Name _____ Date _____ Class _____

Freshwater Pollution

#Please Annotate
#Complete questions on the back.

Guide for Reading

- What is one way that sources of pollution are classified?
- What are four sources of water pollution?
- What are the two parts of the solution to water pollution?

The addition of any substance that has a negative effect on water or the living things that depend on water is called **water pollution.** Water pollution can affect surface water, groundwater, and even precipitation. The substances that cause water pollution are called **pollutants.** Types of pollutants include disease-causing organisms, pesticides and fertilizers, industrial chemicals, metals, radioactive wastes, and petroleum products.

Sources of polution are classified, in part, on how they enter a body of water. A **point source** is a specific source of pollution that can be identified, such as a leaking pipe. A **nonpoint source** is a widely spread source of pollution that can't be tied to a specific point of origin, such as runoff from a highway. **The three major sources of water pollution are human wastes, industrial wastes, and chemical runoff.**

Dumping human wastes into drinking water can spread disease because human wastes contain disease-causing organisms. Water treatment usually kills bacteria. During heavy rains and floods, sewage from sanitary sewers can pollute the drinking water. In rural areas, livestock wastes that run off into water supplies can also be a problem.

Water pollution from factories and mines is a more common problem than sewage in most areas. Some factories release toxic chemicals directly into nearby waters. Smoke and exhaust from power plants, factories, and vehicles release chemicals into the atmosphere. The result is rain or other forms of precipitation that are more acidic than normal, called **acid rain.** Warm water from factories can also act as a pollutant by changing the temperature of streams or ponds into which it is discharged.

Agricultural chemicals that can enter surface water in runoff from fields include fertilizers and pesticides. **Pesticides** are chemicals intended to kill insects and other organisms that damage crops. When pesticides are washed from fields by rain or irrigation, they can harm other organisms. Runoff from roads is another source of pollution. Gasoline, oil, and salt in road runoff pollute rivers, lakes, and groundwater. **Solving pollution problems involves cleaning up existing problems as well as preventing new ones.**

Many pollutants are eventually removed from bodies of fresh water through natural cleaning processes. Living things in lakes, streams, and wetlands filter out and break down waste materials. Plant roots filter larger particles from water, and certain bacteria break down toxic chemicals in rivers and lakes. The rock and sand of an aquifer naturally filter and purify groundwater.

Name _____ Date _____ Class _____

Freshwater Pollution

Understanding Main Ideas

Fill in the spaces in the table below.

Freshwater Pollutants

Pollutant	Major Source of Pollution	Point or Nonpoint Source
Sewage leaking from pipe	Human Waste	1. _____
Toxic wastes leaking from barrels	2. Industrial Waste	Point source
Salt sprinkled on roads	Runoff from roads	3. _____
Chemicals from factory dumped into a river	Industrial waste	4. _____
Fertilizer in runoff	5. Agricultural Runoff	Nonpoint source

Answer the following on a separate sheet of paper.

6. How can water pollution be cleaned up naturally?
7. Explain how runoff from farms can affect ponds and streams.

Building Vocabulary

Fill in the space to complete each statement.

8. Chemicals intended to kill insects and other organisms that damage crops are called _____.
9. The addition of any substance that has a negative effect on water or the living things that depend on water is called _____.
10. Rain and other forms of precipitation that are more acidic than normal are called _____.

Name _____ Date _____ Class _____

Water Supply and Demand

Guide for Reading

#Please Annotate!

- How do people use water?
- What are some ways to conserve available fresh water?
- What are some possible sources of water for the future?

People use water for household purposes, industry, agriculture, transportation, and recreation. As you know, water is constantly recycled in the water cycle. However, sometimes water is used faster than it can be replaced by precipitation. A water shortage occurs when there is too little water or too great a demand on an area—or both. A water shortage may occur because of natural processes, or it can occur because of rapidly growing human needs.

Think of all the ways water is used in the home. There are many demands on water for home use. Industries use water. For example, power plants and steel mills need huge volumes of water to cool hot machinery.

Water has also been used transport people and goods since ancient times. If you look at a map of the United States, you will notice that many large cities are located on coasts. Ocean travel led to the growth of these port cities. In early America, rivers also served as natural highways.

Water is also needed for agriculture. However, some areas don't receive enough regular rainfall for agriculture. In such places, farmland must be irrigated. **Irrigation** is the process of supplying water to areas of land to make them suitable for growing crops.

