

Chapter Quiz

Write your answers on a separate sheet of paper.

1. Where does food go after you have chewed it?
2. Where does food go that is not digested?
3. What systems get oxygen to the cells?
4. Where do the bronchi lead?
5. What two byproducts do you breathe out into the air?
6. What do the valves of the heart do?
7. What are the three different kinds of blood vessels?
8. What are three solids found in blood? Describe their jobs.
9. Is high blood pressure good for a person or bad? Explain your answer.
10. What can you do to keep your heart healthy?

Test Tip

Reread your answers to all the questions. Be sure that you have answered both parts of any two-part question.

Research Project

CPR stands for cardiopulmonary resuscitation. It is a procedure used to save lives. It is a way to restart a person's heart and breathing. A person who has stopped breathing is not taking in oxygen. Do some research on CPR. Find out when it is used, the basics of the procedure, and how you can learn CPR in your community. Write a report on what you find out.



The foods we eat can help our bodies grow strong. These people are eating many different kinds of foods. Why is it important to eat a variety of foods?

Learning Objectives

- Explain the causes of disease.
- Describe how the immune system fights disease.
- Identify the nutrients needed for a healthy diet.
- Describe the Food Guide Pyramid.
- Explain how to guard your health.
- LAB ACTIVITY: Compare the nutrients in different foods.
- ON-THE-JOB SCIENCE: Apply using the Food Guide Pyramid to serving healthy foods.

Words to Know

disease	a kind of illness or sickness, often caused by tiny organisms such as bacteria
defense	a way your body fights off harmful organisms
virus	a very small disease-causing particle
nutrition	the study of food and eating right to stay healthy
nutrient	a substance usually found in food that body cells need to stay healthy and grow
carbohydrate	a sugary or starchy food that gives people energy
fat	a nutrient in foods that supplies the body with energy
cholesterol	a substance found in some fats and also in the body, which is needed in small amounts
protein	a nutrient in foods that builds and repairs body tissues
vitamin	a nutrient found in tiny amounts in many plant and animal foods; it is needed by the body to stay healthy
mineral	an inorganic substance found in water and some foods; tiny amounts of some minerals are needed by the body to stay healthy

12-1**Fighting Disease****Words to Know**

disease	a kind of illness or sickness, often caused by tiny organisms such as bacteria
defense	a way your body fights off harmful organisms
virus	a very small disease-causing particle

What Is Disease?

A **disease** is a kind of illness or sickness. Many diseases are caused by tiny organisms, such as bacteria. Some diseases, like the common cold, are not usually serious. Other diseases are very serious.

In the 1300s, a terrible disease swept through Europe. Almost a quarter of the population died of it in only 20 years. The disease was called the Plague, or the Black Death. No one knew how it started or how it was passed along. Today we know that bacteria caused the Plague.

Since the 1300s, scientists have learned a lot about what makes people sick. They have also learned a lot about how to prevent disease. They know that people can catch diseases from other animals. For example, mosquitoes, fleas, and pigs can carry disease.

Humans also pass diseases to one another. This is why it is important to cover your mouth when you cough or sneeze. It is also why you should wash your hands often.

✓ **How do people usually catch diseases?**

**Science Fact**

The bacteria that started the Plague of the 1300s infected rats. Fleas bit the rats. The fleas then spread the bacteria to humans. The Plague still exists. However, there are now medicines to treat it.

The Immune System

The human body has many ways to fight disease. These are your defenses. A **defense** is a way your body fights off harmful organisms. Your immune system defends you from harmful organisms.

Skin and Hair

The skin is an important defense. It keeps harmful microscopic organisms from reaching most of your organs. The hairs in your nose also keep harmful organisms out of your body. These hairs filter the air you breathe.

