

Chapter 3

Nutrition

Lesson 3.1

What Nutrients Does Your Body Need?

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Food Labels and Food Safety

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What's Your Health and Wellness IQ?

Take this quiz to see what you do and do not know about nutrition. If you cannot answer a question, pay extra attention to that topic as you study this chapter.



Health and Wellness IQ

1. Fiber is a good source of energy.	True	False	It Depends
2. Essential amino acids are produced by your body.	True	False	It Depends
3. Unsaturated fats are better for your health than saturated fats.	True	False	It Depends
4. Drinking 8½ to 11½ glasses of fluids a day is a good strategy for maintaining good health.	True	False	It Depends
5. Taking regular supplements of vitamins and minerals is a good strategy for improving your overall health.	True	False	It Depends
6. Fruit juices and whole fruits provide approximately the same level of nutrients to your body.	True	False	It Depends
7. Eating a candy bar or drinking a sugary soda is a healthful strategy for boosting your energy level.	True	False	It Depends
8. Keeping cold foods cold and hot foods hot is a good strategy for preventing food poisoning.	True	False	It Depends
9. Proteins, carbohydrates, and fats all have the same number of calories per gram.	True	False	It Depends
10. No cure exists for food allergies.	True	False	It Depends

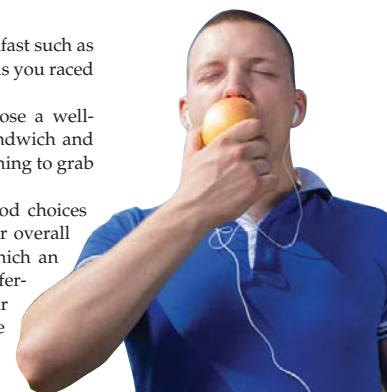
1. Identify each statement as True, False, or It Depends. Choose It Depends if a statement is true in some cases, but false in others.
2. Revise each False statement to make it true.
3. Explain the circumstances in which each It Depends statement is true and when it is false.

Setting the Scene

What have you eaten today? Did you eat a nutritious breakfast such as whole-grain cereal with milk? Or did you grab a piece of toast as you raced out the door? Or did you skip breakfast completely?

Now think about what you ate for lunch. Did you choose a well-balanced meal from the school cafeteria, or did you eat a sandwich and yogurt that you brought from home? Did you skip lunch, planning to grab fast food after school?

Although you may not have thought much about the food choices you've made today, what you eat has a major impact on your overall health. This chapter examines nutrition, the processes by which an organism—you—takes in and uses food. You'll learn about different types of nutrients your body needs, how nutrients help your body stay healthy, and strategies for making healthful and safe food choices.



Lesson 3.1

What Nutrients Does Your Body Need?

Key Terms

In this lesson, you will learn the meanings of the following key terms.

- amino acid
- anemia
- carbohydrate
- cholesterol
- dehydration
- fat
- fat-soluble vitamin
- fiber
- glucose
- glycogen
- hormone
- mineral
- nutrient
- osteoporosis
- protein
- saturated fat
- trans fat
- unsaturated fat
- vitamin
- water-soluble vitamin

Before You Read

Favorite Food Nutrients

List the 10 foods that you eat most frequently. Next to each food, write many or few nutrients. Check your guesses after you read this lesson.

Lesson Objectives

After studying this lesson, you will be able to

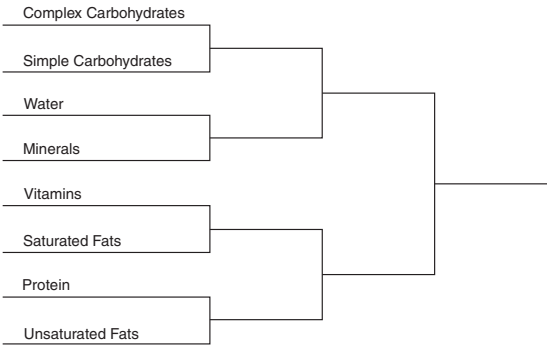
- identify the six types of nutrients;
- understand the role of each nutrient in the body;
- identify sources of each nutrient;
- evaluate the importance of water; and
- recognize the conditions under which the body's supply of water needs to increase.

Warm-Up Activity



The Winning Nutrient

Before reading this lesson, fill out a bracket similar to the one shown below. Pick a "winner" for each match-up based on your opinion as to which nutrient is most important. Write two to three statements expressing why you believe the winner of each match-up is the most important nutrient.



Do you know that the foods and beverages you eat and drink impact virtually all aspects of your body, including how tall you are, how much you weigh, the strength of your muscles, and the complexion of your skin? Food contains **nutrients**, which are chemical substances that give your body what it needs to grow and function properly.

There are six general types of nutrients:

- carbohydrates
- fats
- protein
- minerals
- vitamins
- water

Some of these nutrients provide the energy your body needs for daily activities such as playing sports, dancing, and riding a bicycle. The body also needs this energy to perform many important internal functions. These functions include maintaining a stable body temperature, providing energy to the brain and nervous system, and building body tissues.

Other nutrients enable certain critical bodily functions to occur. For example, the body needs vitamins and minerals to build new cells, strengthen its bones, and carry oxygen to its tissues. Nutrients also regulate crucial physiological processes in your body, such as breathing and digesting.

In this lesson, you will learn about the three types of nutrients—carbohydrates, proteins, and fats—that provide energy to your body. You will also read about three types of nutrients—vitamins, minerals, and water—that serve other functions in your body.

nutrient
a chemical substance that gives your body what it needs to grow and function properly



Figure 3.1

What do you notice about this teen's appearance that suggests she eats nutritious meals on a regular basis?

Carbohydrates

carbohydrate
a nutrient and major
source of energy for the
body

Carbohydrates, a major source of energy for the body, are found in fruits, vegetables, grains, and milk products. Carbohydrates are also known as **saccharides**, or **sugar and starch molecules**. These molecules serve as a source of chemical energy that the body can utilize quickly. Carbohydrates can be described as either simple or complex. There are three distinct types of carbohydrates: sugar, starch, and fiber.

Sugars

Sugars such as fructose, glucose, sucrose, and lactose, are classified as **simple carbohydrates**. These simple sugar compounds occur naturally in some foods, including fruits, maple syrup, and dairy products.

Glucose is the preferred source of energy for your brain and central nervous system. It is glucose that powers your brain, enabling you to concentrate and pay attention in class.

The table sugar people add to their coffee or use in baking is **sucrose**, which has been extracted from sugarcane or sugar beets. When sugar appears in the ingredient list of a processed food, the product contains sucrose. It is common for processed foods such as cereals, breads, desserts, and sugar-sweetened beverages to contain added sugars such as sucrose.

Starches

Starches, which are chains of glucose linked together, are called **complex carbohydrates**. During digestion, your body breaks down starches into smaller glucose units, making the glucose available for use as energy. Products made from grains, such as bread, cereal, rice, and pasta, are rich sources of starch. Starch is also found in beans and in some types of vegetables, including potatoes, peas, and corn.

Supplying Energy

Your body breaks down carbohydrates into glucose to obtain energy. Have you ever skipped breakfast and then had trouble concentrating in one of your early morning classes? This difficulty is caused by your body running out of glucose.

When it is in need of energy, the body can use glucose immediately. This is why having a candy bar or soft drink, both loaded with sugar, can give you a quick “pick-me-up.” The sucrose in these snacks is quickly and easily broken down into glucose and fructose. Later in this chapter, you will learn about the disadvantages of relying on these types of foods for energy.

Glucose can also be stored in the liver and muscles for later use. When glucose is stored in these areas, it is known as **glycogen**. However, after enough glycogen has been stored, any extra glucose is converted by the liver into fat, which is stored in the fat tissue. The body uses glycogen from the muscles and liver, or the fat stored in the fat tissue, when it needs energy between meals or to fuel activity.

glycogen
a stored version of glucose
located in the muscles
and liver; supplies energy
between meals

Fiber

Fiber is a tough complex carbohydrate that the body is unable to digest. This type of carbohydrate is found only in plant-based foods, including fruits, most vegetables, whole grains (such as whole-wheat bread or brown rice), and nuts.

Although fiber does not provide the body with energy, it does have important health benefits:

- **Lowers cholesterol.** Fiber attaches to cholesterol and carries it out of the body during digestion. **Cholesterol** is a type of fat made by the body that is also present in some foods. Having too much cholesterol in the body increases a person’s risk of developing heart disease, high blood pressure, and stroke.
- **Balances level of glucose.** By balancing the level of glucose in the blood, fiber can help control some types of diabetes.
- **Adds bulk to stools.** Fiber maintains the healthy functioning of the digestive system by adding bulk to stools, which helps prevent problems such as constipation (hard stools) and hemorrhoids. Hemorrhoids are swollen, painful veins in the rectum that are caused from straining to pass hard stools.
- **Can prevent overeating.** Because high-fiber foods take longer to chew than many other types of food, people eating a high-fiber meal are inclined to eat less than they would otherwise. Fiber also slows the movement of food out of your stomach and into your intestines (Figure 3.2). This means that you feel full faster, which helps prevent overeating and obesity.

fiber
a complex carbohydrate
that the body is unable to
digest

cholesterol
a type of fat made by the
body that is also present in
some foods

protein
a nutrient the body uses
to build and maintain all
types of cells; can provide
energy in the absence of fat
and carbohydrates



Figure 3.2

High-fiber carbohydrates like whole-grain breads, rice, and pastas make you feel full faster. *How do you think feeling full faster helps prevent obesity?*

Protein

Protein is a nutrient the body uses to build and maintain all of its cells and tissues, including muscles, bones, skin, hair, fingernails, and organs. Protein also provides energy when carbohydrates and fats are lacking in the diet.

Your body uses up and loses protein every day. Certain activities result in cell loss, which also means protein loss. You lose protein when you

- brush your hair—the hair left in the brush contains protein;
- shower—the skin cells that slough off during showering contain protein;
- trim your fingernails—the nail clippings contain protein;
- sweat—the skin cells that are lost when sweating contain protein; and
- urinate—protein is lost through urination.

You need to take in protein to replace what is lost every day. Fortunately, in the United States, many foods that people eat on a regular basis contain protein. If you're like most Americans, you eat more protein than you need.

Types of Proteins

amino acid
a small chemical unit that makes up proteins

hormone
a chemical substance in your body that influences many basic processes

All proteins are made up of smaller chemical units called **amino acids** (Figure 3.3). Twenty different amino acids join in various combinations to make all types of protein. Some of these amino acids are produced in the body. These are called *nonessential amino acids*.

