Answers to Study Questions

Chapter 1

- 1. What are the main factors that influence our food choices? Sensory, cognitive, and cultural
- **3.** List the 6 classes of nutrients. Carbohydrate, protein, fat, vitamins, minerals, and water
- 5. What determines whether a mineral is a macromineral or a micro-(trace) mineral?

Macrominerals are found in and used by the body in the largest amounts.

Microminerals are found in and used by the body in smaller amounts.

7. What is an epidemiological study?

An epidemiological study observes and compares how disease rates vary among different population groups and identifies conditions related to diseases or conditions within the populations. This enables researchers to identify associations between factors within the population and the particular disease being studied.

9. What is a placebo?

A placebo is an imitation treatment that looks the same as the experimental treatment (such as a sugar pill) but has no effect. The placebo is important for reducing bias because subjects do not know if they are receiving the intervention and are less inclined to alter their responses or reported symptoms based on what they think should happen.

Chapter 2

1. Define undernutrition and overnutrition.

Undernutrition is poor health resulting from the depletion of nutrients due to inadequate nutrient intake over time. It is most often associated with poverty, alcoholism, and some types of eating disorders.

The most common type of overnutrition in the United States is due to the regular consumption of excess calories, fats, saturated fats, and cholesterol.

3. What are the recommended amounts for each of the food groups of MyPyramid for a 2,000-calorie diet?

Grains: 6 ounce equivalents; half should be whole grains Vegetable group: 2¹/₂ cups Fruits: 2 cups Milk: 3 cups

Meat and beans: $5\frac{1}{2}$ ounce equivalents

5. List and define the four main Dietary Reference Intake categories.

The Estimated Average Requirement (EAR) is the nutrient intake level that is estimated to meet the needs of 50 percent of the individuals in a life-stage and gender group.

The Recommended Dietary Allowance (RDA) is the daily intake level that meets the needs of most (97 to 98 percent) people in a life-stage and gender group.

An Adequate Intake (AI) level is set when an RDA has yet to be established due to lack of knowledge and the need for more scientific research.

The Tolerable Upper Intake Level (UL) is the maximum daily intake level that is unlikely to pose health risks to almost all of the individuals in a life-stage and gender category.

7. The standard Nutrition Facts panel shows information on which nutrients?

Calories Calories from fat Total fat Saturated fat Trans fat Cholesterol Total carbohydrates Dietary fiber Sugars Protein Sodium Calcium, iron, vitamins A and C (all as a % Daily Value)

9. Define the three types of claims that may be found on food labels.

Nutrient content claims describe the level of a nutrient or dietary substance in the product using terms such as *good source, high, or free.*

A health claim is any statement that associates a food or a substance in a food with a disease or health-related condition. A structure/function claim describes a benefit related to a nutrient-deficiency disease or describes the role of a nutrient or dietary ingredient intended to affect a structure or function in humans; for example, *calcium helps build strong bones*.

Chapter 3

 The contents of which organ has the lowest pH? Which organ produces an alkaline or basic solution to buffer this low pH? The stomach's contents have the lowest pH due to the stomach's production of hydrochloric acid. The pancreas secretes fluid that contains mostly water, bicarbonate, and digestive enzymes. In the small intestine, this basic solution helps neutralize the acidic chyme entering from the stomach.

3. Where in the GI tract does the majority of nutrient digestion and absorption take place?

Small intestine

5. Name three "assisting" organs that are not part of the GI tract but are needed for proper digestion. What are their roles in digestion?

Any three of the following:

- The *salivary glands* produce saliva that moistens food, lubricating it for easy swallowing. Saliva contains enzymes that begin the process of chemical digestion.
- The *pancreas* secretes digestive enzymes that help digest nutrients.
- The *gallbladder* stores and concentrates bile from the liver.
- The *liver* produces and secretes bile, which emulsifies fats in the small intestine, thus aiding fat digestion.

