major cause of air pollution is the burning of _____.
2. Air pollution occurs when harmful substances are released into the _____.
3. Two kinds of pollutants in smoke are dust and _____.
4. Smog is a mixture of smoke, fog, and _____.
5. Some gases that are released into the atmosphere combine with water in the air to form _____.
6. When fuels burn, they release _____ gas into the air.
7. Scientists think that an increase in the amount of carbon dioxide in the air may cause _____ to rise.
8. Acid rain can cause brick, stone, and metal structures to _____ or break apart.

Skill Challenge

Skills: identifying, applying concepts

Complete the table by identifying the pollutant or pollutants that are contained in each item described in the first column. Place a check mark in the correct column or columns.

Table 1 Identifying Air Pollutants

Source	Carbon Dioxide	Smoke	Dust	Soot	Chemicals
1. Burning fossil fuels					
2. Smog					
3. Factory smokestacks					
4. Automobile exhaust					
5. Burning wood in a fireplace					

14-3 What causes water pollution?

Lesson Review

Complete the following.

1. What causes water pollution? _____
2. What is sewage? _____
3. What harmful things are contained in sewage? _____
4. What is a fertilizer? _____
5. What is a pesticide? _____
6. What kinds of water pollutants are produced by industry? _____
7. What is a sewage-treatment plant? _____
8. How have laws helped to reduce water pollution? _____

Skill Challenge

Skills: diagramming, sequencing

In the space below, develop a flow chart that shows two pathways that sewage may take before it enters the environment. One pathway should show untreated sewage entering the environment. The other pathway should show treated sewage entering the environment. Identify the source of the sewage and each step in your flow chart.

14-3 What causes water pollution?

Objective ▶ Describe the major sources of water pollution.

TechTerm

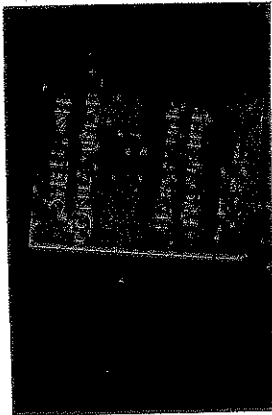
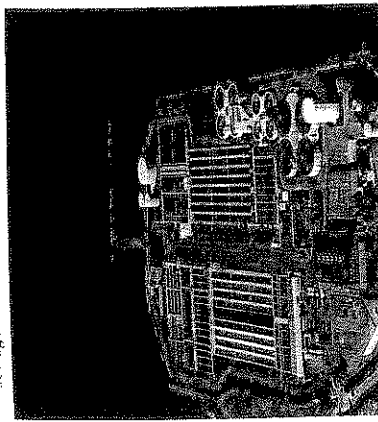
▶ **sewage:** waste that usually is flushed away in water

Water Pollution Water pollution occurs when harmful substances enter the water. Some pollutants dissolve in the water. Other pollutants float in the water. Many lakes and rivers were once used as sources of fresh water. Today, some lakes and rivers are polluted. They cannot be used for drinking or swimming. Some lakes and rivers are so polluted that fish cannot live in their waters.

▶ **Explain:** Why are many lakes and rivers not used for drinking water today?

Sewage Sewage is made up of wastes that usually are flushed away in water. Sewage is a source of water pollution. Bacteria and other disease-causing organisms live in sewage. Many fish and shellfish cannot be eaten because they contain bacteria that live in sewage. Sewage also contains soaps and chemicals.

▶ **Describe:** What harmful things are in sewage?



Chemical Pollutants Many chemicals pollute the water. Fertilizers (FUR-tul-y-zuh-re) are chemicals that help plants grow. Pesticides (PEST-uh-sid-es) are used to kill insect pests. Farmers use fertilizers and pesticides on their crops. Many fertilizers and pesticides seep into the groundwater. This water is then carried to lakes and rivers. The chemicals in the water may harm living things that live in the water.