Other types of amino acids are *not* produced by the body; you can only get them by eating particular foods. This type of amino acid is called an *essential amino acid* because it is essential that your diet includes this type of nutrient.

Protein sources are divided into two types, depending on whether or not they include all of the essential amino acids:

- A *complete protein* source contains all nine of the essential amino acids. This type of protein is found in animal-based foods such as meat, poultry, eggs, fish, and dairy products (milk and cheese).
- An *incomplete protein* source lacks one or more of the essential amino acids. This type of protein is found in legumes (dry beans and peas), tofu, nuts and seeds, grains, some vegetables, and some fruits.

Protein's Role in the Body

Protein is required for the body to function properly. People who don't consume enough protein risk serious consequences. For example, since immune cells are made of protein, individuals who have a protein deficiency are more likely to have weakened immune systems, which make it more likely for them to develop infections and diseases.

Protein plays other important roles in the body, including acting as enzymes and hormones. **Hormones** are chemical messengers that influence many basic processes in your body. Protein also serves as a transporter in the body and is involved in fluid and pH balance.

Protein and Vegetarians

Because some vegetarians avoid eating all (or most) foods from animal sources, they must rely on plant-based sources of protein to meet their protein needs. With some planning, a vegetarian diet can easily meet the recommended protein needs of adults and children. People who eat a vegetarian diet need to take in different types of food that can work together to provide all of the essential amino acids.

No single plant source contains all of the essential amino acids. You must eat multiple types of protein-rich plants to obtain all of the amino acids. For this reason, vegetarians must ensure they are including complementary proteins in their diet. *Complementary proteins* are two or more incomplete protein sources that together provide adequate amounts of all the essential amino acids.

For example, rice contains low amounts of certain essential amino acids; however, these same essential amino acids are found in greater amounts in dry beans. Similarly, dry beans contain lower amounts of other essential amino acids that are found in larger amounts in rice. Together, rice and beans provide adequate amounts of all the essential amino acids (Figure 3.4).

In the past, it was thought that complementary proteins needed to be eaten at the same meal for the body to use them together. Now studies show that the body can combine complementary proteins that are eaten at different times during the day, as long as they are eaten within the same day.

Fats

Fats are a type of nutrient that is largely made up of fatty acids, which provide a valuable source of energy. Fatty acids are a particularly important source of energy for muscles. Common fats in the diet include saturated fats, unsaturated fats, trans fats, and cholesterol.

Saturated Fats

Saturated fats are found primarily in animal-based foods, such as meat and dairy products. These are called *saturated* fats because the carbon atoms in these fats have *all* the hydrogen atoms they can hold. Saturated fats are typically solid at room temperature.

Unsaturated Fats

Unsaturated fats are found in plant-based foods such as vegetable oils, some peanut butters and margarines, olives, salad dressing, nuts, and seeds (Figure 3.5 on the next page). As you might guess, unsaturated fats do *not* have all the hydrogen atoms they could hold. They have at least one double bond to which an additional hydrogen atom can be added. Unsaturated fats are liquid at room temperature.

Trans Fats

Trans fats are created by a process known as *hydrogenation*, which bombards an unsaturated fat with hydrogen atoms and changes double bonds to single bonds. This makes the fat more saturated and, therefore, more solid. This



Figure 3.4

Eating enough of the right complementary proteins can provide your body with all nine essential amino acids in a day. **What are some meals you eat that might combine complementary proteins?**

fat
a type of nutrient, composed of fatty acids, that is a valuable source of energy, especially for muscles

saturated fat
a type of fat found primarily in animal-based foods that is solid at room temperature

unsaturated fat
a type of fat that is liquid at room temperature and is found in plant-based foods

trans fat
a type of fat that is created by hydrogenation; poses health risks acknowledged by the FDA

Figure 3.3

Steak is a complete protein, meaning it contains all nine essential amino acids. **Do you consider complete protein foods like steak to be "healthy"? Why or why not?**



Figure 3.5

Oils and nuts both contain unsaturated fats.

type of fat is found in many processed foods, such as packaged cookies, chips, doughnuts, and crackers. You may see trans fats listed as *partially hydrogenated oils* on ingredient lists.

Cholesterol

Cholesterol is a waxy, fatlike substance that is found in foods from animal sources, but is also produced by the body. Too much cholesterol can cause health problems.

Fats: Positives and Negatives

Your body stores excess dietary fats present in the foods you eat as body fat. Despite the negative publicity that body fat gets, it is important to your body’s health. Body fat

- supplies energy to the body when food is unavailable;
- acts as a cushion to protect internal organs; and
- provides a layer of insulation to help regulate body temperature so you don’t get too hot or too cold.

Likewise, the dietary fats you consume play an important role in the absorption and transport of certain types of vitamins through the blood-stream. These fats also help absorb and transport other nutrients during digestion. As a bonus, dietary fats enhance the flavor and texture of foods. Eating unsaturated fats may reduce the risk of heart disease.

Although fats are important for the body to function, some fats may be better for you than others. Saturated fats tend to be associated with elevated levels of cholesterol in the blood. Diets that are high in this type of fat may cause many long-term health problems, including cardiovascular disease, stroke, some types of cancer, and diabetes. Recent studies suggest, however, that highly refined carbohydrates may have a greater effect on heart disease than saturated fat.

Some scientists believe trans fats pose worse health risks than saturated fats. The US Food and Drug Administration (FDA) is taking action to further reduce the use of this fat in the food supply. Some cities, including New York City, Boston, and Philadelphia, have enacted laws that require restaurants to limit the use of trans fats in the foods they serve. California is the first state to require restaurants to limit their use of trans fats.

Vitamins

vitamins
organic substances derived from plants or animals, which are necessary for normal growth and development

Vitamins are organic substances, meaning they are derived from plants or animals and contain carbon. Like other nutrients, vitamins are necessary for normal growth and development. They help regulate various body processes, such as blood clotting, immune system functions, and the maintenance of healthy skin. They also help the body release the energy found in proteins, fats, and carbohydrates. Different vitamins have distinct functions in the body (Figure 3.6).

Figure 3.6 Types and Functions of Vitamins		
Vitamin	Function	Sources
Fat-Soluble Vitamins		
Vitamin A	helps fight infection and improve immune function, promotes bone health, supports reproduction, maintains the health of the retina	some vegetables (carrots, kale, broccoli), dairy products, meat
Vitamin K	helps with blood coagulation and blood clotting	liver, cereals, cabbage
Vitamin D	helps the body absorb calcium, which leads to strong teeth and bones; involved in regulation of cell growth, immune and neuromuscular function, and reduction of inflammation	fish, egg yolks, fortified dairy products, cereals, sunlight
Vitamin E	protects red blood cells from oxidation	whole grains, leafy greens, nuts
Water-Soluble Vitamins		
Vitamin B ₁ (Thiamin)	helps the body change carbohydrates into energy	pork, legumes, enriched or whole-grain products, ready-to-eat cereals
Vitamin B ₂ (Riboflavin)	involved in metabolism	milk, cheese, leafy vegetables, liver, kidneys, legumes, tomatoes, mushrooms, almonds
Vitamin B ₃ (Niacin)	helps maintain healthy skin and nerves, and improves circulation	eggs, lean meats, nuts, poultry, legumes, avocado, potatoes
Vitamin B ₅ (Pantothenic acid)	helps the body use nutrients for energy	beef and chicken liver, potatoes, sunflower seeds, cooked mushrooms, yogurt
Vitamin B ₆ (Pyridoxine)	involved in the reactions that generate energy from food; is required for proper development of the brain, nerves, and skin	avocado, banana, meat, nuts, poultry, whole grains
Vitamin B ₇ (Biotin)	assists with metabolism and the production of hormones and cholesterol	milk, nuts, pork, egg yolk, chocolate
Vitamin B ₉ (Folic Acid)	essential to numerous bodily functions, including cell division and the growth and production of healthy red blood cells	leafy vegetables, fortified cereals, bread
Vitamin B ₁₂ (Cyanocobalamin)	helps form red blood cells, maintain the central nervous system, and regulate metabolism	meat, eggs, milk and milk products, poultry, shellfish
Vitamin C	promotes healing within the body; is essential for healthy teeth and gums and the production of collagen	citrus fruits, many vegetables (broccoli, cabbage, spinach, and tomatoes)

Your body requires sufficient amounts of 13 different vitamins. Your body is unable to create these vitamins, so you need to absorb them from the foods you eat. Unlike carbohydrates, protein, and fat, your body requires only very small amounts of these nutrients to function properly.

Types of Vitamins

Vitamins can be divided into two distinct types—water-soluble and fat-soluble. Whether a vitamin is fat soluble or water soluble determines how it is stored and transported throughout the body.

water-soluble vitamin
a type of vitamin that dissolves in water and passes into the bloodstream

fat-soluble vitamin
a type of vitamin that dissolves in the body's fat, where it is stored for later use

Water-soluble vitamins dissolve in water, pass into the bloodstream during digestion, and are either used immediately by the body or are removed by the kidneys during urination. For this reason, these vitamins should be included in your meals every day. There are nine water-soluble vitamins—vitamin C and the B vitamins.

Fat-soluble vitamins dissolve in the body's fats and are stored in the body for later use. Because fat-soluble vitamins are stored by the body for longer periods, excessive intake may result in toxic levels. There are four fat-soluble vitamins—vitamins A, D, E, and K.

Sources of Vitamins

Where should you get your vitamins? Can't you just pop a multivitamin pill? Eating a balanced diet that contains a variety of foods can easily provide you with the appropriate amounts of all the vitamins you need.

Obtaining vitamins from your daily diet is preferable to taking vitamin supplements for several reasons. First, vitamin supplements do not contain all of the nutrients and other substances that your body needs and which are contained in foods. Some of these substances contained in food, but not in supplements, may even help your body better utilize the vitamins. Furthermore, some supplements provide larger-than-needed doses of vitamins, which may cause unhealthy levels in the body. A lesser problem with large doses of vitamins is waste—the unneeded amounts do not stay in the body and are simply excreted in the urine.

When deciding whether or not to take a vitamin supplement, you should consult your healthcare provider. People at certain life stages—such as pregnant women, infants, and older adults—and individuals who are ill may benefit from vitamin supplements. However, their healthcare providers should recommend the amount and type of supplements to take.

