# UNIT 2 Food in Your Life

<table>
<thead>
<tr>
<th>Title</th>
<th>Chapter Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHAPTER 5 Nutrients at Work</td>
<td>Identify the nutrients in foods and their main functions.</td>
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<tr>
<td></td>
<td>Describe the digestive process and its stages.</td>
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<td></td>
<td>Summarize the body’s absorption of nutrients.</td>
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<td></td>
<td>Describe how the body uses nutrients both now and later.</td>
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<td></td>
<td>Explain Basal Metabolic Rate and how it relates to calories.</td>
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<tr>
<td>CHAPTER 6 Carbohydrates</td>
<td>Identify the three types of carbohydrates.</td>
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<td></td>
<td>Explain how plants create carbohydrates.</td>
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<td></td>
<td>Identify and describe the forms that carbohydrates take in food.</td>
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<td></td>
<td>Explain how to meet the need for carbohydrates in a healthful diet.</td>
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<tr>
<td>CHAPTER 7 Proteins &amp; Fats</td>
<td>Explain protein, its structure, and its types.</td>
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<td></td>
<td>Identify the role of protein in a healthful diet.</td>
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<td></td>
<td>Explain lipids, their structure and their types.</td>
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<tr>
<td></td>
<td>Summarize the role of cholesterol in a healthful diet.</td>
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<tr>
<td>CHAPTER 8 Vitamins &amp; Minerals</td>
<td>Explain how vitamins work.</td>
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<tr>
<td></td>
<td>List the two types of vitamins and their functions.</td>
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<td></td>
<td>Explain minerals and describe their functions and types.</td>
</tr>
<tr>
<td>CHAPTER 9 Water &amp; Phytochemicals</td>
<td>List seven ways water is crucial to your body’s health.</td>
</tr>
<tr>
<td></td>
<td>Describe phytochemicals and five benefits they provide.</td>
</tr>
</tbody>
</table>

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**Teacher Wraparound Edition**

**Unit Resources**
- Unit Thematic Project Evaluation Rubrics

**Chapter Resources**
- Chapter Summaries
- Graphic Organizers

**Textbook Resources**
- Student Activity Workbook Teacher Annotated Edition
- Reteaching Activities
- Foods Lab Activities
- Enrichment Activities
- Food Science Experiments
- A Global Foods Tour
- World Atlas of Foods
- English Glossary
- Spanish Glosario

Link to the *Food For Today* Online Learning Center at glencoe.com.
Understanding Brackets, Letters, and Ability Levels in the Teacher Wraparound Edition

**Brackets** Brackets on the reduced student edition page correspond to teaching strategies and activities in the Teacher Wraparound Edition. As you teach the lesson, the brackets show you exactly where to use the activities.

**Letters** The letters on the reduced student edition page identify the type of strategy or activity.

**Ability Levels** Teaching Strategies that appear throughout the chapters have been identified by one of three codes to give you an idea of their suitability for students of varying learning styles and abilities.

**Resources** Key program resources are listed in each chapter. Icons indicate the format of resources.

### KEY TO LETTERS

- **D** Develop Concepts activities help teachers gauge and plan for students’ concept development.
- **R** Reading Strategy activities help you teach reading skills and vocabulary.
- **S** Skill Practice provides leveled instruction for meeting individual needs and learning styles.
- **W** Writing Support activities provide writing opportunities to help students comprehend the text.
- **C** Critical Thinking strategies help students apply and extend what they have learned.
- **U** Universal Access activities provide differentiated instruction for English language learners, and suggestions for teaching various types of learners.
- **N** No Child Left Behind activities help students practice and improve their abilities in academic subjects.

### KEY TO ABILITY LEVELS

- **L1** Strategies should be within the ability range of all students. Often full class participation is required.
- **L2** Strategies are for average to above-average students or for small groups. Some teacher direction is necessary.
- **L3** Strategies are designed for students able and willing to work independently. Minimal teacher direction is necessary.

### KEY TO RESOURCE ICONS

- 📚 Print Material
- 🎥 CD or DVD Resources
- 🌐 Online Learning Center (OLC)

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**MINI CLIP VIDEO LIBRARY**

Targeted professional development is correlated throughout Food for Today. The McGraw-Hill Professional Development Mini Clip Video Library provides teaching strategies to strengthen academic and learning skills. Log on to glencoe.com.

In this unit, you will find these Mini Clips:

- **Reading** Building Vocabulary, p. 59
- **ELL** Strategies for English Learners, p. 61
- **Math** Multiple Approaches to Problem Solving, p. 62
- **Reading** Differentiated Instruction, p. 64
- **ELL** Accessing Prior Knowledge, p. 66
- **Math** Communication in Mathematics, p. 69
- **ELL** Content Vocabulary, p. 77, p. 119
- **ELL** Vocabulary Activities, p. 81
- **Reading** Guided Instruction, p. 90
- **ELL** Collaborative Work, p. 92
- **ELL** Level 2 Proficiency, p. 102
- **Reading** During and After Reading, p. 106
- **Reading** On Workshops, p. 123
STANDARDS BASED LESSON PLANNING  

Food For Today provides students with instruction and assessment in the following fundamental content areas:

### National Standards Correlations

<table>
<thead>
<tr>
<th>Standards</th>
<th>Page</th>
<th>Standards</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.1 Analyze career paths within food science, food technology, dietetics, and nutrition industries.</td>
<td>90, 123</td>
<td>9.6 Demonstrate food science, dietetics, and nutrition management principles and practices.</td>
<td>98</td>
</tr>
<tr>
<td>9.3 Evaluate nutrition principles, food plans, preparation techniques and specialized dietary plans.</td>
<td>58-129</td>
<td>14.1 Analyze factors that influence nutrition and wellness practices across the life span.</td>
<td>104</td>
</tr>
<tr>
<td>9.4 Apply basic concepts of nutrition and nutritional therapy in a variety of settings.</td>
<td>58-129</td>
<td>14.2 Evaluate the nutritional needs of individuals and families in relation to health and wellness across the life span.</td>
<td>58-73</td>
</tr>
<tr>
<td>9.5 Demonstrate use of current technology in food product development and marketing.</td>
<td>70, 73, 82, 84, 96, 98, 112, 114, 124, 126</td>
<td>14.3 Evaluate various dietary guidelines in planning to meet nutrition and wellness needs.</td>
<td>61-63, 68-70, 72, 73</td>
</tr>
</tbody>
</table>

