Do you practice healthful nutrition habits? Go to health.glencoe.com and take the Health Inventory for Chapter 4 to find out how you rate.

Collect four sheets of paper, and place them $\frac{1}{2}$ apart. Roll up the bottom edges, stopping them $\frac{1}{2}$ from the top edges. This makes all tabs the same size. Crease the paper to hold the tabs in place and staple along the fold. Label the tabs as shown.

Vocabulary
- Water
- Minerals
- Vitamins
- Fats
- Proteins
- Carbohydrates

Six Major Nutrients
- Carbohydrates
- Proteins
- Fats
- Vitamins
- Minerals
- Water

Before You Read
Make this Foldable to help you organize what you learn in Lesson 1 about the six types of nutrients. Begin with four plain sheets of $8\frac{1}{2} \times 11$ paper.

As You Read
Record information on each type of nutrient and define key vocabulary terms under the appropriate tab.
Nutrients for Health

The Six Major Nutrients

Eating healthful food helps you feel good and do your best. Nutrients are substances in foods that your body needs in order to grow, have energy, and stay healthy. The six categories of nutrients are described below.

Carbohydrates, Proteins, and Fats

Carbohydrates are the starches and sugars that provide energy. Starches are complex carbohydrates. They are found in foods such as rice, pasta, breads, potatoes, beans, and corn. Sugars are simple carbohydrates. They occur naturally in milk, fruit, and honey. Sugar is also added to many foods.

Proteins are nutrients used to repair body cells and tissues. Proteins are made up of amino acids. Complete proteins contain all the essential amino acids. They are found in foods from animal sources, such as meat, dairy products, and eggs. Plant foods lack one or more essential amino acids, so they’re incomplete proteins. However, eating a variety of plant foods, such as beans, nuts, and grains, can provide all the essential amino acids.

Burritos are a good source of several different nutrients, including proteins and carbohydrates.
Fats are nutrients that supply energy, keep the skin healthy, and promote normal growth. They also transport certain vitamins through the body and help build cell membranes. Saturated fats are fats that are solid at room temperature. Examples include butter; stick margarine; and the fats in meat, poultry, and dairy products. Eating large amounts of foods that are high in saturated fats increases the risk of heart disease. Unsaturated fats, fats that are liquid at room temperature, come mainly from plant sources. Foods with mostly unsaturated fats include vegetable oils, nuts, olives, and avocados.

Vitamins, Minerals, and Water

Vitamins are substances that help to regulate the body’s functions. Your body needs vitamins to produce energy, to fight infections, and to help with other tasks. Water-soluble vitamins, including vitamin C and the B vitamins, dissolve in water. Only small amounts of water-soluble vitamins are stored in the body, so these vitamins must be replaced every day. Fat-soluble vitamins, including vitamins A, D, E, and K, dissolve in fat. The body can store these vitamins until they are needed. Fruits and vegetables are the best sources of vitamins A and C. Whole-grain and enriched breads and cereals supply B vitamins. Milk is a good source of vitamin D and the B vitamin riboflavin.

Minerals are nutrients that strengthen bones and teeth, help keep blood healthy, and keep the heart and other organs working properly. Calcium, phosphorus, and magnesium are minerals that help build and renew your bones. Iron is needed for making red blood cells. Potassium, sodium, and chloride help maintain the body’s balance of fluids. Milk is a rich source of calcium and phosphorus. Meat, spinach and other leafy green vegetables, fruits, and dry beans supply iron. Sodium comes from salt and is found in many packaged foods.

Water is a nutrient, too! Without water your body would not be able to function. Water helps with digestion, carries nutrients throughout the body, removes wastes from the body, and regulates body temperature. Drink eight to ten glasses of water each day.

When you’re thirsty, reach for water. This nutrient helps the body function properly.
CHAPTER 4: FOOD AND NUTRITION

The ABCs of Good Health

Getting enough physical activity and eating a variety of foods will help you stay healthy. The U.S. Department of Agriculture (USDA) has developed the Dietary Guidelines for Americans. The guidelines focus on the ABCs of good health: Aim for fitness, Build a healthy base, and Choose sensibly.

Aim for Fitness

Being physically active every day and maintaining a healthy weight are important for fitness. You can easily get the recommended 60 minutes of daily physical activity by walking, running, skating, or making other activities part of your daily routine.

Build a Healthy Base

You can help your body stay healthy and function well by eating a variety of foods. Make grains, fruits, and vegetables the foundation of your meals. Grains (especially enriched and whole grains), fruits, and vegetables supply the vitamins and minerals your body needs for healthy eyes, skin, bones, and blood. They’re your best energy source, too. Many of these foods are also good sources of fiber, the part of grains, fruits, and vegetables that the body cannot break down.

Fiber helps move wastes out of your system, and may also help prevent some diseases, such as heart disease. One way to increase the fiber in your diet is to eat at least five servings of fruits and vegetables daily. Another way is to choose whole-grain cereals, whole-grain breads, and brown rice whenever you can.

A healthy base also involves making sure that food is safe to eat. Handle and prepare foods properly at home and take care when eating out to avoid food-borne illnesses. Harmful bacteria, viruses, and parasites can cause food to spoil and may make you sick.

Staying physically active is an important part of good health. How can you fit physical activity into your daily life?

Topic: Nutrients
For links to more information on the nutrients in foods, go to health.glencoe.com.

Activity: Using the information provided at these links, make a list of ten nutritious food choices.
Choose Sensibly

Avoid consuming too much fat. Good nutrition depends on an eating plan that is low in cholesterol and saturated fat. **Cholesterol** (kuh-LES-tuh-rawl) is a waxy substance used by the body to build cells and make other substances. Saturated fats tend to raise the body’s level of cholesterol, which increases the risk of heart disease and stroke. Choose foods low in saturated fats and keep your overall fat intake to no more than 30 percent of daily calories.