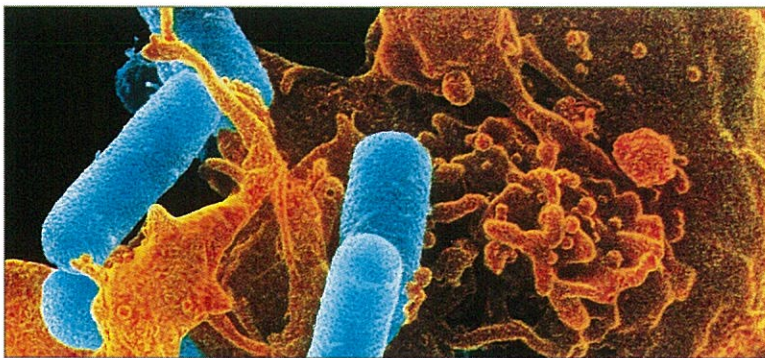
White Blood Cells

Some bacteria still find their way into the body. The white blood cells then go to work to destroy the invaders. Suppose that bacteria enter your body. White blood cells in the blood will surround the bacteria and try to break them down. The bacteria may reproduce faster than the white blood cells can handle, though. In that case, your body will begin to produce more white blood cells. Until there are enough to fight off the invader, you might feel very sick.

Your immune system works best when you are already healthy. If you eat right and get enough exercise and rest, there is less chance of your getting sick.

Remember

White blood cells are found in the circulatory system along with red blood cells and platelets.



This white blood cell is attacking some bacteria, shown here in blue.

✓ What does the immune system do for the human body?



Close-up of a virus

Viruses

A **virus** is a very small disease-causing particle that is often mostly DNA. It is smaller than a bacterium. Viruses cause many diseases, such as AIDS, influenza (the flu), colds, polio, chicken pox, measles, and mumps.

Scientists still do not fully understand viruses. In fact, they are not even sure whether viruses should be considered living or nonliving particles.

Viruses do not appear to be alive. They do not carry out normal cell functions. Viruses invade living cells. Once in a cell, the virus uses parts of the cell to make more viruses. The cell itself is eventually destroyed.

Many diseases caused by viruses can now be prevented. Some, though, are still deadly.

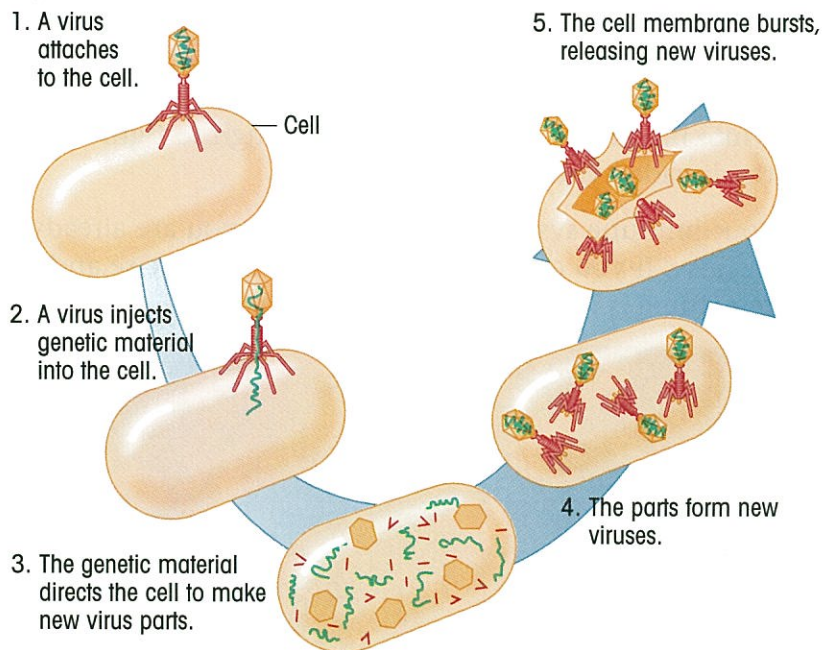


Figure 12-1 *This virus is taking over a cell.*

✓ How do viruses cause disease?