**Note:** See page TM29 for the complete text of the Standards.

### Academic Standards Correlations

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Standard</th>
<th>Feature/Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>English Language Arts</strong></td>
<td><strong>NCTE 4</strong> Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.</td>
<td><strong>Academic Skills</strong> p. 85</td>
</tr>
<tr>
<td></td>
<td><strong>NCTE 5</strong> Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes.</td>
<td><strong>Academic Skills</strong> p. 127</td>
</tr>
<tr>
<td></td>
<td><strong>NCTE 7</strong> Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience.</td>
<td><strong>Academic Skills</strong> p. 99</td>
</tr>
<tr>
<td></td>
<td><strong>NCTE 8</strong> Students use a variety of technological and informational resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge.</td>
<td><strong>Academic Skills</strong> p. 115</td>
</tr>
<tr>
<td></td>
<td><strong>NCTE 12</strong> Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information).</td>
<td><strong>Academic Skills</strong> p. 73</td>
</tr>
</tbody>
</table>
NO CHILD LEFT BEHIND  NCLB activities, information, and skills practice will help your students attain NCLB proficiency. Students will improve their abilities in the following academic standards areas:

### Academic Standards Correlations

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Standard</th>
<th>Feature/Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Math</strong></td>
<td><strong>Number and Operations</strong> Understand numbers, ways of representing numbers, relationships among numbers, and number systems.</td>
<td><strong>Academic Skills</strong> p. 115</td>
</tr>
<tr>
<td></td>
<td><strong>Number and Operations</strong> Understand the meanings of operations and how they relate to one another.</td>
<td><strong>Kitchen Math, Academic Skills</strong> p.119, p. 127</td>
</tr>
<tr>
<td></td>
<td><strong>Number and Operations</strong> Compute fluently and make reasonable estimates.</td>
<td><strong>Kitchen Math, Academic Skills</strong> p. 68</td>
</tr>
<tr>
<td></td>
<td><strong>Measurement</strong> Understand measurable attributes of objects and the units, systems, and processes of measurement.</td>
<td><strong>Kitchen Math, Academic Skills</strong> p. 94, p. 99</td>
</tr>
<tr>
<td></td>
<td><strong>Data Analysis and Probability</strong> Select and use appropriate statistical methods to analyze data.</td>
<td><strong>Academic Skills</strong> p. 85</td>
</tr>
<tr>
<td></td>
<td><strong>Problem Solving</strong> Apply and adapt a variety of appropriate strategies to solve problems.</td>
<td><strong>Academic Skills</strong> p. 73</td>
</tr>
<tr>
<td><strong>Science</strong></td>
<td><strong>Content Standard 1</strong> Students should develop an understanding of science unifying concepts and processes: systems, order, and organization; evidence, models, and explanation; change, constancy, and measurement; evolution and equilibrium; and form and function.</td>
<td><strong>Science in Action</strong> p. 77</td>
</tr>
<tr>
<td></td>
<td><strong>Content Standard A</strong> Students should develop abilities necessary to do scientific inquiry, understandings about scientific inquiry.</td>
<td><strong>Academic Skills, Science in Action</strong> p. 85, p. 92, p. 127</td>
</tr>
<tr>
<td></td>
<td><strong>Content Standard B</strong> Students should develop an understanding of the structure of atoms, structure and properties of matter, chemical reactions, motions and forces, conservation of energy and increase in disorder, and interactions of energy and matter.</td>
<td><strong>Academic Skills</strong> p. 73, p. 99</td>
</tr>
<tr>
<td></td>
<td><strong>Content Standard C</strong> Students should develop understanding of the cell; molecular basis of heredity; biological evolution; interdependence of organisms; matter, energy, and organization in living systems; and behavior of organisms.</td>
<td><strong>Academic Skills</strong> p. 115</td>
</tr>
<tr>
<td></td>
<td><strong>Content Standard G</strong> Students should develop understanding of science as a human endeavor, nature of scientific knowledge, historical perspectives.</td>
<td><strong>Technology for Tomorrow</strong> p. 109</td>
</tr>
<tr>
<td><strong>Social Studies</strong></td>
<td><strong>NCSS II F Time, Continuity, and Change</strong> Apply ideas, theories, and modes of historical inquiry to analyze historical and contemporary developments, and to inform and evaluate actions concerning public policy issues.</td>
<td><strong>Technology for Tomorrow</strong> p. 104</td>
</tr>
</tbody>
</table>

56D
Unit Overview
Introduce the Unit
Describe the main concepts of each chapter in the unit.

Unit 2
In this unit students will learn about nutrition. They will learn what the different nutrient types are and what they do for the body, and then they will explore each nutrient type in greater detail.

Chapter 5 explains how the nutrients in foods affect how we feel and function, and how our bodies use and absorb them.

Chapter 6 explores carbohydrates, the largest part of a healthy diet. Carbohydrates are the body's main source of energy, and come in three different types.

Chapter 7 addresses the role of proteins. Proteins help the body grow and repair itself. Lipids are essential to nutrition, and both are necessary parts of a healthy diet.

Chapter 8 discusses the value of vitamins and minerals, which help the body to be strong and healthy.

Chapter 9 discusses the role water plays as a nutrient that is needed to sustain life, as well as how phytochemicals benefit a body's health.

Activate Prior Knowledge
Explore the Photo
Eating a variety of foods will supply your body with the nutrients it needs. What kinds of foods do you typically eat?

Discussion
Discuss how aware students are of the nutrients in the food they eat. Do they look at nutrition information before selecting foods? Do they know how to find nutrition information for the foods they eat? (Packaged foods generally have a nutrition label that contains that information. For other foods, it is easy to locate the nutrition information on the Internet.)
Fast Food and Health
In this unit you will learn about nutrition. In your unit thematic project you identify your favorite fast foods, evaluate whether they provide appropriate nutrients, and determine more healthful options.

My Journal
Favorite Foods Write a journal entry about one of these topics. This will help you prepare for the unit project at the end of the unit.
- List ten of your favorite foods.
- Determine how many of your favorite foods are fast foods.
- Explain why you do or do not think your favorite foods are nutritionally good for you.

Discussion Starter
Necessary Components
On the board, list the various employees and participants in the school: the teachers, the administration, the maintenance staff, the volunteers, the students, and anyone else who contributes. Explain that all participants in the school are needed to make it run smoothly. Similarly, all of the nutrients are needed in sufficient amounts to make your body run smoothly.

FCCLA
Promote Nutrition
Student Body Use the FCCLA peer-education program Student Body to help capture student interest in promoting good nutrition with their friends. This program helps young people learn how to eat right, stay fit, and make healthy lifestyle choices. Begin with the Eat Right unit. Using the suggested activities and projects, students explore the benefits of good nutrition for controlling weight and feeling good. Locate the information and resources you will need for this program in the FCCLA program guide.

If class time is too short to cover all of the chapters in this unit, have students:
- Write down the key terms and their definitions.
- Read the chapter summaries at the beginning of each chapter review.
- Go to the Food For Today Online Learning Center at glencoe.com to download Study-to-Go content.
Chapter Overview
Introduce the Chapter
In this chapter, students learn how the nutrients in foods affect how we feel and function. Students explore the digestive process and examine how the body metabolizes nutrients to produce energy.