Minerals

mineral
inorganic elements found in soil and water; ingested by the body after being absorbed into plants

Minerals are inorganic elements that come from the earth, and which are found in soil and water. Minerals are absorbed by plants from the soil and water. You then absorb minerals from the plants you eat, the water you drink, or from animal food sources that have absorbed the minerals.

Your body needs a total of 20 different minerals (Figure 3.7). These minerals are divided into two distinct types—macrominerals and trace minerals. *Macrominerals* are those minerals your body needs in quantities greater than 100 milligrams a day to maintain good health. *Trace minerals* are those minerals your body needs in very small amounts—less than 100 milligrams daily—to stay healthy. Although only small amounts are needed, trace minerals are very important.

Your body needs minerals to grow and develop normally. People who fail to take in enough of a particular mineral experience serious health consequences, such as

- **osteoporosis**, a condition in which bones become fragile and may break easily, which can be caused by a lack of calcium during childhood and adolescence;

osteoporosis
a dangerous condition in which bones are fragile and may break easily; can be caused by a lack of calcium during childhood and adolescence

Figure 3.7 Types and Functions of Minerals

Mineral	Function	Sources
Macrominerals		
Calcium	necessary for muscle, heart, and digestive system health; builds bone and supports the synthesis and function of blood cells	dairy products, eggs, canned fish with bones (salmon, sardines), green leafy vegetables, nuts, seeds, tofu
Phosphorus	present in bones and cells; assists with energy processing and other functions	red meat, dairy foods, fish, poultry, bread, rice, oats
Magnesium	contributes to bone health; required for physiological processes in the body	raw nuts, soy beans, spinach, chard, tomatoes, beans
Sulfur	promotes metabolism and communication between nerve cells; helps the body resist bacteria and protect against toxic substances	meats, fish, poultry, eggs, milk, legumes
Sodium	helps maintain normal blood pressure; regulates the body's fluid balance	table salt (sodium chloride), milk, spinach
Chloride	assists with maintaining proper amount of bodily fluids	table salt
Potassium	assists with heart function, skeletal and muscle contraction, and digestive function	legumes, potato skin, tomatoes, bananas, papayas, lentils, dry beans, whole grains, yams, soybeans
Trace Minerals		
Iron	carries oxygen from the lungs to the tissues	red meat, leafy green vegetables, fish (tuna, salmon), eggs, dried fruits, beans, whole grains, enriched grains
Zinc	assists with immune function, reproduction, and nervous system functions	beef, pork, lamb, nuts, whole grains
Iodine	assists with making thyroid hormones	table salt, some types of fish (cod, sea bass, perch, haddock), dairy products
Selenium	protects cells from damage and regulates thyroid hormone action and other processes	vegetables, fish, red meat, grains, eggs, chicken
Copper	assists with metabolism and red blood cell formation; helps with the production of energy for cells	shellfish, whole grains, beans, nuts, potatoes, dried fruits, cocoa
Manganese	assists with bone formation, metabolism, and wound healing	nuts, legumes, seeds, whole grains, tea, leafy green vegetables
Fluoride	prevents dental cavities and stimulates new bone formation	fluoridated water, most seafood, tea, gelatin
Chromium	helps maintain normal blood sugar (glucose) levels	beef, liver, eggs, chicken, apples, bananas, spinach, green peppers
Molybdenum	helps the body process proteins and other substances	legumes, grains, leafy vegetables, liver, nuts

- **anemia**, a condition that causes weakness, fatigue, and headaches, which occurs when people do not take in enough iron; and
- **cretinism**, a severe birth defect that is caused by a lack of iodine during pregnancy.

As with vitamins, eating a nutritious and balanced diet generally provides all of the minerals your body needs.

anemia
a condition causing weakness, tiredness, and headaches; results from decrease in red blood cells or insufficient hemoglobin

CASE STUDY Why Is Jessica Weak and Tired?

Jessica is 15 years old and a sophomore in high school. She is very busy with many activities—performing in the choir, volunteering with Big Brothers/Big Sisters, and playing on the junior varsity softball team. She often finds herself eating in the car as she races from one activity to another. Because Jessica is a vegetarian, she typically eats lots of carbohydrates (such as breads and pasta), vegetables, and fruits.

Over the last few months, Jessica has found herself feeling very tired and out of breath during softball practice. She even finds herself struggling to climb a flight of stairs. She is also having regular headaches.

Jessica's parents took her to the doctor to figure out what was causing her to feel so tired. Blood work revealed that Jessica is showing signs of anemia, which is caused by a deficiency of iron in her blood. She is now making changes to her diet in an effort to take in more iron in the foods she eats. Jessica is also taking an iron supplement.

Thinking Critically

1. What do you think are the primary factors that led Jessica to become anemic?
2. What are some strategies that you think could help Jessica eat more nutritious foods, including more foods that are high in iron?
3. What advice would you give other teenagers who find themselves in the same situation as Jessica to help prevent them from adopting unhealthy eating habits?



Water

Water is necessary for most bodily functions. In fact, although people can live for several weeks, and even months, without taking in any other type of nutrients, they can survive only a few days without water.

Water helps your body in a number of ways, including

- maintaining a normal temperature;
- cushioning and lubricating your joints;
- protecting your spinal cord and other sensitive tissues;
- getting rid of wastes (through urination, perspiration, and bowel movements); and
- moving oxygen, nutrients, wastes, and other materials throughout the body.

dehydration

a condition in which the body's tissues lose too much water

Because your body loses water every day through urination, sweat, and even exhaling breath, you need to ingest water to replace what your body loses and prevent dehydration. **Dehydration** is a dangerous condition in which the body's

tissues lose too much water. Without enough water, the body cannot cool itself, and blood pressure can drop dangerously low as water leaves the blood.

Individuals should drink $8\frac{1}{2}$ to $11\frac{1}{2}$ cups of fluids per day to maintain adequate water in the body. Most of your water needs are met through the water and other beverages you drink. However, you can also get some fluid through the foods you eat. For example, eating broth soups and other foods that have high water content is a great way to replenish a depleted water supply. Foods such as celery, tomatoes, apples, oranges, and melons have high water content.

Fluid needs can change. For instance, women who are pregnant or lactating have increased fluid requirements. Infants also have a greater need for fluids. Although older adults may experience a decreased sensation of thirst, their fluid needs are the same as when they were younger.

Under normal conditions, most people can maintain appropriate amounts of water in their body simply by drinking when they are thirsty and when they are eating a meal. Some conditions, however, may require additional fluids to maintain hydration. Specifically, your body needs more water when you are

- outside in hot weather for a long period of time,
- engaging in vigorous physical activity (Figure 3.8),
- running a fever, or
- experiencing diarrhea or vomiting.

Feeling thirsty is a signal that your body needs more water. If possible, drink enough water to prevent the experience of feeling thirsty.



Figure 3.8

Drinking water even before you are thirsty will keep your body hydrated. *What tools could you use to remind yourself to drink water before your body feels thirsty?*

Lesson 3.1 Review

Know and Understand



1. Name the six types of nutrients.
2. Explain the difference between glucose and glycogen.
3. Describe the role of protein in the body.
4. List three functions of body fat.
5. How are minerals categorized as either *macro* or *trace*?
6. List at least four conditions in which the body needs more than the usual amount of water.

Analyze and Apply


7. Compare and contrast saturated fats and unsaturated fats.
8. Analyze the importance of fiber in the diet.

Real World Health

Revisit the Before You Read activity at the beginning of this lesson. For any of your favorite foods that have few nutrients, suggest two healthier options that you can eat instead. Explain why each option is healthier using information from the lesson, or do your own research to justify your response.

Lesson 3.2

Creating a Healthy Eating Plan

Key Terms  E-Flash Cards
In this lesson, you will learn the meanings of the following key terms.

calorie
metabolism
nutrient-dense food
overnutrition
undernutrition

Lesson Objectives

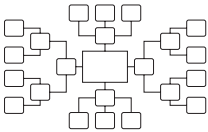
After studying this lesson, you will be able to

- interpret the key concepts from the *Dietary Guidelines for Americans*;
- summarize recommendations from the MyPlate food guidance system; and
- analyze the hazards of poor nutrition.

Before You Read

Healthy Choices Mindmap

Place the phrase healthy food choices in the middle of a mindmap similar to the one shown here. Brainstorm to create a mindmap about this important phrase. What phrases, key terms, or bodily functions are related to the foods that you choose to eat?



Warm-Up Activity

Food Influences
Using a graphic organizer similar to the one shown here, list six factors that influence your food choices and six benefits of a healthy diet.

FACTORS	BENEFITS
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____
4. _____	4. _____
5. _____	5. _____
6. _____	6. _____



When you eat nutritious foods today, you lower your risk of developing diseases later in life. People who follow a healthy eating plan and maintain a healthy body weight are less likely to develop serious illnesses such as heart disease, high blood pressure, diabetes, stroke, and cancer. Eating a nutritious diet also prevents health problems such as obesity, cavities, iron deficiency, and osteoporosis.

Overall, the body needs about 45 different nutrients per day. This is why eating a varied diet full of nutritious foods is important for maintaining good health.

A healthy eating plan includes foods that supply the amounts and types of nutrients your body needs to be healthy. In this section, you will learn how to make smart food choices and how to create a balanced diet. You will also learn about the hazards of poor nutrition.

Dietary Guidelines

The United States Departments of Agriculture (USDA) and Health and Human Services (HHS) publish the *Dietary Guidelines for Americans*, which is revised every five years. The *Dietary Guidelines* provide recommendations for establishing eating patterns to promote health. The guidelines promote two key concepts:

- Maintain calorie balance over time to achieve and sustain a healthy weight.
- Focus on consuming nutrient-dense foods and beverages.

Maintain Calorie Balance

As you learned earlier in this chapter, nutrients provide the body with the energy it needs to function. The energy provided by food is measured in terms of a unit called a **calorie**. Foods that provide larger amounts of energy are higher in calories than foods that provide smaller amounts of energy.

Some types of nutrients provide more calories than others (Figure 3.9 on the next page). Carbohydrates and protein each provide 4 calories per gram. Fats provide 9 calories per gram, more than any other source.