 Avoid consuming too much sugar. Many foods contain sugars. Foods that have large amounts of added sugar include soft drinks, fruit punch, cakes and cookies, candy, and ice cream. Remember that foods containing sugars and starches promote tooth decay. Be sure to check canned and processed foods for hidden sugars. If a product’s ingredient list includes words such as corn syrup, sucrose, or dextrose, the food is likely to be high in added sugars.

 Avoid consuming too much salt. Sodium, a mineral in salt, helps the body regulate fluids and blood pressure. Your body needs only a small amount of sodium (less than 1/4 teaspoon of salt daily). Too much sodium may increase your risk of high blood pressure and can decrease the amount of calcium in your body, weakening your bones. To cut down on salt, choose low-sodium foods; use herbs and spices to season foods; and go easy on salty snacks.

Fats perform many important functions in the body, but consuming too much fat is not healthful. List three ways of adding flavor to salads without adding a lot of fat.
Reading a Nutrition Facts Panel

Most packaged foods come with a food label that includes a Nutrition Facts panel. The panel lists the product’s nutritional value. This information can help you make smart food choices. Figure 4.1 on page 93 shows how to read the various sections of a Nutrition Facts panel.

The Nutrition Facts panel tells you how large one serving is and the number of calories and amounts of nutrients in a serving. Studying the % Daily Value column will tell you if a food is high or low in certain nutrients. Look for foods that have low daily value percentages (below 5 percent) for fats, cholesterol, and sodium. Choose foods whose labels show high percentages (20 percent or above) of fiber, vitamins, and minerals.

PRACTICING HEALTHFUL BEHAVIORS

Keeping Food Safe

Have you ever felt sick to your stomach and thought to yourself, “It must have been something I ate”? If you handle and prepare foods properly, you will greatly decrease your risk of getting a foodborne illness. To keep food safe, follow these steps:

- **CLEAN.** Before you handle food or utensils, wash your hands with warm, soapy water. Wash your hands after handling raw meats, poultry, eggs, and fish as well as everything that comes into contact with these foods. Clean kitchen surfaces as you work.
- **SEPARATE.** Separate raw, cooked, and ready-to-eat foods while buying, preparing, and storing them.
- **COOK.** Make sure that you cook foods to the proper temperature by using a food thermometer. Reheat leftovers thoroughly.
- **CHILL.** Keep perishable foods refrigerated. Thaw frozen foods in the refrigerator.
- **FOLLOW THE LABEL.** Read labels and follow directions such as “Refrigerate after opening.”
- **SERVE SAFELY.** Keep hot foods hot and cold foods cold.
- **WHEN IN DOUBT, THROW IT OUT.** Do not eat any food that you think has not been handled or stored properly.

ON YOUR OWN

On a sheet of paper, describe how you would prepare or store each of the following foods to keep it safe:

- Tuna sandwich
- Raw ground beef
- Raw spinach
Using complete sentences, answer the following questions on a sheet of paper.

Reviewing Terms and Facts

1. **Recall** Identify the six categories of nutrients.
2. **Vocabulary** What are carbohydrates?
3. **Discuss** What are proteins, and how do they help the body?
4. **Distinguish** Explain the difference between saturated and unsaturated fats. What food sources contain each of these types of fats?
5. **List** Name three minerals, and explain how each one helps your body.

**Thinking Critically**

6. **Evaluate** How do the ABCs of good health work together to help you achieve a healthful lifestyle?

7. **Suggest** What would you tell someone who isn’t sure how old the leftovers in the refrigerator are? Why?

**Applying Health Skills**

8. **Accessing Information** Study the Nutrition Facts panel on a package or can of food. Would this food help you fulfill the Dietary Guidelines? Write a short report in which you list your findings and explain the product’s nutritional value.
The Food Guide Pyramid

The Foods You Choose

The foods you eat enable your body to grow and function properly. Nutrition (noo-TRI-shuhn) is the process of taking in food and using it for energy, growth, and good health. Eating fulfills the body’s physical needs. It can also satisfy emotional and social needs.

Influences on Food Choices

Many factors influence food choices:

- **Personal taste.** The way foods look, smell, feel, and taste influences what you choose to eat.
- **Geography.** The land, climate, and agricultural products where you live affect food availability and influence your food choices.
- **Family, friends, and cultural background.** Your family’s traditions or ethnic background may influence your food choices. You may also select certain foods because of your friends.
- **Advertising.** Food ads may influence you to choose one food over others.
- **Cost.** If you don’t have much money to spend, you may choose certain foods because they cost less than others.
- **Convenience.** Sometimes you may select foods that you can prepare quickly and easily.

Seeing what foods your friends choose to eat may inspire you to eat some foods you’ve never tried before. Name at least two ways in which your friends influence you to make positive food choices. What might influence the food choices of adults?
The Food Guide Pyramid

You can combine many foods in different ways to create a wholesome and delicious eating plan. To help you decide what foods to eat, the USDA developed the Food Guide Pyramid, a guide for making healthful daily food choices. Figure 4.2 shows how foods are grouped on the Pyramid according to the nutrients they provide to the body.

**Figure 4.2**

**THE FOOD GUIDE PYRAMID**

The Food Guide Pyramid is an excellent tool to help you build a healthy base. Eat plenty of foods from the widest part of the Pyramid and limited amounts of food from the Pyramid tip. How many servings did you eat from the fruit group yesterday?

Fats, Oils, and Sweets Use sparingly.

Milk, Yogurt, and Cheese Group 2–3 servings

Vegetable Group 3–5 servings

Fruit Group 2–4 servings

Bread, Cereal, Rice, and Pasta Group 6–11 servings

Meat, Poultry, Fish, Dry Beans, Eggs, and Nuts Group 2–3 servings

Science

**VITAMIN AND MINERAL SUPPLEMENTS**

Vitamin and mineral deficiencies can result from a poor diet. Symptoms may include fatigue and frequent bruising. Consult with a doctor to determine when it’s appropriate to take a vitamin or mineral supplement to correct a deficiency.
Using the Pyramid to Meet Your Needs

The Food Guide Pyramid shows the suggested range of daily servings from each of the five major food groups. The number of servings that is right for you will depend on the amount of energy that you need each day. Various factors, including your age, your gender, and how active you are, affect your energy needs. Figure 4.3 shows the recommended daily servings in each food group for teen girls and teen boys.