Build Background
Survey the class to find out what students know about the human digestive system and how it works. Ask students: What is digestion, and why is it important? Ask students to brainstorm three organs that are a part of the digestive system.

CHAPTER

5

Nutrients at Work

Foods That Help and Heal
What kind of food makes you feel better when you are mentally or physically drained? Why do you think this food makes you feel better? Is the food special to you for reasons other than taste? For ten minutes, write about this food and its effect on you, using details that help the reader see, smell, taste, and experience the food the way you do. Take time to be specific.

Writing Tips
Follow these steps to write using details:
- Avoid generalities. Be clear and specific.
- Use adjectives to help bring details to life.
- Include details that are relevant to the topic.

Activate Prior Knowledge
Explore the Photo
The foods we eat have a big impact on how we look, feel, and function in life. What foods make you feel strong and healthy?

Caption Answer
Answers will vary. Ask volunteers to share what they know about the nutritional benefits of the foods that have a positive effect on them.

Discussion
Can you think of a food that is a good source of energy? (Answers may include pasta, meat, energy bars, fruits, vegetables, and bread.)

Writing Activity
This writing activity prompts students to think about foods that make them feel strong. Encourage students to share their responses with the class. Have students write on this topic for 10 minutes. Encourage students to consider how the food looks, tastes, and smells. The details should help illustrate how a particular food can have a positive effect on their well-being.
**Academic Standards**

**English Language Arts**
NCTE 12 Use language to accomplish individual purposes.

**Mathematics**
NCTM Number and Operations Compute fluently and make reasonable estimates.
NCTM Problem Solving Apply and adapt a variety of appropriate strategies to solve problems.

**Science**
NSES B Develop an understanding of chemical reactions.
NCTE National Council of Teachers of English
NCTM National Council of Teachers of Mathematics
NSES National Science Education Standards

**Content Vocabulary**
You will find definitions for these words in the glossary at the back of this book.

- malnutrition
- anemia
- Dietary Reference Intake (DRI)
- Recommended Dietary Allowance (RDA)
- Adequate Intake (AI)
- digestion
- enzyme
- esophagus
- peristalsis
- chyme
- pancreas
- absorption
- villi
- glucose
- glycogen
- metabolism
- oxidation
- calorie
- basal metabolism

**Academic Vocabulary**
You will find these words in your reading and on your tests. Use the glossary to look up their definitions if necessary.

- maintain
- vital

**Graphic Organizer**
Use a graphic organizer like the one below to take notes about what happens during and after nutrient absorption.

<table>
<thead>
<tr>
<th>DURING NUTRIENT ABSORPTION</th>
<th>AFTER NUTRIENT ABSORPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Graphic Organizer** Go to this book’s Online Learning Center at glencoe.com to print out this graphic organizer.

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**Develop Concepts**

**Main Idea**
Ask students: When you see, smell, or even think about foods that you enjoy, how does the body react to set the digestive process in motion? What happens? Explain. (Answers will vary but may include that seeing, smelling, or thinking about foods you enjoy might make you salivate. Saliva prepares your body to digest food.)
The Nutrients in Foods

The nutrients in food keep your body healthy. Water is the most common nutrient in food. In fact, food can be up to 90 percent water. Carbohydrates (kar-bö-hdr-äts), fats, and proteins, make up the rest, along with a very small amount of vitamins, minerals, and phytochemicals (fi-tö-kem-i-kals), which help keep your body free of disease.

- **Carbohydrates** provide the body’s main source of energy.
- **Fats** provide a source of stored energy, as well as insulation for the body.
- **Proteins** help build, repair, and maintain, or preserve, body tissues.
- **Vitamins** help cells, tissues, and organs stay healthy.
- **Minerals** help the body work properly.
- **Water** helps with chemical reactions in the body and helps transport materials to and from cells.

Nutrients and Health

Different foods have different nutrients. Strawberries, for example, are rich in vitamin C but have almost no protein. The best way to get the nutrients you need is to choose a wide variety of healthful foods.

Unhealthy food choices or a lack of food can lead to **malnutrition**, poor nourishment resulting from a lack of nutrients. Shortages of specific vitamins and minerals can cause serious problems, too. People who do not eat enough iron, for example, may develop anemia. **Anemia** (ä-në-mé-a) is a blood disorder that causes lack of energy, weakness, shortness of breath, and cold hands and feet.

Another form of malnutrition is caused by overeating. Eating sugary, fatty foods instead of fruits, vegetables, and lean protein can lead to overweight.

Your health is influenced by your heredity, lifestyle, and food choices. Changing your lifestyle and your food choices can make a huge difference in your health. When you choose healthy habits and a nutritious diet, you can enjoy benefits such as:

- **Appearance** Good nutrition helps give you shiny hair, bright eyes, healthy nails and teeth, and smooth, clear skin.
- **Fitness** Good nutrition helps you stay energetic and alert throughout the day.
- **Weight** A healthy diet helps you reach and maintain a healthy weight.
- **Protection from Illness** Good nutrition helps your body defend against disease.
- **Healing** Nutrients help the body build new cells, repair breaks and sprains, and heal after illness or surgery.
- **Emotional Strength** Good nutrition helps your body and mind deal with stress.
- **Future health** Serious health problems, such as heart disease and some cancers, can result from poor eating habits. Good nutrition today can help you stay healthy as you grow older.

Nutrient Teamwork

Nutrients work together in your body. For example, proteins and minerals are both important for bone structure. Vitamin D helps your body absorb calcium. Nutrient teamwork means your body must have an adequate supply of all nutrients.
Nutrient Requirements

Everyone needs the same nutrients. However, different people need these nutrients in different amounts. For example, women and teenage boys need more iron than men. Nutrients are measured in the metric units of grams (g), milligrams (mg), and micrograms (μg).

To find out how much of each nutrient you need, consult a table of Dietary Reference Intakes. A Dietary Reference Intake (DRI) is the recommended daily amount of nutrients for people of a certain age and gender group.

The DRIs in Figure 5.1 show both Recommended Dietary Allowances and Adequate Intakes. A Recommended Dietary Allowance (RDA) is the amount of a nutrient needed by 98 percent of the people in a given age and gender group. An Adequate Intake (AI) is a nutrient standard that is used when a lack of scientific information makes it impossible to establish the RDA for a particular nutrient. DRIs include RDAs and AIs and are updated periodically.

Dietitians, nutritionists, and other health professionals use DRIs to shape nutrition policy and develop educational programs. The food industry also uses DRIs for product development.