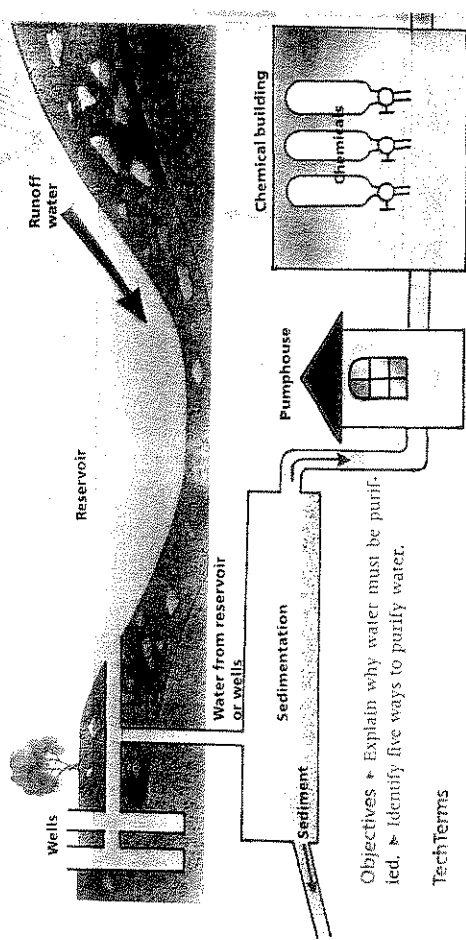
Chemical pollutants also come from industry. Some industries bury their wastes in barrels, or drums, in the ground. If the drums rust and break apart, the wastes can leak into the groundwater. Industries also dump chemical wastes directly into water. These wastes are harmful to fish living in the water. They also are harmful to people who eat the fish. Mercury is a poisonous element that is sometimes found in polluted water. Many fish cannot be eaten because they contain mercury.

▶ **Name:** What are two sources of chemical water pollutants?

Protecting the Water Sewage-treatment plants have been built in many cities and towns. Sewage-treatment plants change sewage into less harmful material. Laws also help to fight water pollution. These laws require industries to clean their wastes before dumping them into lakes and rivers. Many pesticides have been banned.

▶ **Explain:** What happens to sewage at sewage-treatment plants?

14-4 How is water purified?



Objectives • Explain why water must be purified. • Identify five ways to purify water.

TechTerms

- ▶ **hard water:** water containing a lot of calcium and magnesium minerals
- ▶ **soft water:** water containing few or no minerals

Drinking Water Your drinking water comes from reservoirs (REZ-er-vyooz), springs, or wells. A reservoir is a lake made by people. Reservoirs store large amounts of fresh water. Pipelines carry the water to homes and businesses.

Some water contains dissolved minerals. Calcium and magnesium are minerals often found in some water. Water that has a lot of calcium and magnesium is called **hard water**. It is hard for soap to form suds in hard water. Water with few or no minerals in it is called **soft water**.

Identify: What two minerals does hard water contain?

Purifying water Water for drinking and bathing must be purified (PYOOR-ih-fyd), or cleaned. Water is purified in water-treatment plants. Water can be purified in the following ways.

- ▶ **Sedimentation** (sed-uh-mun-TAY-shun): The water is allowed to stand for long periods of time. Heavy particles, such as sand and dirt, settle to the bottom and are removed.
- ▶ **Coagulation** (koh-eg-yoo-LAY-shun): Chemicals that cause particles to clump together are added to the water. The clumps of particles settle to the bottom. The particles are then removed from the water.
- ▶ **Filtration** (fil-TRAY-shun): Water is passed through a filter to remove small particles.
- ▶ **Aeration** (ayr-AY-shun): Water is sprayed into the air. Oxygen from the air dissolves in the water. The oxygen kills some harmful microorganisms.
- ▶ **Chlorination** (klor-uh-NAY-shun): Chlorine is added to the water. Chlorine kills harmful microorganisms in the water.

Name: What are five ways to purify drinking water?