7. What is gastroesophageal reflux disease?

Gastroesophageal reflux disease (GERD) occurs when the lower esophageal sphincter (LES) is weak or relaxes inappropriately, allowing the stomach's contents to flow back up into the esophagus. The acidic stomach contents irritate the gastroesophageal lining, causing severe pain.

Chapter 4

1. Describe the difference between starch and fiber.

Both starch and fiber are long chains of glucose molecules, but we are unable to digest the bonds between the glucose units in fiber. Therefore, fiber moves through the small intestine undigested, while starch is broken down into glucose and absorbed.

3. What are the consequences of eating too few carbohydrates?

Carbohydrates provide energy (fuel) to the cells of the body. Consuming too few carbohydrates can result in the breakdown of body proteins that supply glucose and energy. Inadequate carbohydrate intake prevents fats from breaking down normally, and this results in ketosis.

5. Which foods contain carbohydrates?

Grains, fruits, and vegetables are the most carbohydrate-dense foods. Many dairy foods also contribute quite a bit of carbohydrate. Legumes often are rich in both carbohydrates and protein. Sweets, of course, contain carbohydrates in the form of sugars.

7. Describe the structure of a monosaccharide, disaccharide, and polysaccharide.

A monosaccharide is a single sugar (e.g., glucose, fructose, and galactose). A disaccharide is a molecule of two single sugars (e.g., maltose, sucrose, and lactose). A polysaccharide is a long chain of sugar units (e.g., starch and fiber).

Chapter 5

1. Explain how it is possible for oils to contain a mixture of polyunsaturated, monounsaturated, and saturated fats.

Oils are triglycerides. Triglycerides contain a glycerol molecule and three fatty acids. These fatty acids can vary in three main ways: length, saturation, and omega number. An oil such as corn oil has more polyunsaturated fatty acids attached to glycerol than it does monounsaturated or saturated fatty acids. Therefore, corn oil is known as a mostly polyunsaturated fat, but like all oils, it contains a mixture of fatty acids.

3. What is the most common form of lipid found in food? Triglycerides

5. List the many functions of triglycerides.

- Provide energy (9 kilocalories per gram)
- Provide a concentrated source of stored calories (triglycerides in fat cells)
- Carry flavor in foods
- Pad and protect vital organs
- Provide thermal insulation (subcutaneous fat)

7. What foods contain cholesterol?

Any foods that contain ingredients derived from an animal will contain cholesterol.

Chapter 6

1. List the functions of body proteins.

- Comprise muscles and organs
- Work as hormones, enzymes, and antibodies
- Help to regulate fluid and electrolyte balance
- Help to regulate acid-base balance
- Used as transporter molecules

3. Among the nutrient molecules, which element is unique to protein, and how does it fit into the basic structure of an amino acid?

Nitrogen is part of the chemical structure of amino acids (proteins), but not of carbohydrates and lipids. Nitrogen is part of the amino group, $-NH_{2}$.

5. What are complementary proteins? List three examples of food combinations that contain complementary proteins.

Two proteins that, when combined, contain all of the indispensable amino acids in adequate amounts to support health. Examples include rice and beans, peanut butter on bread, corn bread, and chili (beans).

7. How is protein related to immune function?

Protein is used to make antibodies, which help fight infection. Without adequate dietary protein, synthesis of antibodies is impaired, and a person becomes more susceptible to infection.

9. List the potential health benefits of a vegetarian diet.

- Reduced blood cholesterol levels
- Reduced risk of some cancers
- Improved body weight
- Reduced blood pressure

Chapter 7

1. What is the "universal energy currency"? Where is most of it produced?

ATP is the energy form usable by cells, so it is called the universal energy currency. Most ATP is produced inside mitochondria, so often they are called the powerhouses of the cell.

3. In the catabolic pathways, what two molecules are major electron acceptors? After they accept electrons, what electron carriers do they become? What is the primary function of the electron carriers?

 $\mathsf{NAD^{+}}$ and $\mathsf{FAD^{+}}$ are the electron acceptors in the breakdown pathways.