Daily Values

The U.S. Food and Drug Administration (FDA) uses DRIs as the basis for Daily Values. Daily Values (DVs) are the nutrition standards used on nutrition labels. They are based on averages for all adults. Figure 5.2 shows the Daily Values in use today.

Identify

You can consult a table of Dietary Reference Intakes (DRI) for the recommended daily amount of nutrients for your age range and gender.

Caption Answer

healthy appearance and weight, fitness, the ability to heal, emotional strength and resiliency, and a greater likelihood of future health

Discussion

Ask students: How much physical activity do you need? How much physical activity do you get? (Students typically need about one hour of exercise every day.)
Necessary Nutrients

Making sure your daily meals include choices that meet all the amounts listed below will help you as you grow. Why do you need more nutrients as you move from ages 9–13 to ages 14–18?

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Males 9–13</th>
<th>Males 14–18</th>
<th>Females 9–13</th>
<th>Females 14–18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
<td>34 g</td>
<td>52 g</td>
<td>34 g</td>
<td>46 g</td>
</tr>
<tr>
<td>Carbohydrate (total)</td>
<td>130 g</td>
<td>130 g</td>
<td>130 g</td>
<td>130 g</td>
</tr>
<tr>
<td>Dietary fiber</td>
<td>31 g</td>
<td>38 g</td>
<td>26 g</td>
<td>26 g</td>
</tr>
<tr>
<td>Fat (total)</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Saturated fat</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Linoleic Acid</td>
<td>12 g</td>
<td>16 g</td>
<td>10 g</td>
<td>12 g</td>
</tr>
<tr>
<td>α-Linoleic Acid</td>
<td>1.2 g</td>
<td>1.6 g</td>
<td>1.0 g</td>
<td>1.1 g</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>600 μg RAE</td>
<td>900 μg RAE</td>
<td>600 μg RAE</td>
<td>700 μg RAE</td>
</tr>
<tr>
<td>Thiamin</td>
<td>0.9 mg</td>
<td>1.2 mg</td>
<td>0.9 mg</td>
<td>1.0 mg</td>
</tr>
<tr>
<td>Riboflavin</td>
<td>0.9 mg</td>
<td>1.3 mg</td>
<td>0.9 mg</td>
<td>1.0 mg</td>
</tr>
<tr>
<td>Niacin</td>
<td>12 mg NE</td>
<td>16 mg NE</td>
<td>12 mg NE</td>
<td>14 mg NE</td>
</tr>
<tr>
<td>Vitamin B₆</td>
<td>1.0 mg</td>
<td>1.3 mg</td>
<td>1.0 mg</td>
<td>1.2 mg</td>
</tr>
<tr>
<td>Vitamin B₁₂</td>
<td>1.8 μg</td>
<td>2.4 μg</td>
<td>1.8 μg</td>
<td>2.4 μg</td>
</tr>
<tr>
<td>Folate</td>
<td>300 μg DFE</td>
<td>400 μg DFE</td>
<td>300 μg DFE</td>
<td>400 μg DFE</td>
</tr>
<tr>
<td>Biotin</td>
<td>20 μg</td>
<td>25 μg</td>
<td>20 μg</td>
<td>25 μg</td>
</tr>
<tr>
<td>Pantothenic acid</td>
<td>4 mg</td>
<td>5 mg</td>
<td>4 mg</td>
<td>5 mg</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>45 mg</td>
<td>75 mg</td>
<td>45 mg</td>
<td>65 mg</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>5 μg</td>
<td>5 μg</td>
<td>5 μg</td>
<td>5 μg</td>
</tr>
<tr>
<td>Vitamin E</td>
<td>11 mg α-TE</td>
<td>15 mg α-TE</td>
<td>11 mg α-TE</td>
<td>15 mg α-TE</td>
</tr>
<tr>
<td>Vitamin K</td>
<td>60 μg</td>
<td>75 μg</td>
<td>60 μg</td>
<td>75 μg</td>
</tr>
<tr>
<td>Calcium</td>
<td>1,300 mg</td>
<td>1,300 mg</td>
<td>1,300 mg</td>
<td>1,300 mg</td>
</tr>
<tr>
<td>Copper</td>
<td>700 μg</td>
<td>890 μg</td>
<td>700 μg</td>
<td>890 μg</td>
</tr>
<tr>
<td>Iodine</td>
<td>120 μg</td>
<td>150 μg</td>
<td>120 μg</td>
<td>150 μg</td>
</tr>
<tr>
<td>Iron</td>
<td>8 mg</td>
<td>11 mg</td>
<td>8 mg</td>
<td>13 mg</td>
</tr>
<tr>
<td>Magnesium</td>
<td>240 mg</td>
<td>410 mg</td>
<td>240 mg</td>
<td>360 mg</td>
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<tr>
<td>Phosphorus</td>
<td>1,250 mg</td>
<td>1,250 mg</td>
<td>1,250 mg</td>
<td>1,250 mg</td>
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<tr>
<td>Potassium</td>
<td>4.5 g</td>
<td>4.7 g</td>
<td>4.5 g</td>
<td>4.7 g</td>
</tr>
<tr>
<td>Selenium</td>
<td>40 μg</td>
<td>55 μg</td>
<td>40 μg</td>
<td>55 μg</td>
</tr>
<tr>
<td>Sodium</td>
<td>1.5 g</td>
<td>1.5 g</td>
<td>1.5 g</td>
<td>1.5 g</td>
</tr>
<tr>
<td>Zinc</td>
<td>8 mg</td>
<td>11 mg</td>
<td>8 mg</td>
<td>9 mg</td>
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</table>

*No value established

Key To Nutrient Measures

- g gram
- mg milligram (1,000 mg = 1 g)
- μg microgram (1,000 μg = 1 mg; 1,000,000 μg = 1 g)
- RAE retinol activity equivalents (a measure of Vitamin A activity)
- NE niacin equivalents (a measure of niacin activity)
- DFE dietary folate equivalents (a measure of folate activity)
- α-TE alpha-tocopherol equivalents (a measure of Vitamin E activity)

Source: The National Academies; Institute of Medicine; Board of Nutrition
**One Size Does Not Fit All**

The values used for nutrition labels are based on the nutrients necessary for adults. **What does this mean for teenagers?**