Name _____ Class _____ Date _____

14-4 How is water purified?

Lesson Review

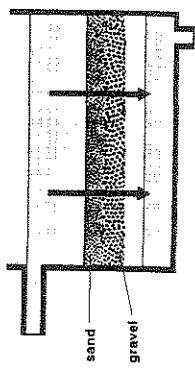
Circle the term that makes each statement true.

1. Reservoirs store large amounts of (fresh, salt) water.
2. Water that has a lot of calcium is (soft, hard) water.
3. Water that contains few or no minerals is (soft, hard) water.
4. The process by which water is allowed to stand for long periods of time so that particles can settle out of the water is called (sedimentation, aeration).
5. The process by which bacteria are removed from water by spraying the water into the air is (coagulation, aeration).
6. Chlorine is added to water to kill (insects, microorganisms).
7. Adding chemicals to water to cause particles in the water to clump together and settle out is called (filtration, coagulation).
8. The cleaning of water to make it safe for drinking and bathing is called (filtration, purification).

Skill Challenge

Skills: interpreting diagrams, describing

Study the illustrations. On line a, identify the water-purification process that is shown. On line b, describe the process.



a. _____

b. _____

14-5 What causes land pollution?

Objective: Describe the causes of land pollution.

TechTerm

Litter: materials that are thrown away on the ground

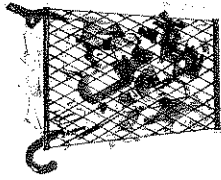
Litter and Garbage: Have you ever seen cans, bottles, papers, and plastic materials that were thrown on the ground? These thrown-away materials are called **litter**. Litter is one of the causes of land pollution. Litter harms the land and destroys the beauty of many areas.



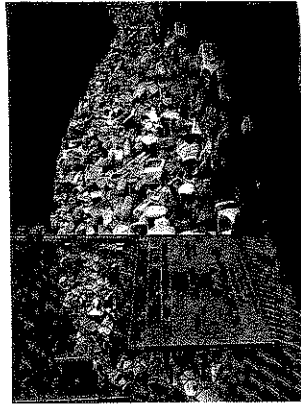
Describe: How are some industrial wastes disposed?

Protecting the Land: Getting rid of garbage and chemical wastes is a growing problem. Cities have taken some steps to reduce land pollution. Garbage is collected regularly. Streets are cleaned of litter. However, much more needs to be done.

One solution to the problem of land pollution is to make use of certain wastes. Some wastes can be used as fertilizers. Others can be burned to produce energy. Still other wastes such as bottles and cans, can be treated and used again.



The clean-up of chemical wastes is a more difficult problem. People are working to clean up wastes leaking into the soil. Cleaning up these wastes is expensive and takes a lot of time.



Identify: What are some solutions to the problem of land pollution?

Garbage also causes land pollution. Each year people make billions of tons of garbage. The garbage builds up at dumps or is used as landfill. The garbage is put between two layers of the land years to be broken down. Materials, such as some kinds of plastic, do not break down at all. Other materials contain harmful substances that seep into the soil.

Identify: Name two causes of land pollution.

Industrial Wastes: You may recall that chemical wastes from industry pollute the water. These chemicals also pollute the land. Some industrial wastes are buried in drums in the ground. Many of these wastes contain harmful metals such as mercury and lead. In many places, these wastes are leaking from the drums into the ground. The wastes pollute the land and harm living things.

Name _____ Class _____ Date _____

14-5 What causes land pollution?

Lesson Review

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

Column A

- materials thrown away on the ground
- wastes buried in layers of soil
- large amounts of materials thrown away by people
- harmful metal found in chemical wastes
- harmful substances on the earth's surface

Column B

- garbage
- landfill
- litter
- mercury
- land pollution

Part B Complete the following.