Lesson Review

1. What are some differences between bacteria and viruses?
2. What are some diseases caused by viruses?
3. **CRITICAL THINKING** What happens if bacteria find their way into your body?

A Closer Look

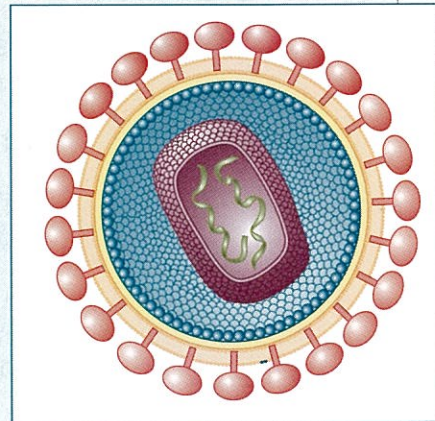
THE FIGHT AGAINST AIDS

AIDS stands for *acquired immune deficiency syndrome*. It is a disease caused by a virus. This virus is called *human immunodeficiency virus*, or HIV. AIDS harms the body's ability to fight other diseases. Since the disease was first recognized in 1981, over 30 million people have been infected with HIV. Over 10 million people have died from AIDS. There is still no known cure.

However, there are ways to protect yourself from getting AIDS. HIV is passed through bodily fluids. It is passed along in four main ways: 1) through sexual contact; 2) by sharing needles used for drugs; 3) through a transfusion of blood from a person who was infected; 4) from a pregnant woman who has AIDS or HIV and passes it to her unborn child. You *cannot* get HIV from mosquitoes, shaking hands, or being near or touching someone with AIDS or HIV.

Some medicines exist to help control HIV. In some cases, medicines have kept people who have HIV from getting AIDS. Scientists are working hard to develop medicines that will stop the spread of HIV.

CRITICAL THINKING How can you avoid getting AIDS?



This is the AIDS virus, called HIV.

Words to Know

nutrition	the study of food and eating right to stay healthy
nutrient	a substance usually found in food that body cells need to stay healthy and grow
carbohydrate	a sugary or starchy food that gives people energy
fat	a nutrient in foods that supplies the body with energy
cholesterol	a substance found in some fats and also in the body, which is needed in small amounts
protein	a nutrient in foods that builds and repairs body tissues
vitamin	a nutrient found in tiny amounts in many plant and animal foods; it is needed by the body to stay healthy
mineral	an inorganic substance found in water and some foods; tiny amounts of some minerals are needed by the body to stay healthy

You Are What You Eat

Have you ever heard the expression, “You are what you eat”? There is certainly some truth to that. If you eat well, you are more likely to feel well and avoid disease. The study of food and eating right to stay healthy is called **nutrition**.

Good nutrition requires eating the right combination and amounts of nutrients. A **nutrient** is a substance usually found in food that body cells need to stay healthy and grow. There are six main kinds of nutrients: carbohydrates, fats, proteins, vitamins, minerals, and water. If any of these nutrients is missing from your diet, your health may be in danger.

✓ What is good nutrition?



Science Fact

Rickets is a painful disease that weakens bones. It is caused by a lack of Vitamin D. You can get Vitamin D by eating tuna, salmon, or eggs, or drinking milk that has Vitamin D added to it.

The Nutrients

Carbohydrates

A **carbohydrate** is a sugary or starchy food.

Carbohydrates give you energy. Fruits, vegetables, grains, potatoes, and pasta are all sources of carbohydrates.

Another kind of carbohydrate is fiber. Humans cannot digest fiber, but it helps move food and wastes through the digestive system. Fiber is found in whole grains and the skins of fruits and vegetables.

Fats

A **fat** is a nutrient in food that also supplies the body with energy. However, your body does not break down fats as quickly as it does carbohydrates. Most people eat more fat than they should. Fat can build up on blood vessel walls and lead to heart disease. Butter, ice cream, and red meat are all sources of unhealthy fat.