<table>
<thead>
<tr>
<th>Nutrient</th>
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<tr>
<td>Protein</td>
<td>50 g*</td>
</tr>
<tr>
<td>Carbohydrate (total)</td>
<td>300 g*</td>
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<tr>
<td>Dietary fiber</td>
<td>25 g</td>
</tr>
<tr>
<td>Fat (total)</td>
<td>65 g*</td>
</tr>
<tr>
<td>Saturated fat</td>
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</tr>
<tr>
<td>Cholesterol</td>
<td>300 mg</td>
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<tr>
<td>Vitamin A</td>
<td>5,000 IU (875 μg RAE)</td>
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<tr>
<td>Thiamin</td>
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</tr>
<tr>
<td>Riboflavin</td>
<td>1.7 mg</td>
</tr>
<tr>
<td>Niacin</td>
<td>20 mg NE</td>
</tr>
<tr>
<td>Vitamin B6</td>
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<tr>
<td>Vitamin B12</td>
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<tr>
<td>Folate</td>
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</tr>
<tr>
<td>Biotin</td>
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<tr>
<td>Pantothenic acid</td>
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<td>Vitamin C</td>
<td>60 mg</td>
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<tr>
<td>Vitamin D</td>
<td>400 IU (6.5 μg)</td>
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<tr>
<td>Vitamin E</td>
<td>30 IU (9 mg α-TE)</td>
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<tr>
<td>Vitamin K</td>
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<td>Calcium</td>
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<td>Copper</td>
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<td>Iodine</td>
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<td>Magnesium</td>
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<td>Sodium</td>
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<tr>
<td>Zinc</td>
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</tbody>
</table>

*Based on a diet of 2,000 calories per day

**Key To Nutrient Measures**

- **g** gram
- **mg** milligram (1,000 mg = 1 g)
- **μg** microgram (1,000 μg = 1 mg; 1,000,000 μg = 1 g)
- **IU** International Unit (an old measure of vitamin activity)
- **RAE** retinol activity equivalents (a measure of Vitamin A activity)
- **NE** niacin equivalents (a measure of niacin activity)
- **α-TE** alpha-tocopherol equivalents (a measure of Vitamin E activity)

Source: U.S. Food and Drug Administration

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**Universal Access**

**Logical/Math Learners**

**Arrange by Value**

Have students refer to Figure 5.2 to find the recommended Daily Values for an adult for the following vitamins: B6, B12, C, D, E, and K. Then have students list the nutrients in ascending order, based on their daily values. Ask students: What nutrient has the highest Daily Value? What nutrient has the lowest Daily Value?
Unlocking Nutrients Many organs are involved in the complex process of digestion. What happens to food as it passes through each stage in digestion?

**Figure 5.3** The Digestive System

**Caption Answer** Enzymes in saliva break food down. The esophagus moves food to the stomach, where food is further broken down into chyme. Absorption of nutrients takes place in the small intestine. Waste matter passes into the large intestine (colon), where waste is removed.

**Discussion** What is in saliva that helps change carbohydrates into sugars? (Saliva includes an enzyme that helps break down food.)

---

**Reading Strategy** Create a Handout. Pair students. Assign each pair of students to research an organ in the digestive system. Have students find the functions of their organ and how it works in tandem with the other organs in the digestive process. Have each pair create a one-page handout about their organ and its functions in the digestive process. Encourage students to use art and words. Make copies of the handouts to distribute to the class. As a class, discuss the stages food passes through before your body can turn it into energy. Have each pair discuss their organ’s role in the process. (Handouts will vary but should describe the functions of the organ. Handouts can be used to create a study booklet on the entire digestive system.)
The Digestive Process

Before your body can turn food into energy, it has to digest the food. **Digestion** is the mechanical and chemical process of breaking down food and changing nutrients into forms your body can use. Digestion takes place in the digestive tract, a flexible tube about 26 feet long. Your digestive tract extends from your mouth to your rectum (rek-t`m). Figure 5.3 shows the major parts of the digestive system.

**The Eyes**

You eat with your eyes first. How? The sight and aroma of food starts saliva flowing in your mouth—your mouth “waters.” Saliva is an important ingredient in digestion. This is why experienced cooks try to make the food they serve look as attractive as possible.

**The Mouth**

Digestion begins in the mouth. As you chew, your teeth grind food into smaller pieces that are easier to swallow and digest. This is the mechanical part of digestion. Chewing also increases the surface area of food, creating more space for chemical reactions to occur.

Try to chew solid food to the size and texture of applesauce. Your stomach cannot digest larger pieces of food completely, and you may miss out on nutrients.

The chemical part of digestion begins when saliva is released in the mouth. Saliva contains the enzyme **ptyalin** (t$-`-l`n), which helps to break food down. An **enzyme** is a special protein that helps a chemical reaction take place. The ptyalin in saliva helps change carbohydrates into sugars.

Saliva also helps you taste food. Taste buds on the tongue can identify four general flavors: salty, bitter, sour, and sweet. Some researchers also list a savory fifth flavor, called umami (u-'ma-mé). The taste buds need saliva to work well. The smell of food also helps your sense of taste. That is why food seems to have less flavor when you have a stuffy nose.

Digestion begins when we see, smell, or even think about tasty food. Making food appetizing helps the digestive process.
The Esophagus

Once you swallow food, it passes into the esophagus (i-sah-fa-gus), the part of the digestive tract that connects the mouth and the stomach. Food moves through the esophagus by peristalsis (per-ah-sto-las), rhythmic movements of muscles. The muscles of the esophagus contract and relax, forcing food into the stomach, as shown in Figure 5.4. A valve at the end of the esophagus closes to prevent food from moving back to the mouth.

The Stomach

The stomach is a muscular pouch just below the rib cage. It can hold up to six cups of food. The stomach produces gastric juices—acids and enzymes that help food break down chemically. It is lined with mucus, which protects it from damage by acids. Carbohydrates begin to break down in the mouth, but proteins and fats begin to break down in the stomach.

The stomach also breaks food down mechanically through peristalsis. The churned food turns into a thick liquid called chyme (kim).

Different foods take different amounts of time to break down and leave the stomach. Carbohydrates usually take one to two hours. Proteins take about three to five hours. Fats take up to 12 hours to break down and leave the stomach.

The Small Intestine

From the stomach, food moves a little at a time into the small intestine. The small intestine is a narrow, winding tube that connects the stomach with the large intestine. Three types of digestive juices help to break down carbohydrates, proteins, and fats in the small intestine.

- Bile Bile helps the body digest and absorb fats. Bile is produced in the liver and stored in the gall bladder until needed.
- Pancreatic juice Pancreatic (pan-kras-tik) juice is a mixture of enzymes made by the pancreas (pan-kras), a gland connected to the small intestine.
- Intestinal juice This works with other juices to break down food. Intestinal juice is produced in the small intestine itself.

Describe What is saliva’s role in the digestion process?
Absorption of Nutrients

Once food is broken down, the body needs to absorb it. **Absorption** is the process by which nutrients move into the bloodstream. Most absorption takes place in the small intestine.

The inner wall of the small intestine has folds covered with billions of tiny, fingerlike projections called **villi** (vi-li). The villi increase the surface area of the intestine so that it can absorb more nutrients. Although the small intestine is only about 20 feet long, its surface area is as big as a tennis court (see Figure 5.5).