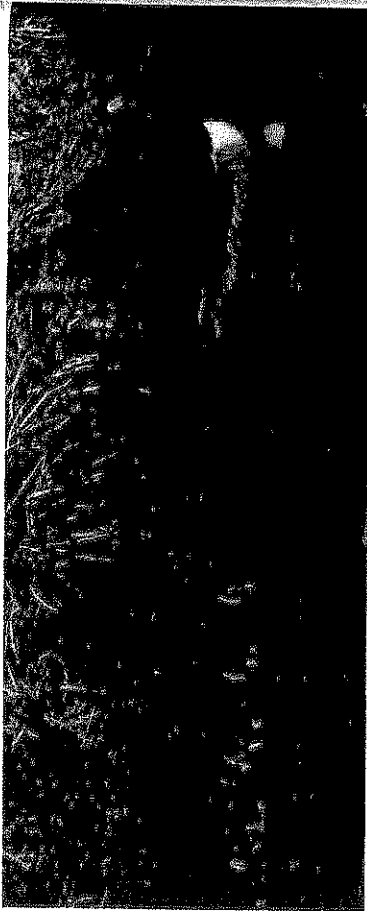
- Name three ways that land pollution can be reduced. _____
- Name two kinds of land pollutants that can be treated and used again. _____
- Why is burying industrial wastes in the ground a problem? _____

Skill Challenge

Skills: calculating, relating concepts
Complete the following.

- Imagine that you produce 2 kg of garbage each day.
 - How many kg of garbage would you produce in a week? _____
 - In a year? _____
 - How many kg of garbage would you produce in 10 years? _____
- Imagine that each person living on your block produces as much garbage as you do. What methods might be used to dispose of this garbage? Suggest methods for dealing with cans, bottles, newspapers, magazines, plastics, and food products. _____

14-6 What are natural resources?



Objective ▶ Distinguish between renewable and nonrenewable resources.

TechTerms

- ▶ **conservation** (kahn-sur-VAY-shun): wise use of natural resources
- ▶ **natural resource**: material from the earth that is used by living things
- ▶ **nonrenewable resource**: natural resource that is not replaced by nature
- ▶ **renewable resource**: natural resource that can be replaced or reused

Natural Resources Everything you use, eat, drink, and wear comes from the earth. When a spaceship travels into space, it carries everything its crew needs to live. A spaceship must have a supply of food, air, water, and fuel. The earth can be compared to a spaceship. The earth has everything living things need to survive. Materials from the earth that are used by living things are called **natural resources**.

Define: What is a natural resource?

Renewable Resources Natural resources that can be reused or replaced are **renewable resources**. Air, water, soil, and living things are renewable resources. The water cycle allows the

earth's water to be used over and over. New soil is formed to replace soil that has been carried away by wind and water. Trees and other new plants grow to replace those that have been cut down or died. Animals are born to replace animals that have died.

List: What are four renewable resources?

Nonrenewable Resources Oil, coal, and natural gas are fossil fuels. They were formed from the remains of plants and animals that lived long ago. Fossil fuels and minerals are **nonrenewable resources**. Nonrenewable resources are natural resources that are not replaced by nature. Nonrenewable resources take millions of years to form. Once nonrenewable resources are used up, their supplies are gone.

Define: What is a nonrenewable resource?

Conservation The wise use of a natural resource is **conservation** (kahn-sur-VAY-shun). As the number of people on Earth gets larger, the need for natural resources increases. People must use natural resources wisely to help them last longer.

Relate: What happens to the need for natural resources as the number of people on the earth grows?

14-6 What are natural resources?

Lesson Review

Part A Complete the following.

1. What are natural resources? _____
2. What are renewable natural resources? _____
3. What are nonrenewable resources? _____
4. What is conservation? _____
5. List five examples of natural resources. _____

Part B Classify each of the following as a renewable resource "R" or a nonrenewable resource "N". Write the correct letter in the space provided.