NADH and FADH_2 are the electron carriers. They carry these high-energy electrons to the electron transport chain, where the electrons power the production of ATP.

- 5. What two carbon molecules does beta-oxidation form as it "clips" the links of a fatty acid chain? What other molecules important to the production of ATP does beta-oxidation produce? Beta-oxidation, or fatty acid oxidation, is a step-by-step process that forms two carbon molecules of acetyl CoA as it clips two carbon links from a fatty acid chain. It also produces NADH and FADH₂, which carry high-energy electrons to the electron transport chain for ATP production.
- 7. What are ketone bodies and when are they produced? Ketone bodies refer to the three compounds (acetoacetate, acetone, and beta-hydroxybutyrate) made during incomplete fatty acid oxidation. Although some ketone bodies are always produced and used, they become a substantial alternative energy source when the body lacks carbohydrate and needs to
- 9. Define gluconeogenesis and lipogenesis. Under what conditions do they predominantly occur? What are their primary inputs and outputs?

Gluconeogenesis is the making of "new" glucose. When the body has a low glucose supply, it can make glucose from the glycerol component of triglycerides and from some amino acids. Lipogenesis is the process of synthesizing long-chain fatty acids. Lipogenesis occurs when ATP is plentiful and building blocks are abundant. Precursors of fatty acid synthesis include ketogenic amino acids, alcohol, and fatty acids themselves.

Chapter 8

fuel vital cells.

1. What is a standard serving of beer, wine, and liquor?

A standard amount of beer is 12 ounces, wine is 4 to 5 ounces, and liquor is $1\frac{1}{2}$ ounces.

3. Where does alcohol metabolism take place? The liver is the chief organ for alcohol metabolism.

5. What causes "fatty liver" in an alcoholic?

In alcohol metabolism, NAD is converted to NADH. Excess NADH blocks the entry of acetyl CoA into the citric acid cycle. The acetyl CoA is diverted and used to synthesize fatty acids.

7. Among health authorities, what is the consensus about drinking alcohol?

Most health officials do not promote the consumption of alcohol; however, for people who do consume alcohol, they suggest moderation (no more than 2 drinks for males, 1 drink for females, per day).

9. Why do health care professionals advise pregnant women not to drink alcohol?

Alcohol can cause fetal alcohol syndrome (FAS). A safe lower limit for alcohol consumption during pregnancy is not currently known.

Chapter 9

1. Explain the concept of energy balance.

Energy balance is the relationship between your energy intake and energy output. You are in energy equilibrium when your energy or caloric intake is equal to the amount of energy or calories you expend. People who maintain their weight over time are in energy equilibrium whether or not they are aware of their intake or expenditure. Positive energy balance (intake > output) results in weight gain, while negative energy balance (intake < output) results in weight loss.

3. Explain the three main factors that determine energy expenditure in activity.

The amount of energy expended in physical activity depends on the activity's duration, type (e.g., walking, running, or typing), and intensity. Energy output increases the longer you perform an activity, the greater your use of large muscle groups (type of activity), and the more intensely you perform the activity.

- 5. Obesity is seen as a complex disorder with multiple behavioral and psychological factors. List the types of factors involved in the development and maintenance of obesity.
 - Genetic
 - Physiological
 - Metabolic
 - Hormonal
 - Sociocultural
 - Environmental
 - Behavioral
 - Psychological

7. Describe the concept of metabolic fitness.

Some health experts advocate the replacement of goals to attain a particular weight with the goal of metabolic fitness, which is the absence of metabolic or biochemical risk factors associated with obesity. Individuals are considered metabolically fit when their blood lipids are at safe levels and their blood pressure is normal. Four suggested goals for metabolic fitness, from most to least aggressive, are to (1) significantly reduce the risk factors, (2) restore abnormal risk factors to normal ranges, (3) reverse the "high normal" or "borderline" parameters, and (4) prevent risk factors in overweight individuals.