Your calorie balance in a given day is determined by two distinct factors:

- the number of calories you consume through eating and drinking (this is energy *in* to your body)
- the number of calories you burn through the work of your **metabolism** and your daily physical activities (this is energy *out* of your body)

Your body burns calories to perform the many functions of your metabolism that keep you alive, such as eating, sleeping, and breathing. You also burn calories in the course of daily life—while walking to class, lifting a heavy backpack, and cleaning your room.

calorie
a unit of measurement for energy provided by food

metabolism
the rate at which the body uses energy

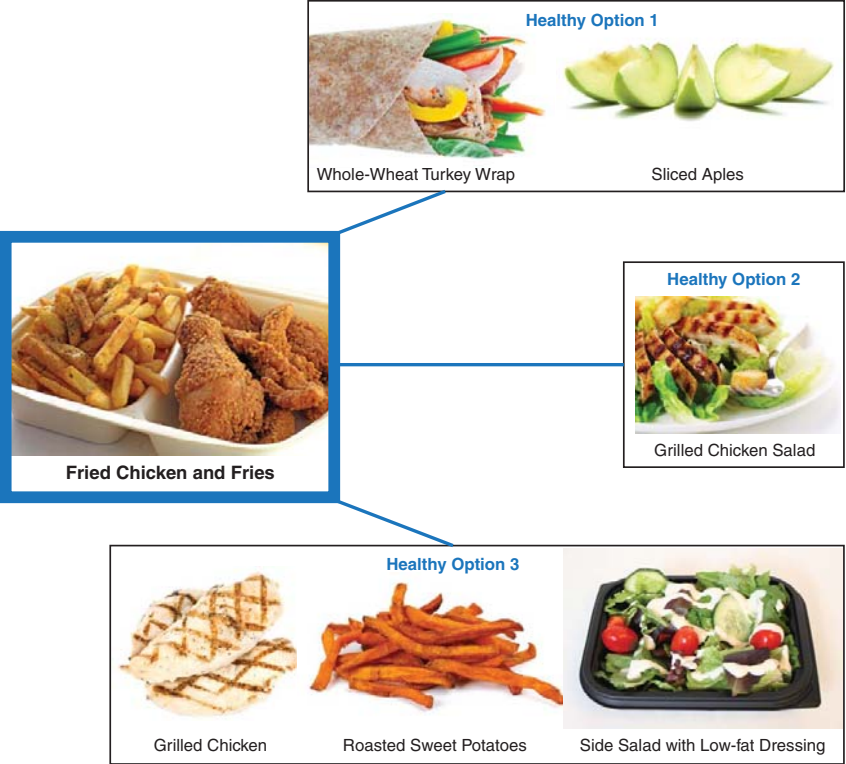


Figure 3.9

You can use your new knowledge of nutrition to “make over” meals and eat healthier.

Maintaining Weight. You can maintain your weight by balancing calories consumed with calories burned throughout the day.
Calories in = Calories burned

Gaining Weight. When you consume more calories than your body burns, an energy imbalance occurs. The number of calories you take in and burn doesn’t have to balance each day. If you take in more calories than you burn over time, however, you will gain weight. Those extra calories are stored in the body (mostly as fat).
Calories in > Calories burned

Losing Weight. An energy imbalance also occurs if, over time, you burn more calories than you take in. As you can probably guess, if you burn more than you consume, you will lose weight.
Calories in < Calories burned

Factors That Influence Your Calorie Needs. The number of calories you need to take in each day depends on a number of different factors. These factors include your age, gender, height, weight, and level of physical activity (Figure 3.10). For example, older people typically don’t need to consume as many calories as younger people, men have greater calorie needs than women, and people who are physically active burn more calories than those who are less active.

Focus on Nutrient-Dense Foods

Calorie balance is only part of the equation. A healthy diet requires that the foods you choose are nutrient dense. The *Dietary Guidelines* define **nutrient-dense foods** as foods that have relatively few calories, and provide vitamins, minerals, and other substances that may have positive health effects.

In addition to focusing on nutrient-dense foods in your meal plan, you should also avoid or limit intake of foods that contain solid fats, added sugars, refined grains, and sodium.

Consider the following examples of ways to consume approximately 100 calories:

- A medium-sized apple contains about 100 calories. These calories mostly come from naturally occurring sugars in the apple. In addition to calories, the apple supplies your body with fiber, vitamins, and minerals.
- An 8-ounce glass of a sugary soda (about two-thirds of a can) also contains about 100 calories. These calories come from the added sugars in this drink—there are 10 teaspoons of sugar in a 12-ounce can of soda. However, there is little to no nutrient value in this soda.

Your body benefits more in terms of nutrients when you eat an apple than when you drink a soda, even though both of these choices provide 100 calories of energy.

Avoid “Empty Calories.” The added sugars and solid fats found in some foods are called “empty calories.” These sugars and fats are called *empty calories* because they supply few, if any, nutrients to a person’s diet.

Calories from added sugars and solid fats contribute up to 40% of daily calories for children and teenagers (2 to 18 years of age). Approximately half of those calories come from six sources: soda, fruit drinks, dairy desserts (such as cheesecake or ice cream), grain desserts (such as cookies or cake), pizza (with meat), and whole milk.

The most common pizza choices and whole milk supply needed nutrients such as calcium and vitamins, but they also contain many “empty calories” from solid fats. More nutrient-dense options are veggie pizza with whole-grain crust and nonfat milk.

Figure 3.10 Recommended Daily Calorie Intake		
	Male/ Moderately Active	Female/ Moderately Active
Age	Calories	
10	1,800	1,800
11	2,000	1,800
12	2,200	2,000
13	2,200	2,000
14	2,400	2,000
15	2,600	2,000
16	2,800	2,000
17	2,800	2,000
18	2,800	2,000
19-20	2,800	2,200
21-25	2,800	2,200
26-30	2,600	2,000
31-35	2,600	2,000
36-40	2,600	2,000
41-45	2,600	2,000
46-50	2,400	2,000
51-55	2,400	1,800
56-60	2,400	1,800
61-65	2,400	1,800

nutrient-dense food
a relatively low-calorie food that provides vitamins, minerals, and other healthful substances

Research
in Action

Does McDonald's Food Taste Better?

In a recent study, researchers wanted to examine the effects of food logos and packaging on children's taste preferences. The study sought to discover if children believe that food from McDonald's tastes better than the same food from a grocery store.

Researchers asked 63 children (from 3 and 5 years of age) to taste five different foods: chicken nuggets, a hamburger, French fries, baby carrots, and milk. The chicken nuggets, hamburger, and French fries were all from McDonald's. The carrots and milk were from a grocery store.

Each type of food was divided into two portions. One portion was wrapped in a McDonald's wrapper or placed in a McDonald's bag. The second portion was given to the children in a wrapper or bag without the McDonald's logo. Therefore, the children tasted each of the five types of foods twice—once in McDonald's packaging and once with generic packaging.

Can you guess what these researchers found? Overall, children preferred the taste of foods and drinks they thought were from McDonald's. After taste-testing, the children said the chicken nuggets, fries, carrots, and milk wrapped in the McDonald's logo tasted better than the foods in grocery store packaging, even though the foods were exactly the same.



Thinking Critically

1. What factors do you think contribute to children's belief that food from McDonald's tastes better? What role is played by family, society, and the media in the formation of this belief?
2. The children in this study were very young. Do you think researchers would find the same results with older children and teenagers? Why or why not?
3. What are the consequences of the children's beliefs about McDonald's food? Can you think of strategies for changing such beliefs? Do you think such efforts could be effective?

Consider How Food Is Prepared. The way food is prepared also influences the number of calories it contains. Fried foods, for example, have more calories than baked or raw foods because the fried food absorbs oil or butter while frying. A grilled chicken leg has 60 calories whereas a fried chicken leg has 130 calories. Something as simple as the method of food preparation can cause the food's calories to double.

Food can also provide different nutrients depending on how it is served. For example, apples with their skins on have more fiber than peeled apples. This is one reason why eating an apple is better for you than eating applesauce or drinking apple juice. By peeling and processing fruits and vegetables, you are removing some of their nutrients. Leaving the skin or peel on gives you a much more nutritious option (Figure 3.11).

	Chips (fried in oil)	Mashed (with whole milk and butter)	Baked (without butter or sour cream)
Fiber	5%*	13%	18%
Total Fat	16%	14%	0



* percentages are daily recommended amounts

Guides for Healthy Eating

There are a number of guides available to help individuals implement healthy eating patterns. For example, the USDA food patterns discussed in the *Dietary Guidelines* can help people trying to maintain calorie balance and focus on nutrient-dense foods. The USDA food patterns serve as the basis for the MyPlate food guidance system.

MyPlate Food Guidance System

In 2011, the USDA created the MyPlate food guidance system to help individuals put the *Dietary Guidelines* into practice (Figure 3.12). The MyPlate graphic is designed to remind people about the proportion of different foods they should eat at a meal.

Food Groups

The MyPlate diagram includes the five food groups: fruits, vegetables, grains, protein foods, and dairy. Oils are not included on the MyPlate graphic because they are not considered a food group. Oils are, however, a necessary part of a healthful diet as well.

Fruits. Foods in the fruit group are often good sources of nutrients many diets are lacking such as potassium, fiber, vitamin C, and folic acid. Fresh, frozen, canned, and dried fruits, as well as fruit juices, are included in this group. Fruit juices, however, lack the fiber found in whole fruits, and are not as nutrient dense as whole fruits. For this reason, whole fruits should be selected more often than juice.

Grains. This group includes foods made from wheat, rice, oats, cornmeal, barley, or other cereal grains. Foods in the grains group are classified as either whole grains or refined grains.

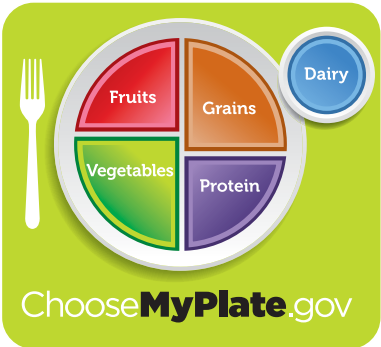
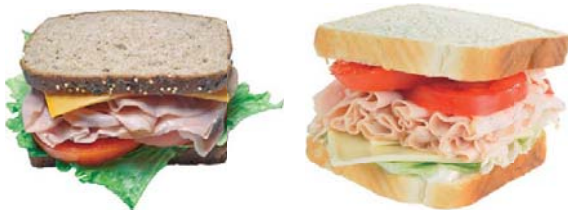


Figure 3.12

MyPlate illustrates the recommended proportions of the different food groups that people should eat in a day. *How much does your daily diet align with these suggestions? What food groups should you eat more of? less of?*

Figure 3.13

These two turkey and cheese sandwiches look very similar, but one is healthier than the other. Why?