After absorption, waste material, including dietary fiber, is left in the small intestine. Fiber helps with digestion and absorption but cannot be digested. Waste moves into the large intestine, also called the colon. The colon removes water, potassium, and sodium from the waste. The remainder is stored in the rectum, the lower part of the large intestine, until elimination.

**Nutrient Transportation and Storage**

After nutrients are absorbed by the villi of the small intestine, they are carried to the liver through a blood vessel called the portal vein. One of the liver’s many jobs is to turn nutrients into forms the body can use.

When carbohydrates are fully broken down, they become a simple sugar called **glucose** (gli-kö), or blood sugar, which is the body’s basic fuel. Fats are changed into fatty acids. Proteins are broken down into amino acids. Vitamins, minerals, water, and phytochemicals, however, do not break down. Your body can use them without changing their form.

The bloodstream carries nutrients to individual cells, where they are put to work.

Some nutrients can be stored for future use. For example, the liver converts extra glucose into **glycogen** (gli-ka-jen), a storage form of glucose. If your body has more glucose than it can store as glycogen, it converts the excess glucose to body fat. Your body also converts excess fatty acids and amino acids into body fat. Fats are your body’s energy reserve.

Your body also stores minerals and vitamins. For example, iron is stored in the liver and in bone marrow. Some vitamins, such as vitamins A and E, are stored in the liver and in body fat. Other vitamins, such as vitamin C and the B vitamins, cannot be stored. If these vitamins are not needed right away, they leave the body in the urine.

**Universal Access**

**List** Three useful nutrients the colon removes from waste are water, potassium, and sodium.

**Reading Check**

**List** What three useful nutrients does the colon remove from waste?

**Universal Access**

**List** Three useful nutrients the colon removes from waste are water, potassium, and sodium.

**Reading Check**

**List** What three useful nutrients does the colon remove from waste?
Metabolism

Nutrients are *vital*, or necessary, for metabolism. *Metabolism* (ma-ˈta-bə-liz-əm) is the use of nutrients to provide energy.

During metabolism, glucose in the cells combines with oxygen to produce energy and heat. A chemical reaction like this, in which molecules combine with oxygen, is called *oxidation* (ak-sā-ˈda-shən). When wood burns, it oxidizes and produces light and heat.

Energy is measured in units called kilocalories (ˈkəl-ərēz), better known as calories. A *calorie* is the amount of energy needed to raise the temperature of 1 kilogram of water (about 2 cups) by 1 degree Celsius. In the metric system, energy is measured in kilojoules (KJ). Calories measure the energy in food and the energy used by the body for activities.

**Basal Metabolism**

Your body uses energy for automatic processes as well as for physical activities. Automatic processes include breathing, digesting food, and building and repairing tissue. Because these processes go on 24 hours a day, your body uses small amounts of energy even when you are sleeping. The energy you need to maintain automatic processes is called *basal metabolism* (bā-sal ma-ˈta-bə-liz-əm).

The amount of energy your body uses for basal metabolism is called basal metabolic rate, or BMR. BMR varies greatly from person to person. Your body uses about two-thirds of the calories you consume for basal metabolism.

**Energy Requirements**

Different foods have different amounts of calories, depending on the amount of carbohydrates, protein, and fat in each. Most foods have a combination of all three.

- There are four calories in one gram of pure carbohydrates. Carbohydrates are the body’s first source of energy.
- There are four calories in one gram of protein. The body uses protein to build and maintain bones and muscles.

**Calculation of Calories**

Calories can be measured in three ways:

- A chemical reaction occurs when food is burned.
- Oxidized glucose is consumed.
- Calories burned describes the process within your body that happens when calories are burned as fuel.

Energy is measured in units called kilocalories (kcal), better known as calories. A calorie is the amount of energy that is created from oxidized glucose.

Basal Metabolism

Your body uses energy for automatic processes as well as for physical activities. Automatic processes include breathing, digesting food, and building and repairing tissue. Because these processes go on 24 hours a day, your body uses small amounts of energy even when you are sleeping. The energy you need to maintain automatic processes is called basal metabolism.

The amount of energy your body uses for basal metabolism is called basal metabolic rate, or BMR. BMR varies greatly from person to person. Your body uses about two-thirds of the calories you consume for basal metabolism.

**Energy Requirements**

Different foods have different amounts of calories, depending on the amount of carbohydrates, protein, and fat in each. Most foods have a combination of all three.

- There are four calories in one gram of pure carbohydrates. Carbohydrates are the body’s first source of energy.
- There are four calories in one gram of protein. The body uses protein to build and maintain bones and muscles.

**Calculate Calories**

For lunch, Maria is making a ground turkey burger as a low-fat alternative to a beef burger. The ground turkey has 15 grams of protein, 7 grams of fat, and no carbohydrates. The burger bun has 4 grams of protein, 2 grams of fat and 21 grams of carbohydrates. The mayonnaise and mustard have 2 grams of fat and no protein or carbohydrates. Maria prepares baked sweet potato fries, which have 2 grams of protein, 4 grams of fat, and 23 grams of carbohydrates. How many calories does Maria’s lunch contain?

**Starting Hint** Remember that one gram of carbohydrates, protein, or fat does not equal one calorie. One gram of protein or carbohydrates has four calories. One gram of fat has nine calories. Use multiplication to convert the grams of protein, fat, and carbohydrate into calories. Add these numbers together to find out how many total calories are in this meal.

**Math Concept** Multi-Step Problems This is a multi-step problem since you have to make more than one calculation. Think through each step before beginning.

**Math Appendix** For math help, go to the Math Appendix at the back of the book.

**NCTM Number and Operations** Compute fluently and make reasonable estimates.

- There are nine calories in one gram of fat. Fat is stored in the body as a means of stored energy.
- How many calories should you eat each day? That depends on your BMR, as well as your age, weight, gender and activity level. Here are some guidelines:
  - Teen males, many active men, and some very active women need 2,800 calories per day.
  - Older children, teen females, active women, and most men need 2,200 calories per day. Women who are pregnant or breast-feeding may need more.
  - Younger children, women and most older adults need 1,600 calories per day.
- If you are still growing, you need more calories to build muscles and bones. You also need more calories if you are physically active. The

**Kitchen Math**

Answer Maria’s lunch contains 395 calories. There are 4 calories in each gram of protein or carbohydrates and 9 calories in each gram of fat. The total number of protein grams in the meal is 21 (15 in the turkey, 4 in the bun, and 2 in the fries). The total number of carbohydrate grams in the meal is 44 (21 in the bun and 23 in the fries). The total number of fat grams in the meal is 15 (7 in the turkey, 2 in the bun, 2 in the mayonnaise and 4 in the fries.) The total protein calories (21 × 4) plus the total carbohydrate calories (44 × 4) plus the total fat calories (15 × 9) equal 395 calories or $84 + 176 + 135 = 395$. 