9. What are the components of a sound approach to weight management?

- A balanced diet of moderate caloric intake
- Adequate exercise
- Cognitive-behavioral strategies for changing habits and behavior patterns
- Attention to balancing self-acceptance and the desire for change

11. Define "underweight."

The term underweight is defined as a BMI of less than 18.5 $\mbox{kg/m}^2.$

Chapter 10

- 1. List at least three characteristics of fat-soluble vitamins.
 - Vitamins A, D, E, and K are found in the fat and lipid components of food.
 - Fat-soluble vitamins require bile for absorption and first travel in the lymphatic system (inside chylomicrons) before entering the bloodstream.
 - Most fat-soluble vitamins are not readily excreted and are stored in the liver and adipose tissue.
- 3. What are the main roles of vitamin A in the body?

Vitamin A is necessary for vision, reproduction, cell differentiation, immune function, and bone health.

5. What antioxidant is responsible for the yellow-orange color of cantaloupes?

Beta-carotene

- 7. From what precursor can vitamin D be synthesized? Cholesterol
- 9. How does a vitamin K deficiency lead to the inability to form a blood clot?

Vitamin K is necessary for the production of prothrombin, a protein that when activated is responsible for the formation of a solid clot.

Chapter 11

- 1. List the nine water-soluble vitamins and one main function for each.
 - Thiamin functions in energy metabolism as the coenzyme thiamin pyrophosphate (TPP).
 - Riboflavin functions in energy metabolism as the coenzymes flavin adenine dinucleotide (FAD) and flavin mononucleotide (FMN).
 - Niacin functions in energy metabolism as the coenzymes nicotinamide adenine dinucleotide (NAD) and nicotinamide adenine dinucleotide phosphate (NADP).

- Biotin acts as a coenzyme critical to energy and amino acid metabolism, as well as fat and glycogen synthesis.
- Pantothenic acid functions in energy metabolism as part of coenzyme A.
- Vitamin B₆ functions in amino acid and fatty acid metabolism as the coenzymes pyridoxal phosphate (PLP) and pyridoxamine phosphate (PMP).
- Folate functions in one-carbon transfer reactions in the synthesis of DNA and many other reactions.
- Vitamin B₁₂ promotes the growth and maintenance of the sheath that protects nerve fibers and activates the folate coenzyme, tetrahydrofolic acid (THFA).
- Vitamin C is important in collagen synthesis, assists with absorption of iron, and is an antioxidant.

3. Name the diseases and/or characteristic symptoms of deficiency of each water-soluble vitamin.

Thiamin—beriberi Riboflavin—ariboflavinosis Niacin—pellagra Biotin—no disease name; a deficiency causes hair loss, nausea, and loss of appetite Pantothenic acid—no disease name Vitamin B_6 —microcytic hypochromic anemia Folate—megaloblastic anemia Vitamin B_{12} —megaloblastic anemia and neurological damage Vitamin C—scurvy

5. List the water-soluble vitamins demonstrated to be toxic in large doses. What signs indicate toxic levels of each vitamin?

The only water-soluble vitamins with demonstrated toxicity are niacin, vitamin B_6 , and vitamin C. Excessive amounts of niacin can dilate the capillaries and cause tingling sensations. When this occurs, it is called a "niacin flush." Excessive amounts of vitamin B_6 can cause irreversible nerve degeneration; and excessive doses of vitamin C can cause diarrhea, nausea, and abdominal cramps.

Chapter 12

1. What are the two main factors that affect absorption of a mineral?

The physiological state of the body (i.e., is the body in a deficient or an overload state?) and the bioavailability of the mineral affect its absorption.

3. What is the role of aldosterone in the body, and how is it released?

Aldosterone helps the kidneys retain sodium, which in turn causes the body to hold on to more water. When the kidneys detect dehydration, they secrete renin. Renin then causes the formation of angiotensin, which leads to the release of aldosterone.

5. What is the recommended daily intake level for sodium?

The AI for sodium is 1,500 milligrams per day, a level that is substantially less than most Americans eat. The UL for sodium

is 2,300 milligrams per day, while the daily value on food labels is 2,400 milligrams per day.