1. nitrogen _____ 2. oil _____ 3. minerals _____ 4. water _____ 5. soil _____
6. oxygen _____ 7. coal _____ 8. natural gas _____ 9. animals _____ 10. trees _____

Skill Challenge

Skills: classifying, identifying

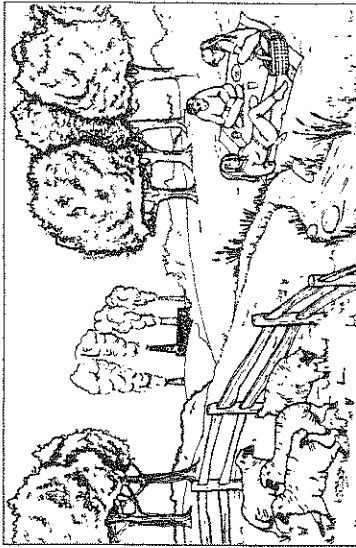
The living parts of the environment are **biotic** (BY-ah-ik). The nonliving parts are **abiotic**. Study the illustration. Then list three biotic natural resources and three abiotic natural resources that are shown in the illustration.

Biotic

1. _____
2. _____
3. _____

Abiotic

1. _____
2. _____
3. _____



14-7 How can resources be conserved?

Objective ▶ Describe ways to conserve natural resources.

Term

▶ **recycling:** using natural resources over and over again

Recycling Natural resources can be conserved by recycling. When a resource is recycled, it is used again. Aluminum cans, glass bottles, newspapers, and some of the metals used to make cars can all be recycled. Recycling conserves minerals. It also conserves living things. For example, when paper is recycled, fewer trees need to be cut down. Recycling uses less energy than finding and using new resources. This conserves fossil fuels.

▶ **Describe:** How does recycling conserve natural resources?



Replacement Materials One way of conserving minerals is to use other materials in their place. For example, some iron and aluminum engines have been replaced with plastic. Lightweight steel cables are being replaced by nylon.

▶ **List:** List two materials that are being used to replace minerals.

Water Conservation The supply of clean, fresh water on the earth is limited. One way to conserve

water is to not waste water. You can conserve water by turning off the water when you brush your teeth or by taking a shower instead of a bath. Fixing leaking faucets also conserves water.

▶ **State:** What are two ways you can conserve water?

Soil Conservation Different farming methods can be used to conserve soil. Soil can be conserved by the following farming practices.

- ▶ Contour farming is plowing across the slope of the land. Terracing is the building of flat areas, or terraces up the side of a hill. Both contour plowing and terracing keep water from washing away the soil.
- ▶ Strip-cropping is the planting of crops in rows. Grasses are planted between the rows of crops. The grasses hold water and help stop erosion.
- ▶ Windbreaks are used to keep wind from blowing soil away. Farmers plant rows of trees along the edges of fields to slow the wind.
- ▶ Fertilizers are used to replace the nutrients used up by plants. Fertilizers add nutrients to the soil.



▶ **Name:** What are three farming methods that help conserve soil?

14-7 How can resources be conserved?

Lesson Review

Complete the following. Write your answers in the spaces provided.

1. What is recycling? _____
2. What natural resources are conserved by recycling? _____
3. How does recycling help to conserve fossil fuels? _____
4. How does the use of plastics and nylon help to conserve natural resources? _____
5. Why should water be conserved? _____
6. What are two ways farmers can help to prevent erosion by water? _____
7. Why do farmers add fertilizers to soil? _____
8. What is strip-cropping? _____

Skill Challenge

Skills: classifying, relating concepts

Place a check beside each item that can be recycled to help conserve natural resources.

- | | |
|---------------------------------|---------------------------|
| _____ 1. aluminum beverage cans | _____ 6. fossil fuels |
| _____ 2. cardboard boxes | _____ 7. glass bottles |
| _____ 3. plastic | _____ 8. nylon cables |
| _____ 4. soil | _____ 9. aluminum engines |
| _____ 5. newspapers | _____ 10. magazines |

14-8 What is wildlife conservation?

Objectives ▶ Identify the main threat to wildlife today. ▶ Describe two ways to conserve wildlife.