**Chapter 5**

**Reteach**

---

**Writing Support**

**Write Using Details**

Evaluate Metabolism After students read the section about metabolism, ask them to close their books and write a paragraph that explains metabolism. Ask students: How does your metabolism relate to calories? (Answers should explain that metabolism describes the process within your body that happens when calories are burned as fuel.)

**Reading Strategy**

**Reading Food Labels** Ask students: What is in the foods you eat? Do you read food labels to find the amount of carbohydrates, protein, and fat in a food? Bring in labels from popular packaged snack foods. Using a pie chart, have students present the nutrition information for the food’s fat, protein, and carbohydrates to the class. (Pie charts will vary depending on the food but should show the percentages of fat, protein, and carbohydrates in one serving. Encourage students to review the number of calories in each nutrient before making their calculations. Students should also share the total number of calories in one serving of their product.)
How to

Calculate Your BMR

Use this formula to calculate your basal metabolic rate, the amount of energy your body uses for automatic metabolic processes.

**Reference**

<table>
<thead>
<tr>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMR = 655 + (4.35 × weight in pounds) + (4.7 × height in inches) − (4.7 × age in years)</td>
<td>BMR = 66 + (6.23 × weight in pounds) + (12.7 × height in inches) − (6.8 × age in year)</td>
</tr>
</tbody>
</table>

1. Have a partner use measuring tape to determine your height.

2. Use a scale to determine your weight. Remove heavy shoes and jackets to get an accurate measurement.

3. Complete the first part of the equation.
   - **Female**: 655 + (4.35 × weight in pounds) + (4.7 × height in inches)
   - **Male**: 66 + (6.23 × weight in pounds) + (12.7 × height in inches)

4. Complete the second part of the equation.
   - **Female**: (4.7 × age in years)
   - **Male**: (6.8 × age in years)

5. Subtract the number you calculated in Step 4 from the number you calculated in Step 3. This is your BMR.

---

**Critical Thinking**

**Expending Energy**

Ask students: If you are sick or stressed, how might this affect your BMR? Why? Have students write one paragraph in response to these questions.

(Responses will vary, but students may say that the body uses energy for automatic processes such as breathing, digesting, and building and repairing tissues, as well as for physical activity. Just as the BMR is higher when physical activity is increased, the BMR may also increase if the body requires more energy to work harder when you are stressed or sick.)

**Universal Access**

**Math/Logical Learners**

Arrange by Weight

Have students refer to the How To feature to find the BMR for the following four people: Greg, 150 pounds, 5’6”, age 21; Dionne, 125 pounds, 5’7”, age 36; Cody, 170 pounds, 5’9”, age 16; and Sara, 115 pounds, 5’4”, age 15. Have them make a list to arrange the BMRs in ascending order. Then have students plot their findings using a line chart.

(Greg, 1693.5; Dionne, 1336.4; Cody 1889.9; and Sara 1377.9. Students should be able to explain their answers.)

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**Mini Clip**

**Math: Communication in Mathematics**

Bea Moore-Harris explains the importance of student communication in the mathematics classroom.
U.S. Department of Agriculture recommends daily calorie amounts. Increased muscle mass means an increased BMR so weight-bearing muscle building exercise along with aerobic exercise raise your BMR. Some Olympic-level athletes need as many as 12,000 calories per day.

### Recommended Sources of Calories

Most of your calories should come from carbohydrates. Limit fat to about a third of your daily calories. As little as 10 percent can come from protein. Adults need slightly more protein and less fat than teens.

- Teens need 45–65% of their calories from carbohydrates, 10–30% from protein and 25–35% from fats.
- Adults need 45–65% of their calories from carbohydrates, 10–35% from protein and 20–35% from fats.

### Giving Your Body What It Needs

Your body has an amazing ability to use the nutrients in food. Help your body stay healthy by choosing a balanced diet that meets all your nutritional needs. Learning about the nutrients in different foods will help you make smart food choices. Learning what foods are high in protein, fat, and carbohydrates will help you make balanced meals even when time is short.

### Trail Mix

**Ingredients**
- 1 cup Any whole grain cereal
- ¼ cup Raisins
- ½ cup Roasted peanuts
- ¼ cup Sunflower seeds
- ¼ cup Dried cranberries
- ¼ cup Chocolate chips

Yield: 4 servings, 3/4 cup each

**Directions**
1. Combine all ingredients and mix in a large bowl.
2. Store in an airtight container.

**Nutrition Analysis per Serving**
- Calories 357
- Total fat 18 g
- Saturated fat 4 g
- Cholesterol 0 mg
- Sodium 57 mg
- Carbohydrate 49 g
- Dietary fiber 5 g
- Sugars 31 g
- Protein 9 g

**Recipe Prep Tip**
This recipe can be made with virtually any nut and any dried fruit. You can even substitute the chocolate chips with peanut butter or butterscotch chips.
CHAPTER 5
Review & Applications

After You Read

Chapter Summary

Food contains nutrients that benefit the body in many ways. Some nutrients work together. While everyone needs the same nutrients, different people require different amounts. The body must digest food before it can use nutrients. Digestion involves the eyes, mouth, esophagus, stomach, and small intestine. Both the small and large intestine are involved in nutrient absorption. The body uses some nutrients right away, and stores others. The body metabolizes nutrients to provide energy. It is important to obtain calories from good sources and eat a balanced diet that meets nutritional needs.

Content and Academic Vocabulary Review

1. Use each of these content and academic vocabulary words in a sentence.

Content Vocabulary
- malnutrition (p. 60)
- anemia (p. 60)
- Dietary Reference Intake (DRI) (p. 61)
- Recommended Dietary Allowance (RDA) (p. 61)
- Adequate Intake (AI) (p. 61)
- digestion (p. 65)
- enzyme (p. 65)
- esophagus (p. 66)
- peristalsis (p. 66)
- chyme (p. 66)
- pancreas (p. 66)
- absorption (p. 67)
- villi (p. 67)
- glucose (p. 67)
- glycogen (p. 67)
- metabolism (p. 68)
- oxidation (p. 68)
- calorie (p. 68)
- basal metabolism (p. 68)

Academic Vocabulary
- maintain (p. 60)
- vital (p. 68)

Review Key Concepts

2. Identify the nutrients in foods and their main functions.
3. Describe the digestive process and its stages.
4. Summarize the body’s absorption of nutrients.
5. Describe how the body uses nutrients both now and later.
6. Explain Basal Metabolic Rate and how it relates to calories.