7. What are the major functions of calcium, other than its relation to bone health?

Calcium is important for blood clotting, nerve function, muscle contractions, and cell metabolism.

9. Which people have a high risk of hypomagnesemia, and why? Alcoholics are at high risk of hypomagnesemia because their diet is poor and usually lacks magnesium. They also tend to excrete more magnesium in their urine.

Chapter 13

1. In what two ways do trace minerals differ from major minerals? Trace minerals differ from the major minerals in terms of their dietary requirements and the amounts present in the body. The daily dietary recommendations for trace elements are less than 100 milligrams, and the total amount of each trace element in the body is less than 5 grams.

3. List five factors that can affect a mineral's bioavailability.

Factors that can increase or decrease a mineral's bioavailability include:

- The type of food
- The presence or absence of fibers and phytate
- Competition with other minerals
- The acidity of the environment
- A person's need for that mineral

5. List the three stages of iron deficiency and the effects of each.

The initial stage of iron deficiency is iron depletion, which causes no physiological impairment. Measuring serum ferritin, which is proportional to body iron stores, assesses iron depletion.

In the second stage of iron deficiency, there is a decrease in functional or transport iron. While hemoglobin and hematocrit remain in the normal range, other values begin to change as functional iron decreases. A new measure of this intermediate stage is the serum level of transferrin receptors (TfRs). As transport iron decreases and stores are depleted, TfR levels increase in proportion to the iron deficit. Other values used to detect this stage are transferrin saturation and protoporphyrin, the precursor of heme, which is elevated when the supply of iron is inadequate for heme synthesis.

The third and most severe stage of iron deficiency is anemia, which is characterized by decreased size and number of red blood cells, reduced hemoglobin and hematocrit, and pale red blood cells. This is referred to as microcytic hypochromic anemia. Symptoms include fatigue, pallor, breathlessness with exertion, decreased cold tolerance, behavioral changes, deficits in immune function, cognitive impairment, decreased work performance, and impaired growth.

7. Describe the common causes of zinc deficiency.

The primary culprits in marginal zinc deficiency are increased needs, poor intake, poor absorption, and excessive losses.

Diarrhea and chronic infections like pneumonia can cause excessive zinc excretion. These diseases are commonplace in developing countries where zinc deficiency may be widespread.

9. lodine is a component of which hormones? What are the functions of these hormones? How is selenium linked to these hormones?

lodine is an essential component of the two thyroid hormones: triiodothyronine (T3) and thyroxine (T4). Although T3 is the active form of thyroid hormone, T4 is more prevalent in the body. Thyroid hormones regulate body temperature, basal metabolic rate, reproduction, and growth.

Three selenium-dependent enzymes help convert T4 to the more active T3 form.

11. Define Wilson's disease and Menkes' syndrome.

Wilson's disease is a genetic disorder of copper transport that is characterized by impaired excretion and toxic accumulation of copper in the liver, kidney, and eye. The prevalence of Wilson's disease is higher than that of Menkes' syndrome (1 in 30,000). Patients with Wilson's disease frequently appear healthy until adolescence or early adulthood. Without treatment, patients develop serious liver and neurological problems.

Menkes' syndrome is a genetic copper deficiency resulting from a failure to absorb copper from the intestinal tract. The incidence is extremely rare (1 in 200,000). Menkes' syndrome results in neurological degeneration, peculiar kinky hair, and poor growth.

13. How does fluoride prevent dental caries?

Fluoride decreases the demineralization of tooth enamel by organic acids that eat away tooth enamel. Fluoride also accelerates the subsequent remineralization process. Fluoride also inhibits bacterial activity in dental plaques.

Chapter 14

1. What are muscle fibers, and what are the two major types?

Muscle fibers are individual muscle cells. The two primary types are slow-twitch (ST) fibers and fast-twitch (FT) fibers. ST fibers have high aerobic endurance and take twice as long to reach maximum contraction as FT fibers. FT fibers have poor aerobic endurance. They perform anaerobically, contract quickly, and tire easily due to their limited endurance.

