Chapter 3
Nutrition

Lesson 3.1
What Nutrients Does Your Body Need?

Lesson 3.2
Creating a Healthy Eating Plan

Lesson 3.3
Food Labels and Food Safety

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.

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.
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.

<table>
<thead>
<tr>
<th>Complex Carbohydrates</th>
<th>Simple Carbohydrates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>Minerals</td>
</tr>
<tr>
<td>Vitamins</td>
<td>Saturated Fats</td>
</tr>
<tr>
<td>Protein</td>
<td>Unsaturated Fats</td>
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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.

D o 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.
**Carbohydrates**

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.

**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.

**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.

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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?
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

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
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.

<table>
<thead>
<tr>
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<th>Function</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vitamin A</strong></td>
<td>helps fight infection and improve immune function, promotes bone health, supports reproduction, maintains the health of the retina</td>
<td>some vegetables (carrots, kale, broccoli), dairy products, meat</td>
</tr>
<tr>
<td><strong>Vitamin K</strong></td>
<td>helps with blood coagulation and blood clotting</td>
<td>liver, cereals, cabbage</td>
</tr>
<tr>
<td><strong>Vitamin D</strong></td>
<td>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</td>
<td>fish, egg yolks, fortified dairy products, cereals, sunlight</td>
</tr>
<tr>
<td><strong>Vitamin E</strong></td>
<td>protects red blood cells from oxidation</td>
<td>whole grains, leafy greens, nuts</td>
</tr>
</tbody>
</table>

**Fat-Soluble Vitamins**

<table>
<thead>
<tr>
<th>Vitamin B1 (Thiamin)</th>
<th>helps the body change carbohydrates into energy</th>
<th>pork, legumes, enriched or whole-grain products, ready-to-eat cereals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin B2 (Riboflavin)</td>
<td>involved in metabolism</td>
<td>milk, cheese, leafy vegetables, liver, kidneys, legumes, tomatoes, mushrooms, almonds</td>
</tr>
<tr>
<td>Vitamin B5 (Pantothenic acid)</td>
<td>helps maintain healthy skin and nerves, and improves circulation</td>
<td>eggs, lean meats, nuts, poultry, legumes, avocado, potatoes</td>
</tr>
<tr>
<td>Vitamin B6 (Pyridoxine)</td>
<td>involved in the reactions that generate energy from food; is required for proper development of the brain, nerves, and skin</td>
<td>avocado, banana, meat, nuts, poultry, whole grains</td>
</tr>
<tr>
<td>Vitamin B7 (Biotin)</td>
<td>assists with metabolism and the production of hormones and cholesterol</td>
<td>milk, nuts, pork, egg yolk, chocolate</td>
</tr>
<tr>
<td>Vitamin B9 (Folic Acid)</td>
<td>essential to numerous bodily functions, including cell division and the growth and production of healthy red blood cells</td>
<td>leafy vegetables, fortified cereals, bread</td>
</tr>
<tr>
<td>Vitamin B12 (Cyanocobalamin)</td>
<td>helps form red blood cells, maintain the central nervous system, and regulate metabolism</td>
<td>meat, eggs, milk and milk products, poultry, shellfish</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>promotes healing within the body; is essential for healthy teeth and gums and the production of collagen</td>
<td>citrus fruits, many vegetables (broccoli, cabbage, spinach, and tomatoes)</td>
</tr>
</tbody>
</table>

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 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).

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.
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

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

- anemia, a condition that causes weakness, fatigue, and headaches, which occurs when people do not take in enough iron;
- 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.

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<tr>
<td>calcium</td>
<td>necessary for muscle, heart, and digestive system health; builds bone and supports the synthesis and function of blood cells</td>
<td>dairy products, eggs, canned fish with bones (salmon, sardines), green leafy vegetables, nuts, seeds, tofu</td>
</tr>
<tr>
<td>phosphorus</td>
<td>present in bones and cells; assists with energy processing and other functions</td>
<td>red meat, dairy foods, fish, poultry, bread, rice, oats</td>
</tr>
<tr>
<td>magnesium</td>
<td>contributes to bone health; required for physiological processes in the body</td>
<td>raw nuts, soy beans, spinach, chard, tomatoes, beans</td>
</tr>
<tr>
<td>sulfur</td>
<td>promotes metabolism and communication between nerve cells; helps the body resist bacteria and protect against toxic substances</td>
<td>meats, fish, poultry, eggs, milk, legumes</td>
</tr>
<tr>
<td>sodium</td>
<td>helps maintain normal blood pressure; regulates the body’s fluid balance</td>
<td>table salt (sodium chloride), milk, spinach</td>
</tr>
<tr>
<td>chloride</td>
<td>assists with maintaining proper amount of bodily fluids</td>
<td>table salt</td>
</tr>
<tr>
<td>potassium</td>
<td>assists with heart function, skeletal and muscle contraction, and digestive function</td>
<td>legumes, potato skin, tomatoes, bananas, papayas, lentils, dry beans, whole grains, yams, soybeans</td>
</tr>
<tr>
<td>iron</td>
<td>carries oxygen from the lungs to the tissues</td>
<td>red meat, leafy green vegetables, fish (tuna, salmon), eggs, dried fruits, beans, whole grains, enriched grains</td>
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<tr>
<td>zinc</td>
<td>assists with immune function, reproduction, and nervous system functions</td>
<td>beef, pork, lamb, nuts, whole grains</td>
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<td>iodine</td>
<td>assists with making thyroid hormones</td>
<td>table salt, some types of fish (cod, sea bass, perch, haddock), dairy products</td>
</tr>
<tr>
<td>selenium</td>
<td>protects cells from damage and regulates thyroid hormone action and other processes</td>
<td>vegetables, fish, red meat, grains, eggs, chicken</td>
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<tr>
<td>copper</td>
<td>assists with metabolism and red blood cell formation; helps with the production of energy for cells</td>
<td>shellfish, whole grains, beans, nuts, potatoes, dried fruits, cocoa</td>
</tr>
<tr>
<td>manganese</td>
<td>assists with bone formation, metabolism, and wound healing</td>
<td>nuts, legumes, seeds, whole grains, tea, leafy green vegetables</td>
</tr>
<tr>
<td>fluoride</td>
<td>prevents dental cavities and stimulates new bone formation</td>
<td>fluoridated water, most seafood, tea, gelatin</td>
</tr>
<tr>
<td>chromium</td>
<td>helps maintain normal blood sugar (glucose) levels</td>
<td>beef, liver, eggs, chicken, apples, bananas, spinach, green peppers</td>
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<tr>
<td>molybdenum</td>
<td>helps the body process proteins and other substances</td>
<td>legumes, grains, leafy vegetables, liver, nuts</td>
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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.