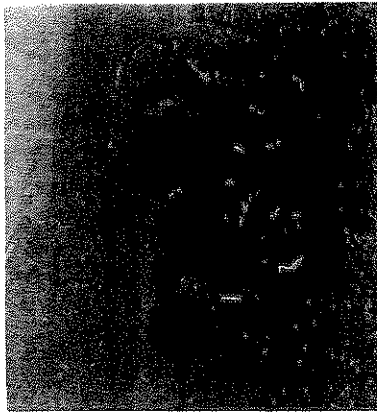
TechTerm

▶ **wildlife:** all the plant and animals that live in an area

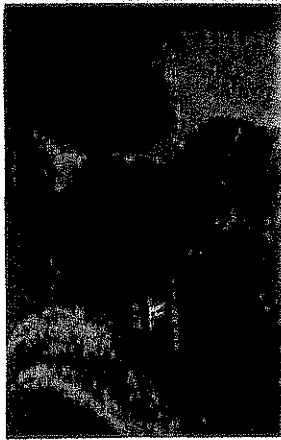
Endangered Wildlife Do you enjoy hiking, camping, or nature photography? Each of these activities depends on **wildlife**. Wildlife is the plants and animals that live in an area.

During the past two hundred years, hundreds of kinds of plants and animals, have died out, or become extinct (EX-tink). Once a kind of living thing becomes extinct, it will never return. Today other kinds of plants and animals are in danger of becoming extinct. Plants and animals in danger of becoming extinct are considered endangered. The African elephant is an endangered animal. There are very few African elephants left. Other kinds of living things are threatened. Their numbers are going down.

▶ **Define:** What is wildlife?



Loss of Living Space Many places where wildlife live are being destroyed. Loss of living space is the main threat to wildlife. As the number of



people on the earth increases, people use up more and more space. Land that was once covered with forest is now used for cities, farms, roads, and industries. One place living space is being rapidly destroyed is in tropical rain forests. About one-third of the kinds of plants and animals that live on the earth live in tropical rain forests.

▶ **Identify:** What is the major threat to wildlife today?

Laws and Wildlife One way to conserve wildlife is to pass laws that protect wildlife. Laws have been passed setting up rules for hunting and fishing. In recent years, some countries have passed laws stopping the use of certain pollutants. Laws also have been passed to stop the places where wildlife live from being destroyed.

▶ **Describe:** How have laws helped to protect wildlife?

Wildlife Parks and Refuges Have you ever visited an animal refuge (REF-yooj), a National Park, or a zoo? An animal refuge is an area where wildlife is protected. Wildlife also is protected in National Parks. Setting up animal refuges and National Parks conserves wildlife. Zoos also help conserve wildlife. Breeding programs at zoos have helped save some kinds of animals from extinction. Endangered animals are bred at many zoos. They are then returned to their natural environment.

▶ **State:** List two ways to conserve wildlife.

Name _____

Class _____

Date _____

14-8 What is wildlife conservation?

Lesson Review

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

Column A

1. all of the plants and animals that live in an area
2. living things that are in danger of becoming extinct
3. kinds of living things that are no longer found alive
4. loss of this is the greatest threat to wildlife
5. living things whose numbers are decreasing
6. area where living things are protected from harm

Column B

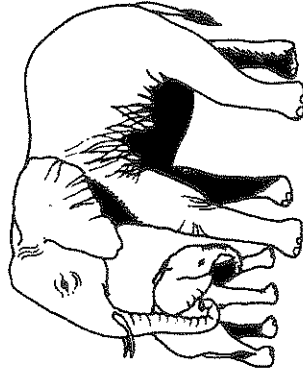
- a. extinct
- b. threatened
- c. endangered
- d. wildlife
- e. living space
- f. refuge

Skill Challenge

Skills: analyzing, applying concepts

Read the passage about African elephants. Then, suggest three ways that could be used to help protect this animal from becoming extinct.