**Figure 4.3**

**Recommended Daily Servings for Teens**

Teen boys usually require larger amounts of food from most food groups than teen girls do. Look at this table. Do you think that you might need to increase or decrease servings from any of the food groups? If so, which ones?

<table>
<thead>
<tr>
<th>Food Group</th>
<th>Sample Serving Sizes</th>
<th>Teen Girls</th>
<th>Teen Boys</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bread, Cereal, Rice, and Pasta Group</td>
<td>• 1 slice of bread</td>
<td><img src="image1" alt="Girls" /></td>
<td><img src="image2" alt="Boys" /></td>
</tr>
<tr>
<td></td>
<td>• 1 ounce ready-to-eat cereal</td>
<td><img src="image3" alt="Girls" /></td>
<td><img src="image4" alt="Boys" /></td>
</tr>
<tr>
<td></td>
<td>• 1/2 cup cooked cereal, rice, or pasta</td>
<td><img src="image5" alt="Girls" /></td>
<td><img src="image6" alt="Boys" /></td>
</tr>
<tr>
<td>Vegetable Group</td>
<td>• 1/2 cup cooked or raw chopped vegetables</td>
<td><img src="image7" alt="Girls" /></td>
<td><img src="image8" alt="Boys" /></td>
</tr>
<tr>
<td></td>
<td>• 1 cup raw leafy vegetables</td>
<td><img src="image9" alt="Girls" /></td>
<td><img src="image10" alt="Boys" /></td>
</tr>
<tr>
<td></td>
<td>• 3/4 cup vegetable juice</td>
<td><img src="image11" alt="Girls" /></td>
<td><img src="image12" alt="Boys" /></td>
</tr>
<tr>
<td>Fruit Group</td>
<td>• 1 medium apple, banana, or orange</td>
<td><img src="image13" alt="Girls" /></td>
<td><img src="image14" alt="Boys" /></td>
</tr>
<tr>
<td></td>
<td>• 1/2 cup chopped, cooked, or canned fruit</td>
<td><img src="image15" alt="Girls" /></td>
<td><img src="image16" alt="Boys" /></td>
</tr>
<tr>
<td></td>
<td>• 3/4 cup fruit juice</td>
<td><img src="image17" alt="Girls" /></td>
<td><img src="image18" alt="Boys" /></td>
</tr>
<tr>
<td>Milk, Yogurt, and Cheese Group</td>
<td>• 1 cup milk or yogurt</td>
<td><img src="image19" alt="Girls" /></td>
<td><img src="image20" alt="Boys" /></td>
</tr>
<tr>
<td></td>
<td>• 1 1/2 ounces natural cheese</td>
<td><img src="image21" alt="Girls" /></td>
<td><img src="image22" alt="Boys" /></td>
</tr>
<tr>
<td></td>
<td>• 2 ounces processed cheese</td>
<td><img src="image23" alt="Girls" /></td>
<td><img src="image24" alt="Boys" /></td>
</tr>
<tr>
<td>Meat, Poultry, Fish, Dry Beans, Eggs,</td>
<td>• 2 to 3 ounces cooked lean meat, poultry, or fish. The following are equal to</td>
<td><img src="image25" alt="Girls" /></td>
<td><img src="image26" alt="Boys" /></td>
</tr>
<tr>
<td>and Nuts Group</td>
<td>1 ounce of meat:</td>
<td><img src="image27" alt="Girls" /></td>
<td><img src="image28" alt="Boys" /></td>
</tr>
<tr>
<td></td>
<td>▲ 1 egg</td>
<td><img src="image29" alt="Girls" /></td>
<td><img src="image30" alt="Boys" /></td>
</tr>
<tr>
<td></td>
<td>▲ 1/2 cup cooked dry beans</td>
<td><img src="image31" alt="Girls" /></td>
<td><img src="image32" alt="Boys" /></td>
</tr>
<tr>
<td></td>
<td>▲ 2 tablespoons peanut butter</td>
<td><img src="image33" alt="Girls" /></td>
<td><img src="image34" alt="Boys" /></td>
</tr>
<tr>
<td></td>
<td>▲ 1/3 cup nuts</td>
<td><img src="image35" alt="Girls" /></td>
<td><img src="image36" alt="Boys" /></td>
</tr>
</tbody>
</table>
Eating a Variety of Foods

Using the Food Guide Pyramid can help you get enough nutrients each day. Many of the foods you eat have ingredients from two or more food groups. A slice of pizza, for example, combines bread, cheese, tomato sauce, and possibly vegetables and meat. Because no single food or food group supplies all the nutrients your body needs, it’s a good idea to eat a variety of foods from every group over time.

Foods that are high in sugars and fats—represented by the tip of the Food Guide Pyramid—are generally low in nutrients but high in calories. A calorie (KA·luh·ree) is a unit of heat that measures the energy available in foods. An eating plan that has more calories than your body can use results in weight gain. A high-fat diet is often high in calories, too. Most teens need about 2,200 to 2,800 calories per day, depending on their activity level. Try to get most of your calories from the lower levels of the Food Guide Pyramid to maintain your health.

Many foods contain ingredients from several different food groups. What food groups are represented in this meal?

Lesson 2 Review

Using complete sentences, answer the following questions on a sheet of paper.

Reviewing Terms and Facts

1. **Vocabulary** Define the term *Food Guide Pyramid*, and explain how the Pyramid can be used to make healthful food choices.

2. **List** Identify the five major food groups shown in the Food Guide Pyramid.