Cholesterol is a substance found in some fats and also in the human body. You need small amounts of it to digest food and produce certain substances in the body.

However, too much cholesterol can be unhealthy. Cholesterol causes fat to build up in the arteries and block the flow of blood.

It is a good idea for people to limit the amount of cholesterol from animal fats in their diet. Eating less red meat and fewer eggs and foods containing butter, cheese, or cream helps. Also, adults should have their cholesterol levels checked by a doctor once a year.

Proteins

Foods containing the nutrient **protein** build and repair body tissue. Almost every part of your body is made of protein. This includes your hair, fingernails, blood, muscles, and organs. Meat, fish, nuts, beans, and dairy products are all sources of protein.

Remember

There are three ways to help prevent heart disease.

1. Do not smoke.
2. Cut back on fatty foods.
3. Get plenty of exercise.

Some Vitamins Used by the Body	
Vitamin	Used by Body For
A	Normal sight; healthy skin; defending against infection
B	Nerve and heart functions
C	Bone tissue and growth; healing wounds
D	Bone growth and repair

Some Minerals Used by the Body	
Mineral	Used by Body For
Potassium	Nerve and muscle functions
Calcium	Boot and tooth growth
Iron	Forming red blood cells and muscle cells

Vitamins and Minerals

To stay healthy, people need vitamins in their diet. A **vitamin** is a nutrient found in tiny amounts in many plant and animal foods. A **mineral** is an inorganic substance found in water and some foods. The body needs tiny amounts of some minerals to stay healthy. Potassium, calcium, and iron are examples of minerals the body needs.

Many people take vitamin and mineral pills. Some scientists believe that taking a few of these nutrients in large amounts can prevent disease. Others say that a well-balanced diet with a variety of foods gives you all the vitamins and minerals you need.

Water

Water is also an important nutrient. All body cells contain water. To stay healthy, it is important to drink 8 glasses of water a day.

 **What are the six kinds of nutrients?**

The Food Guide Pyramid

Eating the right amount of nutrients takes practice. Your meals throughout the day should contain a balance of nutrients.

Scientists have created a tool to help you choose foods for a healthy diet. That tool is called the Food Guide Pyramid.

The Food Guide Pyramid groups foods according to the number of servings you should eat daily. The foods you should eat most often are at the bottom of the pyramid. For a healthy diet, start with plenty of bread, cereal, rice, pasta, fruits, and vegetables. Then add foods from the milk group and the meat group. Keep in mind that the meat group not only includes meat, fish, and poultry but also eggs, dry beans, and nuts.