During a water shortage, people often try to avoid wasting water. **Conservation** is the practice of using less of a resource so that it will not be used up. **Reducing water use, recycling water, and reusing water are three ways to conserve water.**

As the use of water in the world increases, so does the need for water. An obvious place to find a new source for water is the ocean. For thousands of years, people have tried to make fresh water from salt water. One possible method of obtaining fresh water from salt water is called **desalination.** A technique called distillation involves boiling water so that it evaporates, leaving the salt behind. The water vapor is then condensed to produce liquid fresh water. Freezing salt water, flowing salt water through a filter, and melting icebergs are also possible methods of meeting future water needs.

Name _____ Date _____ Class _____

Water Supply and Demand

Understanding Main Ideas

Complete the table below by stating whether each situation generally increases or reduces the water supply.

Situation	Affects Water Supply
A drought occurs throughout a region.	1. Reduces
A city builds a desalination plant.	2. _____
Water is pumped from an aquifer faster than the aquifer can be recharged.	3. _____
A new mining company begins using water to flush out the mines that it digs.	4. _____
A wastewater treatment plant pumps water into shallow ponds to feed an aquifer.	5. _____

Answer the following on a separate sheet of paper.

6. How does carrying irrigation water into fields through open ditches waste water?
7. Give an example of water conservation in industry.

Building Vocabulary

Fill in the blank to complete each statement.

8. The process of obtaining fresh water from salt water is called _____.
9. A process of supplying water to areas of land to make them suitable for growing crops is called _____.
10. Using a resource wisely so that it will not be used up is called _____.

Name _____ Date _____ Class _____

Water to Drink

#Please Annotate!

Guide for Reading

- What factors affect water quality?
- Why is drinking water often treated before people drink it?
- What happens to wastewater in most communities?

Water quality is a measurement of those substances in water other than water molecules. **Some substances, such as iron, can affect the taste or color of water but are harmless unless present at very high levels. Other substances, such as certain chemicals and microorganisms, can be harmful to health.** In the United States, the Environmental Protection Agency (EPA) is responsible for developing water-quality standards. These standards set concentration limits for certain substances. A **concentration** is the amount of one substance in a certain volume of another substance.

The pH level of water also affects its quality. The **pH** of water is a measurement of how acidic or basic the water is, on a scale of 0 to 14. Pure water has a pH of 7—it is neutral, meaning that it is neither an acid nor a base.

The combined level of two minerals, calcium and magnesium, in a sample of water is referred to as the **hardness** of that sample. Hard water contains high levels of calcium and magnesium. Soft water, on the other hand, contains lower levels of calcium and magnesium.

How can you be sure that the quality of water is good? **Water from both public and private supplies often needs some treatment to ensure that it is clean and safe to drink.** The first step in treating water from a lake is usually filtration. **Filtration** is the process of passing water through a series of screens that allow the water through, but not larger, solid particles.

In the second step, a chemical such as alum is added to cause sticky globs, called flocs, to form. Other particles in the water stick to the flocs in a process called **coagulation.** The heavy clumps sink to the bottom in the settling basins. The water is then filtered again.

What happens after used water goes down the drain? The wastewater and the different kinds of wastes in it are called **sewage. Two ways that communities handle sewage are septic systems and wastewater treatment plants.** Most communities treat their wastewater to make it safe to return to the environment.

Name _____ Date _____ Class _____

Freshwater Resources ▪ *Review and Reinforce*

Water to Drink

Understanding Main Ideas

Complete the flowchart by filling in the spaces with the names of the steps.

Drinking-Water Treatment

1. _____ Fish, leaves, and trash removed.
2. _____ Alum is added to form flocs.
3. Settling Basins Water and flocs sink.
4. _____ Water trickles through sand or gravel.
5. Disinfection Chlorine is added to kill organisms.
6. Aeration Bubbling air through the water reduces unpleasant odors and taste.
7. Additional Treatment Minerals are added to soften the water.

Building Vocabulary

Match each term with its definition by writing the letter of the correct definition on the line beside the term in the left column.

____ 8. filtration	a. a measurement of how acidic or basic a substance is
____ 9. concentration	b. wastewater and the different kinds of wastes in it
____ 10. pH	c. forming of heavy clumps
____ 11. hardness	d. the toal amount of calcium and magnesium in water
____ 12. water quality	e. process of passing water through a series of screens that allow the water to pass, but not solid particles
____ 13. sewage	f. the amount of one substance in a certain volume of another substance
____ 14. coagulation	g. the measurement of substances in water other than water molecules