3. What are the general recommendations for an athlete (compared to a nonathlete) in terms of the percentage of calories from carbohydrates, proteins, and fats?

It is recommended that athletes consume 60 to 70 percent of their calories from carbohydrates, 20 percent from fat, and 15 percent from protein. Compared to a nonathlete whose diet should be 45 to 65 percent carbohydrate, this diet is higher in carbohydrates and lower in fat. The nonathlete's recommended fat intake is approximately 30 percent of total calories.

5. How do protein recommendations for athletes vary from those for nonathletes?

The adult nonathlete's RDA for protein is 0.8 grams per kilogram of body weight per day. This is less than the recommended intake for endurance athletes, which is 1.2 to 1.4 grams per kilogram of body weight per day. The protein recommendation for strength athletes is 1.6 to 1.7 grams of protein per kilogram of body weight per day.

7. What is sports anemia and why does it happen? How does it compare to other anemias?

Increases in plasma volume (as much as 20 percent) have been observed in aerobically trained individuals as a normal consequence of training. This causes a dilution effect on blood measures. Diluted plasma yields a low hemoglobin concentration, a condition called sports anemia. Because sports anemia is a result of increased plasma volume, it is not considered a true iron-deficiency anemia. Taking extra iron supplements will do nothing for this condition.

9. What is the nutritional strategy for athletes who want to gain muscle mass?

Nutritional strategies that support gaining muscle mass include (1) setting realistic weight gain goals, (2) providing adequate energy intake for muscle building, and (3) determining carbohydrate and protein needs.

Chapter 15

1. In what ways do diet and exercise affect your health?

Both a high-fat diet and sedentary lifestyle have been shown to contribute to the onset and progression of cardiovascular disease and cancer.

3. What are the diet-related guidelines for reducing heart disease risk?

Develop a healthy eating pattern, maintain a desirable body weight, achieve a healthy cholesterol and lipoprotein profile, and maintain a normal blood pressure level.

5. What are the risk factors for hypertension?

Smoking, diabetes, high-fat diet, obesity, age, heredity, gender, and race.

7. What is the difference between cancer initiation and promotion?

Initiation occurs when something alters a cell's genetic structure and prompts it to act abnormally. Promotion occurs when a hormone, growth factors, or other substance encourages initiated cells to become active.

9. What is metabolic syndrome?

Metabolic syndrome is the presence of at least three of the following signs:

- Abdominal fat—for most men, a 40-inch waist or greater; for women, a 35-inch waist or greater
- High blood glucose—at least 110 milligrams per deciliter (mg/dL) after fasting
- High serum triglycerides—at least 150 mg/dL
- Low HDL cholesterol—less than 40 mg/dL for men; less than 50 mg/dL for women
- Chronic blood pressure of 130 mm Hg systolic, 85 mm Hg diastolic, or higher

Chapter 16

1. Describe the three stages of fetal growth.

In the first stage of fetal growth, called the blastogenic stage, the fertilized egg rapidly divides and begins to differentiate. During the embryonic stage, the major organ systems form. The fetal stage is the longest stage of development and during this stage, the fetus grows dramatically in size.

3. How do the recommended intake values for calories, protein, folate, and iron change for pregnancy?

- Calories—increased by 340 to 450 kilocalories per day during the second and third trimesters
- Protein—increased to 71 grams per day
- Iron—increased by 9 milligrams per day (from 18 to 27 milligrams per day)
- Folate—increased by 200 micrograms per day (from 400 to 600 micrograms per day)

5. Is it okay for an infant to experience weight loss immediately after birth? If an infant does lose weight, does it mean he or she is at nutritional risk?

It is normal for infants to lose weight in the first few days of life. In fact, they may lose up to 6 percent of their weight. This does not necessarily mean that an infant is at nutritional risk. Infants typically regain their birth weight within 2 weeks.