3. **Recall** What is the range of recommended daily servings for each of the five major food groups?

Thinking Critically

4. **Hypothesize** How are food choices behavioral factors that can put you at risk for contracting specific diseases?

5. **Distinguish** List some advertising claims you’ve seen and heard about the nutrients in foods and food supplements. How can you distinguish which are true and which are false?

Applying Health Skills

6. **Decision Making** Imagine that you are at the supermarket. You need to purchase foods to prepare dinner for a family of four, and you have a food budget of $20.00. What foods will you choose for a healthful meal that will not cost more than you have budgeted? On the same budget, what foods would you buy at the food court in the mall to provide a healthful lunch for a group of six friends? Share your budgets with the rest of the class.
Planning Healthful Meals

The Dietary Guidelines and the Food Guide Pyramid can help you plan healthful meals and snacks. Here are a few suggestions to help you get the nutrients you need and still enjoy your food:

- **Eat regular meals.** Avoid skipping meals. People who skip meals tend to overeat at other times.
- **Watch portion sizes.** Suggested portion sizes may be smaller than you think. For example, one serving of meat is only 2 to 3 ounces. A cup of pasta may not seem like much, but it is two servings from the Bread, Cereal, Rice, and Pasta Group.
- **Eat small amounts of foods from the Pyramid tip.** You don’t need to cut out fats and sugars entirely. An occasional candy bar or soft drink won’t undo an otherwise healthful eating plan.
- **Aim to achieve balance over time.** Eat a variety of foods from all of the food groups over several days to get the right amounts and types of nutrients. If you eat a big lunch that is high in fats, balance it by making sure that your next few meals are lower in fats.

Some common items can help you visualize Pyramid serving sizes.

- 3 oz (84 g) cooked meat, poultry, or fish = deck of cards
- 2 tbsp. (30 mL) peanut butter = matchbox
- 1 oz (28 g) cheese = four dice
- ½ cup (125 mL) cooked vegetables = half a tennis ball
- 1 cup (250 mL) raw leafy greens = four lettuce leaves
- 1 medium potato = computer mouse

Quick Write

List three of your favorite snacks and evaluate whether they are healthful.

Learn About...

- planning nutritious meals.
- why eating breakfast is important.
- choosing healthful snacks.

Vocabulary

- nutrient dense
Breakfast Starts Your Day

When you wake up in the morning, 10 or 12 hours may have passed since you last ate. Your body needs a fresh supply of energy. Start each morning with a healthful breakfast. Students who eat breakfast concentrate better at school and have a more positive attitude.

Breakfasts that include complex carbohydrates and some protein will give you the energy you need to start the day. You might eat oatmeal with milk along with a piece of fruit or combine whole-wheat toast and eggs. Even a bean burrito or a hamburger on a bun counts as breakfast. Adding Vitamin C-rich foods such as grapefruit or orange juice, or a calcium-rich dairy food such as milk will help you to fit in all the vitamins and minerals you need to stay healthy. If you’re short on time, grab a cup of yogurt or a bowl of ready-to-eat cereal. Choose cereals that are made from whole grains or that have added vitamins and minerals. If you don’t have time to eat at home, take something with you. A muffin, string cheese, and raisins plus a drink such as fruit or vegetable juice will give you the fuel you need for a great start.

### Practicing Healthful Behaviors

**Breakfast on the Go**

If you don’t have a lot of time in the morning, try some of these healthful and quick-to-prepare breakfasts:

- Toaster waffle with blueberries, instant hot cocoa made with low-fat milk
- Low-fat ham and cheese on an English muffin, carrot sticks, grapefruit juice
- Bagel, yogurt drink
- Leftover pizza, cranberry juice
- Smoothie (blender shake made with milk and sliced fruit), whole-wheat toast
- Cereal with yogurt or milk, orange juice
- Celery sticks stuffed with peanut butter, apple juice

**On Your Own**

Make a list of some healthful breakfasts you could prepare when you are in a hurry. Include some items that can be eaten “on the go.” Refer to your list when you need a quick breakfast.

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### Health Skills Activity

**Lesson 3: Healthful Meals and Snacks**

Wake up your taste buds! Try leftover pizza for breakfast. It may not be a traditional breakfast food, but it is healthful and can provide the energy you need to start the day. How can you improve your breakfast eating habits?
Packing a School Lunch

If you pack your own lunch, be sure to include a variety of nutritious foods. Vary your selections to avoid eating the same foods every day. Brainstorm ways to make your lunches more healthful. For example, using whole-grain bread instead of white bread for sandwiches will give you more fiber. Adding raw spinach leaves and tomatoes to tuna on rye bread boosts the meal’s vitamin and mineral content. If you like deli meats, try lean roast beef, turkey, or ham for protein. Lean meats have less fat.

A packed lunch doesn’t always have to include sandwiches. Many foods are available in individual servings. Look for single-serving containers of low-fat or fat-free salad dressings. Then you can pack a salad for lunch. Add low-fat yogurt, cheese sticks, applesauce, or granola bars. Instead of potato chips, pack carrot sticks or pepper slices for something crunchy. A crisp apple, a banana, or grapes make a great dessert, and these fruits are easy to transport. Instead of soft drinks or fruit drinks that contain added sugar, pack bottled water or plan to buy milk at school.

Nutritious Snacks

Many snack foods—such as potato chips and candy bars—are high in calories, fat, salt, and/or sugar, but low in nutrients. A more healthful way of eating is to choose snack foods that are nutrient dense, meaning that they have a high amount of nutrients relative to the number of calories. Figure 4.4 shows examples of nutrient-dense snacks.