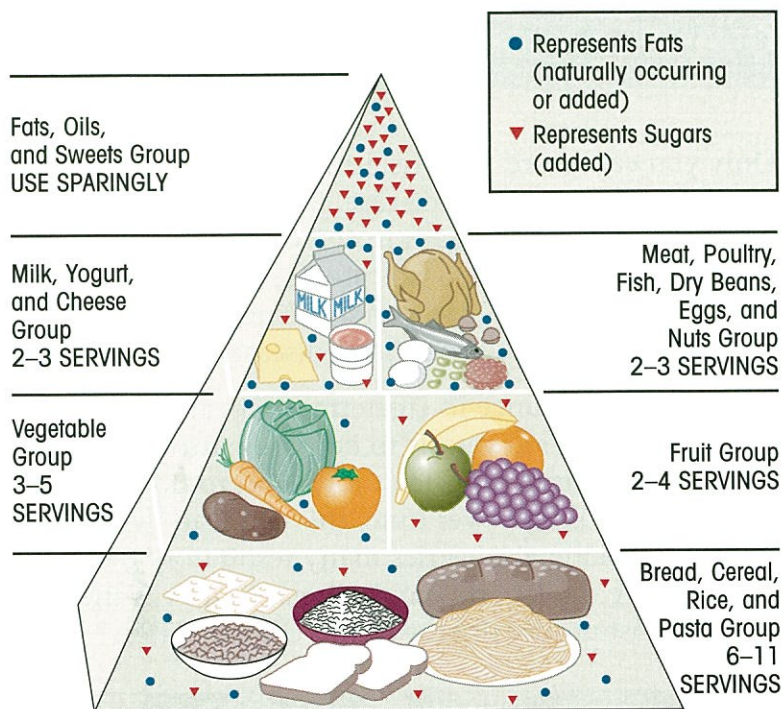


Figure 12-2 *The Food Guide Pyramid shows what you should eat every day.*

Notice that fats, oils, and sweets are at the top of the pyramid. They take up the least amount of space. That means you should eat them the least of all foods.

✓ **What three food groups should most of your foods come from, according to the Food Guide Pyramid?**

Lesson Review

1. What nutrients do you need to stay healthy?
2. Why should people be concerned about cholesterol?
3. What is the purpose of the Food Guide Pyramid?
4. **CRITICAL THINKING** Using the Food Guide Pyramid, how would you change a diet that was too high in fat?

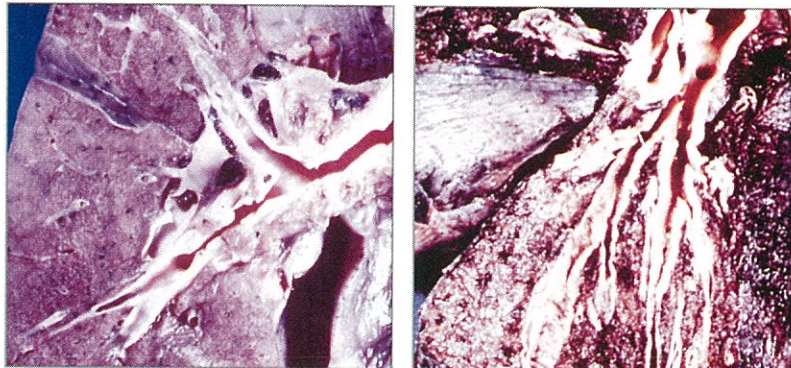
Only you can guard your health. In Chapter 11, you learned about heart disease. Heart disease is the number one cause of death in the United States. Good nutrition is one way you can protect yourself against heart disease. Not smoking and getting exercise will also help protect you from heart disease.



Safety Alert

People can get addicted to substances, such as nicotine, caffeine, alcohol, certain medicines, and illegal drugs. *Addicted* means “having a habit that cannot be broken easily.” People addicted to a substance can have serious health problems and should get help.

Nicotine is a substance in cigarettes that can make you sick. It causes blood vessels to become narrow. Narrow blood vessels make it difficult for blood to flow freely through your body. Over time, this can lead to heart disease. Smoking also causes many respiratory diseases such as lung cancer and emphysema. Cancer is the second most deadly disease in the United States.



This photo compares the lung of a non-smoker with the lung of a smoker.

Exercise keeps your muscles in good working order. Your heart is a big muscle. It needs exercise just as other muscles in your body do. By exercising, you keep your heart strong. Exercise also keeps your blood vessels open wide. This helps prevent heart disease.

✓ **What are three ways to guard your health?**

Lesson Review

1. How does nicotine affect the body?
2. What are the benefits of exercise?
3. **CRITICAL THINKING** How can you best protect yourself from heart disease?