Critical Thinking

7. Explain how eating the same healthful foods every day could harm your health.
8. Predict what will happen. Brian’s mom serves an unappetizing dinner. The food is a strange color and gives off a foul odor.
9. Solve Lorenzo’s dilemma. Lorenzo is overweight and unable to lose weight even though he has been eating less. What might Lorenzo be missing?
10. Explain why Rose feels hungry all the time. Rose, who is sixteen, eats breakfast, lunch, and dinner with her mom. Rose and her mom are the same height even though he has been eating less. What might Lorenzo be missing?

5. Once nutrients are absorbed by the villi of the small intestine, the portal vein carries them to the liver, which turns them into forms the body can use. Carbohydrates turn into glucose. Proteins become amino acids. Vitamins, minerals, water, and phytochemicals do not change. Blood carries nutrients to individual cells. Some nutrients are stored for later use. Not all nutrients can be stored.

6. Basal Metabolic Rate is the energy a person needs to operate automatic body functions, like breathing, digesting food, and building and repairing tissue. The energy is measured in calories. A calorie is the amount of energy it takes to raise the temperature of a kilogram of water by one degree Celsius.

Critical Thinking

7. Because different foods have different nutrients, and because some nutrients depend on each other in order to function optimally, it is important to eat a varied diet. Eating the same foods every day, even if they are healthful, can adversely affect health because they probably will not contain all the nutrients the body needs.
8. You eat with your eyes first. Because this meal is so unappealing, Brian may not digest his food well.

9. Lorenzo may be consuming too many carbohydrates and more calories than he needs. When carbohydrates are broken down, they become glucose. Extra glucose becomes stored as glycogen. If the body has more glucose than can be stored as glycogen, it becomes fat.

10. Rose is a teen and is still growing. Even though she and her mom are the same size and weight now, Rose requires more calories than her mom to build her muscles and bones. This is why age is a factor in calculating BMR.

11. Answers will vary. Students should support their answers with logical reasons. Some may note that it is easy to meet nutrient needs from readily available foods, because many of the foods that provide a nutrient are tasty, easy to use in a variety of ways, and affordable.

12. Paragraphs will vary but should emphasize that Beatrix needs to eat a more nutritious and varied diet, because nutrients help the body build new cells, repair breaks and sprains, and heal after illness or surgery. She could try adding nutritious additions to her comfort foods, such as fresh vegetable pizza toppings or fresh fruits in the milkshakes. She could also replace them altogether with better choices.

13. Students’ findings will vary. For example, peppermint tea is one purported digestive aid that works by promoting the production of digestive juices if consumed before a meal, or by relaxing and soothing the stomach after a meal. Bromelin capsules, made from pineapple, help people with too much stomach acid.

14. A Smart Start Each day, breakfast is the body’s first chance to absorb a variety of useful nutrients, yet many people skip it. Brainstorm and write a menu for a week’s worth of quick and convenient breakfasts, each one providing a different combination of nutrients. Note some of the nutrients that are provided by each breakfast.

15. An In-Depth Look Follow your teacher’s instructions to get into groups. Select one nutrient to focus on. Work together to research the sources and benefits of the nutrient, as well as signs of its deficiency. Collaboratively create a poster board display that will educate others about the nutrient.

16. Compare Vitamin Costs Brenda wishes to supplement her regular diet with multivitamin pills, and is deciding between two competing products. Product A comes in a 120-pill bottle and directs that three pills be taken per day. Product B, which requires only one pill per day, comes in a 45-pill bottle. If both products cost $9.00 and provide the same amount of vitamins when taken according to directions, which is the better buy?
Academic Skills

Food Science

17. Enzymes Aid Digestion Enzymes break down foods into smaller nutrients for absorption. As an example of enzyme action, observe how the enzyme in fresh pineapple (bromelin) breaks down the protein gelatin.

Procedure Prepare 2 small boxes of gelatin dessert, following the directions on the package. Add canned pineapple chunks to the first batch, and fresh pineapple chunks to the second batch. Chill overnight.

Analysis Describe the two gelatins. Explain your results, addressing the difference between the fresh versus canned pineapple.

Mathematics

18. Translate Calories into Grams Dylan, a healthy and active teen male, has determined that he needs 2,800 calories each day. His goal is to limit his daily fat intake to 30 percent of his daily calories, while consuming 55 percent of his calories as carbohydrates and 15 percent as protein. How many grams of fat, carbohydrates, and protein does Dylan need each day?

Math Concept Find the Percent of a Number
To find a percent of a given number, change the percent to a decimal by removing the percent sign and moving the decimal point two places to the left. Multiply this decimal by the number.

Starting Hint Determine the total calories for each nutrient by performing the percent calculations. Divide each total by the number of calories per gram.

English Language Arts

19. Write a Letter Imagine you have a relative who is so concerned about her weight that she has changed her diet and refuses to eat anything but popcorn, crackers, and fruit. Write a letter to her that explains why she must change her diet, and offers specific suggestions for how she can. Offer better ideas on how to control her weight while still getting proper nutrition. Explain to your relative that she needs carbohydrates, proteins, and fats. Tell her how many calories she needs to eat per day and explain how her body uses a minimum number of calories to carry out basic functions.

STANDARDIZED TEST PRACTICE

TRUE OR FALSE

Re-read the paragraph about the esophagus on page 66. Determine whether the following statement is true or false.

20. The muscles of the esophagus force food into the intestine by contracting and relaxing.

a. true
b. false

Test-Taking Tip Before deciding whether a statement is true or false, carefully read the text to which it relates. Then slowly review both the statement and the text again. Pay close attention to words. One word can make the difference between a true statement and a false one.

Financial Literacy Skills

16. Product B is the better buy, since it provides a 45-day supply for $9.00. Product A requires three pills per day, so it provides a 120 ÷ 3 = 40-day supply for the same price.

Academic Skills

Food Science

17. Students should find that the enzyme bromelin is active in the fresh pineapple and breaks down the gelatin proteins, preventing solidification. The process of canning breaks down this enzyme.

Mathematics

18. 93.3 g of fat, 385 g of carbohydrates, and 105 g of protein. Dylan wishes to consume 0.3 × 2,800 = 840 calories per day of fat, 0.55 × 2,800 = 1,540 calories per day of carbohydrates, and 0.15 × 2,800 = 420 calories per day of protein. Since there are 9 calories per gram of fat, his total fat consumption should not exceed 840 ÷ 9 = 93.3 grams. There are 4 calories per gram of carbohydrate, so he should consume 1,540 ÷ 4 = 385 grams of carbohydrates per day. There are 4 calories per gram of protein, so his daily protein intake should be 420 ÷ 4 = 105 grams.

English Language Arts

19. Letters must note that the recipient must change her diet or risk malnutrition. In addition, letters may point out that by calculating BMR, the recipient can know how many calories she requires to maintain health.