A food is considered *whole grain* if it contains the entire grain kernel—the bran, germ, and endosperm (Figure 3.13). *Refined grains* have been processed to produce a finer texture and improved shelf life, and no longer contain the whole kernel.

Examples of whole grains include brown rice, oatmeal, whole-wheat bread, and wild rice. Examples of refined grains include couscous, crackers, and white bread.

Vegetables. Most foods in the vegetables group are naturally low in fat and calories, and are important sources of many nutrients including potassium, fiber, folic acid, and vitamins A and C. By definition, this means vegetables are often very nutrient dense. Vegetables may be fresh, frozen, canned, dried, raw, cooked, whole, cut up, or juiced.

Vegetables are divided into five subgroups—dark green, starchy, red and orange, beans and peas, and other. You should consume vegetables from each of these groups every week.

Dairy. The dairy group includes many foods that are high in calcium including milk and foods made from milk such as cheese and yogurt. You should choose foods in this group that are low fat or fat free.

Foods such as cream and butter, which are made from milk, but contain little calcium, are not included in this group. Calcium-fortified soy milk is included in this dairy group as an option for individuals who are lactose intolerant. Dairy foods are often good sources of potassium and protein, and are frequently fortified with vitamin D.

Protein Foods. The protein foods group includes meat, poultry, seafood, beans and peas, eggs, processed soy products, and nuts and seeds (Figure 3.14). Including a variety of protein foods in your meal plan each

Figure 3.14 Protein Content of Various Foods

Food Type	Grams of Protein
1 cup of milk	8
1 cup of cooked dry beans	16
3-ounce piece of meat	21
8-ounce container of yogurt	11

Figure 3.15 Recommended Protein Dietary Allowance by Age

Age (in years)	Grams of Protein Needed Daily
children ages 1–3	13
children ages 4–8	19
children ages 9–13	34
girls ages 14–18	46
boys ages 14–18	52
women ages 19–70+	46
men ages 19–70+	56

week improves your nutrient intake and supplies health benefits. The *Dietary Guidelines* recommend that you include at least eight ounces of cooked seafood in your meal plan each week (Figure 3.15).

In addition to protein, foods in this group may supply niacin, thiamin, riboflavin, B₆, vitamin E, iron, zinc, and magnesium. Some seafood contains fats believed to reduce the risk of heart disease. Plant-based proteins are often rich in fiber.

Some animal-based proteins are high in saturated fats and cholesterol, which may increase the risk for heart disease. For this reason, you should select cuts of meat and poultry that are lean or low fat more often.

Women who are pregnant or breastfeeding should avoid seafood that is high in mercury such as shark, swordfish, tilefish, and King mackerel, and limit canned white tuna (albacore) to less than six ounces per week.

Oils. Oils are not considered a food group, but do provide essential nutrients and must be included in your diet. Oils are naturally present in many plants and fish. Often the oil is extracted from a food source and sold as liquid oil. For instance, olive oil is extracted from olives. Other examples of oils include corn oil and canola oil. Avocados, nuts, and some fish are common sources of oils that are typically included in the diet.

Oils are unsaturated fats and are, as you read earlier, typically liquid at room temperature. Saturated fats, however, are not oils and come from animal sources. Saturated fats commonly found in the diet include butter, milk fat, beef fat, pork fat, and poultry fat. Saturated fat in the diet may contribute to chronic health conditions such as heart disease.

Recommended Amounts

The MyPlate food guidance system provides tools to help you develop a personalized food plan. This daily food plan outlines the amounts you should consume from each food group and provides information for making nutrient-dense choices.

The amount of food you need from each of the food groups is affected by the factors discussed earlier—age, gender, height, weight, and level of physical activity. Other factors such as health conditions, pregnancy, and lactation can affect your nutrient needs as well.

Personal Profile

Are You at Risk of Poor Nutrition?

These questions will help you assess how much you are putting your own health at risk by practicing poor eating habits.

I rarely drink soda and sugar-sweetened drinks. **yes no**

I limit how often I eat foods that are high in salt. **yes no**

I drink skim or low-fat milk every day. **yes no**

I drink at least 8½ to 11½ cups of water or other fluids a day. **yes no**

I limit or avoid saturated fats such as butter, cream, and cheese. **yes no**

I eat at least 2½ cups of fruits and vegetables each day. **yes no**

I eat foods that are high in whole grains—such as brown rice, oatmeal, and whole-wheat bread—at least once a day. **yes no**

I choose meats that are leaner cuts and trim away the fat and skin. **yes no**

I eat at least 8 ounces of fish or seafood each week. **yes no**

I choose beans or peas (legumes) as a main dish at least once a week. **yes no**

Add up the number of yes answers to assess your eating habits. The more yes answers, the lower your risk for poor nutrition.

Health in the Media

Advertisements for Unhealthy Foods

The average child watching children's television programming sees an estimated 10,000 TV commercials for food products in a year. Unfortunately, most of these advertisements are for foods with poor nutritional content.

- about 91% are for foods or beverages that are high in fat, sodium, or added sugars (foods with "empty calories")
- nearly 60% are for products that exceeded the criteria for added sugars
- about 20% exceeded other guidelines, including those for total fat, saturated plus trans fat, and sodium
- none of the advertisements are for beverages that meet nutritional guidelines

Not surprisingly, children who see advertisements for unhealthy food on TV are more likely to want to eat high-fat and high-sugar foods. Researchers in one study showed children an episode of a popular cartoon. Some children saw five minutes of commercials for toys before the cartoon, while another group saw five minutes of commercials for snacks and fast food.

After watching the cartoon, researchers gave the children a list of various food items and asked them to choose which ones they would like to eat. The children who saw the food commercials were more likely to pick unhealthy foods than children who saw the toy commercials.

Thinking Critically

1. Present a convincing argument for reducing the number of unhealthy food advertisements shown on television. Cite evidence from the study mentioned above and this chapter. Incorporate your argument into a letter to your congressperson asking him or her to support these efforts.
2. Generate a list of strategies that could be used to avoid the influence of these advertisements.

undernutrition

a condition in which the body takes in too few nutrients for health and growth; malnutrition

overnutrition

a condition in which the body takes in too many foods with too much sugar content, total fat, sodium, and calories



Poor Nutrition

Healthy eating plans identify the amounts and types of food individuals should consume to obtain the nutrients needed for good health. These plans have been developed to help individuals avoid the problems associated with poor nutrition, or malnutrition, which includes both undernutrition and overnutrition.

Undernutrition

When people do not receive the needed nutrients from the food they eat, they experience **undernutrition**. This means they take in too few nutrients for health and growth.

Healthy eating is especially important for children and teenagers, since the body undergoes considerable growth and development during these life stages. Undernutrition can lead to growth problems; children who don't receive enough nutrients may never reach their full height. Undernutrition can also lead to serious and even life-threatening problems, including brain damage, impaired vision and blindness, and bone deformities.

Undernutrition during pregnancy affects the health of the fetus. When a woman who is pregnant doesn't consume sufficient nutrients, the growing fetus may not receive enough nutrients to develop properly.

Overnutrition

Although many people think about poor health in terms of not getting *enough* nutrients, poor health can also be caused by consuming *too much* of some nutrients. This type of **overnutrition** is often caused by people eating too many foods that contain high amounts

of added sugar, solid fat, sodium, or refined carbohydrates, or simply too many calories.

Foods high in solid fats, added sugars, refined grains, and sodium are believed to contribute to a variety of health conditions. For instance, evidence suggests that as an individual's sodium intake decreases, so does his or her blood pressure. Maintaining a normal blood pressure reduces the risk of heart and kidney diseases.



Local and Global Health

Nutrition

Good nutrition is essential for normal health and development. Children who eat well-balanced diets do better in school, have fewer illnesses, and are more likely to become healthy adults.

Sadly, an estimated 129 million children under five years of age are malnourished worldwide. Malnutrition is defined as both a lack of calories and an inadequate amount of nutrition.

Malnutrition is caused by a number of different factors, including

- poverty, which leads to a lack of money to buy food;
- disease, which can cause a problem absorbing nutrients;
- food shortages, which can be caused by agricultural productivity issues; and
- dietary practices, such as an overreliance on a single food source (for example, corn or rice).

Undernourished children have a lowered resistance to infection and are more likely to die from common childhood illnesses, such as diarrhea and respiratory infections. More than a third of child deaths worldwide are caused by a lack of nourishment, with approximately 6 million children dying of hunger each year.

Percentage of Child Malnutrition in Selected Countries

Country	Percentage	Country	Percentage
India	43.5	Kenya	16.5
Bangladesh	41.3	Morocco	9.9
Ethiopia	34.6	China	6.8
Afghanistan	32.9	Peru	5.4
Pakistan	31.3	Mexico	3.4
Cambodia	28.8	United States	1.3
Rwanda	18.0	Germany	1.1

Thinking Critically

1. What do you believe are the primary causes of the widely different rates of malnutrition in different countries? Explain your answer.
2. How do you think the rates of malnutrition in different countries will change over time? What are some factors that might cause rates of malnutrition to increase in a given country? to decrease?
3. What strategies could the US government or other governments take to decrease the rate of childhood malnutrition in their country and worldwide? Which strategies would you support? Which would you oppose?

Lesson 3.2 Review

Know and Understand

1. What are the two key concepts communicated in the *Dietary Guidelines*?
2. List five factors that affect the number of calories needed by an individual.
3. List the five vegetable subgroups and provide an example of your favorite vegetable for each subgroup.
4. Describe how undernutrition or malnutrition during pregnancy affects the fetus.

Analyze and Apply

5. Analyze a typical meal that you eat using the recommendations from the MyPlate food guidance system. How does your meal rate?


6. Evaluate why an individual must select nutrient-dense foods to consume a healthy diet.

Real World Health

Your older sibling just completed his first year of college and has returned home for the summer. He has informed you that college was tough the first year and that he gained 18 pounds of fat during the year. He cites studying, lack of time to exercise, and limited financial resources as the main "excuses" for his weight gain. Write a letter to your sibling detailing at least four solutions to each of his excuses. Also write a paragraph about how a healthier body will lead to higher grades.