The snacks you eat give you energy and a chance to fit in the nutrients you may miss at other times during the day. Satisfy your hunger by choosing snack foods that combine grain products, fruits, vegetables, and dairy foods. Try some of these nutritious snacks:

- Baked tortilla chips with salsa
- Fruit smoothie made with milk or yogurt
- A peanut butter and banana sandwich on whole wheat bread
- Raw veggies with yogurt dip
- Apple and cheese slices with graham crackers
- Popcorn topped with chili powder or cinnamon
- Tomato or vegetable juice

Choosing foods that provide a variety of nutrients and textures will make your lunch nutritious and fun to eat. How can you keep your lunch cold and safe to eat?
Lesson 3 Review

Using complete sentences, answer the following questions on a sheet of paper.

Reviewing Terms and Facts
1. List  Name two ways to make sure you get the nutrients you need.
2. Recall  Explain why it is important to eat breakfast.
3. Describe  Give two examples of nutritious lunches you could pack.

Thinking Critically
5. Judge  How can you make sure that you eat portions of reasonable sizes at a restaurant?
6. Evaluate  Analyze the nutritional value of each of the following breakfast menus.

Then suggest several foods that might be substituted to make each menu more nutritious and lower in fat.

- Breakfast #1: orange juice, two fried eggs with bacon, whole wheat toast
- Breakfast #2: whole-grain cereal with whole milk and sliced peaches, white toast with butter and jelly, glass of water

Applying Health Skills
7. Advocacy  Using what you have learned from this chapter so far, write an advertisement for a healthful breakfast or snack. Combine words and pictures to persuade readers that the foods you suggest are healthful, easy to prepare, and delicious.
The Digestive and Excretory Systems

Turning Food into Fuel

When you eat, your body breaks the food down into smaller parts so that it can use the nutrients in the food for fuel. Digestion (dy-JES-chuhn) is the process by which the body breaks down food into smaller components that can be absorbed by the bloodstream and sent to each cell in your body. Your digestive system is a group of organs that work together to break down foods into substances that your cells can use.

Figure 4.5 shows the steps in digestion. Digestion involves physical changes, such as the crushing of food by the teeth. It also involves chemical changes, such as the transforming of food by substances in the body called enzymes.

Steps in Digestion

It takes 16 to 24 hours for your body to break down food into energy and get rid of wastes.
How Digestion Begins

Does your mouth start to water when you sit down to eat a meal or smell something good cooking? That “water” is saliva. **Saliva** (suh-LY-uh) is a digestive juice produced by the salivary glands in your mouth. Saliva starts to flow as a physical signal from your body that it is ready to begin the digestive process. When you chew food and then swallow it, the food begins a long journey through your body. **Figure 4.6** shows the first steps in the digestive process.

**Organs of the Digestive System**

**Figure 4.7** on page 104 shows the path food takes during the next part of the digestive process. The esophagus pushes the food along until it reaches the stomach. The stomach’s strong, muscular walls churn the food to break it into smaller pieces and mix them with gastric juice, a mixture of acid and enzymes. This process can take up to four hours.
Removing Wastes from the Body

Some foods that you eat contain materials that the body cannot use. During the digestive process, these substances—commonly called wastes—are separated out. These wastes must be removed from the body. **Excretion** (ek-SKREE-shuhn) is the process by which the body gets rid of waste materials.

The body produces three kinds of wastes: solids, liquids, and gases. Your **excretory** (EK-skruh-toh-ee) system is the system that removes wastes from your body and controls water balance. Although your lungs get rid of carbon dioxide gas when you exhale, and your skin gets rid of some wastes when you sweat, the major organs of the excretory system are the kidneys, bladder, and colon.
Liquid Wastes

Liquid wastes are produced by cell activity. Approximately 50 to 80 percent of your body is water, and most waste materials are dissolved in it. Figure 4.8 shows how the organs involved in excreting liquid wastes filter, store, and finally remove these wastes from your body.

Solid Wastes

Solid wastes are made up of foods that your body cannot break down, including fiber. After digestion, the body sends a mixture of water and undigested solid wastes into the colon (KOH-uhn), a storage tube for solid wastes. The colon is also called the large intestine. Most of the water is absorbed by the colon and returned to the body. The remaining solid wastes become material called feces. When the colon becomes full, strong muscles in its walls contract. This movement pushes the feces out of the body through an opening called the anus.

Figure 4.8

**Eliminating Liquid Wastes**

Your kidneys and bladder get rid of liquid wastes. How do you think drinking plenty of fluids helps you take care of your kidneys and bladder?

1. The **kidneys** are a pair of organs that filter water and waste materials from the blood. The kidneys also help to regulate the amounts of water and salts in the body. Urine is made up of the fluid and dissolved substances secreted by the kidneys.

2. The kidneys send the urine to the bladder through two tubes called ureters (YUR-uh-terz).

3. The bladder is a pouch in which urine is stored.

4. A signal from the nervous system lets the person know when the bladder is full. Urine passes out of the body through a tube called the urethra (yu-REE-thruh).

Reading Check

Understand shades of meaning. The word **excrete** comes from the Latin word meaning “to sift out” or “to separate.” Explain how separating is part of the excretory process.
Caring for Your Digestive and Excretory Systems

Follow these guidelines to help keep the digestive and excretory systems working well.

- Eat a balanced diet that is based on the Food Guide Pyramid. Eating a variety of foods while taking care not to eat too many foods from the tip of the Pyramid promotes healthy digestion.
- Eat plenty of foods that are low in fat and high in fiber. Dietary fiber helps move wastes through the digestive system.

Hands-On Health

How Foods Break Down

PART I

Digestion begins when your teeth tear and crush large pieces of food into small chunks. The following activity will help demonstrate how chewing aids digestion.

WHAT YOU WILL NEED
- Two hard candies
- Two bowls filled with lukewarm water

WHAT YOU WILL DO
1. With a partner, crush one piece of candy into small pieces. Drop the whole candy into one bowl and the crushed candy into a second bowl at the same time.
2. Record the time each candy takes to dissolve completely.

IN CONCLUSION
1. Did one candy dissolve faster than the other?
2. Why is chewing part of digestion?