African elephants are large animals that are killed for the ivory contained in their tusks. The number of African elephants still living is decreasing very quickly. As a result, the African elephant is in danger of becoming extinct.



Suggestions:

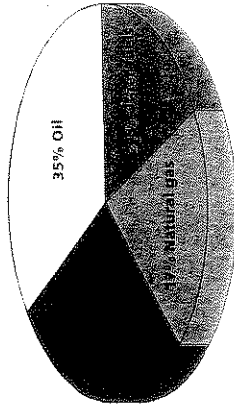
14-9 What are energy resources?

Objective ▶ Name and describe the main sources of energy.

TechTerms

- ▶ **hydroelectric** (HY-droh-ih-LEK-trik) **power**: electrical energy produced from moving water
- ▶ **kinetic** (KI-NET-ik) **energy**: energy of motion
- ▶ **potential** (pub-TEN-shul) **energy**: stored energy

Fossil Fuels Fossil fuels are the main sources of energy. Oil, coal, and natural gas are fossil fuels. Fossil fuels are used to produce electricity and

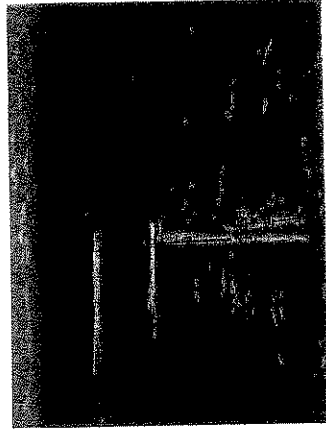


heat. They also are needed to run cars, trucks, and machines.

Large amounts of fossil fuels are being used up rapidly. It is important for everyone to conserve energy to avoid running out of fossil fuels. There are ways people can conserve energy. Driving to school or work in carpools helps save oil. Lowering the heat saves gas or oil. Turning off unneeded lights saves coal and oil burned to produce electricity.

Match: What are the three main sources of energy in the world?

Hydroelectric Power Water running downhill has **kinetic** (KI-NET-ik) **energy**. Kinetic energy is the energy of motion. Water stored behind a dam has **potential** (pub-TEN-shul) **energy**. Potential



energy is stored energy. When this water falls to a lower level, its potential energy changes to kinetic energy.

The kinetic energy of moving water can be used to produce electricity, or electrical energy. Electrical energy produced by moving water is called **hydroelectric** (HY-droh-ih-LEK-trik) **power**. The moving water turns the blades of a turbine (TUR-byne). The turbine drives an electric generator (JEN-uh-ray-ter). Today falling water is used to produce about one-fourth of the world's electricity.

A place where moving water produces electricity is called a hydroelectric plant. Hydroelectric plants do not pollute the air. Their energy source, moving water, is renewable.

Recognize: What are two advantages of hydroelectric plants?

Wind Energy The energy from moving air, or wind energy, is a renewable resource. Windmills have been used for years. Farmers use windmills to pump water. Windmills also are used to produce electricity. In California, thousands of windmills are used to make electricity. Windmills do not pollute the air, but there is one big problem. What happens on a windless day? There are not many places where there is a steady wind blowing.

Explain: What are windmills being used for today?

14-9 What are energy resources?

Lesson Review

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

Column A

1. oil, coal, and natural gas
2. stored energy
3. electrical energy produced from moving water
4. energy of motion
5. energy from moving air
6. place where moving water produces electricity
7. drives an electric generator in a hydroelectric plant
8. used to produce electricity from moving air

Column B

- a. hydroelectric plant
- b. wind energy
- c. kinetic energy
- d. potential energy
- e. fossil fuels
- f. hydroelectric power
- g. windmill
- h. turbine

Skill Challenge

Skills: organizing, relating concepts

Complete the table. Then answer the questions.

Table 1 Characteristics of Energy Resources

Energy Source	Renewable or Nonrenewable?	Source of Pollution?	Kind of Energy Produced
Fossil Fuels	1.	2.	3.
Hydroelectric Power	4.	5.	6.
Windmill	7.	8.	9.