Lesson 3.3

Food Labels and Food Safety

Key Terms  *In this lesson, you will learn the meanings of the following key terms.*

Daily Values
food additives
food allergy
Food and Drug Administration (FDA)
food intolerance
foodborne illness
foodborne intoxication
generally recognized as safe (GRAS)
gluten
organic food

Before You Read

Healthy Food Decisions

List the five facts that you think are most important for a person to look for on a food label when deciding whether or not to eat that particular food. Based on food labels that you have read, do you think there are foods that we should never eat? Why or why not?

Lesson Objectives

After studying this lesson, you will be able to

- analyze a Nutrition Facts label to identify the nutritional value of a food product;
- describe how the order of ingredients is determined on a food label;
- understand the use of claims on food labels;
- describe the consequences of unsafe food handling;
- differentiate between the different types of foodborne illnesses;
- recognize steps to prevent foodborne illnesses; and
- distinguish between food intolerances and food allergies.

Warm-Up Activity

Portion Sizes

Many of us underestimate the amount of food that we eat in a given meal. Analyze the difference between serving sizes and portion sizes, such as those shown in the samples below. Then, identify three strategies to reduce portion sizes to the actual recommended serving sizes.



The goal of making good food choices is to provide the right amount of nutrients for your body. Another goal is to make sure the foods and beverages you put into your body are safe.

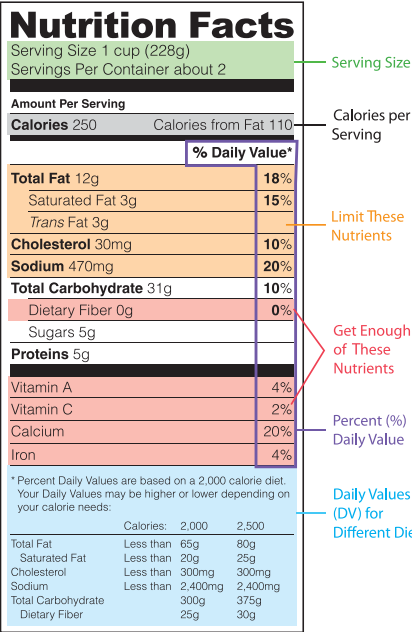
One of the most helpful strategies for making good food choices is to carefully read the information provided on a packaged food label. These labels contain valuable information about that food, such as how long it will remain fresh, how it should be stored, and the type of nutrients it provides. This section will focus on the important information provided on food labels and how you can avoid becoming ill from the foods you eat.

Daily Values
the recommended amounts of nutrients that a person should consume each day

Understanding Nutrition Facts Labels

To help consumers make good choices about what they eat, the FDA requires any food sold in a package to include a Nutrition Facts label (Figure 3.16). Certain pieces of information are required to be printed on the Nutrition Facts label, including

- serving size (the volume or weight of a single serving of the food);
- number of servings in a package;
- number of calories in each serving;
- number of calories from fat in each serving;
- amount of different nutrients (including fat, cholesterol, sodium, carbohydrates, fibers, sugars, protein, and some vitamins and minerals) in a serving; and
- percent of daily values for the different nutrients provided in a serving.



Daily Values

Daily Values, which are printed at the bottom of the food label panel, are the recommended intake amounts for specific nutrients. Daily Values are provided for both 2,000-calorie and 2,500-calorie diets. The Daily Values for a 2,000-calorie diet are used to calculate the Percent (%) Daily Values for the nutrients on the panel. These percentages, therefore, could be higher or lower depending on an individual's daily calorie needs.

The % Daily Value signals whether a serving of food contributes a lot or a little of a particular nutrient to your total daily diet. For example, suppose a food item's % Daily Value for calcium is 20. That means one serving of the food supplies 20% of the daily requirement for calcium for an individual on a 2,000-calorie diet.

Figure 3.16

A Nutrition Facts label outlines the nutritional value of a food. **Why do you think nutrition information is required to be printed on packaged foods?**

The % Daily Values can be used to evaluate the overall nutritional quality of a food. Some of the nutrients listed on the label, such as dietary fiber and calcium, are beneficial. Greater % Daily Values for these beneficial nutrients indicate better nutritional value of the food. Other nutrients, such as saturated fat and sodium, should be limited so lower % Daily Values are desirable. Use the following guidelines to interpret % Daily Values:

- 5% or less is low—aim for this when eating total fat, saturated fat, trans fat, cholesterol, and sodium
- 20% or more is high—aim for this when eating dietary fiber, calcium, iron, and vitamins A and C

Servings

When you are reading Nutrition Facts labels, remember to check the number of servings provided in the container first. The amount and % Daily Value of nutrients are based on a single serving size, but people often consume more than just a single serving. For example, if the package contains two servings and you consume the entire package, then you have consumed twice the number of calories and nutrients reported in the Nutrition Facts label.

Can you guess how many servings are in a pint of ice cream? Many people would guess one 2-cup serving or two 1-cup servings. Ice cream manufacturers, however, describe a pint of ice cream as four ½-cup servings. This means that the calories listed for a single serving of ice cream from a one pint container reflect only one-fourth of the container.

Ingredients in Foods

The information on a food label also includes all the ingredients that were used to make that food. These ingredients are listed in the order in which they contribute weight to a given product. Ingredients that are listed first make up a greater amount of the final product by weight than ingredients that appear near the end of the list. In other words, the closer the ingredient appears to the top of the list, the more of that ingredient in the food (Figure 3.17).

Ingredient Names. Food manufacturers often list ingredients in somewhat confusing ways. This makes it harder to determine exactly what foods are in the product. For example, many different ingredients can add sugar to a food product. All of the following terms can be used to describe sugar that has been added to a food: *corn syrup, corn sweetener, fructose, dextrose, high fructose corn syrup, lactose, maltose, sucrose, malt syrup, molasses, honey, glucose, and fruit juice concentrate*. If you see any of these in the ingredient list, you know the food contains added sugars.

Let’s take a real-world example to illustrate how different terms for sugar can be used in describing ingredients in a given product. One of the best-selling cereals in the United States lists the following five ingredients first on its nutrition label:

- whole-grain oats
- sugar
- modified corn starch
- honey
- brown sugar syrup

As you can see from this list, four of the top five ingredients are a type of sugar. Can you guess what the sixth ingredient is? Salt. Do you think you might be able to find a more nutrient-dense cereal?

Food Additives. Often food manufacturers add sugar, salt, or other ingredients to extend their product’s shelf life, improve its flavor, and for other reasons. Substances that are added to food products to cause desired changes are called **food additives**.

The government regulates food additives and maintains a list of food additives that have proven to be safe. Additives on this list are **generally recognized as safe (GRAS)**. Food manufacturers must obtain approval from the **Food and Drug Administration (FDA)** to use substances that do not appear on the GRAS list.

Food additives must be included in the product’s ingredient list. If your goal is to avoid specific food additives, you can find them on the ingredient lists on food labels.

Claims on Labels

Sometimes food labels describe a particular food using a specific claim about its health benefits. For example, a label might describe a food as “low



Figure 3.17

Food labels contain a great deal of information. *Do you take advantage of having this information at your fingertips? Why or why not?*

Health across the Life Span

Recommended Macronutrient Proportions by Age

The recommended ranges (at right) for the percentage of calories from protein, carbohydrates, and fat in a diet were established by the Institutes of Medicine. Total calories vary among individuals based on a number of factors including age, gender, height, weight, and level of physical activity.

Analyzing Data

1. According to this table, which age group has the highest recommended percentage of calories from protein?
2. Based on these recommendations, do two-year-olds need the same number of calories per day from carbohydrates as 19-year-olds? Explain your answer.

Age Group	Total Calories		
	% Carbohydrate	% Protein	% Fat
young children (1 to 3 years of age)	45–65%	5–20%	30–40%
older children and adolescents (4 to 18 years of age)	45–65%	10–30%	25–35%
adults (19 years of age and older)	45–65%	10–35%	20–35%

organic food
a type of food that
is produced without
pesticides, bioengineering,
or high-energy radiation

fat” or “reduced calories.” If these terms are being used, the food must meet certain criteria established by the FDA.

For example, a food described as “low fat” must not contain more than three grams of fat in a single serving. Similarly, the FDA allows manufacturers to state on the label that a food may reduce the risk of heart disease if that food is made up of at least 51% whole-grain ingredients and is low in total fat, saturated fat, and cholesterol.

It is important to understand that even low-fat versions of some foods contain a fair amount of fat. For example, a cup of plain yogurt made with whole milk has 7 grams of fat, whereas a cup made with low-fat milk has 4 grams of fat. Obviously 4 grams of fat is better than 7, but a cup of plain yogurt made from skim milk contains 0 grams of fat. Sometimes ingredients can make all the difference when choosing a more healthful snack option (Figure 3.18).

A food that is described on the label as “organic” also must meet certain criteria. **Organic food** must consist of at least 95% organically produced ingredients. Organic foods must be grown without using any fertilizers or pesticides made from manufactured chemicals, sewage sludge, bioengineering, or high-energy radiation. The United States Department of Agriculture (USDA) created the standards that must be met for food products to be labeled “organic.”

Individuals may purchase organic foods for a variety of reasons. Some people are trying to avoid consuming pesticides, hormones, or other substances that are used in the production of nonorganic foods. Others may choose organic foods because they believe these foods are more nutritious; however, research has not yet confirmed this notion.

Figure 3.18 Making More Healthful Food Choices

Less Healthful Choice	More Healthful Alternative
whole milk	low-fat (1%), reduced-fat (2%), or fat-free (skim) milk
ice cream	sorbet, sherbet, fruit smoothie, low-fat ice cream, or fat-free frozen yogurt
pasta with white or cheese sauce	whole-grain pasta with red sauce (marinara) or vegetables (primavera)
cream soups	broth-based soups
donuts, muffins, scones, or pastries	whole-grain English muffins or bagels
cheese	reduced-fat or fat-free cheese
white bread or hamburger bun	whole-grain bread or bun
sour cream	plain, low-fat Greek yogurt
bacon or sausage	Canadian bacon or lean ham
potato chips	popcorn (air-popped or light microwaved), roasted chickpeas, fruits, vegetables
regular ground beef	extra-lean ground beef such as ground round, or ground turkey breast
butter or margarine on toast or bread	fruit spread, jam, or honey on whole-grain bread or toast
frozen breaded fish or fried fish	unbreaded fish or shellfish poached, steamed, or broiled
regular margarine or butter	light spread margarines or olive oil
granola or sweetened breakfast cereal	bran flakes, crispy rice, grits, oatmeal, or reduced-fat granola
deep-dish pepperoni pizza	thin, whole-grain crust veggie pizza
sugar-sweetened soda	seltzer with lime wedge

SKILLS FOR HEALTH AND WELLNESS

Improving the Nutrition in Your Diet

The strategies listed below can help you increase the level of nutrition in your own diet.