On the Cutting Edge

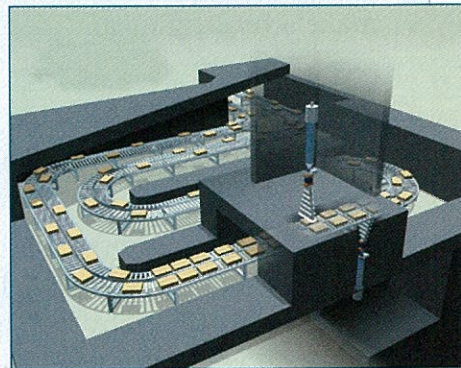
USING ELECTRICITY TO KILL BACTERIA

Every year, millions of people become sick by eating foods that contain harmful bacteria. Scientists have tried to develop ways to stop the bacteria from growing in the foods we buy. One process that many companies use to kill bacteria in food is called *gamma irradiation*. However, some groups are concerned about the safety of this process, which exposes the food to harmful rays.

Now there is a new process that kills 99.9 percent of the bacteria found in food and may be safer than gamma irradiation. The new process is called *electronic pasteurization*. It uses electricity to stop bacteria from reproducing. It does not change the taste or quality of the food.

The U.S. government has approved the new process. Electronically pasteurized foods should appear in markets soon.

CRITICAL THINKING Why is it important to kill bacteria in the food we buy?



This is a model of an electronic pasteurization factory.



LAB ACTIVITY

Making a Healthy Meal

BACKGROUND

Healthy meals provide a variety of nutrients in the right amounts. So, to plan healthy meals, you need to know what nutrients the foods contain.

PURPOSE

You will use the number of grams of protein, carbohydrate, and fat in different foods to make a healthy meal.

MATERIALS

paper, pencil

WHAT TO DO

1. Look at the list of foods to the right.
2. Choose foods from the list to make a healthy lunch. Write your choices in a notebook. Try to make a lunch that has about 20 grams of fat, 20 grams of protein, and 90 grams of carbohydrates. You can be a few grams over or under for each nutrient.
3. You can choose more than one serving of a food, but try to use a variety of foods.

DRAW CONCLUSIONS

- What can you say about the variety of foods you chose?
- Raul and Katrina make meals that each include 20 grams of fat, 20 grams of protein, and 90 grams of carbohydrates. Raul's meal includes two kinds of foods. Katrina's meal includes six kinds of foods. Which meal is probably healthier? Explain why.

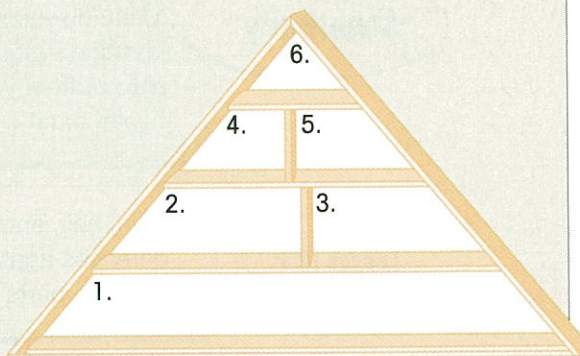
Food	Serving Size	Protein (grams)	Carbohydrate (grams)	Fat (grams)
Banana	1		30	
Apple	1		15	
Pork chop	1 oz	7		5
Chicken (white)	1 oz	7		1
Rice	1/3 cup	3	15	
Biscuit	1	3	15	5
American cheese	1 slice	7		8
Skim milk	8 oz	8	12	1
Whole milk	8 oz	8	12	5
Broccoli (cooked)	1/2 cup	2	5	
Beans	1/3 cup	3	15	1
Pasta	1/2 cup	3	15	1
Bread	1 slice	3	15	1
Spaghetti sauce	1/2 cup	3	15	5
Tuna	1 oz	7		1
Juice (grape or cranberry)	1/3 cup		15	

ON-THE-JOB SCIENCE

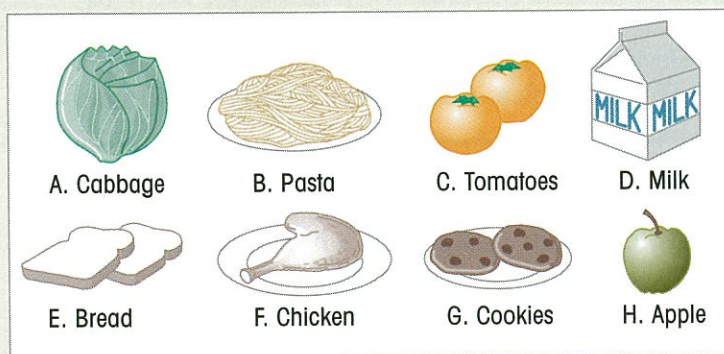
Cafeteria Attendant

Shawn is a cafeteria attendant. He works half-days at an elementary school. He helps serve breakfast and lunch to the students.