10. What is one problem with using windmills for energy? _____

11. Why is it important to conserve fossil fuels? _____

12. What are two advantages of producing electricity in hydroelectric plants? _____

14-10 What are future energy sources?

Objective ▶ Describe five energy resources.

TechTerm

- ▶ **geothermal** (jee-oh-THER-muh) **energy**: energy produced from heat inside the earth
- ▶ **nuclear** (NOO-klee-ar) **energy**: energy produced by breaking apart atoms
- ▶ **solar cells**: structures that change sunlight into electricity

Solar Energy Energy from sunlight, or solar energy, is an energy resource. Solar energy is used to heat some homes. These houses have solar collectors on their roofs. Solar collectors collect the sun's energy. Solar energy also can be used to produce electricity. Special structures called solar cells change sunlight into electricity. Solar energy is a renewable resource. It does not pollute the earth. However, solar energy is a good source of energy only in places with lots of sunlight.

Define: What are solar cells?

Nuclear Energy Energy that is produced by breaking apart atoms is called nuclear (NOO-klee-ar) energy. When atoms are split, energy is given off as heat. This heat can be used to produce

electricity. Uranium often is used as the nuclear fuel.

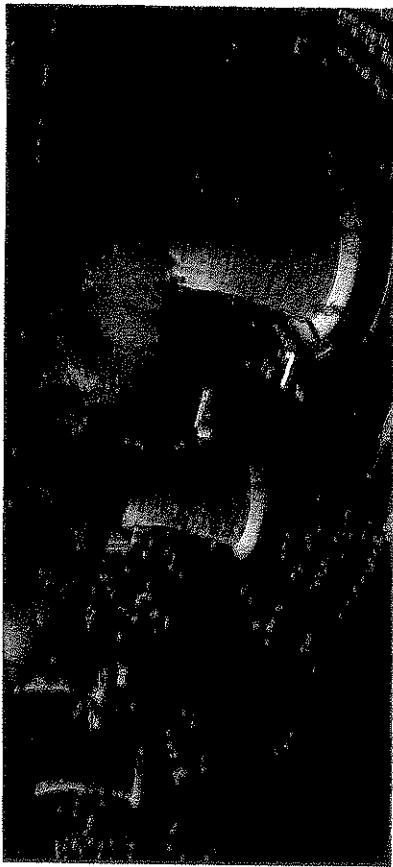
Today, nuclear power plants have been built in many places. However, there are drawbacks to using nuclear energy. Radiation is produced in nuclear reactors. An accident could release deadly radiation. Dangerous radioactive wastes also are produced. Storing and getting rid of these wastes is a problem.

Identify: What are some problems using nuclear energy?

Geothermal and Tidal Energy Heat produced inside the earth is **geothermal** (jee-oh-THER-muh) energy. Geothermal energy causes groundwater to boil and change to steam. In some places in the world, the steam is used to produce electricity for homes. In Iceland, about 80% of the homes get their hot water and heat from geothermal energy.

Tidal energy is the energy of rising and falling tides. Tidal energy can be used to produce electricity. However, it can be used only near a shoreline where tides are very high and very low.

Describe: How is geothermal energy used to produce electricity?



14-10 What are future energy sources?

Lesson Review

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

1. Solar energy is energy from the wind.
2. Energy produced by breaking apart atoms is nuclear energy.
3. Geothermal energy comes from heat inside homes.
4. Geothermal energy causes groundwater to boil and change to steam.
5. When atoms are split, energy is given off as light.
6. One of the drawbacks of nuclear energy is the radiation that is produced as a waste.
7. Energy produced by rising and falling tides is hydroelectric energy.
8. Sunlight can be changed into electricity by splitting atoms.

Skill Challenge

Skills: diagramming, sequencing

In the space provided, draw a flowchart that shows how sunlight can be used to produce electricity. Be sure to include solar collectors and solar cells in your flowchart.