PART II

Bile, secreted by the liver, helps to digest fats. The following activity will demonstrate bile’s role in the digestive process.

WHAT YOU WILL NEED
- A bowl of water
- Vegetable oil
- Dishwashing liquid

WHAT YOU WILL DO
1. Put several drops of vegetable oil into the water.
2. Put several drops of dishwashing liquid onto the oily surface of the water and observe what happens.

IN CONCLUSION
Suppose that the vegetable oil was fat and the dishwashing liquid was bile. From your observation, how do you think bile works to digest fat?

Whole grains and many fruits and vegetables contain fiber, a substance that helps your digestive system work properly. How can you add more fiber to your eating plan?
LESSON 4: THE DIGESTIVE AND EXCRETORY SYSTEMS

Using complete sentences, answer the following questions on a sheet of paper.

Reviewing Terms and Facts
1. Vocabulary Define the term digestion, and explain why food has to be digested.
2. Recall How do the liver and the pancreas aid in the digestive process?
3. Vocabulary Define the term excretory system.
4. List Identify the major organs of the excretory system.
5. Restate What does the colon do?

Thinking Critically
6. Predict Describe possible consequences for the rest of the body if the digestive system is not working properly.
7. Plan Choose two of the tips in this lesson for caring for your digestive and excretory systems, and explain how you might make them part of your life.

Applying Health Skills
8. Stress Management Stress and anxiety can cause or worsen disorders of the digestive system such as indigestion. This particular disorder may cause pain in the upper abdomen and nausea. List at least three ways that you can reduce stressful situations to keep your digestive system healthy.
Managing Your Weight

A Healthy Weight

What do you consider to be your healthy weight? External factors, such as the way models look in ads, may influence your idea of what you think you should weigh. However, the weight that you think is appropriate for you may not be healthy.

Your height, age, gender, inherited body type, and growth pattern determine your healthy weight. Maintaining a healthy weight is important for wellness. A healthy weight is not just one number but a range. To see if your weight falls within a healthy range, use the Body Mass Index chart for teens (Figure 4.9). Body Mass Index (BMI) is a way to assess your body size, taking your height and weight into account. By using the BMI chart from year to year, you can look at your growth pattern to see if your weight is appropriate for your age.

**Figure 4.9**

**Body Mass Index Range**

Calculate your BMI (See “Connect to Math” on page 109.) Then find your age on the bottom of the graph and trace an imaginary line straight up from your age to your BMI to see what range your BMI falls into.
Benefits of a Healthy Weight

Being overweight or underweight may increase your risk of developing serious health problems. Staying in your healthy weight range will help you enjoy a long, healthy life.

Being seriously overweight strains the muscles and bones and makes the heart work harder. It increases the risk of heart disease, stroke, and diabetes (dy-uh-BEE-teez), a disease that prevents the body from converting food into energy. Being seriously underweight can cause fatigue, sleeplessness, and irritability.

Nutrition and Physical Activity

Your body runs on energy from food. You need to eat in order to move, to grow, to build and repair tissues, and to keep your body systems working. When you eat, your body converts the calories in the food to a type of energy that your cells can use.

To stay at a healthy weight, you must take in the same number of calories each day that you use for energy. If you eat too much, your body converts the extra calories into body fat. If you take in fewer calories than you need, your body converts its stored body fat to energy, causing you to lose weight. Figure 4.10 shows how many calories are burned during some common activities. Choosing nutritious foods according to calculated energy expenditure will help you achieve a healthy body composition.

**Figure 4.10**

**Activity and Calorie Use**

This chart shows the calculated energy expenditure of a 100-pound person performing each activity for one hour. What happens when you use more calories than you take in?

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**Math**

**Calculate Your BMI**

Use this formula to calculate your BMI.
1. Multiply your weight in pounds by 0.45.
2. Then multiply your height in inches by 0.025. Square the result.
3. Divide your answer in step 1 by the answer in step 2.

*Calculate the BMI of someone who is 5’2” (62 inches) tall and weighs 110 pounds.*
Eating Disorders

Eating disorders are extreme eating behaviors that can lead to serious illness or even death. These disorders are often related to other problems, such as an unrealistic body image, low self-esteem, depression, and other emotional pain. Anorexia nervosa (ə-nər-kə-sə nerv-ə-suh) is an eating disorder in which a person has an intense fear of weight gain and starves herself or himself. People who have anorexia nervosa risk heart problems, kidney failure, loss of bone minerals, and even death.

Bulimia (boo-LEE-mee-uh) nervosa is an eating disorder in which a person repeatedly eats large amounts of food and then purges. That is, the excess food is forced from the body through vomiting or using laxatives to speed up the excretory system. Although a bulimic person’s weight may be within the normal range, medical problems such as dehydration, irregular heartbeat, and damage to the colon, liver, and kidneys can develop. Binge eating disorder, or compulsive overeating, is an eating disorder in which a person repeatedly eats large amounts of food at one time. Binge eaters do not purge but may frequently fast or diet. Over time, they may develop high blood pressure, diabetes, or certain types of cancer.

Advocacy

Positive Body Image

Poor body image affects teens and adults alike. Often, people think that they are too fat, too thin, or just not muscular or shapely enough. A person with an unrealistic body image is in danger of developing an eating disorder. If you have negative feelings about the way you look, the following can help you develop a more realistic body image.

- **Recognize that there is no one body type that is right for everyone.** Your body type depends on your height, weight, gender, and family characteristics.
- **Be happy with who you are.** Accept the way you look now.
- **Get advice from your doctor.** Remember that you need nutrients and food energy for your growing, active body.
- **Set reasonable goals.** Avoid drastic diets. Aim to lose or gain a few pounds slowly and get into better shape.
- **Add physical activity to your daily routine.** Physical activity will help keep your body in a healthy weight range and will build muscle.