- Vary your fruit choices to benefit from a wider array of nutrients.
- Select potassium-rich vegetables such as sweet potatoes, tomato products, lentils, and kidney beans often.
- Try to eat two vegetables (choose dark green, red, or orange vegetables often) with your evening meal.
- Make a meal around dried beans or peas (legumes) instead of meat. Substitute pinto or black beans for meat in chili and tacos.
- Include low-fat or nonfat milk or calcium-fortified soy milk as a beverage with meals.
- Substitute whole-grain flour for up to half of the flour called for in pancake, waffle, and other recipes.
- Drink water instead of sugar-sweetened beverages.
- Have a piece of fruit for dessert and skip desserts with added sugar.
- Choose leaner cuts of red meat that include “round” or “loin” in the name and trim away any fat you can see. For chicken and turkey, remove the skin to reduce fat.
- Include fish or seafood high in omega-3 fatty acids such as salmon, trout, or herring in your diet each week.
- Choose whole-grain, unsweetened, ready-to-eat cereals or oatmeal for breakfast.

When Food Causes Illness

Foodborne illness, or *food poisoning*, refers to illnesses that are transmitted by foods. Foodborne illnesses are a common, yet preventable, public health problem. An estimated 48 million people—or 1 in 6 Americans—get sick from consuming foods or beverages each year. About 128,000 of these people are hospitalized, and 3,000 die of foodborne diseases. Most foodborne illness can be prevented by practicing safe food handling.

Foodborne illnesses aren’t especially harmful for most people. Many people experience only a brief period of illness and make a full recovery without medical care. However, these illnesses can be dangerous for people who are very old or very young, as well as pregnant women. People who are already in bad health, or have weakened immune systems, can become extremely sick, and can even die from foodborne illnesses.

Foodborne Illness Caused by Infection

Some foodborne illnesses are caused by agents, such as bacteria, viruses, or parasites. This type of illness is called a **foodborne infection**. Many different disease-causing organisms can contaminate foods—more than 250 different foodborne infections have been discovered. When food is handled improperly, these organisms rapidly multiply to dangerous levels at which foodborne illness becomes more likely.

The most common foodborne illnesses are caused by four agents:

- **Norovirus** (or the Norwalk-like virus) is an extremely common cause of foodborne illness, which causes an acute gastrointestinal illness, including vomiting and diarrhea. This virus spreads primarily from one infected person to another, often through contaminated food, water, or environmental surfaces.

foodborne illness
a disease that is
transmitted by food; food
poisoning

foodborne infection
an illness caused by a
bacteria, virus, or parasite
that has contaminated a
food

- *Salmonella* is a bacterium that is common in the intestines of birds, reptiles, and mammals. It can spread to humans through various foods such as milk products, undercooked eggs, meat, poultry, peanut butter, and cantaloupe.
- *Clostridium perfringens* is a bacterium commonly found on raw meat and poultry, which produces a toxin that causes illness.
- *Campylobacter*, the most commonly identified bacterial cause of diarrheal illness in the world, is an organism that is present in undercooked chicken or another food that has been contaminated with juices from raw chicken (Figure 3.19).

Because these different diseases have many different symptoms, it can be difficult to determine whether a particular illness is caused by something you ate. Nausea, vomiting, abdominal cramps, and diarrhea are, however, common symptoms of many foodborne diseases.

Foodborne Illness Caused by Intoxication

Other types of food poisoning are caused by toxins in the food. These toxins are produced by an organism present in the food. This type of foodborne illness is called **foodborne intoxication**. Three common causes of foodborne intoxication are

- *Escherichia coli* (*E. coli*), a bacterium that lives in the digestive tracts of humans and animals and can cause diarrhea, anemia, and kidney failure; although some strains of this bacteria are harmless, other strains can make a toxin that causes infection and disease;
- *Staphylococcus aureus*, a bacterium that can grow in some foods and produce a toxin that causes intense vomiting; and
- *Clostridium botulinum*, a bacterium that grows and produces a powerful paralytic toxin in foods, causing the rare but deadly disease known as *botulism*.

Toxins can be present in food for other reasons. Toxins may be the result of contamination from chemicals, heavy metals, or other substances.

Figure 3.19

Preparing raw meat and vegetables on the same cutting board can cause cross-contamination. **How many cutting boards do you have in your house? How does your family prevent cross-contamination?**



People can become ill if a pesticide is accidentally added to a food, or if naturally poisonous substances are used to prepare a meal. For example, every year people become ill after eating poisonous mushrooms that they mistake for edible mushrooms. Fish may have toxins in their flesh as a result of living in polluted waters.

Preventing Foodborne Illness

Fortunately, there are several effective strategies for preventing foodborne illness. These strategies include the following:

- wash your hands with hot, soapy water for at least 20 seconds before cooking and eating, and after handling uncooked meat (Figure 3.20)
- cook foods to the appropriate temperature
- keep hot foods hot—above 140 degrees Fahrenheit—since microbes die at this temperature
- keep cold foods cold—below 40 degrees Fahrenheit—since microbes divide and produce toxins very slowly at this temperature
- refrigerate and freeze perishable food and leftovers promptly
- wash counters, tables, dishes, and eating utensils with hot, soapy water
- avoid nonpasteurized juice, apple cider, and milk
- wash fruits and vegetables before preparing them
- throw away cans that are leaking or bulging at the top (these are clear signs of botulism)

These strategies can help reduce your risk of getting foodborne illnesses.



Figure 3.20

Washing your hands can help you avoid foodborne illnesses. **Do you make a point of washing your hands thoroughly before and after you handle foods?**

Food Sensitivities

Some people experience negative reactions after eating particular types of foods. Food sensitivities are often the cause of these negative reactions. Food sensitivities are categorized as either food intolerances or food allergies. Depending on the type of sensitivity, these reactions can range from mild discomfort to life threatening.

Food Intolerance. **Food intolerances** occur when a person's body can't properly digest a particular type of food. These intolerances often occur gradually, after eating large quantities of a particular type of food or eating a particular food very frequently. For instance, people who are lactose intolerant have difficulty digesting the lactose found in milk and many dairy products because their bodies do not produce the substance required to help digest the lactose. These people may become ill after eating ice cream.

Symptoms caused by food intolerances can include gas, cramps, bloating, heartburn, headaches, and irritability or nervousness. Although these symptoms can be unpleasant, they are not usually life threatening.

People with food intolerances may be able to avoid unpleasant symptoms simply by consuming smaller amounts of the food that makes them ill. In some cases, drugs or dietary supplements may be used to help a person tolerate particular types of food. For example, people who are lactose

food intolerance
a condition in which a person cannot properly digest a certain type of food

Spotlight on

Health and Wellness Careers

Nutrition

Described below are just a few of the many careers related to nutrition.

Career	Typical Education and Training	Typical Job Duties and Demands	Career Resources
Nutritionist or Dietitian	four-year college degree; some states also require licensing	Nutritionists and dietitians counsel people on how to lead healthier lives by improving their eating habits. They may work to assess a client's nutritional needs, develop meal plans, and achieve health-related goals such as lowering cholesterol levels.	Academy of Nutrition and Dietetics; Commission on Dietetic Registration
Food Science Researcher	four-year college degree, and often a graduate degree	Food science researchers study the chemical composition of food to determine the vitamin, fat, sugar, and protein levels in the food. They also work to make sure food is packaged, stored, and distributed safely.	American Registry of Professional Animal Scientists
Food Service Manager	high school diploma	Food service managers oversee daily restaurant or cafeteria operations. They make sure all health regulations are followed, monitor food preparation activities, and oversee budgets, payroll, and food inventory.	National Restaurant Association; Society for Foodservice Management
Pediatric Dietitian	four-year college degree; most states also require licensing as a Registered Dietitian	Pediatric Dietitians provide nutritional counseling to families and children. They may work with overweight children to help them develop a healthier diet or decrease the risk of health problems developing later on.	Academy of Nutrition and Dietetics; Commission on Dietetic Registration

Exploring Careers

1. Think about your interests, strengths, and weaknesses. Which career appeals most to you? Which career does not interest you?

2. Do you know anyone who works in one of these careers? If so, ask this person why he chose this career and what he likes most and least about the work.

intolerant can take a dietary supplement called *lactase* that provides the enzyme they need to digest lactose.

Some people have gluten intolerance. **Gluten** is the protein found in wheat, rye, oats, and barley. You may have heard about celiac disease, which causes an inability to process the gluten protein. These people must avoid eating many grain-based products, such as bread, pasta, and cookies. Celiac disease is not a type of food intolerance, however, but rather an autoimmune disease caused by a person's genetics. People can have gluten intolerance without having celiac disease.

Fortunately, many gluten-free food products are now available. These products are suitable for individuals with either celiac disease or gluten intolerance.



Figure 3.21

A small selection of foods, including the foods pictured at the left, are responsible for the majority of allergic reactions. **What extra precautions do you think people with food allergies have to take when preparing food or eating at a restaurant?**

Food Allergy. A **food allergy** is an immune response to a certain food that the body reacts to as if it were harmful. In contrast to food intolerances, symptoms of a food allergy typically occur very suddenly and can be caused even by tiny amounts of a particular food. People who are highly allergic to a particular food may even experience a reaction if they are exposed to the food on their skin or in the air. Symptoms of an allergic reaction to food can vary widely. Some of the most common reactions include hives or a rash, swelling in the tongue and throat, difficulty breathing, and abdominal cramps (Figure 3.21).

Currently no cure exists for food allergies. Given the more serious reactions associated with food allergies, the best way to manage these allergies is to simply avoid all contact with food that might trigger a reaction.