Shawn built a wooden Food Guide Pyramid with shelves in the shape of a triangle. Each day, he displays the breakfast and lunch foods in the pyramid. This helps the students learn more about nutrition and shows that they are getting healthy meals.



Help Shawn display the foods for today's lunch.



Draw an outline of the pyramid on a sheet of paper. Number the sections 1 to 6. Then write the letter of each food shown above in the correct section of the Food Guide Pyramid. Use the pyramid on page 177 to help you.

Critical Thinking

A student asked Shawn if he could have another serving of cookies instead of the apple. What should Shawn say about the nutrition of this meal?

Summary

Many diseases are caused by bacteria and viruses. Your immune system helps you avoid disease. You can also help protect yourself from getting sick by following good health habits.

Lesson 12.1

Skin, hair, and white blood cells form your body's defenses against disease. Viruses invade living cells and use parts of the invaded cell to make more viruses.

Lesson 12.2

You need the right balance of nutrients in your diet to stay healthy. The six nutrients are: carbohydrates, fats, proteins, vitamins, minerals, and water.

Lesson 12.3

Having good nutrition, getting exercise, and not smoking are ways you can help protect yourself from disease.

Vocabulary Review

Complete each sentence with a term from the list.

virus
vitamin
disease
protein
carbohydrate
defense
nutrition
cholesterol

1. A _____ is a kind of illness or sickness.
2. A way your body fights off harmful organisms is called a _____.
3. A _____ invades living cells.
4. The science of food and eating right is called _____.
5. A sugary or starchy food is a _____.
6. People often take a _____ pill to get more of this nutrient, which is found mostly in fruits and vegetables.
7. You should limit the amount of _____ in your diet.
8. A nutrient that builds and repairs body tissue is called a _____.

Chapter Quiz

Write your answers on a separate sheet of paper.

1. What are three animals that carry diseases?
2. How do hairs in your nose help your body fight diseases?
3. How do white blood cells destroy bacteria?
4. What are three diseases caused by viruses?
5. What are the six kinds of nutrients you need for a healthy diet?
6. What do carbohydrates do for your body?
7. If you needed more protein in your diet, what foods would you need to eat?
8. What kinds of foods should you eat the least of? Why?
9. What are two diseases caused by smoking cigarettes?
10. How does exercise help you to stay healthy?

Test Tip

When you are asked questions that begin with *How* or *Why*, answer in complete sentences. Read your answers to make sure they are sentences and that they answer the question.

Research Project

Make a poster of a food pyramid based on the Food Guide Pyramid on page 177. Look through newspapers and magazines for pictures of foods. Choose one food from each food group to research. Find out how many grams of protein, carbohydrates, and fat are in one serving of each. Also look for amounts of cholesterol. Put all of this information on the poster.



Zebras live in Africa on grasslands called savannas. What living things do zebras need to live and grow? What nonliving things do zebras need?

Learning Objectives

- Identify resources that are recycled in nature.
- Compare populations and communities.
- Describe how organisms interact with nonliving things in an ecosystem.
- Give an example of a food chain and a food web.
- Identify energy sources from the past.
- Explain the water and air cycles.
- Identify reasons for conserving natural resources.
- LAB ACTIVITY: Make models of food chains.
- SCIENCE IN YOUR LIFE: Relate recycling of garbage to preserving natural resources.