With a Group

Create a public service announcement that promotes having a realistic body image. You may create a poster, a radio ad, or a television commercial. Share your announcement with your class.
Tips for Managing Your Weight

To safely reach and maintain a healthy weight for you, eat moderate amounts of nutritious foods and be physically active each day. Avoid fad diets—those that are popular for only a short time. Many fad diets limit food variety, which is unhealthy. Also, any weight lost on these diets is usually regained.

Choose lean meats, low-fat dairy foods, and foods that are steamed or baked instead of fried. Watch portion sizes. Eat slowly, and chew your food well; this can help you eat less. It takes about 20 minutes for your brain to get the signal that your stomach is feeling full.

If you need to lose weight, do it gradually—aim for no more than 1/2 to 1 pound a week. Eat smaller servings, which supply fewer calories. Try to eat at regular times each day and drink plenty of water. If you need to gain weight, eat larger servings of nutritious foods. You may also want to drink more milk or juice.

Healthful weight management depends on eating regular meals and choosing snacks wisely. Why isn’t it a good idea to skip meals as a way to lose weight?

Lesson 5 Review

Using complete sentences, answer the following questions on a sheet of paper.

Reviewing Terms and Facts
1. **Vocabulary** What is Body Mass Index?
2. **Explain** Describe the possible health risks of being underweight.
3. **Restate** Identify and describe types of eating disorders, such as bulimia, anorexia, and binge eating disorder.
4. **List** What tips would you give someone who wanted to lose weight?

Thinking Critically
5. **Explain** Why should a weight maintenance program include physical activity?
6. **Hypothesize** Why do you think weight lost on fad diets is usually regained?

Applying Health Skills
7. **Accessing Information** Use reliable online and print resources to research healthy weight-loss practices that have been scientifically proven. Share your findings with the class.
When one major fast-food company announced that it was changing its cooking oil by reducing the amount of trans fats by 48 percent and increasing the amount of polyunsaturated fats by 167 percent, many consumers had no idea what the company was talking about.

The answer depends on what kind of oil the fries are cooked in.
It turns out it was a step in the right direction. Fast-food restaurants fry their foods in fats. Not all fats are created equal, however. Depending upon their chemical composition, some fats are healthier than others. Fats are made up of fatty acids, which may be saturated or unsaturated. Saturated fatty acids hold a full quota of hydrogen atoms in their chemical structure; unsaturated fatty acids do not. Consuming excess amounts of saturated fats raises blood levels of low-density lipoprotein (LDL) cholesterol—the “bad” cholesterol—which increases the risk of heart disease. Consuming unsaturated fats lowers LDL cholesterol and raises high-density lipoprotein (HDL) cholesterol (the “good” cholesterol), thereby reducing the risk of heart disease. Lard and butter are two examples of saturated fats. Soybean, olive, corn, and other vegetable oils are all unsaturated fats.

A Partial Solution

In the past, fried fast-food products were cooked primarily in animal fats, which are generally saturated. Under pressure from consumers concerned about heart disease, many fast-food chains switched to unsaturated vegetable oils for frying. However, vegetable oils tend to be less stable and spoil more quickly than animal fats. So many chains switched again, turning to vegetable oils that have been partially hydrogenated—a process that fills unsaturated fat molecules with hydrogen atoms. Partial hydrogenation allows vegetable oils to stay fresh longer while still cooking up fries that are crisp and tasty.

For the fast-food industry, partially hydrogenated oils were doubly good. The companies got a cheap product with a long shelf life, and customers got vegetable oils, which they were demanding.

Unfortunately, the process of partial hydrogenation creates a new type of fatty acid known as a trans fatty acid. According to dietitian Liz Weiss, an expert on family nutrition, trans fats might be even worse for heart health than saturated fats. While saturated fats simply raise LDL cholesterol, Weiss explains, “trans fats appear to both raise bad (LDL) cholesterol and lower the good (HDL) cholesterol.”

A fast-food restaurant’s oil change will make its fried foods better for the hearts of the 46 million customers who eat there every day. What it won’t do is turn any of those dishes into health foods. Fries cooked in the new oil will have the same amount of calories and will do nothing to trim America’s growing waistline. So cut down on fries when eating out. Better still, try the salads!

Many fast-food chains offer healthy options, such as salads.

About Fatty Acids

Look at the labels of at least 10 packaged food products that you normally eat, such as crackers, potato chips, desserts, and frozen meals. Note the amount of saturated fat in each product (it’s usually listed in grams). List the five foods that have the greatest amount of saturated fat per serving, and five foods that have the least amount. Based on your findings, create an eating plan that significantly reduces your weekly intake of saturated fats. Share your plan with the rest of the class.
Your decisions about what to eat can have a major impact on your health. Read about how Luke uses the decision-making process to choose healthful foods at a fast-food restaurant.

Luke considers several options, listed on the chart below. As he weighs these options, Luke thinks about the number of calories in each item. He also considers the amount of fat and sodium and the number of grams of protein. Then he considers his personal values and tastes. Luke cares about good nutrition and tries to eat fresh vegetables every day. He also likes chicken better than beef. After considering all these factors, Luke decides on a grilled chicken sandwich, a garden salad, and low-fat milk. He enjoys his meal and feels good about making an informed decision.