This is not always as easy as it sounds. Some foods that normally would not contain allergens are manufactured in factories that process other foods containing allergens. For example, an oatmeal cookie that does not contain peanuts may pick up traces of peanut from the peanut butter cookies manufactured at the same factory. The manufacturer must indicate on the package of oatmeal cookies that peanut butter cookies are manufactured in the same facility. This is one more reason people should read food labels.

food allergy
an immune response in which the body reacts to a certain type of food as though the food were a harmful substance; may manifest itself in rashes, swelling, difficulty breathing, indigestion, or dizziness

Lesson 3.3 Review

Know and Understand

1. Identify and describe the components of a food label.

2. Explain how ingredients are listed on a food label.

3. List strategies for preventing foodborne illnesses.

4. Explain the difference between a food allergy and a food intolerance.

Analyze and Apply

5. Analyze the food label provided on page 89 and assess the product's nutritional value.

6. Evaluate the importance of learning to read food labels.

7. Compare and contrast foodborne infection and foodborne intoxication.

Real World Health

Because you are such a food guru now, write a letter to the food director of your school. This person is responsible for everything served in the cafeteria. In this letter, advocate on behalf of yourself and all your classmates for tools to make healthful food choices. Request that each food served have a large food label beside it so students can make more educated decisions in the lunchroom. Don't forget to list the reasons why this new system would be beneficial to the health of the students.

Chapter 3 Review and Assessment

Lesson 3.1



What Nutrients Does Your Body Need?

Key Terms

amino acid	hormone
anemia	mineral
carbohydrate	nutrient
cholesterol	osteoporosis
dehydration	protein
fat	saturated fat
fat-soluble vitamin	trans fat
fiber	unsaturated fat
glucose	vitamins
glycogen	water-soluble vitamin

Key Points

- There are six main types of nutrients. These are including carbohydrates, protein, fat, vitamins, minerals, and water.
- Carbohydrates can be simple or complex and are a major source of energy for the body.
- Protein is used to build and maintain the body's cells and tissues.
- Common dietary fats are saturated, unsaturated, or trans.
- Vitamins and minerals are involved in many processes throughout the body.
- Water is necessary for most body functions.

Check Your Understanding

1. _____ are chemical substances found in foods that your body needs to grow and function properly.
2. Which of the following is a complex carbohydrate?
 - A. starch
 - B. glucose
 - C. fiber
 - D. both A and C
3. *True or false?* Protein is made up of smaller units called *incomplete proteins*.
4. _____ are organic substances required by the body in small amounts.
 - A. Minerals
 - B. Vitamins
 - C. Trans fats
 - D. Amino acids

5. Anemia is a condition resulting from insufficient _____.
6. What amount is recommended for daily fluid intake?
7. Which of the following statements is true about fiber?
 - A. Fiber is found only in plant-based foods.
 - B. Fiber is a good source of energy for the body.
 - C. Fiber binds cholesterol and prevents it from leaving the body.
 - D. Fiber is a form of protein.
8. _____ are inorganic elements needed by your body in quantities of less than 100 milligrams daily.
 - A. Water-soluble vitamins
 - B. Amino acids
 - C. Trace minerals
 - D. Saccharides
9. **Critical Thinking.** If you were trying to determine whether a fat was saturated or unsaturated, what criteria could you use?

Lesson 3.2



Creating a Healthy Eating Plan

Key Terms

calorie	overnutrition
metabolism	undernutrition
nutrient-dense food	

Key Points

- Choose foods and beverages that are healthful.
- Be physically active on a daily basis.
- The MyPlate food guidance system is a guide for healthful eating.
- Both undernutrition and overnutrition can result in poor health.

Check Your Understanding

10. What factors determine an individual's daily calorie needs?
11. *True or false?* Whole fruit is more nutrient-dense than fruit juice.

Chapter 3 Review and Assessment

12. Which of the following is a recommendation of the MyPlate food guidance system?
 - A. Make at least half of the grains you eat whole grains.
 - B. Make half your plate protein.
 - C. Avoid frozen and canned vegetables.
 - D. Include at least eight ounces of cooked seafood in your meal plan each week.
13. What types of foods are common sources of oils?
14. Why is undernutrition a concern during childhood and adolescence?
15. Which of the following is likely to result in weight gain?
 - A. Calories in = Calories burned
 - B. Calories in > Calories burned
 - C. Calories in < Calories burned
 - D. None of the above.
16. Indicate whether each of the following is an example of a whole grain (WG) or refined grain (RG).
 - A. Brown rice
 - B. Oatmeal
 - C. Couscous
 - D. Whole-wheat bread
17. **Critical Thinking.** Explain why nutrient-dense foods do not contain much, if any, added sugar, solid fat, refined grains, or sodium.

Key Points

- Nutrition Facts labels contain information to help consumers make healthful food choices.
- Understanding how ingredients are listed on food labels can provide you with more information to help you make good food choices.
- Claims made on food labels are regulated by the government.
- Foodborne illness can be prevented by handling food safely.
- Foodborne illness is the result of disease-causing organisms in the food, or by toxins introduced into the food.
- Food allergies differ from food intolerances.

Check Your Understanding

18. *True or false?* The Nutrition Facts label states the number of calories in the entire package of food.
19. A can of tomato soup lists ingredients as follows: tomato puree, water, high fructose corn syrup, wheat flour, salt, potassium chloride, citric acid, ascorbic acid. Does this product contain added sugar? If so, how is it identified on this label?
20. Norovirus, *salmonella*, Clostridium perfringens, and *Campylobacter* are the top four causes of _____.
21. The body's inability to digest milk is an example of _____.
 - A. an immune system response
 - B. a food allergy
 - C. celiac disease
 - D. a food intolerance
22. Who establishes the criteria for claims made on food labels?
 - A. food manufacturers
 - B. Food and Drug Administration
 - C. Academy of Nutrition and Dietetics
 - D. Department of Health and Human Services
23. *True or false?* Individuals who are highly allergic to a certain food may experience a reaction if they are exposed to the food on their skin or in the air.
24. **Critical Thinking.** Explain why a high % Daily Value is not always an indication of a healthful food choice.
25. **Critical Thinking.** How does temperature play such an important role in preventing foodborne illness?

Lesson 3.3



Food Labels and Food Safety

Key Terms

Daily Values	safe (GRAS)
food additives	gluten
food allergy	organic food
Food and Drug Administration (FDA)	
food intolerance	
foodborne illness	
foodborne infection	
foodborne intoxication	
generally recognized as	

Chapter 3 Skill Development

Health and Wellness Skills

26. **Reduce Health Risks.** Exercise, along with eating healthy, is one of the key factors in obesity prevention. Getting 30–60 minutes of exercise a day can greatly decrease your risk of obesity and other diseases, put you in a better mood, and just be fun! So don't sit, get fit! For each day of the week, write one or two activities you can do to get moving. After each day, make a note regarding what you accomplished toward your exercise goal.
27. **Practice Healthy Behaviors and Reduce Health Risks.** Imagine that you have been elected to a Healthy High School Vending Machine committee, and it is your job to determine which foods your high school's vending machines will include. List at least five healthy criteria that foods must pass to be in the machines. Write a paragraph explaining how the new options will enhance student health.
28. **Comprehend Concepts.** Create six superhero cartoon characters to represent each of the six nutrients. Draw each character and give him or her a creative name. Undereath each drawing, write the following information about each character: What are this character's "super powers" (what he or she does for the body)? How did this character get his or her super powers? Where is this character found? Include at least three foods that provide each nutrient.
29. **Comprehend Concepts.** Label a piece of paper from A to Z. For each letter, write a word or phrase that starts with that letter and pertains to nutrition in some way. Next, write a paragraph about what you learned from this chapter using as many of the words or phrases from your list as possible. You must use at least 10 of the terms, but your goal is to use them all.
30. **Access Information.** Create a menu that includes all of your favorite foods and their nutrition information. Divide your favorite foods into five categories: appetizers (4 items), main courses (6 items), side dishes (5 items), desserts (at least 2 items), and beverages (at least 2 items). Once you have listed your favorite foods by category, research the nutrition information of all the items on your menu. Finally, create a visually pleasing menu with your foods listed by category, their nutrition information, your restaurant name, and pictures. Print your menu to show to the class. At whose "restaurant" would you want to eat?


Hands-On Activity

Healthy Tip of the Day Calendar

Create a 30-day calendar of healthy eating tips. Write a catchy title for your calendar and include a different healthy eating tip for each day. Include at least five pieces of art and verify that all of your tips enhance health. When you are done with your calendar, distribute it to a few of your friends to encourage their healthy eating habits.

Example:

Eating Your Way to Good Health

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
21 Wait for 15 minutes to go for seconds; you may find you are already full.	22 Trade in that sugary soda for a glass of low-fat or fat-free milk.	23 Record everything that you eat today. You might be surprised to see how much you're eating.	24 Substitute fruit for a sugary snack. 	25 Don't skip meals. Skipping a meal can lower your metabolism by five percent, enough to gain a pound every month.	26 Sample a new nutritious food today.	27 Sit down with your parents and help plan a week of healthy meals.

Core Skills

Math Practice

Use the information below and on the Nutrition Facts label shown here to answer the questions.

- Proteins supply 4 calories/gram
- Carbohydrates supply 4 calories/gram
- Fats supply 9 calories/gram



31. What is the percentage of calories from fat in this food?
A. 18%
B. 44%
C. 12%
D. 0.44%
32. What is the % Daily Value for saturated fat in this food?
A. 12%
B. 18%
C. 15%
D. 11%
33. If the entire container of food is eaten, what is the % Daily Value of carbohydrates in this food?
A. 20%
B. 10%
C. 17%
D. 50%
34. What is an important function of glucose?
A. Maintains the health of the digestive tract.
B. Acts as an energy source for the brain and central nervous system.
C. Breaks down nutrients in the small intestine.
D. Is used by the body to convert carbohydrates into energy.
35. How are glucose and glycogen related?
A. They are the same substance.
B. Glucose is needed to digest glycogen.
C. When glucose is stored in the liver and muscles, it is called *glycogen*.
D. Glycogen turns into glucose when protein is synthesized in the body.
36. Based on the passage you just read, write two or three sentences about the importance of breakfast.

Reading and Writing Practice

Read the passage below and then answer the questions.

Your body breaks down carbohydrates into the sugar known as glucose, which is your brain and central nervous system's preferred source of energy. Glucose powers your brain, enabling you to concentrate and pay attention. Have you ever skipped breakfast and then had trouble concentrating in one of your early morning classes? This difficulty is caused by your body running out of glucose.

When your body needs more energy, it can use glucose immediately. This is why having a candy bar or soft drink, both loaded with sugar, can give you a quick "pick-me-up." The sucrose in these snacks is quickly and easily broken down into glucose and fructose.

When glucose is stored in the muscles and liver for later use, it is known as glycogen. After enough glycogen has been stored, any extra glucose is converted by the liver into fat, which is stored in the fat tissue. The body uses glycogen from the muscles and liver, or the stored fat, when it needs energy between meals or to fuel activity.