7. How much water does a breastfed or formula-fed infant need each day?

Babies need approximately 0.7 liters of water each day in the first six months of life and 0.8 liters per day from age 7 months to 1 year. Breastfed and formula-fed infants do not need supplemental water; the breast milk and properly mixed formula provide enough water for adequate hydration until significant amounts of solid foods have been added to the diet.

9. Describe the process for introducing solid foods into an infant's diet.

Solid foods (anything other than breast milk or infant formula) should be introduced at about 6 months of age. Then new foods should be introduced one at a time to check for any allergies or intolerances. Most parents begin with infant rice cereal, mixed to a thin consistency with water, breast milk, or infant formula. After the infant is eating cereal several times a day, strained fruits and vegetables are introduced one at a time.

Chapter 17

1. Which vitamins and minerals are most likely to be deficient in a child's diet?

Iron, vitamin D, and vitamin E (if parents follow a low-fat diet), and possibly zinc.

3. What are typical nutritional concerns for adolescents?

As at earlier ages, calcium, iron, and vitamin A are the nutrients that often are lacking in adolescent diets. Other nutritional concerns include obesity and eating disorders. 5. Compared with a younger adult, does a person older than 65 need more, less, or about the same amount of protein?

Even though older adults may have less lean mass, protein recommendations (as grams per day) are the same for all healthy adults, regardless of their age. However, because of taste changes and other factors, some individuals find it difficult to meet their protein needs. Some chronically ill people need more protein to maintain nitrogen balance. In addition, trauma, stress, and infection increase protein needs.

7. Discuss minerals that may need special attention in assessment of an older adult's nutrition status.

Minerals of concern for elders include calcium, zinc, and magnesium. Calcium status is an important factor in the risk for osteoporosis. Marginal zinc deficiency has been suspected in many elders and may be the result of reduced intake of red meats.

9. What is the role of physical activity in osteoporosis prevention? What nutritional factors are important?

While inactivity increases osteoporosis risk, regular physical activity, especially weight-bearing exercise, helps prevent osteoporosis. An adequate intake of vitamin D and calcium helps slow the rate of bone loss in osteoporosis.

Chapter 18

1. What are the two main ways that pathogenic bacteria can cause foodborne illness?

Some types of pathogenic bacteria can directly infect a person who consumes contaminated food. Others may produce a toxin that can cause foodborne illness.

3. List four naturally occurring toxins.

- Aflatoxin, a fungus found on nuts and corn
- · Ciguatera and methyl mercury, found in seafood
- Toxins found in poisonous mushrooms
- Solanine, found in potatoes

5. What are some ways to keep food safe at home?

When trying to keep a kitchen safe from pathogenic microorganisms, you should:

- Make sure hands and kitchen surfaces are thoroughly clean.
- Keep raw meats and poultry separate from other raw foods to avoid cross-contamination.
- Use proper temperatures while cooking.
- Chill food properly.
- 7. What are scientists' major concerns about genetically engineered crops?

Concerns scientists have regarding genetically engineered crops are (1) GM crops will hurt innocent creatures, (2) GM crops will lead to the emergence of superweeds, or (3). the potential risk of introducing a new allergen into a GM food.

Chapter 19

1. What is the difference between food insecurity and hunger?

Food insecurity is the worry that one does not have the resources to obtain adequate food. Hunger is the physical sensation of unease or pain caused by a lack of food. Food insecurity can exist with or without hunger.

3. List four common nutritional deficiencies worldwide.

- Vitamin A
- lodine
- Iron
- Protein-energy malnutrition (PEM)
- 5. List some of the organizations and programs fighting hunger and food insecurity in the United States.
 - Supplemental Nutrition Assistance Program
 - National School Lunch Program
 - School Breakfast Program
 - Child and Adult Care Food Program
 - The Food Research and Action Center (FRAC)
 - Special Supplemental Nutrition Program for Women, Infants and Children (WIC)