<table>
<thead>
<tr>
<th>MENU ITEM</th>
<th>CALORIES</th>
<th>GRAMS OF FAT</th>
<th>NUMBER OF CALORIES FROM FAT</th>
<th>MILLIGRAMS OF SODIUM</th>
<th>GRAMS OF PROTEIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular cheeseburger</td>
<td>320</td>
<td>13</td>
<td>120</td>
<td>820</td>
<td>15</td>
</tr>
<tr>
<td>Regular grilled chicken sandwich with mayonnaise, tomato, and lettuce</td>
<td>440</td>
<td>20</td>
<td>180</td>
<td>1040</td>
<td>27</td>
</tr>
<tr>
<td>Regular fish sandwich with tartar sauce and cheese</td>
<td>560</td>
<td>28</td>
<td>250</td>
<td>1060</td>
<td>23</td>
</tr>
<tr>
<td>Small french fries</td>
<td>210</td>
<td>10</td>
<td>90</td>
<td>135</td>
<td>3</td>
</tr>
<tr>
<td>Garden salad</td>
<td>35</td>
<td>0</td>
<td>0</td>
<td>330</td>
<td>2</td>
</tr>
<tr>
<td>Packet of fat-free vinaigrette dressing</td>
<td>50</td>
<td>0</td>
<td>0</td>
<td>350</td>
<td>0</td>
</tr>
<tr>
<td>Packet of ranch dressing</td>
<td>230</td>
<td>21</td>
<td>180</td>
<td>550</td>
<td>1</td>
</tr>
<tr>
<td>Medium cola</td>
<td>210</td>
<td>0</td>
<td>0</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>Small chocolate shake</td>
<td>360</td>
<td>9</td>
<td>80</td>
<td>250</td>
<td>11</td>
</tr>
<tr>
<td>Low-fat milk</td>
<td>100</td>
<td>2.5</td>
<td>20</td>
<td>115</td>
<td>8</td>
</tr>
</tbody>
</table>
**Practice**

Imagine that you have to choose a healthful fast-food meal. How well do you think you would choose? Look at the meals pictured below. Use the six steps of the decision-making process to make the most healthful choice. When you have made your decision, compare your choice with others in the class. Explain how you made your decision.

**Apply/Assess**

Research the nutrition facts from your favorite fast-food restaurant. Find the information on the Internet, or ask for nutrition information when you visit the restaurant. Compare the calories of the different foods. Consider the percentage of fat, protein, and carbohydrate that each food contains. Choose items from the menu that make a healthful meal you would enjoy. Write a paragraph about your decision. In your paragraph, explain: 1) the fast-food meals you considered; 2) the meal you chose; and 3) why you chose it.

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**Self-Check**

- Does my paragraph explain how I made my decision?
- Do I tell why my meal is a healthful choice?

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**Decision Making**

1. State the situation.
2. List the options.
3. Weigh the possible outcomes.
4. Consider values.
5. Make a decision and act.
6. Evaluate the decision.

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**Menu**

- Two slices of thin-crust cheese pizza and a medium soft drink (620 calories, 18 g fat, 160 cal from fat, 1060 mg sodium, 24 g protein)
- Vegetable fajita and a medium soft drink (620 calories, 19 g fat, 170 cal from fat, 967 mg sodium, 11 g protein)
- Bacon burger, french fries, and a medium diet cola (880 calories, 48 g fat, 430 cal from fat, 1670 mg sodium, 37 g protein)
- Two grilled chicken soft tacos, Mexican rice, and a medium cola (810 calories, 30 g fat, 200 cal from fat, 1607 mg sodium, 34 g protein)
Lesson 3
9. You should eat large amounts of food from the Pyramid tip.
10. Your food choices should include many foods that are nutrient dense.

Lesson 4
11. The liver helps the small intestine by producing a blend of enzymes that breaks down proteins, carbohydrates, and fats.
12. Kidneys are a pair of organs that filter water and waste materials from the blood.
13. The pancreas is the place where most of the digestive process takes place.

Lesson 5
On a sheet of paper, write the numbers 14–16. After each number, write the letter of the answer that best completes each statement.

14. Which of the following is used to assess body size?
   a. Food Guide Pyramid
   b. Dietary Guidelines
   c. Body Mass Index (BMI)
   d. Nutritive Value Chart

15. An eating disorder in which a person has an intense fear of weight gain and starves herself or himself is
   a. anorexia nervosa.
   b. bulimia nervosa.
   c. bipolar disorder.
   d. binge eating disorder.

16. An eating disorder in which a person repeatedly eats large amounts of food and then purges is
   a. bulimia nervosa.
   b. anorexia nervosa.
   c. binge eating disorder.
   d. depression.
**Thinking Critically**

Using complete sentences, answer the following questions on a sheet of paper.

17. **Assess** If your body uses sugar for energy, why is eating large amounts of candy not good for your health?

18. **Apply** You need to eat breakfast on the go today. What will you choose to eat, and how will the nutrients in the food help your body?

19. **Differentiate** What are some factors that affect the food choices you make? Which factor do you think influences you most?

20. **Hypothesize** How might a person’s body be affected by irregular eating patterns?

**Career Corner**

**Dietitian** Have you planned some of your family’s meals? Are you concerned about people getting proper nutrition? Then you might enjoy a career as a dietitian. These professionals plan menus for people in hospitals, nursing homes, schools, or other facilities. To become a dietitian, you need a four-year college degree with a major in food and nutrition. You might volunteer for a community food-on-wheels program to prepare for this career. Visit Career Corner at [health.glencoe.com](http://health.glencoe.com) to find out more about this and other health careers.

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**Standardized Test Practice**

**Reading & Writing**

Read the paragraphs below and then answer the questions.

Why do you love some foods and dislike others? The answer to the first part of this question is easy—people generally like food that they have eaten and enjoyed in the past. The answer to the second part is not so simple, since people often dislike food that they have never tried. Why is this so?

People might find that the smell or texture of a certain food makes them dislike it. For example, they might enjoy eating a vegetable raw, but not like the feeling or taste of it when it is cooked. Others might refuse to eat a food that once made them sick. For instance, a person who felt ill after eating fish might not want to eat it again.

1. In the first paragraph of the passage the author uses a question to
   - A show that the passage is about people who hate food.
   - B explain why people like or dislike certain foods.
   - C tell why the author likes or dislikes certain foods.
   - D tell that the passage will be about food.

2. Which of the following best describes the organization of the second paragraph?
   - A comparing and contrasting different food favorites
   - B listing reasons for disliking a food
   - C stating a reason and giving an example of it
   - D stating a reason and telling why others disagree with it

3. Write a paragraph giving the reasons why you like and dislike certain foods.