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

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

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

trace minerals

- figure 3.7 types and functions of minerals

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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.

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 8½ to 11½ 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.
Lesson 3.2

Creating a Healthy Eating Plan

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.

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.

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 boldly functions are related to the foods that you choose to eat?

Dietary Guidelines

The United States Department 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.

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.
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.
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—one 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.

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).

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, corn, meal, barley, or other cereal grains. Foods in the grains group are classified as either whole grains or refined grains.
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 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.
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 does not 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 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

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.

Nutrition

Selected Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage</th>
<th>Country</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>43.5</td>
<td>Kenya</td>
<td>16.5</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>41.3</td>
<td>Morocco</td>
<td>19.9</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>34.6</td>
<td>China</td>
<td>6.8</td>
</tr>
<tr>
<td>Afghanistan</td>
<td>32.9</td>
<td>Peru</td>
<td>6.4</td>
</tr>
<tr>
<td>Pakistan</td>
<td>31.3</td>
<td>Mexico</td>
<td>5.4</td>
</tr>
<tr>
<td>Cambodia</td>
<td>28.8</td>
<td>United States</td>
<td>1.3</td>
</tr>
<tr>
<td>Rwanda</td>
<td>18.0</td>
<td>Germany</td>
<td>1.1</td>
</tr>
</tbody>
</table>

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 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.

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
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.
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.

**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.

**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...
Chapter 3     Nutrition

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.
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)
- wash your hands with hot, soapy water for at least 20 seconds before cooking and eating, and after handling uncooked meat (Figure 3.20)
- 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.

**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...
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.

### 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.

### 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.

---

**Analyze and Apply**

Products are suitable for individuals with either celiac disease or gluten intolerance.

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

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**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.

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**Nutrition**

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

<table>
<thead>
<tr>
<th>Career</th>
<th>Typical Education and Training</th>
<th>Typical Job Duties and Demands</th>
<th>Career Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutritionist or Dietitian</td>
<td>four-year college degree; some states also require licensing</td>
<td>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.</td>
<td>Academy of Nutrition and Dietetics; Commission on Dietetic Registration</td>
</tr>
<tr>
<td>Food Science Researcher</td>
<td>four-year college degree, and often a graduate degree</td>
<td>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.</td>
<td>American Registry of Professional Animal Scientists</td>
</tr>
<tr>
<td>Food Service Manager</td>
<td>high school diploma</td>
<td>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.</td>
<td>National Restaurant Association; Society for Foodservice Management</td>
</tr>
<tr>
<td>Pediatric Dietitian</td>
<td>four-year college degree; most states also require licensing as a Registered Dietitian</td>
<td>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.</td>
<td>Academy of Nutrition and Dietetics; Commission on Dietetic Registration</td>
</tr>
</tbody>
</table>

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**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.
Chapter 3  Review and Assessment

Lesson 3.1  What Nutrients Does Your Body Need?

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
- vitamins
- 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. What 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. What are organic substances required by the body in small amounts?
   A. Minerals
   B. Vitamins
   C. Trans fats
   D. Amino acids

Lesson 3.2  Creating a Healthy Eating Plan

Key Terms
- calorie
- metabolism
- overnutrition
- 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.

Lesson 3.3  Food Labels and Food Safety

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: tomatos, 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 __________.

Food and Drug Administration (FDA) food intolerance foodborne illness foodborne intoxication generally recognized as __________.

Lesson 3.4  Critical Thinking

Check Your Understanding
22. 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.

23. What types of foods are common sources of oils?

24. Critical Thinking. Explain why nutrient-dense foods do not contain much, if any, added sugar, solid fat, refined grains, or sodium.

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### 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**

<table>
<thead>
<tr>
<th>Sunday</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>Trade in that sugary soda for a glass of low-fat or fat-free milk.</td>
<td>Record everything that you eat today. You might be surprised to see how much you’re eating.</td>
<td>Substitute fruit for a sugary snack.</td>
<td>Don’t skip meals. Skipping a meal can lower your metabolism by five percent, enough to gain a pound every month.</td>
<td>Sample a new nutritious food today.</td>
<td>Sit down with your parents and help plan a week of healthy meals.</td>
</tr>
</tbody>
</table>

### 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 let, 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. Underneath 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?

### 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**

**Sample a new nutritious food today.**

**Chapter 3 Nutrition**

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.

37. Based on the passage you just read, write two or three sentences about the importance of breakfast.

38. Based on the passage you just read, write two or three sentences about the importance of breakfast.

39. Based on the passage you just read, write two or three sentences about the importance of breakfast.

40. Based on the passage you just read, write two or three sentences about the importance of breakfast.